A COMPARATIVE STUDY OF THE EFFECT ON
SPELLING BY COPYING IN LONG-
HAND AND TYPEWRITING

By

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The writer wishes to express grateful appreciation to the members of his advisory committee, Mr. E. L. Abell, and Dr. J. R. Shannon, of the Education Department, and Miss Kate Browning, of the Commercial Department, of Indiana State Teachers College. The writer is also indebted to Mr. V. E. Briedenbaugh, formerly of the Commercial Department.

Herman F. Truelove
"It is the business of everyone interested in education to insist upon the school as the primary and most effective interest of social progress and reform in order that society may be awakened to realize what the school stands for, and arouse to the necessity of endowing the educator with sufficient equipment properly to perform his task.

The teacher is engaged, not simply in the training of individuals, but in the formation of the proper social life. Every teacher should realize the dignity of his calling; that he is a social servant set apart for the maintenance of proper social order and the securing of the right social growth."--John Dewey
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>LIST OF TABLES</th>
<th>vi</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>A. Purpose of This Study</td>
<td>1</td>
</tr>
<tr>
<td>B. Brief Summary of Related Studies</td>
<td>1</td>
</tr>
<tr>
<td>C. Statement of Problem</td>
<td>5</td>
</tr>
<tr>
<td>D. Procedure Used</td>
<td>5</td>
</tr>
<tr>
<td>1. Selections of Groups</td>
<td>5</td>
</tr>
<tr>
<td>2. Selection of Copy and Drill Material</td>
<td>6</td>
</tr>
<tr>
<td>3. Administering Copy and Drill Material</td>
<td>10</td>
</tr>
<tr>
<td>4. Testing the Copy and Drill Activities</td>
<td>11</td>
</tr>
<tr>
<td>II. ORGANIZATION AND ANALYSIS OF DATA</td>
<td>13</td>
</tr>
<tr>
<td>A. Presentation of Data</td>
<td>13</td>
</tr>
<tr>
<td>1. General Treatment of Data</td>
<td>13</td>
</tr>
<tr>
<td>2. Statistical Treatment of Data</td>
<td>13</td>
</tr>
<tr>
<td>3. Explanation of Table Headings</td>
<td>14</td>
</tr>
<tr>
<td>III. GENERAL SUMMARY</td>
<td>28</td>
</tr>
<tr>
<td>A. Findings</td>
<td>28</td>
</tr>
<tr>
<td>B. Conclusions</td>
<td>29</td>
</tr>
<tr>
<td>C. Limitations of This Study</td>
<td>29</td>
</tr>
<tr>
<td>IV. APPENDIX</td>
<td>31</td>
</tr>
<tr>
<td>A. Bibliography</td>
<td>31</td>
</tr>
</tbody>
</table>
LIST OF TABLES

Table                                    Page
I.  Rank of Words According to Times Missed........ 7
I-A. A Comparative Study of Each Group on
     Test I......................................................... 16
II. A Comparative Study of Each Group on
     Test II......................................................... 17
III. A Comparative Study of the Boys on Test I..... 18
IV.  A Comparative Study of the Boys on Test II.... 19
V.   A Comparative Study of the Girls on Test I... 20
VI.  A Comparative Study of the Girls on Test II... 21
VII. A Comparative Study of the Control Group
     on Test I........................................................ 22
VIII. A Comparative Study of the Control Group
      on Test II...................................................... 23
IX.  A Comparative Study of the Typing Group
     on Test I........................................................ 24
X.   A Comparative Study of the Typing Group
     on Test II........................................................ 25
XI.  A Comparative Study of the Control Group
     on Both Tests.................................................... 26
XII. A Comparative Study of the Typing Group
     on Both Tests.................................................... 27
I. INTRODUCTION

A. Purpose of This Study

The ability to touch the typewriter keys accurately is one of the major techniques of typewriting. The typing of a line of words, or phrases, or a paragraph is one of the common types of drills used. It may be that an alphabetic sentence such as "The quality of modern explosives allows projectiles of remarkable and almost unbelievable weight and size to be fired long distances," will be typed once or a number of times for a period of one day or several days. If the material contains words which the student is unable to spell, how much improvement, if any, will be made in his ability to spell after he has typed it? This question was the motive for this research undertaking.

B. Brief Summary of Related Studies

The general theme of this study is treating of copying words in longhand compared to writing them on a typewriter as a method of learning to spell. Studies have been made pertaining to various methods of learning to spell but few have been made studying the effect of typing on spelling ability. In the past most of the studies and experiments made have been in the lower grades. Fewer studies have been made in grades six or
investigations indicate a search for a method of meeting

seven and seldom has there been a study pertaining to
g or. In recent years, however, there
high school students. In recent years, however, there
has been a trend toward emphasizing the need of teaching
spelling in the junior and senior high schools. Recent
investigations indicate a search for a method of meeting
this situation.

An investigation by Gilbert calls attention to
the improvement in spelling ability from year to year in
the high school regardless of the presence or absence
of spelling instruction, and shows that this improvement
is due, in part at least, to incidental learning in con-
nection with reading.

Results of investigators frequently differ as to the
most efficient method in teaching spelling. Obner found that no one method showed superiority in teaching


2L. C. Gilbert. "Effect of Reading on Spelling in the
Secondary Schools." California Quarterly of Secondary
Education. 9:269-75. April, 1934.

3E. L. Obner. Method in Teaching Spelling. Master's
spelling. McKee\textsuperscript{4} found that the column form of teaching spelling is superior to either the phrase, sentence or paragraph form. Gates and Graham\textsuperscript{5} found that the use of games and activities in connection with teaching spelling is slightly better than the study-test plan, especially with the third of pupils highest in intelligence and spelling scores. Jones\textsuperscript{6} found from the administration of a number of tests to seventh grade pupils that there was little correlation between spelling ability and general intelligence.

Again results of studies pertaining to the relative ability of boys and girls do not agree. Some results show that girls have superior abilities and others show that boys possess superior abilities.


H. L. Eply found that women students are superior in average scholarship to men students.

E. Toene found that women excel men in scholarship.

E. Higgins found that women excel men in scholarship.

---

7 H. L. Eply. *A Comparative Study of Social Studies Majors of Indiana State Teachers College for the Years 1931-1933.* (Indiana State Teachers College, Unpublished Master's Thesis, Number 203.)


9 E. Higgins. *A Study of the Achievement and Related Factors of Mathematics Majors at Indiana State Teachers College for the Years 1926-1932.* (Indiana State Teachers College, Unpublished Master's Thesis, Number 76.)
C. Statement of Problem

1. Do students taking typewriting learn to spell any of the words in the exercise as they type it?

2. What does a comparative study of the effect on spelling by copying in longhand and typewriting show?

3. Do boys or girls rank higher on such spelling tests?

D. Procedure Used

1. Selections of Groups. In order to make a comparative study it was necessary to have a group known as a control group copy the words in longhand as a means of learning to spell them. Students from English classes were selected for this group and in most instances were either freshmen or sophomores. The typing group was composed of students enrolled in typewriting and not in a control group. This group in most instances was composed of either juniors or seniors.

There was a total of 604 students from ten Indiana high schools who took the test of 108 words at the beginning of the school year but only 403 of them actually participated in the whole study. Both groups from one school and the control group from each of two other
schools did not participate. This partially accounts for the decrease in the number that took part in the study. Other probable reasons for the decrease are given on page 10. Groups from the following schools participated in this study: Ambia, Boswell, Earl Park, Fowler, Freeland Park, Kentland, Loogootee, Otterbein, and Oxford.

There were 107 boys and 105 girls making a total of 212 students in the control group. There were 91 boys and 100 girls making a total of 191 students in the typing group. The mean age of the control group in years was 14.65 for boys and 14.26 for girls. It was 16.72 for boys and 16.32 for girls in the typing group.

2. Selection of Copy and Drill Material. A list of 108 words was given groups at the beginning of the school year in order to obtain a list of words suitable for copying and typing. This list is shown in the Appendix on pages 33 and 34. The first 100 words was a list used by Mr. V. E. Briedenbaugh, former instructor in the Commerce Department, Indiana State Teachers College, Terre Haute, in his master's thesis and which he often uses to secure a relative spelling ability of the students in his classes. The last eight words were selected at random by the writer, who has noticed that they are some of the words high school students frequently find difficult
to spell. The lists were checked carefully and a record was kept of the number of times each word was missed.

Since fifty words, together with the other words necessary to make sentences, probably would make sufficient material for either copying or typing material it was decided to select the fifty words missed the greatest number of times out of the 108 as the list used in the copy material for the control group and in the drill material for the typing group. This list of fifty words is shown in Table I.

**TABLE I**

**RANK OF WORDS ACCORDING TO TIMES MISSED**

<table>
<thead>
<tr>
<th>Word</th>
<th>By 604 Students</th>
<th>First Test</th>
<th>Second Test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control Typing</td>
<td></td>
<td>Control Typing</td>
</tr>
<tr>
<td>baccalaureate</td>
<td>1 7.5</td>
<td>1 13.5</td>
<td></td>
</tr>
<tr>
<td>psychology</td>
<td>2 19.5</td>
<td>2 22</td>
<td></td>
</tr>
<tr>
<td>live stock</td>
<td>3 1</td>
<td>4 2</td>
<td></td>
</tr>
<tr>
<td>imminent</td>
<td>4 2</td>
<td>3 9</td>
<td></td>
</tr>
<tr>
<td>supersede</td>
<td>5 5</td>
<td>5 7</td>
<td></td>
</tr>
<tr>
<td>wave length</td>
<td>6 13.5</td>
<td>7.5 18</td>
<td></td>
</tr>
<tr>
<td>all right</td>
<td>7 7</td>
<td>10 10.5</td>
<td></td>
</tr>
<tr>
<td>Hereford</td>
<td>8 39.5</td>
<td>6 27</td>
<td></td>
</tr>
<tr>
<td>per cent</td>
<td>9</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>acompaniment</td>
<td>10</td>
<td>8</td>
<td>37.5</td>
</tr>
<tr>
<td>ukulele</td>
<td>11</td>
<td>16.5</td>
<td>28</td>
</tr>
<tr>
<td>inalienable</td>
<td>12.5</td>
<td>9</td>
<td>15.5</td>
</tr>
<tr>
<td>impairment</td>
<td>12.5</td>
<td>12</td>
<td>24</td>
</tr>
<tr>
<td>technique</td>
<td>14</td>
<td>11</td>
<td>29</td>
</tr>
<tr>
<td>moccasin</td>
<td>15</td>
<td>15</td>
<td>14</td>
</tr>
<tr>
<td>sluice</td>
<td>16</td>
<td>18</td>
<td>39.5</td>
</tr>
<tr>
<td>vagueness</td>
<td>17.5</td>
<td>20</td>
<td>19.5</td>
</tr>
<tr>
<td>coefficient</td>
<td>17.5</td>
<td>16.5</td>
<td>31</td>
</tr>
<tr>
<td>covenant</td>
<td>19</td>
<td>13.5</td>
<td>11</td>
</tr>
<tr>
<td>Cincinnati</td>
<td>20</td>
<td>21</td>
<td>18</td>
</tr>
<tr>
<td>corduroy</td>
<td>21</td>
<td>19</td>
<td>35.5</td>
</tr>
<tr>
<td>derrick</td>
<td>22</td>
<td>22</td>
<td>48</td>
</tr>
<tr>
<td>strenuous</td>
<td>23</td>
<td>24</td>
<td>4</td>
</tr>
<tr>
<td>cemetery</td>
<td>24</td>
<td>23</td>
<td>30</td>
</tr>
<tr>
<td>superintendence</td>
<td>25</td>
<td>26.5</td>
<td>26</td>
</tr>
<tr>
<td>residuary</td>
<td>26</td>
<td>32</td>
<td>43.5</td>
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<tr>
<td>yacht</td>
<td>27</td>
<td>29</td>
<td>46</td>
</tr>
<tr>
<td>bankruptcy</td>
<td>28</td>
<td>28</td>
<td>47</td>
</tr>
<tr>
<td>asparagus</td>
<td>29</td>
<td>26.5</td>
<td>32</td>
</tr>
<tr>
<td>blamable</td>
<td>30</td>
<td>25</td>
<td>12</td>
</tr>
<tr>
<td>alleged</td>
<td>31</td>
<td>30</td>
<td>43.5</td>
</tr>
<tr>
<td>interchangeable</td>
<td>32</td>
<td>31</td>
<td>21.5</td>
</tr>
<tr>
<td>-----------------</td>
<td>----</td>
<td>----</td>
<td>------</td>
</tr>
<tr>
<td>lignite</td>
<td>33</td>
<td>47</td>
<td>43.5</td>
</tr>
<tr>
<td>professionally</td>
<td>34</td>
<td>41</td>
<td>24</td>
</tr>
<tr>
<td>hazardous</td>
<td>35.5</td>
<td>33</td>
<td>43.5</td>
</tr>
<tr>
<td>kilowatt</td>
<td>35.5</td>
<td>40</td>
<td>21.5</td>
</tr>
<tr>
<td>disappoint</td>
<td>37.5</td>
<td>43</td>
<td>24</td>
</tr>
<tr>
<td>raccoon</td>
<td>37.5</td>
<td>39</td>
<td>37.5</td>
</tr>
<tr>
<td>fraternal</td>
<td>39</td>
<td>38</td>
<td>33</td>
</tr>
<tr>
<td>judgment</td>
<td>40</td>
<td>35</td>
<td>7.5</td>
</tr>
<tr>
<td>appendicitis</td>
<td>41</td>
<td>35</td>
<td>41</td>
</tr>
<tr>
<td>vitamin</td>
<td>42</td>
<td>35</td>
<td>35.5</td>
</tr>
<tr>
<td>hydrogen</td>
<td>43</td>
<td>42</td>
<td>34</td>
</tr>
<tr>
<td>alphabetic</td>
<td>44</td>
<td>46</td>
<td>17</td>
</tr>
<tr>
<td>sophomore</td>
<td>45.5</td>
<td>44.5</td>
<td>49.5</td>
</tr>
<tr>
<td>specimen</td>
<td>45.5</td>
<td>49</td>
<td>3</td>
</tr>
<tr>
<td>unnecessary</td>
<td>47</td>
<td>37</td>
<td>27</td>
</tr>
<tr>
<td>hygiene</td>
<td>48</td>
<td>46</td>
<td>49.5</td>
</tr>
<tr>
<td>separate</td>
<td>49</td>
<td>50</td>
<td>7.5</td>
</tr>
<tr>
<td>referred</td>
<td>50</td>
<td>44.5</td>
<td>15.5</td>
</tr>
</tbody>
</table>
Table I is read as follows: The word baccalaureate was missed the greatest number of times on the first test by the control group; it ranked 7.5 in number of times missed on the first test by the typing group; it was missed the greatest number of times on the second test by the control group; it ranked 13.5 in number of times missed on the second test by the typing group.

The word psychology was missed the second greatest number of times on the first test by the 604 students; it ranked 6 in number of times missed on the first test by the control group; it ranked 19.5 in number of times missed on the first test by the typing group; it ranked 2 in number of times missed on the second test by the control group; it ranked 22 in number of times missed on the second test by the typing group.

3. Administering Copy and Drill Material. The English teacher had charge of each control group and the commercial teacher had charge of each typing group.

Complete instructions were given the teacher in charge of each group on how to conduct the copying and drill exercises.

The copy and drill material contained the fifty words written in a paragraph entitled "A Versatile Genius." This paragraph is shown in the Appendix as Form B. The control
group copied the paragraph once each day for ten consecutive school days. Each group knew that a test would be given to study the effect on spelling by copying or typing. They knew too that the attention necessary to give each word was only enough to either copy it in longhand or write it on the typewriter. The control group would probably resent this copying, not because of the material itself, but as high school students they would feel more keenly that the copying was entirely out of place in their class and was taking too much of their time. The drill material in the typing group could be worked in as a regular part of each day's work. The copy material was made as brief as possible in order that the control group especially would do it correctly. It was made into sentences because much of the practice material in typing is in sentence and paragraph form. The paragraph would also provide interest to motivate the copy exercise for the control group.

4. Testing the Copy and Drill Activities. After the control group had copied the paragraph and the typing group had practiced it the required number of times the next problem was to devise a measure to determine whether or not the students had acquired any ability to spell the words they did not spell on the first test. This
device also would have to be of such a nature as to require but little time of either the teacher in charge of the group or the group itself. This is especially true in the case of the control group because both had already sacrificed much of their time during the ten days in order to copy the material. So if this test was to be effective it must of itself promote a willingness on the part of both teacher and student to do it.

The paragraph which had been used in the copy and drill material was made into a test. It was rewritten with the fifty words, as well as others, misspelled. The student was to mark out the misspelled word and write the correct spelling above it. This paragraph prepared as a test is shown in the Appendix as Form C. The students were instructed to take plenty of time to check all words carefully and also told that this was the last time they would be asked to work with this material and it would be very much appreciated if they did the best they could. Each student was asked to write the correct spelling in longhand. The typing group wrote in longhand too because it was a spelling exercise and not a typing exercise. These tests were checked carefully to determine the misspelled words out of the fifty.
II. ORGANIZATION AND ANALYSIS OF DATA

A. Presentation of Data

1. General Treatment of Data. A special form was printed on which to write the 108 words. Space on these forms was also provided for the student to indicate name, age, school, sex, subject, and year in school.

An illustration in a sentence of each of the 108 words was furnished the teacher of each group. This form is illustrated in the Appendix.

There were 604 students in both groups who took the first test of 108 words but of this number only 403 actually participated in the entire study. This decrease in number is probably due to:

a. Failure of teacher in charge of group to follow plan.

b. Student absent during a copy or a drill activity.

c. Student failing to take second test.

Only those students are considered who participated in the study in its entirety.

2. Statistical Treatment of Data. The statistical methods used by Tiegs\(^1\) and Garrett\(^2\) for the comparison of

\(^1\)Ernest W. Tiegs, Tests and Measurements for Teachers. Pp. 222-236.

\(^2\)H. E. Garrett, Statistics in Psychology and Education. p. 154.
groups were the methods used in this study. These measures consisted of: (1) the mean (2) the standard deviation (3) the difference between the two means of the groups being compared (4) the standard error of the mean (5) the standard error of the difference between the two means.

In order to be certain that there is a real difference in the merit of the two groups being compared the difference between the means should be at least three times as great as the standard error of the difference of the two means. If this difference is three times as great or greater, then the chances are that in 100 out of every hundred cases the difference between the two groups is real. If the same groups were tested indefinitely, the designated higher group would always be superior.

3. Explanation of Table Headings.

a. Group. This column designates whether control and typing groups are considered or whether the comparisons are made between boys and girls, or between tests.

b. Number. The figures under the number heading specify the number of students considered in each group.

c. Mean. This is the statistical average of the group.

d. Difference in Means. This is arithmetical difference between the means mentioned in c.
e. Standard Error of Mean. This is found by dividing the standard deviation of the distribution by the square root of the number of measures.

f. Standard Error of Difference of Means. This is found by adding the squares of the standard error of means of the two groups compared and extracting the square root of the sum of the two squares.

g. Difference in favor of. This column designates which group, control or typing, boys or girls, received the largest mean score in the test designated.

h. Significant ratio. This column represents the answer obtained by dividing the difference between the two means by the standard error of the difference between the two means. If this ratio is 3, it signifies that the test taken is perfectly reliable in measuring what it is intended to measure and any number greater than 3 shows added reliability.

i. Chances in 100 that given group is superior. If this test were given indefinitely and the significant ratio were 3 or more, one hundred out of every hundred times the result would favor the group designated higher in these tables. These statements are to be considered in the study of the Tables I-A to XIII inclusive.
A COMPARATIVE STUDY OF EACH GROUP ON TEST I

<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
<th>Mean</th>
<th>Difference in Means</th>
<th>Standard Error of Mean</th>
<th>Standard Error of Difference of Means</th>
<th>Difference in Favor</th>
<th>Significant Ratio</th>
<th>Chances in 100</th>
<th>Given Group is Superior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>212</td>
<td>13.26</td>
<td>.607</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5.12</td>
<td>.917</td>
<td>Typing</td>
<td>5.57</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Typing</td>
<td>191</td>
<td>18.38</td>
<td>.688</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This table presents the data concerning the results made by both groups on spelling the fifty words used on Test I. The significant ratio of 5.57 for the typing group indicates a superiority over the control group.


**TABLE II**

A COMPARATIVE STUDY OF EACH GROUP ON TEST II

<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
<th>Mean</th>
<th>Difference in Means</th>
<th>Standard Error of Mean</th>
<th>Standard Error of Difference of Means</th>
<th>Difference Significant in Favor of</th>
<th>Ratio</th>
<th>Changes in 100</th>
<th>Group is Superior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>212</td>
<td>37.40</td>
<td>.721</td>
<td>3.62</td>
<td>1.05</td>
<td>Control</td>
<td>3.44</td>
<td>100</td>
<td>Superior</td>
</tr>
<tr>
<td>Typing</td>
<td>191</td>
<td>33.78</td>
<td>.762</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This table presents the data concerning the results made by both groups on Test II after each had copied or drilled on the paragraph containing the fifty words. The significant ratio of 3.44 indicates that the control group is now superior.
TABLE III
A COMPARATIVE STUDY OF THE BOYS ON TEST I

<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
<th>Mean</th>
<th>Difference in Means</th>
<th>Standard Error of Mean</th>
<th>Difference in Favor of Mean</th>
<th>Standard Error of Difference of Means</th>
<th>Difference Significant Ratio</th>
<th>Chances in 100</th>
<th>Given Group is Superior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>107</td>
<td>11.42</td>
<td>.828</td>
<td>4.73</td>
<td>1.26</td>
<td>Typing</td>
<td>3.67</td>
<td>100</td>
<td>Superior</td>
</tr>
<tr>
<td>Typing</td>
<td>91</td>
<td>16.15</td>
<td>.949</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This table presents the data concerning the results made by the boys on spelling the fifty words used on Test I. The significant ratio of 3.67 indicates that the typing group is superior.
## TABLE IV

A COMPARATIVE STUDY OF THE BOYS ON TEST II

<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
<th>Mean</th>
<th>Difference in Means</th>
<th>Standard Error of Mean</th>
<th>Standard Error of Difference of Means</th>
<th>Difference Significant Ratio</th>
<th>Chances in 100 that Given Group is Superior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>107</td>
<td>35.38</td>
<td>1.117</td>
<td>4.03</td>
<td>1.63</td>
<td>Control 2.47</td>
<td>99</td>
</tr>
<tr>
<td>Typing</td>
<td>91</td>
<td>31.35</td>
<td>1.187</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This table presents the data concerning the results made by the boys on test II after each group had copied or drilled on the paragraph containing the fifty words. The significant ratio of 2.47 indicates a relative degree of superiority in the control group.
TABLE V

A COMPARATIVE STUDY OF THE GIRLS ON TEST I

<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
<th>Mean</th>
<th>Difference in Means</th>
<th>Standard Error of Mean</th>
<th>Standard Error of Difference of Means</th>
<th>Difference in Favor of Means</th>
<th>Significant Ratio</th>
<th>Chances in 100 that Given Group is Superior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>105</td>
<td>15.12</td>
<td>4.78</td>
<td>.852</td>
<td></td>
<td></td>
<td>3.79</td>
<td>100</td>
</tr>
<tr>
<td>Typing</td>
<td>100</td>
<td>19.90</td>
<td></td>
<td>.942</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This table presents the data concerning the results made by the girls that on Test I. The significant ratio of 3.79 indicates the typing group is superior.
### TABLE VI

**A COMPARATIVE STUDY OF THE GIRLS ON TEST II**

<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
<th>Mean</th>
<th>Difference in Means</th>
<th>Standard Error of Means</th>
<th>Difference in Favor of Means</th>
<th>Standard Error of Difference of Means</th>
<th>Significance Ratio</th>
<th>Chances in 100 that Given Group is Superior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>105</td>
<td>39.48</td>
<td>.855</td>
<td></td>
<td></td>
<td></td>
<td>2.27</td>
<td>99</td>
</tr>
<tr>
<td>Typing</td>
<td>100</td>
<td>36.68</td>
<td>.889</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This table presents the data concerning the results made by the girls on Test II after each group had copied or drilled on the paragraph containing the fifty words. The significant ratio of 2.27 indicates the control group is relatively superior.
This table presents the data concerning the results made by the control group on spelling the fifty words used on Test I. The significant ration of 3.13 indicates that the girls were superior to the boys.
TABLE VIII
A COMPARATIVE STUDY OF THE CONTROL GROUP ON TEST II

<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
<th>Means</th>
<th>Difference</th>
<th>Standard Error of Means</th>
<th>Standard Error of Difference of Means</th>
<th>Difference in Means</th>
<th>Significant Ratio</th>
<th>Chances in 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys</td>
<td>107</td>
<td>35.38</td>
<td>1.117</td>
<td>4.10</td>
<td>1.40</td>
<td>Girls</td>
<td>2.92</td>
<td>100</td>
</tr>
<tr>
<td>Girls</td>
<td>105</td>
<td>39.48</td>
<td>.855</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This table presents the data concerning the results made by the control groups on Test II after each had copied or drilled on the paragraph containing the fifty words. The significant ratio of 2.92 indicates that the girls are superior.
### TABLE IX

**A COMPARATIVE STUDY OF THE TYPING GROUP ON TEST I**

<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
<th>Means</th>
<th>Difference in Means</th>
<th>Standard Error of Means</th>
<th>Difference of Means</th>
<th>Standard Error of Difference of Means</th>
<th>Difference in Favor</th>
<th>Significant Ratio</th>
<th>Chances in 100 that Given Group is Superior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys</td>
<td>91</td>
<td>16.15</td>
<td>3.75</td>
<td>.949</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2.82</td>
</tr>
<tr>
<td>Girls</td>
<td>100</td>
<td>19.90</td>
<td></td>
<td>.942</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This table presents the data concerning the results made by the typing group on spelling the fifty words used on Test I. The significant ratio of 2.82 indicates that the girls will always be superior to the boys.
TABLE X
A COMPARATIVE STUDY OF THE TYPING GROUP
ON TEST II

<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
<th>Means</th>
<th>Difference in Means</th>
<th>Standard Error of Mean</th>
<th>Standard Error of Difference of Means</th>
<th>Difference in Favor of Means</th>
<th>Significance Ratio</th>
<th>Chances in 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys</td>
<td>91</td>
<td>31.85</td>
<td>1.187</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4.83</td>
<td></td>
<td></td>
<td>1.48</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Girls</td>
<td>100</td>
<td>36.68</td>
<td>.889</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This table presents the data concerning the results made by the typing groups after each had copied or drilled on the paragraph containing the fifty words. The significant ratio of 3.26 indicates that the girls will always be superior to the boys.
This table presents the data comparing the results of the control group on both tests. It shows that this group has made a very decided and marked increase in the ability to learn to spell by copying in longhand.

<table>
<thead>
<tr>
<th>Test</th>
<th>Number</th>
<th>Mean</th>
<th>Difference in Means</th>
<th>Standard Error of Mean</th>
<th>Standard Error of Difference of Means</th>
<th>Difference in Favor</th>
<th>Significant Ratio</th>
<th>Chances in 100 that Group is Superior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test II</td>
<td>212</td>
<td>37.40</td>
<td>.721</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### TABLE XII

A COMPARATIVE STUDY OF THE TYPING GROUP ON BOTH TESTS

<table>
<thead>
<tr>
<th>Test</th>
<th>Number</th>
<th>Means</th>
<th>Difference in Means</th>
<th>Standard Error of Means</th>
<th>Standard Error of Difference of Means</th>
<th>Difference in Favor of Means</th>
<th>Significant Ratio</th>
<th>Chances in 100 that Given Group is Superior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test I</td>
<td>191</td>
<td>18.38</td>
<td>.688</td>
<td>15.40</td>
<td>1.02</td>
<td>Test II</td>
<td>15.09</td>
<td>100</td>
</tr>
<tr>
<td>Test II</td>
<td>191</td>
<td>33.78</td>
<td>.762</td>
<td>15.40</td>
<td>1.02</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This table presents the data comparing the results of the typing group on both tests. It shows that an appreciable gain has been made in the ability to learn to spell by typing words.
III. GENERAL SUMMARY

A. Findings

1. The typing group had a superior rating on the first test. This group was older and was on an average about two years advanced in school over the control group.

2. The control group had a superior rating on the second test. This group copied the words with the idea of learning to spell them. The typing group practiced the words as typing exercise with the idea that they too would be tested on their ability to spell them.

3. The girls made a superior rating in both groups on both tests.

4. The girls in the typing group made a higher percent of gain than that made by the girls in the control group.

5. The mean of the control group was increased 181 per cent. The mean of the typing group was increased 84 per cent.

The significant ratio of the control group is 70 per cent greater than the significant ratio of the typing group.
B. Conclusions

1. Copying words in longhand is much more effective in learning to spell than typing them.
2. Girls possess a superior ability to spell.
3. Girls show greater gain than boys in learning to spell by typewriting.

C. Limitations of This Study

Perhaps it would have been just as well to have had the groups use the material five times instead of ten. It is not to be assumed that the same results would have been obtained had the groups used the material more or fewer times than ten times. Each group evidently gained power in spelling each time it used the material. Whether or not each group continued to increase in spelling power at a certain rate during the ten times is doubtful. Neither is it to be assumed that a control group composed of students more nearly the age of the typing group in this study would show variations similar to those shown in this study.

It may be that the typing group was acquiring greater power per time copied the tenth time than the control group was acquiring. The maximum amount of spelling
power acquired by the control group per time copied may have been reached a few times before the tenth copy was made. Perhaps only a series of studies, in regard to the number of times typing material may be typed and at the same time the typist improve in spelling, will be the best solution of the limitations of this study.
IV. APPENDIX

A. Bibliography


Eply, H. L. A Comparative Study of Social Studies Majors of Indiana State Teachers College for the Years 1931-1933. (Indiana State Teachers College, Unpublished Master's Thesis, Number 203.)


Gilbert, L. C. "Effect of Reading on Spelling in the Secondary Schools." California Quarterly of Secondary Education. 9:269-75. April, 1934.

Higgins, E. A Study of the Achievement and Related Factors of Mathematics Majors at Indiana State Teachers College for the Years 1926-1932. (Indiana State Teacher's College, Unpublished Master's Thesis, Number 76.)


SPELLING MATERIAL

1. ukulele—He plays a ukulele.
2. sluice—The sluice was closed.
3. Hereford—Hereford is a breed of beef cattle.
4. blamable—It is practically impossible to decide who was blamable.
5. imminent—The man said a war was imminent.
6. Cincinnati—Cincinnati is a city in Ohio.
7. baccalaureate—The baccalaureate was well attended.
8. psychology—Psychology is the study of the mind.
9. corduroy—His suit was made of corduroy.
10. superintendence—This work is under the superintendence of Mr. Ray.
11. judgment—He acted in accordance with his judgment.
12. moccasin—The Indian made the moccasin.
13. vitamin—This food contains the vitamin you need.
14. impairment—The climate caused the impairment of his health.
15. moron—A moron is a type of a feeble-minded person.
16. kilowatt—What is the cost per kilowatt hour?
17. specimen—These specimen pages are C. K.
18. technique—The musician displayed great technique in his performance.
19. strenuous—It required strenuous effort to reach the goal.
20. inalienable—It was an inalienable right.
21. coefficient—What is the coefficient of the number?
22. raccoon—There is a raccoon in the cage.
23. hazardous—It will be a hazardous journey.
24. excusable—The boy’s absence was not excusable.
25. referee—Who is the referee in this game?
26. hygiene—Much attention was given to the study of hygiene.
27. derrick—The storm destroyed the derrick.
28. copyright—The copyright is 1931.
29. residuary—The residuary estate is to be divided between them.
30. yacht—He has a new yacht.
31. vagueness—The letter was poor because of the vagueness of its thought.
32. hydrogen—The light substance is hydrogen.
33. covenant—They entered into a covenant.
34. asparagus—He would not eat the asparagus.
35. professionally—The physician was not professionally interested.
36. bankruptcy—They declared him in a state of involuntary bankruptcy.
37. labeled—The goods have been labeled for shipment.
38. interchangeable—The broken part was interchangeable.
39. scissors—The scissors are sharp.
40. alphabetic—The names were in alphabetic order.
41. lignite—The product mined here is lignite.
42. sophomore—She is a sophomore in school.
43. brake--A faulty brake caused the wreck.
44. valid--The story was valid.
45. registration--I met him on the day of registration.
46. appendicitis--He is suffering from an attack of appendicitis.
47. zoology--My brother teaches zoology.
48. Pennsylvania--I was born in Pennsylvania.
49. Ordinance--The city passed the ordinance.
50. viaduct--He was found under the viaduct.
51. vaccinate--The doctor will vaccinate you.
52. receipt--Do you fail to obtain a receipt from the customer?
53. disappointed--The boy will not disappoint his father.
54. fraternal--What fraternal order meets here?
55. volume--The volume is twenty cubic inches.
56. inquiry--An inquiry was held in the office.
57. memorandum--I saw the memorandum he made.
58. initial--The initial cost is the first cost.
59. pianos--The pianos are all new.
60. wringer--He hurt his hand in the wringer.
61. brief--He wrote a brief report of the meeting.
62. carton--The carton was sold by the close of day.
63. violent--A violent storm traveled up the coast.
64. reputation--His enviable reputation was based on his character.
65. referred--The matter was referred to the board of adjustment.
66. equalizer--The equalizer would not work.
67. voltage--The wire carried a high voltage.
68. induced--He could not be induced to invest the money.
69. welfare--The President is interested in the welfare of the people.
70. corporation--The corporation tax was paid by the president.
71. unnecessary--It is unnecessary to have so many players.
72. attorney--The attorney for the man is ill.
73. granulated--The granulated sugar is higher in price.
74. hanger--The suit is on the hanger.
75. finance--The promoter could not finance his scheme.
76. vanilla--The company makes the vanilla ice cream.
77. sincere--One could tell that he was very sincere.
78. glider--He has purchased a new glider.
79. speculate--It is dangerous to speculate on the stock exchange.
80. penmanship--He received a certificate in penmanship.
81. intermediate--My brother is in the intermediate group.
82. neither--Neither horse won the race.
83. whether--He does not know whether to sail or not.
84. concrete--The road is a concrete road.
85. committee--The president appointed the committee.
86. waist--The waist is a red one.
87. pumpkin--The pumpkin grew on the farm.
88. offset--We found an offset in the fence.
89. live stock--The live stock have been shipped.
90. middleman--The middleman advanced the price.
91. hospital--The patient is in the hospital now.
92. waiter--Jones is the best waiter they have.
93. supplying--The tube is supplying the air.
94. knob--The camp site is on the knob near the river.
95. native--The speaker is a native of this country.
96. blunder--The pitcher did not make the blunder.
97. people--What people live on this island?
98. wave length--They have been assigned a wave length.
99. polish--What polish will give the best shine?
100. point--They saw the point of the sword.
101. per cent--The interest rate is eight per cent.
102. separate--It was necessary to separate them.
103. accompaniment--She plays best with piano accompaniment.
104. all right--It was all right for you to see him.
105. alleged--The alleged slayer was shot.
106. supersede--The highest officer will supersede him.
107. aviator--The student is learning to be an aviator.
108. cemetery--The cemetery is kept well.
A VERSATILE GENIUS

The man with the Hereford live stock began to experiment with hydrogen and the coefficient of the imminent number that represents the hazardous expansion of iron in the derrick. He was professionally interested in a covenant between lignite and sluice owners that would supersede the one referred to as blamable for bankruptcy. He exercised keen judgment in the superintendence of the corduroy and moccasin plant in Cincinnati. He would not disappoint his fraternal group in a strenuous study of the psychology and technique of training a raccoon. A ukulele accompaniment was no impairment on his alleged interchangeable method to deliver a baccalaureate lecture. He had purchased an unnecessary specimen of a yacht with funds from a residuary estate. He acquired an inalienable right to separate the per cent of vagueness of the wave length and kilowatt. His study of asparagus and hygiene was all right and it led to a discovery of a vitamin that will help prevent appendicitis. While yet a sophomore, his interest in botany caused him to classify in an alphabetic order a victoria found near the cemetery.
A VERSATILE GENIUS

The man with the Herford livestock began to experiment with hydrogen and the coefficient of the imminant number that represents the hazardous expansion of iron in the derrick. He was professionally interested in a covenant between lignight and sluice owners that would supersede the one referred to as blameable for bankruptcy. He exercised keen judgement in the superintendence of the cordroy and mocassin plant in Cincinatti. He would not disappoint his fraternal group in a strenous study of the psychology and technique of training a racoon. A ukulele accompanment was no impariment on his aleged enterrchangable method to deliver a bacaleaurate lecture. He purchased an unnecessary specimen of a yahct with funds from a resediary estate. He aquired an enaleinable right to separate the percent of vageness of the wavelength and killowat. His study of asperages and higene was allright and it led to a discovry of a vitemin that will help prevent appendisits. While yet a sopomore, his interest in boteny caused him to clasify in an alphabetic order a vectoria found near the cemetary.

There are several missspelled words in the above paragraph. Draw a line through the words that you think are missspelled and write the correct spelling above the incorrect word. Do not change a word unless you think it is spelled wrong.