EFFECTS OF STUDENT TEACHING ON PUPILS IN TWO
BEGINNING ALGEBRA CLASSES IN THE
BALDWIN KANSAS HIGH SCHOOL

By

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Approved by:

[Signature]
Instructor in charge

[Signature]
Dean, School of Education

July 17, 1931
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</table>
Effects of Student Teaching on Pupils in the Beginning Algebra Classes in the Baldwin Kansas High School

CHAPTER 1

Introduction

The Kansas State Board of Education will no longer grant teaching certificates to graduates of any university or college in the state that does not maintain facilities for practice teaching. This ruling makes it necessary for several colleges to obtain permission to utilize the local public schools for the training of prospective teachers.

Usually a majority of the parents of school children in any community are skeptical about having their children taught by student teachers even for a part of the time. They say, "We don't want our children practiced upon."

Again and again we hear this question: "Will the public school pupil be as well taught by the student teacher as by the regular teacher?" This question has not yet been satisfactorily answered nor will it be until a great many more investigations have been made.

Many articles on student teaching, participation teaching, practice teaching, etc., contain some such statement as: "We find, we think, we believe, or we conclude that teaching by student teachers does not cause the public school pupil to do poorer work." Often these conclusions are based
on the answers to questionnaires sent to public school superintendents and supervisors of teacher training courses.
CHAPTER 2

Present Status of Problem

To date but little has been done to determine in an objective way the actual effect of student teaching on the pupils' classwork. As previously stated, the usual method has been to send out a questionnaire. As one person's opinion is as good as another's or a little better no solution is apt to be obtained by this method.

J. D. Heilman\(^1\) conducted an experiment in the training school of Colorado State Teachers College and seven elementary schools of Logan County, Colorado in 1924, for the purpose of measuring the achievement of the child of the training school and of the child of the regular elementary school.

In order to counteract the difference in rate of learning caused by average life age of pupils in the different schools, the achievement of a group of pupils was expressed in relation to the learning ability of the group. The achievement of an average group of pupils in relation to its native learning ability was expressed by the number 100 if the group made an average score on a battery of standard tests. If a group accomplished less than it should for its learning ability, the result was expressed by a number less than 100 and vice

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versa. These numbers were called accomplishment ratios.

The average accomplishment ratio of the seven schools was 103.6 while in the training school it was 104.

The author concludes that the difference in teaching is negligible but suggests that the superior training and ability of the supervisors probably has much to do with the good work of the student teachers.

In connection with this experiment the writer of this thesis wishes to offer this observation: The pupils of the several Logan County elementary schools were taught by the regular teachers throughout the experiment. What would have been the effect had they been taught part of the time by the student teachers?

Among the questions in a questionnaire sent out by J. O. Engleman\(^2\) in 1925 and answered by forty superintendents was this: "Do pupils in the regular classes in the grades or in the high school suffer at the hands of the practice department?" Fourteen thought that they did. Of the twenty-six who thought that the pupils did not, two based their judgments on the results obtained by means of standard tests. One superintendent thought that his pupils would make 15 per cent more progress with the regular teachers only, if the "cadet teachers" were left out.

In his conclusions Engleman says: "Pupils in the public schools need not suffer at the hands of practice teachers if the regular teachers teach at least half of the

---
time, ......... and if public-school authorities ask for the removal of any cadet who is unable to do the work he is attempting."

One might raise this question: If the pupils are going to suffer when taught more than half the time, why would they not do much better work if taught full time by the regular teacher? The writer also notes that with but two exceptions Engleman is basing his conclusion, in so far as the forty superintendents are concerned, on what these men think rather than upon objective data.

At the University of California all students who wish to enroll for supervised teaching are required to take an intelligence examination. In the fall of 1927 the Thurstone Psychological Examination was given. This test was previously given to 5,077 freshmen enrolled in fifteen colleges and universities. Only 24 per cent of these freshmen made a score which was equal to that of the average of the student teachers in the University of California.

The Thurstone Psychological Examination as a whole is designed to test inherent mental alertness rather than training. The scores of the student teachers in the University of California ranged from 73 to 284. Just what bearing these scores will have on success in teaching has not been determined.

CHAPTER 3

Statement of the Problem

and the Specific Field Limited and Defined

In this study the writer has attempted to determine the effects of student teaching on pupils in two beginning algebra classes when taught part of the time by student teachers.

The critic teacher was in charge of both algebra classes all year. He knew that the experiments were being conducted—his cooperation being needed as the tests required the full class periods of each class for six days—but had nothing to do with the scoring of the tests or with the computations. In fact, he knew nothing about the results of the tests until after the completion of the experiments. The student teachers did not know that the experiments were being carried on.

The critic teacher was never absent from a class period. He considered the student teacher an assistant, an assistant who at times scored tests and work books, gave individual help to pupils, supervised study, and taught the class at least one full period a week.

One hour each week was used by the critic teacher for conferences with the student teacher. At that time the critic teacher helped the student teacher plan his work and offered constructive suggestions and criticisms.

As a student teacher worked in a class ten weeks,
each experiment lasted that length of time.

During the first 10 weeks period a student teacher was placed in one class; the other class was taught by the regular teacher. Both classes were given the same standardized tests to measure the pupils' knowledge of algebra at the start of the experiment. At the end of this 10 weeks period an equivalent form of the same standardized test was given to both classes. The gain in the scores of the second test over the scores of the first one represents the growth of the pupils' knowledge of algebra in 10 weeks.

The Columbia Research Bureau Algebra Tests, Form 1A and 1B, were used. These tests cover the fundamental operations and the solution of problems. The twenty items of part 1 cover the essential operations of first-year algebra. The twenty problems of part 2 are all real problems, such as could occur in real life.

Form 1B was given at the beginning of the first 10 weeks period and Form 1A at the close. The scores made on Form 1A were used to show the status of the pupils at the beginning of the second 10 weeks period as well as to show the accomplishment of the pupils during the first ten weeks. At the end of the second 10 weeks period Form 1B was again given to both classes.

A bright pupil should learn more algebra in ten weeks than one less bright. This was taken into consideration by finding the average intelligence quotient of each class from the results of from two to four group intelligence tests.

The tests used were Terman's group Test of Mental
Ability, forms A and B, and Otis' Group Intelligence Scale, forms A and B.

Members of the classes for whom there were no intelligence test records were given one test ten weeks before, and another, one week before the experiment was begun.

Intelligence test scores for those members of the algebra classes who had come from the Baldwin grade schools had been obtained at different times over a period of three years previous to the experiment here reported.

To determine the effect of student teaching in the one class—the class in which the student teacher was working—the following proportion was used:

\[
\frac{\text{I. Q. of class with student teacher}}{\text{I. Q. of class without student teacher}} = \frac{\text{Growth of class with student teacher}}{\text{Growth of class without student teacher}}
\]

The same procedure was followed the second 10 weeks period but with a different student teacher in the class that had none during the first period.

The results of those two periods were then used in the following manner:
<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average growth of classes without student teacher</td>
</tr>
<tr>
<td>Average growth of classes with student teacher</td>
</tr>
<tr>
<td>as</td>
</tr>
<tr>
<td>Average I. Q. of classes without student teacher</td>
</tr>
<tr>
<td>Average I. Q. of classes with student teacher</td>
</tr>
</tbody>
</table>

(See appendix for a complete outline of the practice teaching plan.)
CHAPTER 4

Presentation and Interpretation of Data

One of the beginning algebra classes met at the first period of the school day, the other at the fourth period. For convenience the two classes are referred to in this study by the numbers of the class periods.

Table 1 contains the data of class 1 for the first 10 weeks period, when a student teacher was teaching part time.

The first column on the left contains the pupils' names. The second column shows the number of different intelligence tests each pupil had taken, and the third column the average of the scores made in the several intelligence tests listed in the preceding column.

Column four is subdivided into three parts and contains: first, the scores made on part one of Columbia Research Bureau Algebra Test, Form 1B; second, the scores made on part two of the same test; and third, the total of parts one and two.

Column five is similarly divided into three parts and contains the results of Form 1A of the Columbia Research Bureau Algebra Test.

This table also shows the intelligence quotient of all the members of the class to be 101.9; the average score
for the first algebra test to be 21.05; the average score of
the second algebra test to be 31.32; and the difference of
averages of total scores to be 10.27. The number 10.27
represents the growth in knowledge of algebra.

As the number of pupils in each class was small the
factor of chance may have affected the results. To determine
this, the formula $P.E.(\text{dif}) = \sqrt{P.E.^2(\text{av}.1.) + P.E.^2(\text{av}.2.)}$
was used. The probable error was found to be 1.1981, thus
the difference of the means of the scores for the two tests
is $10.27 \pm 1.1981$.

The critical ratio ($C. R. = \frac{\text{Dif. of Means}}{\text{P.E. Dif. of Means}}$)
is 8.5719.

The accepted standard for undoubted significance of
a critical ratio is that the number obtained by means of the
critical ratio formula (8.5719 in this case) shall be at least
four times as great as the probable error of the difference
of the means. In this experiment four times the probable error
is only 4.7924 thus the findings would be significant if the
number of pupils in the class had been a little greater.
According to Garrett and others the number of cases should be
greater than 25 before any particular significance is attached
to the critical ratio.
TABLE I

(A student teacher in the class)

<table>
<thead>
<tr>
<th>Pupil</th>
<th>Number of intelligence tests</th>
<th>Average of the I. tests taken</th>
<th>Test scores at start of first 10 weeks experiment. Form 1B</th>
<th>Test scores at end of first 10 weeks experiment. Form 1A</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Part one</td>
<td>Part two</td>
</tr>
<tr>
<td>A 1</td>
<td>3</td>
<td>105</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>A 2</td>
<td>3</td>
<td>93</td>
<td>13</td>
<td>14</td>
</tr>
<tr>
<td>A 3</td>
<td>3</td>
<td>134</td>
<td>19</td>
<td>16</td>
</tr>
<tr>
<td>A 4</td>
<td>3</td>
<td>88</td>
<td>11</td>
<td>7</td>
</tr>
<tr>
<td>A 5</td>
<td>2</td>
<td>104</td>
<td>12</td>
<td>5</td>
</tr>
<tr>
<td>A 6</td>
<td>4</td>
<td>83</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>A 7</td>
<td>2</td>
<td>107</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>A 8</td>
<td>3</td>
<td>102</td>
<td>14</td>
<td>4</td>
</tr>
<tr>
<td>A 9</td>
<td>3</td>
<td>122</td>
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<td>16</td>
</tr>
<tr>
<td>A 10</td>
<td>4</td>
<td>79</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>A 11</td>
<td>3</td>
<td>112</td>
<td>15</td>
<td>14</td>
</tr>
<tr>
<td>A 12</td>
<td>2</td>
<td>101</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>A 13</td>
<td>3</td>
<td>113</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td>A 14</td>
<td>3</td>
<td>80</td>
<td>11</td>
<td>8</td>
</tr>
<tr>
<td>A 15</td>
<td>2</td>
<td>93</td>
<td>21</td>
<td>8</td>
</tr>
<tr>
<td>A 16</td>
<td>3</td>
<td>100</td>
<td>13</td>
<td>8</td>
</tr>
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<td>A 17</td>
<td>3</td>
<td>98</td>
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<td>6</td>
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<td>A 18</td>
<td>3</td>
<td>112</td>
<td>13</td>
<td>10</td>
</tr>
<tr>
<td>A 19</td>
<td>3</td>
<td>110</td>
<td>17</td>
<td>6</td>
</tr>
<tr>
<td>Averages</td>
<td>101.9</td>
<td>21.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Growth</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table II contains the data of class IV for the first 10 weeks period with the regular high school teacher in charge of the class.

The first column on the left contains the pupils' names. The second column shows the number of different intelligence tests each pupil has taken, and the third column the average of the scores made in the several intelligence tests listed in the preceding column.

Column four is subdivided into three parts and contains: first, the scores made on part one of Columbia Research Bureau Algebra Test, Form 1B; second, the scores made on part two of the same test; and third, the total of parts one and two.

Column five is similarly divided into three parts and contains the results of Form 1A of the Columbia Research Bureau Algebra Test.

This table also shows the intelligence quotient of all the members of the class to be 96; the average score for the first algebra test to be 26.61; the average score of the second algebra test to be 37.19; and the difference of averages of total scores to be 11.58. The number 11.58 represents the growth in knowledge of algebra.

The probable error was found to be 1.2605, thus the difference of the means of the scores for the two tests is 11.58 ± 1.2605, and the critical ratio 9.1154. This number is considerably greater than four times the probable error of the difference of the means hence the findings may be significant.
# TABLE II


(No student teacher in the class)

<table>
<thead>
<tr>
<th>Pupil</th>
<th>Number of intelligence tests</th>
<th>Average of the I. tests taken</th>
<th>Test scores at start of first 10 weeks experiment. Form 1B</th>
<th>Test scores at end of first 10 weeks experiment. Form 1A</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Part one</td>
<td>Part two</td>
</tr>
<tr>
<td>B 1</td>
<td>4</td>
<td>91</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>E 2</td>
<td>2</td>
<td>109</td>
<td>19</td>
<td>11</td>
</tr>
<tr>
<td>B 3</td>
<td>4</td>
<td>112</td>
<td>21</td>
<td>16</td>
</tr>
<tr>
<td>B 4</td>
<td>2</td>
<td>101</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>B 5</td>
<td>3</td>
<td>91</td>
<td>11</td>
<td>6</td>
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<td>2</td>
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<td>B 9</td>
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<td>B 10</td>
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<td>17</td>
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<td>B 12</td>
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<td>2</td>
</tr>
<tr>
<td>B 13</td>
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<td>9</td>
</tr>
<tr>
<td>B 14</td>
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<td>101</td>
<td>21</td>
<td>13</td>
</tr>
<tr>
<td>B 15</td>
<td>4</td>
<td>89</td>
<td>16</td>
<td>5</td>
</tr>
<tr>
<td>B 16</td>
<td>4</td>
<td>96</td>
<td>15</td>
<td>13</td>
</tr>
<tr>
<td>B 17</td>
<td>4</td>
<td>105</td>
<td>17</td>
<td>13</td>
</tr>
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<td>B 18</td>
<td>2</td>
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</tr>
<tr>
<td>B 19</td>
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<td>B 20</td>
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<td>89</td>
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<td>10</td>
</tr>
<tr>
<td>B 21</td>
<td>3</td>
<td>98</td>
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<td>17</td>
</tr>
<tr>
<td>Averages</td>
<td>96</td>
<td></td>
<td>26.61</td>
<td></td>
</tr>
</tbody>
</table>

Growth
Results at End of First 10 Weeks Period

The achievement of a class should be proportional to its ability to learn. Class I with an average I. Q. of 101.9 should therefore be expected to show a greater growth than class IV with an average I. Q. of 96.

If these classes were taught by the same teacher the ratio of the achievement of the two should equal the ratio of their I. Qs.

If a class fails to make its proportionate growth when taught part of the time by a student teacher it would seem reasonable to conclude that the presence of a student teacher has in some way, directly or indirectly, effected the achievement of the class.

The following proportion was used to show the relative achievement of the two classes:

\[
\frac{\text{I. Q. of Class I}}{\text{I. Q. of Class IV}} = \frac{\text{Growth of Class I}}{\text{Growth of Class IV}}
\]

\[
\frac{101.9}{96} = \frac{10.27}{x} \quad \text{(substituting)}
\]

As the ratio of the growth of the two classes does not equal the ratio of the I. Qs. \(x\) has been substituted in order to find the difference in the amount of growth.

\[
101.9 \times x = 985.92 \quad \text{(solving)}
\]

\[
x = 9.675
\]

Therefore if class IV had made a growth of only 9.675 it would have made the same proportionate growth as
that made by class I. Since class IV made an actual growth of 11.58, the results show a greater growth in the class unassisted by a student teacher.

Suppose the growth of class IV is considered to be 100 per cent. Then:

\[
\frac{\text{Growth of Class I}}{\text{Growth of Class IV}} = \frac{x}{100}\%
\]

(or)

\[
\frac{10.27}{11.58} = \frac{x}{100}
\]

(solving) \(11.58 \times x = 1027\)

\[x = 88.68, \text{ approximately } 88\frac{3}{4}\%\]

Thus the results indicate that the class in which a student teacher was teaching part of the time (class I) achieved but \(88\frac{3}{4}\%\) per cent as much in 10 weeks as the class which was taught by the regular high school teacher all the time.

The procedure for the second 10 weeks period was reversed. Class I (the class that was assisted by a student teacher the first ten weeks period) was taught all the time by the regular high school teacher. Class IV (the class that was taught by the regular teacher the first 10 weeks) was assisted by a new student teacher.

As previously stated, the scores made on the Columbia Research Bureau Algebra Tests at the end of the first 10 weeks period were used to indicate the pupils' knowledge of algebra at the start of the second 10 weeks period.

Table III contains the data of class I for the second 10 weeks period with the regular high school teacher.
in charge of the class.

The first column on the left contains the pupils' names. The second column shows the number of different intelligence tests each pupil has taken, and the third column the average of the scores made in the several intelligence tests listed in the preceding column.

Column four is subdivided into three parts and contains: first, the scores made on part one of Columbia Research Bureau Algebra Test, Form IA; second, the scores made on part two of the same test; and third, the total of parts one and two.

Column five is similarly divided into three parts and contains the results of Form 1B of the Columbia Research Bureau Algebra Test.

This table also shows the intelligence quotient of all the members of the class to be 101.9; the average score for the first algebra test to be 31.32; the average score of the second algebra test to be 41.21; and the difference of averages of total scores to be 9.89. The number 9.89 represents the growth in knowledge of algebra.

The probable error was found to be 1.1981, thus the difference of the means of the scores for the two tests is 9.89 \pm 1.1981, and the critical ratio 8.2547. This number (8.2547) is greater than four times the probable error of the difference of the means hence the results may be significant.
TABLE III
SHOWING NUMBER OF INTELLIGENCE TESTS EACH PUPIL HAS TAKEN,
THE AVERAGE I. Q. OF EACH PUPIL, AND THE ACHIEVEMENT OF
CLASS I FOR THE SECOND 10 WEEKS PERIOD AS SHOWN BY THE RE-
SULTS OF COLUMBIA RESEARCH BUREAU ALGEBRA TESTS
(No student teacher in the class)

<table>
<thead>
<tr>
<th>Pupil</th>
<th>Number of intelligence tests</th>
<th>Average of the I. tests taken</th>
<th>Test scores at start of second 10 weeks experiment. Form 1B</th>
<th>Test scores at end of second 10 weeks experiment. Form 1A</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Part one</td>
<td>Part two</td>
</tr>
<tr>
<td>A 1</td>
<td>3</td>
<td>105</td>
<td>20</td>
<td>9</td>
</tr>
<tr>
<td>A 2</td>
<td>3</td>
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<td>A 3</td>
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<td>A 4</td>
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</tr>
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<td>A 9</td>
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<td>17</td>
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<tr>
<td>A 10</td>
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<td>A 11</td>
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<td>16</td>
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<td>A 12</td>
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<td>9</td>
</tr>
<tr>
<td>A 14</td>
<td>3</td>
<td>80</td>
<td>17</td>
<td>6</td>
</tr>
<tr>
<td>A 15</td>
<td>2</td>
<td>93</td>
<td>29</td>
<td>16</td>
</tr>
<tr>
<td>A 16</td>
<td>3</td>
<td>100</td>
<td>20</td>
<td>10</td>
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<tr>
<td>A 17</td>
<td>3</td>
<td>98</td>
<td>22</td>
<td>5</td>
</tr>
<tr>
<td>A 18</td>
<td>3</td>
<td>112</td>
<td>16</td>
<td>6</td>
</tr>
<tr>
<td>A 19</td>
<td>3</td>
<td>110</td>
<td>24</td>
<td>12</td>
</tr>
</tbody>
</table>

Averages 101.9  31.32  41.21
Growth  9.89
Table IV contains the data of class IV for the second 10 weeks period when a student teacher was teaching part of the time.

The first column on the left contains the pupils' names. The second column shows the number of different intelligence tests each pupil has taken, and the third column the average of the scores made in the several intelligence tests listed in the preceding column.

Column four is subdivided into three parts and contains: first, the scores made on part one of Columbia Research Bureau Algebra Test, Form 1A; second, the scores made on part two of the same test; and third, the total of parts one and two.

Column five is similarly divided into three parts and contains the results of Form 1B of the Columbia Research Bureau Algebra Test.

This table also shows the intelligence quotient of all the members of the class to be 96; the average score for the first algebra test to be 37.19; the average score of the second algebra test to be 42.43; and the difference of averages of total scores to be 5.24. The number 5.24 represents the growth in knowledge of algebra.

The probable error was found to be 1.2605, thus the difference of the means of the scores for the two tests is 5.24 ± 1.2605, and the critical ratio 4.1571. This number (4.1571) is smaller than four times the probable error of the difference of the means hence the results may not be significant.
TABLE IV


(A student teacher in the class)

<table>
<thead>
<tr>
<th>Pupil</th>
<th>Number of intelligence tests</th>
<th>Average of the I. tests taken</th>
<th>Test scores at start of second 10 weeks experiment, Form 1B</th>
<th>Test scores at end of second 10 weeks experiment, Form 1A</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Part one</td>
<td>Part two</td>
</tr>
<tr>
<td>B 1</td>
<td>4</td>
<td>91</td>
<td>24</td>
<td>9</td>
</tr>
<tr>
<td>B 2</td>
<td>2</td>
<td>109</td>
<td>22</td>
<td>18</td>
</tr>
<tr>
<td>B 3</td>
<td>4</td>
<td>112</td>
<td>30</td>
<td>10</td>
</tr>
<tr>
<td>B 4</td>
<td>2</td>
<td>101</td>
<td>26</td>
<td>17</td>
</tr>
<tr>
<td>B 5</td>
<td>3</td>
<td>91</td>
<td>25</td>
<td>8</td>
</tr>
<tr>
<td>B 6</td>
<td>2</td>
<td>85</td>
<td>17</td>
<td>4</td>
</tr>
<tr>
<td>B 7</td>
<td>2</td>
<td>90</td>
<td>31</td>
<td>15</td>
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<tr>
<td>B 8</td>
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<td>100</td>
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<tr>
<td>B 9</td>
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<td>B 10</td>
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<td>12</td>
</tr>
<tr>
<td>B 11</td>
<td>4</td>
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<td>23</td>
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<tr>
<td>B 12</td>
<td>2</td>
<td>81</td>
<td>16</td>
<td>4</td>
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<tr>
<td>B 13</td>
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<td>93</td>
<td>28</td>
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<tr>
<td>B 14</td>
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<td>101</td>
<td>29</td>
<td>14</td>
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<tr>
<td>B 15</td>
<td>4</td>
<td>89</td>
<td>21</td>
<td>7</td>
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<tr>
<td>B 16</td>
<td>4</td>
<td>95</td>
<td>25</td>
<td>13</td>
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<tr>
<td>B 17</td>
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<td>B 18</td>
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<td>B 19</td>
<td>2</td>
<td>84</td>
<td>14</td>
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<tr>
<td>B 20</td>
<td>2</td>
<td>89</td>
<td>21</td>
<td>14</td>
</tr>
<tr>
<td>B 21</td>
<td>3</td>
<td>98</td>
<td>30</td>
<td>20</td>
</tr>
</tbody>
</table>

Averages 96 37.19 42.42

Growth 6.24
Results at End of Second 10 Weeks Period

The following proportion was used to show the relative achievement of the two classes:

\[
\frac{\text{I. Q. of Class I}}{\text{Growth of Class I}} = \frac{\text{I. Q. of Class IV}}{\text{Growth of Class IV}}
\]

\[
\frac{101.9}{96} = \frac{9.89}{x} \quad \text{(substituting)}
\]

\[101.9 \times x = 949.44\]
\[x = 9.317\]

As the ratio of the growth of the two classes does not equal the ratio of the I. Qs., x has been substituted in order to find the difference in the amount of growth.

The results show that class IV should have made a growth of 9.317 in order to have made the same proportionate growth as class I. As class IV made an actual growth of 5.24 the results show a greater growth in the class unassisted by a student teacher.

Suppose the growth of class I is considered to be 100 per cent. Then:

\[
\frac{\text{Growth of Class I}}{\text{Growth of Class IV}} = \frac{100\%}{x}
\]

\[
\frac{9.89}{5.23} = \frac{100\%}{x}
\]

\[9.89 \times x = 524\]
\[x = 52.98\]
Thus the results indicate that the class in which a student teacher was teaching part of the time (class IV) achieved but approximately 53 per cent as much in 10 weeks as the class which was taught by the regular high school teacher all the time.

If the two classes had made the same proportionate growth throughout the twenty weeks of the experiment the results could have been expressed by the following proportion:

\[
\text{Average growth of classes without student teacher} : \text{Average growth of classes with student teacher}
\]

\[
\begin{align*}
\text{Average I. Q. of classes without student teacher} & = \frac{11.58 + 9.89}{2} = \frac{98.95}{98.95} \\
\text{Average I. Q. of classes with student teacher} & = \frac{10.27 + 5.24}{2} = \frac{98.95}{98.95}
\end{align*}
\]

\[
(\text{then}) \quad \frac{10.735}{7.755} = \frac{I}{I} \quad (\text{not true so substitute in 1st ratio of 1st proportion})
\]

\[
\begin{align*}
\text{Average growth of classes without student teacher} & = 10.735 \\
\text{Average growth of classes with student teacher} & = 7.755
\end{align*}
\]

Suppose the average growth of the classes without student teachers is considered to be 100 per cent. Then:

\[
\begin{align*}
\frac{10.735}{7.755} & = \frac{100\%}{x} \\
x & = 72.24
\end{align*}
\]

In other words the growth of classes with student teachers has
been approximately \(72\frac{1}{2}\) per cent that of the classes without student teachers.
Limitations

This attempt to measure the effects of student teaching on the pupils in two beginning algebra classes has its limitations, among them the following:

1. The total duration of the experiment was but twenty weeks. A longer period should give more reliable results.

2. Allowing the student teacher to work in a class but ten weeks did not give him time enough to do his best work. A teacher must first become acquainted with the pupils and orient himself; this requires time hence the student teacher was working under a handicap for several days of his ten weeks period.

3. The critic teacher was always present when the student teacher had charge of the class. The supervisor was often present too thus the student teacher probably never felt at ease in his work. The factor of nervousness surely decreased the efficiency of the student teacher.

4. It is pretty generally agreed among students in the field of intelligence testing that the results of mental tests are fairly reliable when obtained from boys and girls who have not yet reached the chronological age of fourteen. But even though the results of the different intelligence tests do agree very closely, can it be proved that it is intelligence that is being measured? It is true that something is being measured with considerable accuracy, but is it intelligence?
Nevertheless persons opposed to the idea that one's mental ability can be ascertained by means of intelligence tests will have to devise better methods of determining this ever present elusive mental quality before they can ignore the findings of Terman, Otis, and many others.

5. There were three pupils in one class and six in the other who had failed the preceding year. No attempt was made to control this factor.
Conclusions

1. If we entirely ignore the factor of ability and assume that neither class had an advantage over the other we find that: first, the classes with a student teacher the first ten weeks period (class I) made an actual gain of $88\frac{3}{4}$ per cent of that made by the class without a student teacher (class IV); second, the class with a student teacher the second ten weeks period (class IV) made an actual gain of only 53 per cent that made by the class without a student teacher (class I); and third, the average gain of the two classes with student teachers for the twenty weeks period was only $72\frac{1}{2}$ per cent that of the classes without student teachers.

2. It would be unwise to accept the results of this experiment as conclusive evidence for or against student participation teaching; too many factors for which no accounting has been made effect or may effect the results.

3. Another experiment conducted in the same school in a similar manner might produce results in favor of the student teachers.

4. The effects of student teaching on pupils in public schools will not be accurately determined until the data from many experiments have been collected and analyzed.
BIBLIOGRAPHY


Gray, W. S. The Results of Practice Teaching on the Pupils Taught. United States Bureau of Ed. 1913.


APPENDIX

PRACTICE TEACHING

Plan for Baker University Training School

Cooperative Organization with the Baldwin Public Schools

Prepared by Department of Education
Baker University

July 25, 1930
W. J. Williams
PRACTICE TEACHING

Plan for Baker University Training School.

Cooperative Organization with the Baldwin Public Schools.

A. Purpose and Aim:

1. To provide for immediate operation under the minimum requirements as set up by the State Board of Education, which has adopted the standards of the American association of Teachers Colleges.

2. To furnish practical opportunities for sophomores and seniors in securing adequate training through demonstration, observation and participation in actual class-room management and methods of teaching.

3. To make use of all available means for such practice, as may be found and developed in the college classes, elementary and high school, rural schools, nearby schools, and schools in neighboring towns.

4. To protect all established organization by means of careful supervision and reasonable controls, to the end that schools and classes shall have the least interference with their ordinary routines and standards, thus:

- Recognized standards set up by local Boards of Education.
- Educational policies of the local school superintendent.
- Plans, schedules and standards of classroom teachers.
- Classification, promotion and general progress of the pupils. This especially must be safeguarded.
- Courses of study.
- Holidays and vacations.
B. Officials: Definitions and description of duties.

1. Local Board of Education and the College Board of Trustees, or (through their representatives) responsible for formal contract of operation in the use of the public schools.

2. Local superintendent. Responsible for the successful operation of his school system and the general welfare of his pupils. His authority to be recognized as final in all matters having to do with the presence of student teachers, subject only to the limitations of contract. A close and sympathetic cooperation with the supervisor is highly desirable.


4. Dean. Coordinator of academic program of student teachers.

5. Critic teacher. Teacher in charge of grade or subject, who assumes responsibility for training of student teacher under direction of the supervisor.

6. Student-Teacher. A student in training as a teacher, recognizing a professional attitude in the class-room.
II. Superintendent

1. As chief executive officer of the Board of Education, the superintendent has the sole charge of the local school system, and is entirely responsible for the working of his schedule, course of study, oversight of teachers, local and state laws and regulations.

2. Will determine together with the supervisor the terms of admission of student-teachers.

3. Jointly with the supervisor will set up standards of department and action of student-teachers when acting as practice teachers anywhere within the school building or upon the school grounds, and will have the same right of control as exercised over regularly employed teachers under contract.

4. Will have the right to exclude any student-teacher. Said teacher having the right of appeal to the Board of Education on the same condition as any regular teacher.

5. Act as official representative of his teachers, presenting their viewpoints, criticisms and suggestions to the supervisor.

6. Consult with parents regarding progress of pupils as conditioned in any way by the presence of the student-teachers.

7. The essential and peculiar problem of administration is recognized by the college, is that the authority of the superintendent in regard to practice teaching, is one of ade-
quately and specifically safeguarding the progress of the pupils in his school system and to establish that appropriate degree of control so that the demands of practice teaching shall not limit the activities of the teachers in discharge of their duties nor shall it modify the effectiveness of the teaching process.
III. Supervisor

1. As head of the Department of Education, the supervisor will have full control and responsibility for all student-teachers in terms of admission, quantity and quality of work, methods and techniques of procedure, estimates of progress and general deportment, subject to modification as determined through conference with the superintendent.

2. Prepare standards for practice teaching, and upon adoption by the faculty of the college make provision for their successful operation.

3. Adjust, in cooperation with the Dean of the College, the schedules of student-teachers.

4. Provide for careful organization for observation teaching, when such is carried on in schools distant from the community.

5. Conduct group conferences, and arrange for critic conferences.


7. Visit each student-teacher at least once every two weeks, supervising each when actually teaching.

8. Since the success of the practice teaching will rest largely with the supervisor, he should be given wide liberty, within terms of contract and faculty regulation, and held responsible for operation of his plans.
IV. Dean of College

Feature of coordination:

1. As Dean of Instruction the dean will need to establish a working program so that the student-teacher may be as easily as possible adjusted to the schedule of the college, thus avoiding conflicts with the public school program and schedule.

2. To provide a means of coordination and cooperation between the college instructors and the training school, as such. This may require an adjustment of classes and the professionalizing of some courses which the student-teacher may teach.

3. If feasible, make available certain college classes for practice teaching.

4. Considerations:
   a. There will be need, if we are to avoid a six day week schedule for the student-teacher and the supervisor, to make faculty provision for the change of the Baker idea of Saturday classes, changing them to Monday.
   b. A change of the float period schedule, or the need to make some kind of an arrangement that such classes will not effect student-teachers.
   c. A method of coordinating the matter of holidays, so that if possible, college holidays will coincide
with such occasions in the public schools. Perhaps also the date of opening college, the Christmas recess and other calendar features.

d. The excusing of student-teachers from chapel requirements, when the student-teacher is in actual practice.

e. Afternoon classes should not be unduly affected by the athletic schedule.

f. Making the city superintendent a member of the college staff. Giving him one course (School Management, or History of Education.) in the Department of Education. In return, perhaps the Department of Mathematics might teach a class in Algebra at the high school, in which there would be practice teaching. Compensation might have to be considered.

5. Suggestions for the schedule of the Department of Education.


c. Under the tentative plan suggested, the supervisor will need to spend two periods per day in the public schools.
V. Critic Teachers

General Features of Responsibility.

1. No organization involving the presence of the student-teacher in the class-room of the teacher acting as critic, shall be established that will seriously interfere with the regular work of that class.

2. The critic teacher has full responsibility for her class in the same manner and under the same conditions that would maintain if the student-teacher were not present.

3. It is not expected that the critic teacher will be absent from her room when the student-teacher has charge.

4. The critic teacher shall determine when and for what type of work the student-teacher shall have actual charge, although it would seem highly advisable that the student-teacher shall have opportunity to secure experience in all phases of class-room activities and methods of teaching.

5. The student-teacher is an apprentice teacher for whom the critic is adviser, guide and critic. The relationship here established should be one of mutual professional concern and should involve:

a. A sympathetic understanding of each other's viewpoint, responsibilities and purposes.

b. The critic teacher should help the student-teacher plan her work, giving timely suggestions, and not sparing adverse criticism, but such criticism...
should be given privately or in the conference period.

c. The student-teacher is to consider herself much in the relation, not only of the learner, but also of an assistant, and consequently the critic teacher may not hesitate to assign such duties that will not only lessen the routine of the critic but will enable the student-teacher to secure the maximum of training:

e. e. Helping grade papers and themes.
   Individual help to pupils.
   Supervised study.
   Making reports.
   Filling out grade reports.
   Help with special programs and special days.
   Hall, room, and playground duties, etc.

d. The student-teacher is but a learner and should therefore look to the critic teacher for guidance, suggestions for improvements and personal encouragement.

6. The relation of the critic teacher to the supervisor is one of mutual cooperation. The supervisor is not a supervisor primarily of critic teachers but of student-teachers. Cooperation should be:

a. In assisting the supervisor to work out plan sheets with the student-teacher so that there will be no conflict with the course of study.

b. Presenting freely criticisms of student-teachers, advising as to possible changes and if necessary the elimination of student-teachers from the group of practice teaching students.
c. Assist in estimating the work of student-teachers.

d. Acquainting the supervisor with complaints of pupils and of parents.

e. Be free to suggest improvements.

f. The regarding of supervision as not inspectorial.

7. It must be assumed at all times on the part of all concerned that practice teaching is a professional matter and that the critic teacher will hold the same high ethical teacher's code with student-teachers as are now maintained with fellow teachers.
VI. The Student-Teacher

Standards and Regulations.

1. The student-teacher is a student in training, regarded by the training school not so much as an individual to be educated but rather as one who is being given a professional education. Here the demands and responsibilities are preeminent and take a priority over individual wishes. Hence a special and technical viewpoint is to be kept in mind.

   a. Mastery of Subject-matter. Scholastic preparation.
      1. To know and to know intensively and extensively what is to be taught.
      2. To know and to know effectively how it is to be taught.
      3. To know and to know skillfully the manifold forms in which it may be taught.

   b. Professionalized subject-matter.
      1. Material organized in terms of the children and grade to be taught.
      2. Careful planning according to certain psychological laws and revealed by specific techniques.
      3. Application of fundamental principles, holding to the scientific accuracy of each subject, but translating it into the needs and according to the demands of the learner.
4. To see all subject-matter from the standpoint of teaching it.

c. Method of Teaching.

1. A means to an end. It should figure in practice teaching as an art rather than as a theory.

2. A doing in terms of reconstructed experience.

3. The psychologizing of subject matter.

d. Management.

1. Careful planning of all lessons to be taught.
   (Weekly lesson sheets.)

2. Manner and mannerisms teach. Example is vastly more potent than precept.

3. Environment conditions the learning process.

2. The student-teacher must see and understand that in practice teaching is an opportunity for professional development, not an occasion to earn a credit or satisfy a certificate requirement.

3. Professional integrity.

   a. The student-teacher is more than an individual in training, she is a teacher and therefore recognizes both the dignity and the responsibility of such a position.

   b. A manifestation of a personal interest in the work as that of teaching rather than experimenting.

   c. An attitude of loyalty must be required and unobtrusively cultivated. This involves a distinct sense of hearty responsiveness to the school and a peculiar sensitiveness to the genuine welfare of the school child.
d. An attitude of confidence. What goes on in the school-room is not for gossip. Neither does it merit an impersonal aloofness but must be regarded with the kindness of a sympathetic confidant.

4. Admission to practice teaching.

a. Prerequisites. Elementary certificate.

1. Candidates for the elementary certificate must be of sophomore classification and shall either have a three hour credit in general psychology or be enrolled in such a class.

2. College work shall average "C".

3. Give evidence that they have mastery of the subjects they expect to teach, as student-teachers, either by a grade of "B" (average) in such subjects, or by making a certain standing on standardized tests in such subjects.

4. Rank in freshman psychological tests shall be considered in estimating standing.

b. Prerequisites for State Three Year Life certificate.

1. Classification of senior, having at least 15 hours of work above 50.

2. Shall have at least 9 hours of education, three of which must be general psychology and three hours of work above 50. It would be desirable that educational psychology should have been included.

3. An average in college grades of "C".

4. An average of "B" in major subject or the subject in which student teacher expects to practice.
5. Must have received credit for at least 12 hours in major subject or 9 hours in subjects in which student-teacher expects to teach.

6. A standing in a general psychological test which shall approximate the mean of the standard of such a test.

5. Admission to the public schools shall be determined by the joint action of the supervisor and superintendent and will be based on:
   a. Personality and adaptability.
   b. Scholarship.
   c. Type of work student-teacher gives promise of doing in a creditable manner.

6. Continuance in the course will depend upon:
   a. Grade of work as estimated by supervisor, critic teachers and superintendent.
   b. Observance of professional integrity. A failure to observe in spirit and in fact a confidential attitude toward school doings, both of teachers and pupils, will be deemed sufficient cause for removal from the course.
   c. Willingness to accept supervision.
   d. Prompt and regular attendance at all practice periods. All absences must be pre-excused and a substitute provided. This must be arranged for with the supervisor. The derangement of the college program will not be accepted as a legitimate excuse.
Lengthy chapels, changed schedules, overtime classes, athletic events, special holidays, do not constitute justifiable reasons for excuses.

7. The course in practice teaching will consist of:
   a. Observation and demonstration classes.
   d. Critic conferences. Keeping notes and comments.

8. Equipment.
   a. Text book for course.
   b. Teaching manual.
   c. Project case. Folder with cards for observations, etc. form for project note book.

9. The course in practice teaching will be counted toward the required hours for the certificate but will apply only on the B. S. degree in special subjects as determined by the standards of the college.

10. Assignment to the various groups--A. B. C. D. E.--will be made by the supervisor and will be determined by the needs of the student-teacher and the opportunity for practice, but will be subject to the following general conditions:
    a. Scholarship standards will be an essential factor in assignment to group and subject.
    b. The number of majors will be accommodated first, then
student-teachers may be assigned according to their minor subjects or subject of special interest as decided by the supervisor.

c. Limitation of available places will necessitate rather arbitrary assignments, but the rights of the student-teacher will be protected as much as possible.
VII. Plan

1. Student-teachers will enroll in practice teaching, securing a special form, filling it out and on consultation with the head of the department be tentatively enrolled.
   a. College regulation will call for the payment of a special fee, which will be $10.00 above the regular tuition for a three hour credit.
   b. At the time of the first scheduled group conference, student will receive permanent enrollment according to section.

2. The present and temporary arrangement for practice teaching will call for the maximum use of the local schools, and in order to provide for all, a special arrangement of student-teacher's assignments will have to be made.
   a. Sections A, B, C. Senior group, and specials.
   Sections D, E. Elementary, and specials.
   b. Elementary group D, first semester. Group E, second semester.

60 Practice periods. In a grade, doing work in a particular subject for the length of time of that subject, five days a week. 12 weeks.

18 Conference group sessions. One each week for eighteen weeks.

12 Critic group sessions. As worked out by critic but within the limits of the practice periods, i. e. within the twelve weeks.
Example. In the fifth we would have during the first semester, a student-teacher doing practice work in Arithmetic. Also one in Reading.
Two per grade, in each grade, (not including the first grade) per semester or 14 elementary student-teachers.
28 for the year. Special arrangements will be made for special student-teachers.

c. Senior group.

Group A. Assigned for work, first ten weeks of the first semester.

Group B. Last five weeks, (but one) of the first semester and the first five weeks of the second semester.

Group C Last ten weeks of the second semester.

This will provide in each group:

Practice periods. 50, 40 minute, 5 times a week.

Group conferences. 18, one per week.

Critic conferences. 12 during period of practice.

Observations. 10, under supervision.

Example. Student-teachers, x, y, and z, assigned to English department. X for English I. Y for English II. Z for English III. X, y, and z will be with critic teacher Aa. for 10 weeks.

3. If college classes can be arranged so as to provide practice teaching, the plan under 2 b could be used.

THIS PLAN WOULD BE SUBJECT TO THE MODIFICATIONS OF EXPERIMENTATION