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A STUDY OF ACHIEVEMENT OF ABOVE AVERAGE STUDENTS IN A MULTI-GRADED CLASSROOM
(TITLE)

BY

TERRIL J. WALKER

PLAN B PAPER

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR
THE DEGREE MASTER OF SCIENCE IN EDUCATION
AND PREPARED IN COURSE

583

IN THE GRADUATE SCHOOL, EASTERN ILLINOIS UNIVERSITY,
CHARLESTON, ILLINOIS

1968
YEAR

I HEREBY RECOMMEND THIS PLAN B PAPER BE ACCEPTED AS
FULFILLING THIS PART OF THE DEGREE, M.S. IN ED.

8-9-68
DATE

[redacted]
ADVISER

DATE

[redacted]
DEPARTMENT HEAD

TABLE OF CONTENTS

LIST OF TABLES

LIST OF GRAPHS

INTRODUCTION

The purpose of this study was to determine the effects a multi-graded room had on the achievement level of above average students in the elementary school system. As the writer began his research he had no basis for holding an opinion favoring the students in either the multi-graded or single graded room.

He was interested in any difference that could be observed between the two groups regardless of the direction of the difference. His hypothesis was $M_1 = M_2$. This hypothesis will be rejected if the difference, either positive or negative, is significant at the .05 grade level.

CHAPTER I

THE STUDY

Statement of the problem.--The purpose of this study was to determine the effects a multi-graded room had upon the achievement level of above average students in the elementary school system.

Need for study.--Today, more than in years past, we are attempting to help each individual attain his highest achievement level in academics. We are confronted with the problem of how this can best be accomplished in a graded school system.

Educators differ in their opinions as to the merits of the single graded room compared to the multi-graded unit.

Most research in this area considered a wide range of I.Q. scores for sampling. Few attempts have been made to isolate and study a more limited I.Q. range. To compare the two types of classrooms without considering a more limited range would tend to defeat our efforts.

Extent of research.--The study included seven elementary schools within the East Richland District. Because of the severe restrictions on I.Q. scores, it was necessary to examine the records of approximately 240 different students. Twenty eight of these had to come

from a mixed room of fifth and sixth graders. The other twenty eight came from single graded classrooms.

The scope.--This study has been limited to the comparison of fifty six students at the fifth grade level having an I.Q. range from 114-131. Originally sixty students were to be used but only fifty six could be found who were suitable for the study.

Only students in the East Richland School District were used. It was assumed there were no major differences in the teaching methods employed. All schools in this research used the same texts and followed the same curriculum. These students were compared in the three major fields of the California Achievement Test: (1) Language, (2) Reading, (3) Mathematics. Also compared was the total test battery as given by the California Achievement Test.

Definitions.--For the purpose of further clarity the following words were defined:

1. Mean---The sum of all the scores divided by the total number of scores.
2. Multi-grade---A classroom composed of more than one grade. In this report the fifth and sixth grades.
3. Mean increase---Sum of all increases divided by the total number of subjects in group.
4. Group I---Students from multi-graded rooms.
5. Group II---Students from single graded rooms.

Related research.--Most information read by this person dealt with a cross section of an average class. The information gained therefore was not entirely pertinent to this study.

Drier, Adams, McIntosh, Schrammel, Nelson, and Finley found no significant difference in the achievement levels. Carmen J. Finley used the third and fifth grades for his study. He matched his groups according to:

1. Sex
2. I.Q. within 5 points.
3. Chronological age--3 months.
4. Participation in the yearly county wide group testing.

Finley reported the greatest difference came in the field of mathematic fundamentals. This difference, however, was not significant according to his standards.[1]

Clem and Hovey found differences favoring the single graded class. The study, however, was made in 1933. With the numerous changes in philosophy and the increased amount of educational aids the present validity of the study is uncertain. J.H. Hull, Superintendent of the Torrana Unified School District in California, engaged in a three year study with Walter Rehwoldt and Warren Hamilton concerning this problem in 1957. In their thesis, "An Analysis of Some of the

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[1]Carmen J. Finley, "A Comparison of the Achievement of Multi-Graded and Single Graded Rural Elementary School Children," The Journal of Educational Research, LVI (May-June 1963), pp. 471-475.

Effects of Interage and Intergrade Grouping in an Elementary School," these men found a significant difference in all but one area. This difference favored the multi-graded pattern.[1] Warren Hamilton, co-author of this same study said:

> It is my personal belief that all grades in all schools are multi-grade since it is impossible to group children in such a manner as to have them at a particular grade level in more than one subject at any particular time. The actual placing of children into a multi-grade class recognized the difference of pupils and by increasing the general spread of difference enriches the learning situation in the classroom---Since the multi-grade pupils clearly demonstrated greater personal and social growth, it is my opinion that this represents the major area in which the multi-grade structure is superior to a regular grade program....(The multi-grade program) forces the teacher to provide for the difference in children.[2]

The sample.--Twenty eight fifth grade pupils were chosen from each of the two groups under study. The following factors were common to the multi and single graded groups:

1. Students I.Q. scores ranged from 114-131.
2. I.Q. scores were taken from fourth grade test.
3. Participants took the California Achievement Test.
4. The same number of boys and girls were chosen for each group.

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[1]J.H. Hull, "Multi-Grade Teaching," Nation's Schools, LXII (July 1958), pp. 33-36.

[2]Bernice J. Wolfson, "The Educational Scene," Elementary English, XXXVIII (Dec. 1961), p.25.

5. Each student attended the same school the previous year.

The grade level placement obtained on the test for Mathematics, Reading, and Language, on the second month of the fifth and sixth grades were recorded for each student. Results were then tallied in those three fields and their subtests to compute means. Increased means were then obtained.

Selection of subjects.--The first step taken in this research was checking each student's I.Q. score from his fourth grade records. In screening out the I.Q. scores between 114-131 the writer found, as expected, a small percentage of students who had such a score.

Although it was not necessary to prove or disprove the hypothesis, the writer compared the scores of each student with his total mean increase, to see if there was any noticeable relationship between his I.Q. score and mean increase. In doing this, no relationship was found between the I.Q. score and the student's increase when compared to other students in this study. It was noticed, however, that the greatest increases were made by the students in group one. These results are shown on Graph 1, immediately following this page.

The second step was to eliminate any possible prospects who were not in the East Richland District the year prior to this study. The researcher also had to check to make sure the student had been in the same type of room,

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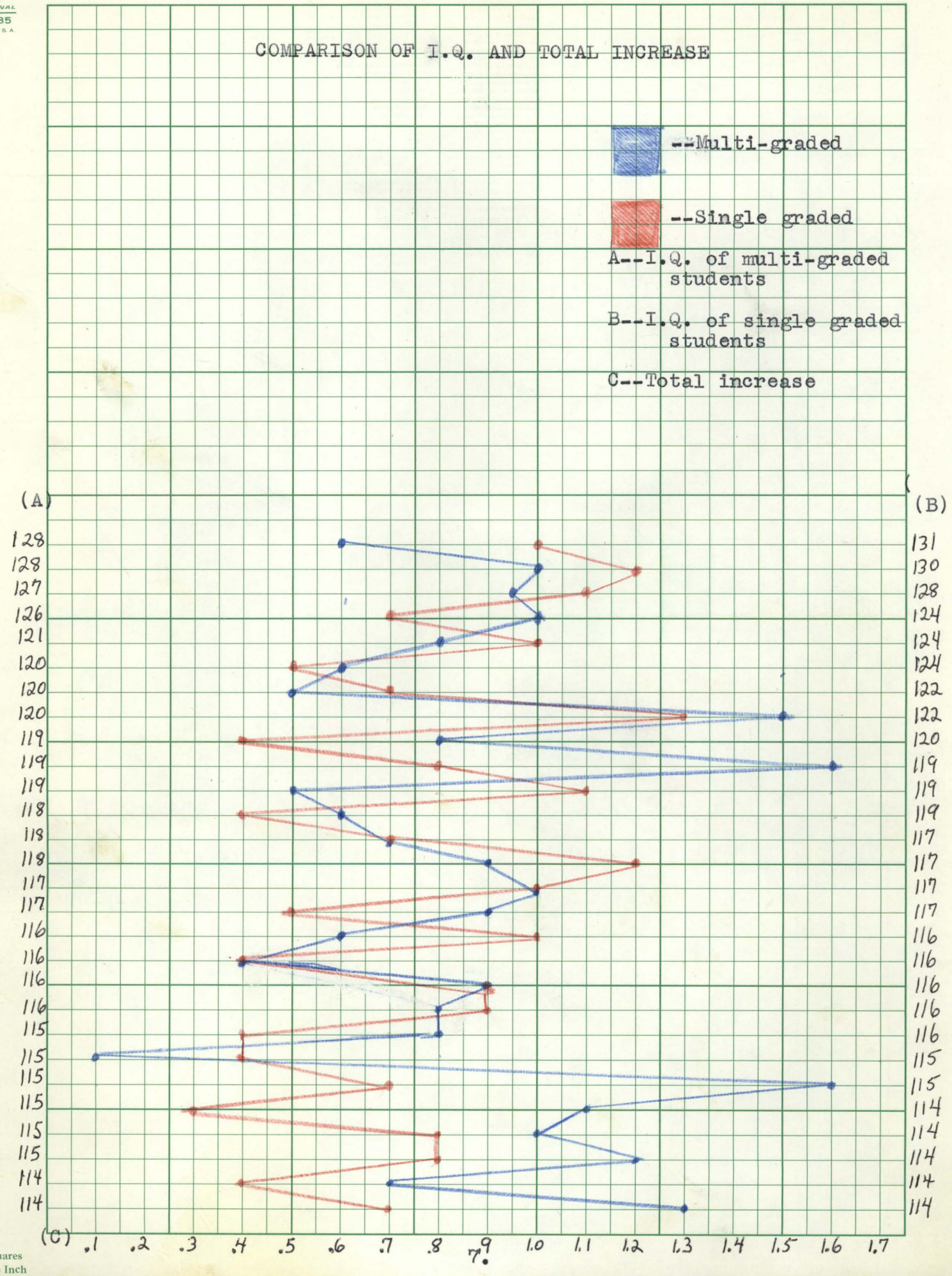
GRAPH 1



5 Squares
to the Inch

single or mixed, throughout the entire period he was observing.

Tables showing the I.Q., sex, and grade placement level of each student used in the research may be found in the appendix.

Mathematical treatment.--In order to determine the significance of the difference in mean increase, between these two non-independent groups, it was necessary to establish the estimated standard error of difference between the means. The writer used the .05 level as his basis for judging significance.

To find this estimated standard error require two major steps.

I. Step one was completed by use of the following formulas.

A. $S\bar{x}_1 - x_2 = \sqrt{S\bar{x}_1^2 + S\bar{x}_2^2}$

B. $S\bar{x}_1 - \bar{x}_2 = \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$

C. $s^2 = \frac{\sum x_1^2 + \sum x_2^2}{n_1 + n_2 - 2}$

The above formulas can be substituted into formula D.

D. $S\bar{x}_1 - \bar{x}_2 = \sqrt{\left(\frac{\sum x_1^2 + \sum x_2^2}{n_1 + n_2 - 2}\right)\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}$

1. The sum of squares for the multi-graded room was given by: $\sum x_1^2 = \sum X_1^2 - \frac{(\sum X_1)^2}{n_1}$
2. The sum of squares for the single graded room was given by: $\sum x_2^2 = \sum X_2^2 - \frac{(\sum X_2)^2}{n_2}$

3. S^2 = the estimate of the common population variance.

4. ΣX_1^2 = the sum of squares for the N_1 observations about the mean of group one.

5. ΣX_2^2 = the sum of squares for the N_2 observations about the mean of group two.

6. $N_1 = N_2 - 2$ indicates the degrees of freedom.

II. After formula D was used the test of significance was found by this formula:

$$t = \frac{\overline{X}_1 - \overline{X}_2}{S\overline{X}_1 - \overline{X}_2}$$

A. $\overline{X}_1$ = mean increase of group one.

B. $\overline{X}_2$ = mean increase of group two.

C. $S\overline{X}_1 - \overline{X}_2$ = estimated standard error.[1]

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[1]Allen B. Edwards, Statistical Methods for the Behavioral Sciences, (New York: Rinehart & Co., 1958), pp. 252-254.

CHAPTER II

THE FINDINGS

Introduction.--This chapter was divided into four major subtopics. These topics were Reading, Mathematics, English and Total Battery. Each area was studied in detail. A short summary can be found at the end of each subtopic.

Reading

Subtests.--The California Achievement Test has two subtests for this subject, reading vocabulary and comprehension. Rather than just comparing the reading total of each student it was decided to compare the subtests first. The reason for this was the feeling that any difference in the results would be more noticeable in the subtests than in the final total. Therefore, the following three comparisons will be made:

1. Vocabulary
2. Comprehension
3. Total reading

Reading vocabulary.--The multi-graded students, or Group I, had a total increase of 28.2 in this subtest. By dividing this figure by the total number of participants (28) a mean increase of 1.00 was found for the group.

The single graded, or Group II, had a total increase score of 11.6. Again dividing by 28 the mean increase was found to be .41.

By subtracting, the difference between the two was found to be .49, which is a half year advantage in favor of the multi-grade.

Reading comprehension.--In the area of comprehension the findings were reversed in favor of Group II, although not to the extent of the advantage Group I obtained in the vocabulary subtest. Group II showed a mean increase of .92 while Group I had a .73 increase, thus a .19 spread in favor of the single graded Group II.

Total reading.--The total reading batteries give a slight edge to Group I. This group had a mean increase of .89 total. Group II had a .75 increase for its total, leaving a .14 difference between the two groups. It is important to note, and keep in mind, the total battery is not an average of the subtests but is normed separately.

Table I shown at the end of this topic, on page 13, will show individual increases in the total battery for reading.

Significance of results.--A formula was not applied to determine the significance of the difference in the subtests. The formulas set forth in the second chapter of this paper were applied to the total reading battery. This policy has been followed throughout this paper. To be signif-

icant at the .05 grade level the results would have to be at least 2.006[1] in each case. Shown below, step by step, is the result obtained by applying the formulas as previously described.

$$\sum x_1^2 = \sum X_1^2 - \frac{(\sum X_1)^2}{n_1} = 1.29$$

$$\sum x_2^2 = \sum X_2^2 - \frac{(\sum X_2)^2}{n_2} = 9.87$$

$$s_{\bar{x}_1 - \bar{x}_2} = .121$$

$$t = \frac{\bar{X} - X_2}{s_{\bar{x}_1 - \bar{x}_2}}$$

Conclusion.--Since the resulting figure obtained through use of standard procedure was 1.17, and therefore less than the prescribed significance level of 2.006, it would uphold the hypothesis as set forth in the forward of this paper.

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[1] Ibid., p. 501

Table 1 located below shows the individual increases of each student. It should be mentioned that Group I had the greatest single increase. One student had an increase of 2.0 which represents an increase of two grade levels. The lowest score was recorded by a student in Group II. This student actually scored a loss of .6 over the one year period.

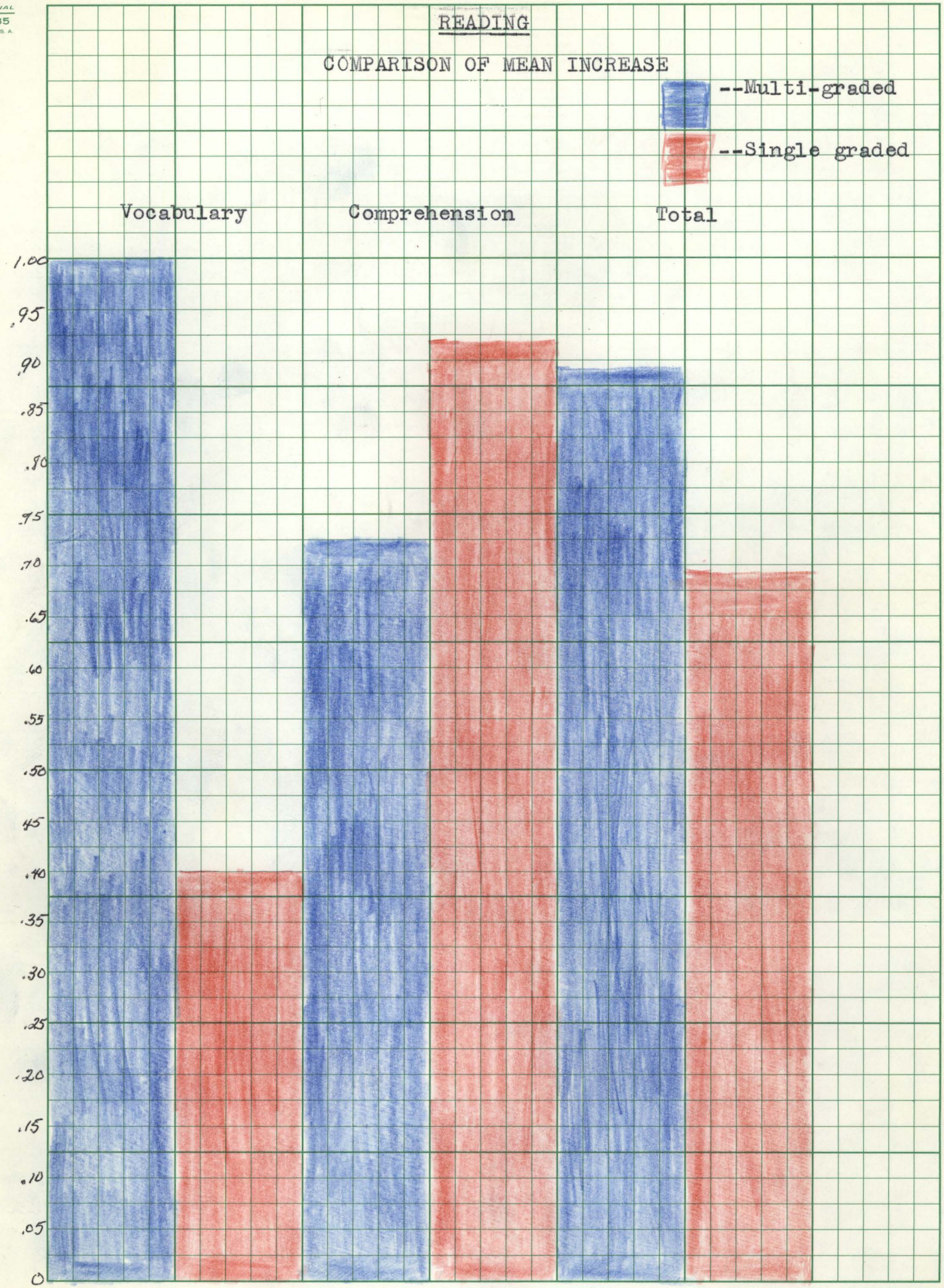
TABLE 1

INDIVIDUAL INCREASE IN TOTAL READING

GROUP I (multi-graded)				GROUP II (single graded)			
Sex	I.Q.	Inc.	ΣX_1^2	Sex	I.Q.	Inc.	ΣX_2^2
M	128	.9	.81	F	131	.4	.16
F	128	1.0	1.00	F	130	1.9	3.61
M	127	.7	.49	F	128	1.2	1.44
M	126	.4	.16	M	124	.6	.36
M	121	.7	.49	M	124	-.6	.36
M	120	.8	.64	M	124	1.3	1.69
F	120	1.3	1.69	F	122	1.4	1.96
F	120	.7	.49	F	122	.6	.36
F	119	1.0	1.00	M	120	.3	.09
M	119	1.4	1.96	M	119	.6	.36
F	119	.7	.49	M	119	1.6	2.56
M	118	.7	.49	F	119	.5	.25
F	118	.2	.04	M	117	.5	.25
M	118	.2	.04	M	117	1.7	2.89
F	117	.5	.25	M	117	.7	.49
F	117	.9	.81	F	117	.3	.09
F	116	1.2	1.44	F	116	1.9	3.61
F	116	1.8	3.24	M	116	.9	.81
F	116	1.0	1.00	M	116	.6	.36
M	116	.7	.49	F	116	1.2	1.44
F	115	1.2	1.44	F	116	.4	.16
M	115	.1	.01	M	115	-.2	.04
M	115	2.0	4.00	M	115	.8	.64
M	115	.6	.36	M	114	.0	.00
M	115	.7	.49	F	114	.4	.16
M	115	.9	.81	M	114	.6	.36
M	114	1.6	2.56	F	114	.4	.16
F	114	1.1	1.21	F	114	.9	.81

In order to see more clearly a group comparison in reading and its subtests refer to Graph 2 on the next page.

GRAPH 2



5 Squares to the Inch

Mathematics

Subtests.--The California Achievement Test subdivides the area of mathematics into three parts. These parts are reasoning, fundamentals and total battery.

Reasoning.--In this section the first group had a mean increase of .76, while the second group registered a .58 mean increase. By subtracting, an .18 difference was found in favor of Group I, the multi graded group.

Fundamentals.--In arithmetic fundamentals Group I had a mean increase of 1.00, with Group II showing a mean increase of 1.10, a slight advantage of .10.

Total battery.--In this section there was practically no difference in the mean increase of the two groups. Group I having a mean increase of .88 was only .02 behind Group II whose increase was .90. Individual increases will appear on Table 4 following this page.

Significance of results.--The small difference did not appear to warrant figuring the significance level, however, using the same formulas as before these results were obtained:

$\Sigma x_1^2 = 6.81$

$\Sigma x_2^2 = 3.59$

$S_{\bar{x}_1 - \bar{x}_2} = .161$

$t = .12$

Conclusion.--Since .12 is not large enough to show a significant difference, it does not invalidate the original hypothesis that $M_1 = M_2$.

Table 2 below and Graph 3 on the next page may give the reader a clearer idea of the results. Notice on the table that Group II had the highest single increase while Group I had the lowest score recorded.

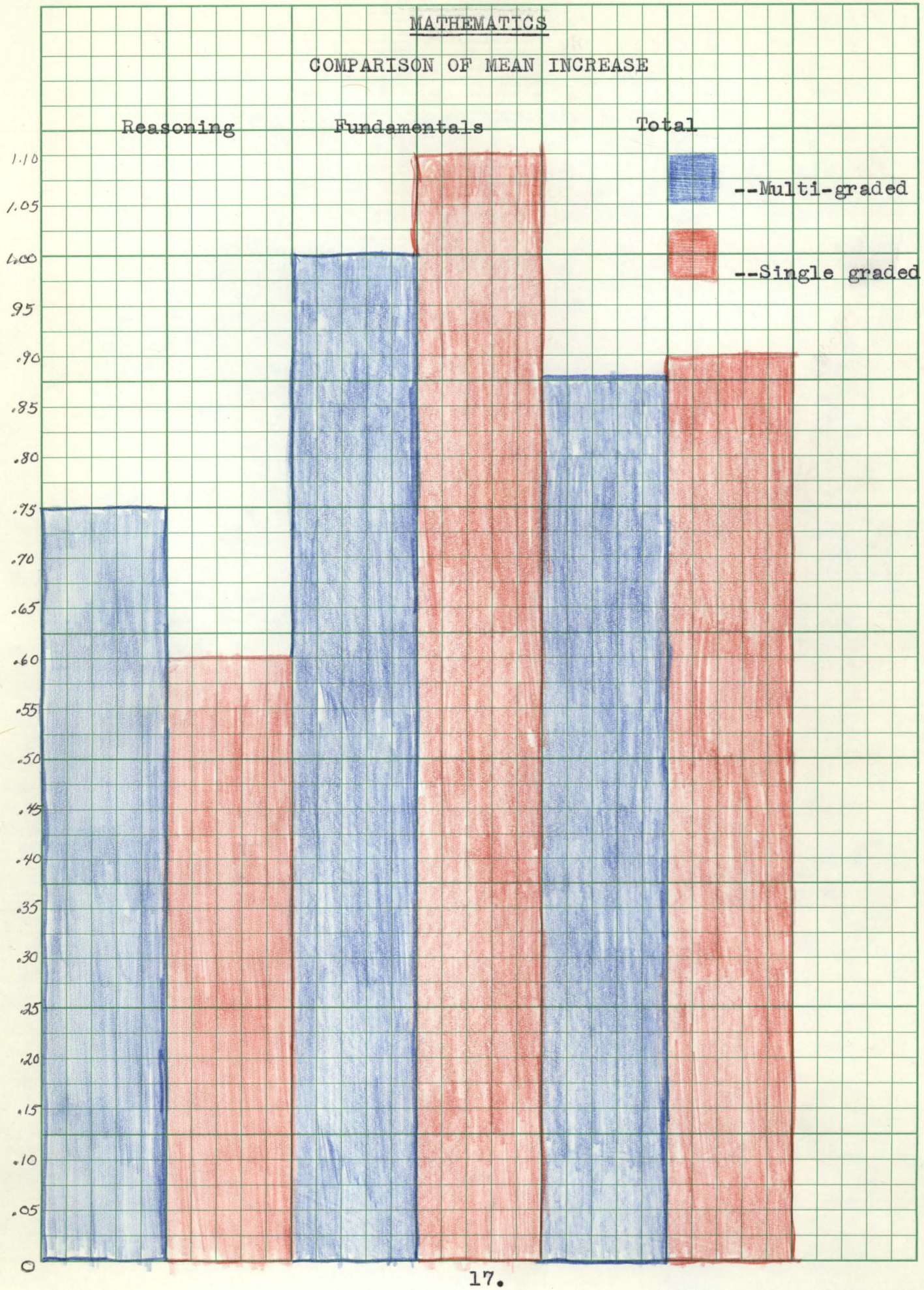
TABLE 2

INDIVIDUAL INCREASE IN TOTAL MATHEMATICS

Group I (multi-graded)				Group II (single graded)			
Sex	I.Q.	Inc.	ΣX_1^2	Sex	I.Q.	Inc.	ΣX_2^2
M	128	.4	.16	F	131	1.8	3.24
F	128	.6	.36	F	130	.6	.36
M	127	1.1	1.21	F	128	.9	.81
M	126	1.5	2.25	M	124	.7	.49
M	121	.8	.64	M	124	1.5	2.25
M	120	.9	.81	M	124	.9	.81
F	120	.5	.25	F	122	.7	.49
F	120	1.4	1.96	F	122	1.5	2.25
F	119	1.1	1.21	M	120	.6	.36
M	119	1.6	2.56	M	119	.9	.81
F	119	.4	.16	M	119	.7	.49
M	118	.7	.49	F	119	.4	.16
F	118	1.2	1.44	M	117	.9	.81
M	118	1.4	1.96	M	117	1.6	2.56
F	117	.9	.81	M	117	1.4	1.96
F	117	.8	.64	F	117	.9	.81
F	116	1.0	1.00	F	116	.7	.49
F	116	-.1	.01	M	116	.4	.16
F	116	.7	.49	M	116	.9	.81
M	116	.1	.01	F	116	.6	.36
F	115	.6	.36	F	116	.5	.25
M	115	.4	.16	M	115	.9	.81
M	115	1.7	2.89	M	115	.7	.49
M	115	.8	.64	M	114	1.0	1.00
M	115	1.2	1.44	F	114	1.1	1.21
M	115	1.3	1.69	M	114	1.1	1.21
M	114	1.1	1.21	F	114	.6	.36
F	114	.7	.49	F	114	.8	.64

Graph 3, next page, will give the reader a better idea how the two groups compared on the two subtests and total battery in the field of mathematics.

GRAPH 3


MATHEMATICS
COMPARISON OF MEAN INCREASE
Reasoning
Fundamentals
Total
--Multi-graded
--Single graded
1.10
1.05
1.00
.95
.90
.85
.80
.75
.70
.65
.60
.55
.50
.45
.40
.35
.30
.25
.20
.15
.10
.05
0

Language

Subtests.--The California Achievement Test subdivides Language into two subtests, English and Spelling, as well as the total battery.

English.--The difference between the two groups in this section was very minor. Group I held a .10 advantage as their mean increase was .77 with .67 recorded by Group II.

Spelling.--In this area a more noticeable difference was observed. Group I had a mean increase of .51 while the second group had a mean increase of .79. A difference of .28 would represent a two or three month gain in grade level.

Total.--In the total column, Group I had a .98 mean increase. Group II had a mean increase of .79 in the same column. A difference of .19 between the two groups. Individual increases are shown on Table 3, next page.

Significance of results.--To see if this difference was enough to be significant the writer applied the same method used in gaining this information in Reading and Mathematics. The results were as follows:

$$\sum x_1^2 = 10.81$$

$$\sum x_2^2 = 10.29$$

$$S_{\bar{x}_1 - \bar{x}_2} = .31$$

$$t = .61$$

Conclusion.--As was mentioned, to be significant at the .05 grade level with 54 degrees of freedom, the score would have had to be more than 2.006. That the score was .61 indicated the hypothesis still held true.

Table 3 located below shows the individual increase of each student over a one year period in language. It should be observed that both groups had one student who had an increase of 2.2 years. Both groups also had two students each who regressed from the previous year's score. Group II had the lowest score in language. This score was a negative .4.

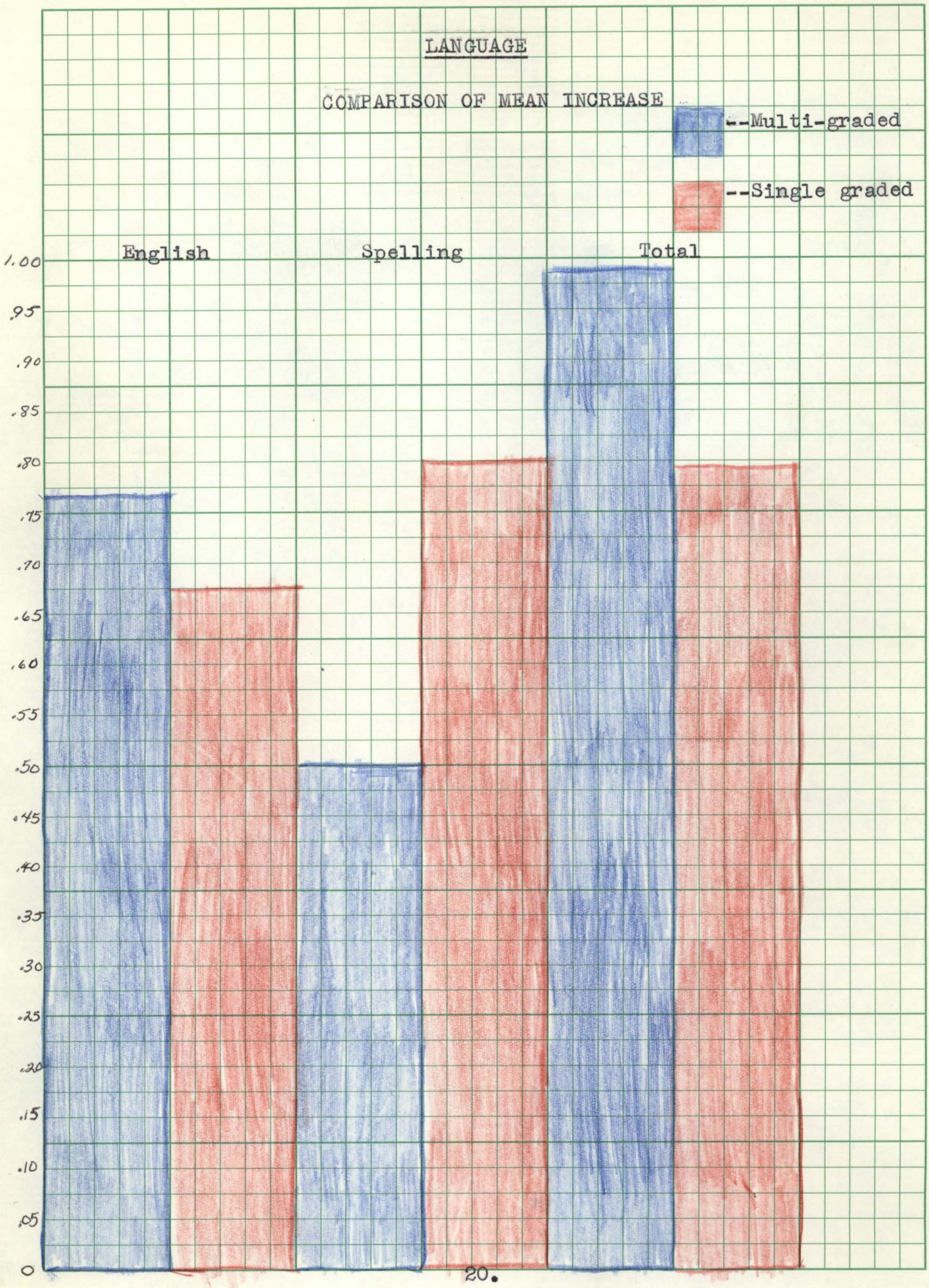
TABLE 3

INDIVIDUAL INCREASE IN TOTAL LANGUAGE

Group I (multi-graded)				Group II (single graded)			
Sex	I.Q.	Inc.	$\Sigma' x_1^2$	Sex	I.Q.	Inc.	Σx_2^2
M	128	.8	.64	F	131	.9	.81
F	128	1.4	1.96	F	130	2.2	4.84
M	127	.7	.49	F	128	.5	.25
M	126	.9	.81	M	124	1.0	1.00
M	121	.6	.36	M	124	1.9	3.61
M	120	.0	.00	M	124	-.4	.16
F	120	.7	.49	F	122	.9	.81
F	120	2.2	4.84	F	122	.7	.49
F	119	.7	.49	M	120	.5	.25
M	119	1.3	1.69	M	119	.9	.81
F	119	.5	.25	M	119	1.6	2.56
M	118	.8	.64	F	119	.5	.25
F	118	.6	.36	M	117	.8	.64
M	118	1.0	1.00	M	117	1.0	1.00
F	117	1.5	2.25	M	117	.9	.81
F	117	1.0	1.00	F	117	.0	.00
F	116	.0	.00	F	116	1.2	1.44
F	116	-.3	.09	M	116	.1	.01
F	116	1.6	2.56	M	116	1.2	1.44
M	116	1.7	2.89	F	116	1.6	2.56
F	115	.9	.81	F	116	.5	.25
M	115	-.1	.01	M	115	.3	.09
M	115	.9	.81	M	115	.4	.16
M	115	2.1	4.41	M	114	-.2	.04
M	115	1.3	1.69	F	114	.9	.81
M	115	1.4	1.96	M	114	.8	.64
M	114	1.6	2.56	F	114	.6	.36
F	114	1.6	2.56	F	114	.7	.49

Graph 4 on the following page may give the reader a clearer picture of group comparison in this subject.

Graph 4


LANGUAGE
COMPARISON OF MEAN INCREASE
--Multi-graded
--Single graded
English
Spelling
Total
1.00
.95
.90
.85
.80
.75
.70
.65
.60
.55
.50
.45
.40
.35
.30
.25
.20
.15
.10
.05
0

Total Test Battery

Total increase.--The California Achievement Test provides a summary column. In this column Group I had a total increase of 25.0, a mean increase of .89. Group II had a total increase of 20.3, representing a mean increase of .73. For the complete battery, Group I showed a mean increase of .16 over Group II.

For a more meaningful interpretation of this data refer to Graph I on page 7.

Significance.--The test for significance showed that:

$\Sigma x_1^2 = 3.18$

$\Sigma x_2^2 = 2.41$

$s_{\bar{x}_1 - \bar{x}_2} = .083$

$t = 1.93$

Conclusion.--At the .05 level, 1.93 is not enough difference to be considered as significant. The hypothesis has held true throughout this entire study. The graph previously mentioned, appearing on page 7, compares total increase with students I.Q. scores.

CHAPTER III

SUMMARY AND CONCLUSIONS

Summary.--Preceeding research the writer could only speculate on what effect a combination room would have upon a student of above average intelligence. After several months of study and research the following results were found:

I. Group I had an advantage in:
   - A. Reading Vocabulary.
   - B. Reading Comprehension.
   - C. Total Reading.
   - D. Arithmetic Reasoning.
   - E. Total Mathematics.
   - F. English.
   - G. Total Language.
   - H. Total Test Battery.

II. Group II had an advantage in:
   - A. Arithmetic Fundamentals.
   - B. Spelling.

The largest difference found in the entire study was found in the area of Spelling, a subtest in the major field of Language. In this catagory the single graded room held a .28 margin in mean increase over the multi-graded.

In all other areas there was a smaller difference in the two groups.

Conclusion.--The findings indicated that although there was no statistically significant difference at the .05 level in any of the academic areas included in the study, the majority of the differences found favored the multi-graded group.

A noticeable trend favoring the multi-graded group was also found on Graph I. Of the five students who scored the greatest increase for the entire test four were from the multi-graded room.

These facts, however, must be viewed within the limitations of this study. It was concerned with only one school district. Only fifth and sixth grade students were compared according to their scores obtained by means of the California Achievement Test.

Further study.--This writer would recommend that someone try the same study with a different age group. Research is also needed in the area of the average and below average student. There is a need to isolate each group to find under which circumstances the greatest level of performance can be achieved by the greatest number of students.

A P P E N D I X

TABLE 4

RESULTS OF CALIFORNIA ACHIEVEMENT TEST---MULTI-GRADED ROOM
RECORDED SECOND MONTH OF FIFTH AND SIXTH GRADES

		Reading			Arithmetic			Language			Total Battery
Sex	I.Q.	Vocab-ulary	Compre-hension	Total	Reason-ing	Funda-mentals	Total	Eng-lish	Spell-ing	Total	
M	128	7.7--8.5	7.8--8.6	7.8--8.7	7.2--7.5	6.8--7.3	7.0--7.4	7.0--7.5	7.7--7.2	6.7--7.5	7.0--7.6
F	128	5.8--7.1	7.0--7.8	6.6--7.6	6.8--6.9	6.8--7.5	6.8--7.4	6.4--7.4	8.7--9.2	6.3--7.7	6.5--7.5
M	127	6.0--6.9	6.1--6.7	6.2--6.9	6.3--7.4	6.3--7.5	6.4--7.5	5.8--6.4	7.7--7.7	5.9--6.6	6.1--7.0
M	126	7.3--7.5	7.2--7.8	7.3--7.7	6.3--7.1	5.9--7.7	6.1--7.6	6.8--7.4	6.8--6.8	6.4--7.3	6.5--7.5
M	121	6.4--7.5	6.7--7.0	6.6--7.3	6.2--7.1	6.8--7.6	6.7--7.5	6.6--6.8	5.0--5.7	6.0--6.6	6.4--7.2
M	120	5.7--6.8	6.4--7.0	6.2--7.0	5.6--6.6	5.3--6.2	5.5--6.4	7.0--7.0	7.2--6.8	7.0--7.0	6.2--6.8
F	120	7.5--8.0	7.2--8.1	7.4--8.1	6.3--7.1	6.2--6.6	6.3--6.8	7.8--7.9	6.8--9.2	7.2--8.4	7.0--7.5
F	120	4.8--6.9	6.9--7.3	5.9--7.2	6.2--7.1	5.9--7.6	6.1--7.5	6.4--7.9	8.2--9.2	6.2--8.4	6.1--7.6
F	119	6.8--7.3	6.3--7.4	6.5--7.5	5.0--6.4	5.4--6.4	5.4--6.5	6.8--7.6	7.7--7.7	6.9--7.6	6.3--7.1
M	119	4.3--5.6	5.6--6.8	5.0--6.4	6.2--7.5	6.5--8.3	6.4--8.0	7.0--7.6	5.2--7.2	6.2--7.5	5.9--7.5
F	119	5.8--6.1	4.7--5.6	5.3--6.0	5.4--6.0	5.2--5.5	5.4--5.8	5.7--6.5	8.2--7.2	6.1--6.6	5.7--6.2
M	118	6.9--7.7	6.9--7.4	7.0--7.7	6.6--7.1	5.9--6.8	6.2--6.9	7.5--8.1	8.7--8.7	7.7--8.5	6.9--7.5
F	118	7.3--7.5	6.6--6.7	6.9--7.1	6.3--6.4	5.6--7.5	6.0--7.2	6.4--7.4	6.8--5.7	6.4--7.0	6.4--7.1
M	118	6.6--7.5	7.2--6.9	7.0--7.2	6.3--7.7	6.3--7.7	6.4--7.8	6.9--7.6	6.2--8.2	6.7--7.7	6.7--7.6
F	117	5.7--7.1	7.8--7.4	6.9--7.4	6.6--6.4	6.2--7.6	6.4--7.3	6.7--7.7	8.2--8.7	6.5--8.0	6.5--7.5
F	117	5.6--5.5	5.6--7.3	5.7--6.6	6.3--7.1	5.8--6.8	6.1--6.9	6.3--7.2	6.2--6.8	6.2--7.2	6.0--6.9
F	116	7.7--8.0	5.8--7.4	6.5--7.7	5.1--6.4	5.1--6.0	5.2--6.2	7.2--7.4	6.8--6.5	7.2--7.2	6.3--6.9
F	116	5.8--7.1	5.1--7.3	5.5--7.3	5.8--6.2	5.8--5.5	5.9--5.8	6.5--6.3	6.8--6.5	6.6--6.3	6.0--6.4
F	116	4.9--7.5	6.7--6.4	5.9--6.9	6.2--6.8	5.6--6.4	5.9--6.6	7.4--8.2	7.2--7.7	6.8--8.4	6.2--7.1
M	116	7.7--8.5	7.3--8.1	7.6--8.3	8.3--7.2	6.9--7.6	7.4--7.5	7.8--8.3	10.0-10.0	7.6--9.3	7.4--8.2
F	115	5.8--7.3	5.7--6.7	5.8--7.0	5.6--6.4	5.6--6.1	5.7--6.3	5.6--6.7	8.7--8.7	6.1--7.0	5.9--6.7
M	115	6.6--6.4	6.6--6.5	6.5--6.6	6.8--6.6	6.2--6.9	6.5--6.9	7.0--7.0	7.5--5.2	6.7--6.6	6.6--6.7
M	115	4.9--7.1	5.5--7.0	5.2--7.2	6.2--7.5	6.2--8.1	6.2--7.9	7.2--7.5	6.5--7.2	6.6--7.5	6.0--7.6
M	115	6.8--6.6	6.0--7.0	6.3--6.9	6.9--7.4	6.4--7.5	6.7--7.5	6.2--8.3	8.2--8.2	6.5--8.6	6.5--7.6
M	115	6.6--7.7	7.3--7.8	7.1--7.8	6.3--7.2	6.2--7.5	6.3--7.5	6.4--7.5	6.5--8.7	6.4--7.7	6.6--7.6
M	115	6.2--6.9	6.4--7.2	6.3--7.2	6.3--7.4	6.1--7.5	6.2--7.5	6.6--7.6	5.0--7.2	6.2--7.6	6.3--7.5
M	114	5.4--7.5	6.4--7.4	6.0--7.0	6.0--6.8	5.5--6.9	5.8--6.9	6.4--7.6	5.0--7.7	6.1--7.7	6.0--7.3
F	114	5.0--6.8	6.4--6.9	5.8--6.9	6.3--7.4	5.6--7.2	6.3--7.0	6.0--7.6	8.7--9.2	6.4--8.0	6.1--7.4

TABLE 5

RESULTS OF CALIFORNIA ACHIEVEMENT TEST---SINGLE GRADED ROOM
RECORDED SECOND MONTH OF FIFTH AND SIXTH GRADES

		Reading			Arithmetic			Language			Total Battery
Sex	I.Q.	Vocab-ulary	Compre-hension	Total	Reason-ing	Funda-mentals	Total	Eng-lish	Spell-ing	Total	
F	131	6.4--7.1	7.4--7.6	7.1--7.5	4.9--6.4	5.1--7.1	5.1--6.9	7.1--7.9	6.5--7.2	7.0--7.9	6.3--7.3
F	130	6.8--7.7	7.0--9.5	7.0--8.9	6.9--7.1	6.7--7.5	6.8--7.4	6.7--8.4	8.2--9.7	6.9--9.1	6.9--8.1
F	128	7.7--8.0	7.4--9.2	7.7--8.9	7.1--8.1	7.1--8.1	7.2--8.1	8.3--8.4	8.2--9.7	8.6--9.1	7.6--8.7
M	124	6.9--7.7	6.6--7.0	6.8--7.4	6.6--7.2	5.9--6.6	6.2--6.9	6.2--7.1	5.2--6.5	6.0--7.0	6.3--7.0
M	124	6.6--5.8	8.9--7.9	7.7--7.1	7.4--7.8	6.0--8.1	6.5--8.0	7.0--8.8	10.0--9.2	7.5--9.4	7.1--8.1
M	124	6.9--7.7	7.3--8.9	7.2--8.5	6.2--6.8	5.8--6.8	6.0--6.9	8.2--8.0	9.7--9.2	8.9--8.5	7.1--7.6
F	122	6.9--7.1	6.9--7.8	7.0--7.6	5.0--5.1	4.5--6.1	5.1--5.8	6.4--7.2	8.2--9.7	6.7--7.6	6.2--6.9
F	122	6.6--7.3	6.7--8.9	6.7--8.1	6.2--7.7	6.2--7.8	6.3--7.8	7.6--7.9	7.2--8.7	7.5--8.2	6.8--8.1
M	120	6.8--7.7	8.4--8.1	7.7--8.0	6.6--7.2	6.9--7.5	6.9--7.5	7.6--8.2	9.2--8.2	8.0--8.5	7.4--7.8
M	119	7.5--7.5	6.8--7.9	7.2--7.8	6.9--7.5	6.7--7.7	6.8--7.7	6.6--7.6	7.7--8.2	6.8--7.7	6.9--7.7
M	119	7.3--7.7	6.6--8.9	6.9--8.5	6.6--7.4	6.3--6.9	6.5--7.2	6.3--7.9	8.2--8.7	6.6--8.2	6.6--7.7
F	119	6.8--7.3	6.8--7.3	6.9--7.4	6.2--5.8	5.9--6.8	6.1--6.5	8.4--8.5	7.7--9.2	8.6--9.1	6.9--7.3
M	117	6.9--6.9	6.4--7.0	6.6--7.1	6.2--6.4	6.2--7.3	6.2--7.1	6.4--7.0	6.8--8.2	6.4--7.2	6.4--7.1
M	117	6.9--8.5	6.6--8.4	6.8--8.5	6.0--7.2	4.8--6.8	5.3--6.9	6.7--7.6	6.5--7.7	6.7--7.7	6.3--7.5
M	117	6.4--6.4	6.6--7.9	6.6--7.3	6.2--6.9	5.4--7.2	5.8--7.2	6.4--7.3	5.7--6.2	6.2--7.1	6.2--7.2
F	117	6.9--7.1	6.7--7.2	6.9--7.2	6.2--6.8	5.9--7.3	6.1--7.2	7.6--7.5	7.2--8.2	7.6--7.6	6.8--7.3
F	116	6.4--7.5	6.6--9.2	6.6--8.5	6.4--7.1	6.5--7.2	6.5--7.2	7.6--8.6	8.7--8.7	7.9--8.1	6.9--7.9
M	116	6.0--6.9	5.9--6.8	6.0--6.9	6.0--6.6	5.8--6.2	6.0--6.4	7.0--7.3	8.2--7.2	7.2--7.3	6.4--6.8
M	116	6.8--7.3	7.2--7.8	7.1--7.7	6.9--7.7	6.7--7.6	6.8--7.7	7.1--8.2	6.2--6.8	6.9--8.1	6.9--7.3
F	116	6.8--8.0	7.9--8.9	7.5--8.7	6.8--7.2	6.5--7.4	6.7--7.3	7.8--8.6	6.9--9.2	7.7--9.3	4.2--8.1
F	116	7.7--8.0	7.9--8.4	7.9--8.3	6.9--6.9	6.2--6.9	6.5--7.0	7.6--8.4	8.2--6.5	7.7--8.2	7.2--7.6
M	115	6.6--5.5	6.7--7.2	6.7--6.5	6.0--7.2	6.3--7.1	6.3--7.2	6.4--6.6	7.7--8.7	6.6--6.9	6.5--6.9
M	115	6.2--7.3	7.2--7.8	6.9--7.7	7.4--7.6	6.3--7.4	6.8--7.5	7.5--8.0	8.7--7.7	7.7--8.1	7.0--7.7
M	114	7.1--7.1	5.8--5.8	6.3--6.3	5.4--6.3	5.0--6.2	5.3--6.3	5.3--5.2	5.8--5.4	5.4--5.2	5.7--6.0
F	114	7.1--6.8	6.8--7.8	7.0--7.4	6.2--6.6	5.9--7.4	6.1--7.2	6.8--7.6	7.7--8.2	6.9--7.8	6.6--7.4
M	114	7.7--7.7	7.4--8.6	7.7--8.3	6.8--7.8	6.2--7.4	6.5--7.6	7.2--7.9	6.8--7.7	7.2--8.0	7.0--7.8
F	114	6.6--6.8	7.2--7.8	7.0--7.4	6.3--6.6	5.5--6.3	5.9--6.5	7.3--7.7	7.2--8.2	7.3--7.9	6.7--7.1
F	114	6.8--7.7	7.2--8.1	7.1--8.0	6.8--7.4	6.3--7.2	6.5--7.3	7.6--8.0	8.7--9.2	7.8--8.5	7.0--7.7

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