AN EXPERIMENT TO DETERMINE THE RELATIVE
ADVANTAGE OF IMPROVING SPELLING
BY TYPEDWRITING AS OPPOSED
TO HANDWRITING

by

Mary Dallas Legris

Thesis submitted to the Graduate Faculty of the
Virginia Polytechnic Institute
in candidacy for the degree of

MASTER OF SCIENCE

in

Business Education

June 1, 1960

Blacksburg, Virginia
ACKNOWLEDGMENTS

It gives the author much pleasure to express her sincere appreciation and thanks to Dr. Harry Huffman, faculty adviser, for his encouragement and guidance in helping her to plan and prepare this thesis.

The author also wishes to thank for his assistance in helping her to plan these experiments.

To the students of six grade eleven's of the Welland High and Vocational School, the author extends her appreciation for their part in having made these experiments possible.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>ACKNOWLEDGMENTS</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. THE PROBLEM</td>
<td>7</td>
</tr>
<tr>
<td>Introduction</td>
<td>7</td>
</tr>
<tr>
<td>The Problem</td>
<td>8</td>
</tr>
<tr>
<td>Purposes</td>
<td>8</td>
</tr>
<tr>
<td>The Need for the Study</td>
<td>11</td>
</tr>
<tr>
<td>Definitions</td>
<td>13</td>
</tr>
<tr>
<td>Selection of Words</td>
<td>13</td>
</tr>
<tr>
<td>Selection of Methods of Teaching and Testing</td>
<td>14</td>
</tr>
<tr>
<td>Experiment A, The Column—phrase Form</td>
<td>15</td>
</tr>
<tr>
<td>Experiment B, The Column—sentence Form</td>
<td>15</td>
</tr>
<tr>
<td>Experiment C, The Column—paragraph Form</td>
<td>15</td>
</tr>
<tr>
<td>II. REVIEW OF LITERATURE</td>
<td>17</td>
</tr>
<tr>
<td>History of Spelling</td>
<td>17</td>
</tr>
<tr>
<td>Sounds and Spelling</td>
<td>17</td>
</tr>
<tr>
<td>The Influence of Noah Webster</td>
<td>19</td>
</tr>
<tr>
<td>Summary of Wilson's Dissertation</td>
<td>22</td>
</tr>
<tr>
<td>First Period--1647-1840</td>
<td>22</td>
</tr>
<tr>
<td>Second Period--1840-1900</td>
<td>23</td>
</tr>
<tr>
<td>Third Period--1900-1950</td>
<td>23</td>
</tr>
<tr>
<td>Spelling Rules</td>
<td>24</td>
</tr>
<tr>
<td>Watson's Dissertation</td>
<td>27</td>
</tr>
<tr>
<td>Preliminary Assumptions</td>
<td>28</td>
</tr>
<tr>
<td>Spelling Vocabularies</td>
<td>28</td>
</tr>
<tr>
<td>Studies of Spelling Errors of High School Students</td>
<td>29</td>
</tr>
<tr>
<td>Probable Causes of Misspellings</td>
<td>30</td>
</tr>
<tr>
<td>General Conclusions</td>
<td>30</td>
</tr>
<tr>
<td>An Experimental Study</td>
<td>31</td>
</tr>
<tr>
<td>Spelling and Typewriting</td>
<td>33</td>
</tr>
<tr>
<td>Conclusions</td>
<td>35</td>
</tr>
<tr>
<td>Recommendations</td>
<td>35</td>
</tr>
</tbody>
</table>
### III. PROCEDURE

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selection of Problem</td>
<td>37</td>
</tr>
<tr>
<td>Selection of Students</td>
<td>38</td>
</tr>
<tr>
<td>The First Experiment</td>
<td>38</td>
</tr>
<tr>
<td>The Second Experiment</td>
<td>39</td>
</tr>
<tr>
<td>The Third Experiment</td>
<td>40</td>
</tr>
<tr>
<td>Questionnaire</td>
<td>43</td>
</tr>
</tbody>
</table>

### IV. ANALYSIS OF DATA

<table>
<thead>
<tr>
<th>Experiment</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Experiment</td>
<td>45</td>
</tr>
<tr>
<td>Ability to Spell and the I. Q.'s of Students</td>
<td>48</td>
</tr>
<tr>
<td>Comparison of Frequency Distribution</td>
<td>48</td>
</tr>
<tr>
<td>Statistical Analysis</td>
<td>52</td>
</tr>
<tr>
<td>Second Experiment</td>
<td>55</td>
</tr>
<tr>
<td>Ability to Spell and the I. Q.'s of Students</td>
<td>57</td>
</tr>
<tr>
<td>Comparison of Frequency Distribution</td>
<td>57</td>
</tr>
<tr>
<td>Statistical Analysis</td>
<td>62</td>
</tr>
<tr>
<td>Third Experiment</td>
<td>65</td>
</tr>
<tr>
<td>Comparison of Frequency Distribution</td>
<td>68</td>
</tr>
<tr>
<td>Statistical Analysis</td>
<td>72</td>
</tr>
</tbody>
</table>

### V. SUMMARY

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUMMARY</td>
<td>73</td>
</tr>
</tbody>
</table>

### VI. RESULTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>RESULTS</td>
<td>74</td>
</tr>
</tbody>
</table>

### VII. CONCLUSIONS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONCLUSIONS</td>
<td>76</td>
</tr>
</tbody>
</table>

### VIII. RECOMMENDATIONS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>RECOMMENDATIONS</td>
<td>77</td>
</tr>
</tbody>
</table>

### IX. BIBLIOGRAPHY

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIBLIOGRAPHY</td>
<td>79</td>
</tr>
</tbody>
</table>

### X. VITA

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>VITA</td>
<td>81</td>
</tr>
</tbody>
</table>

### XI. APPENDIX

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>APPENDIX</td>
<td>82</td>
</tr>
</tbody>
</table>
**LIST OF TABLES**

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Rotation Schedule for the First Experiment</td>
<td>39</td>
</tr>
<tr>
<td>2. Rotation Schedule for the Second Experiment</td>
<td>40</td>
</tr>
<tr>
<td>3. Rotation Schedule for Teaching Spelling</td>
<td>42</td>
</tr>
<tr>
<td>4. Rotation Schedule for Testing Spelling</td>
<td>42</td>
</tr>
<tr>
<td>5. Means and Medians of Spelling Scores for Seventeen Students When Tested by Both Handwriting and Typewriting</td>
<td>46</td>
</tr>
<tr>
<td>6. Means and Medians of Spelling Scores for Thirty Students When Tested by Both Handwriting and Typewriting</td>
<td>46</td>
</tr>
<tr>
<td>7. Means and Medians of Spelling Scores for Forty-seven Students (Classes Combined) When Tested by Both Handwriting and Typewriting</td>
<td>47</td>
</tr>
<tr>
<td>8. Relationship Between a Student's Ability to Spell as Measured by the Combined Handwriting and Typewriting Scores, Class--ClIA</td>
<td>49</td>
</tr>
<tr>
<td>9. Relationship Between a Student's Ability to Spell as Measured by the Combined Handwriting and Typewriting Scores, Class--ClIB</td>
<td>50</td>
</tr>
<tr>
<td>10. Means and Medians of Spelling Scores for Eighteen Students When Tested by Both Handwriting and Typewriting on 1500 words</td>
<td>56</td>
</tr>
<tr>
<td>11. Means and Medians of Spelling Scores for Thirty-one Students When Tested by Both Handwriting and Typewriting on 1500 Words</td>
<td>56</td>
</tr>
<tr>
<td>12. Means and Medians of Spelling Scores for Forty-nine Students (Classes Combined) When Test ed by Both Handwriting and Typewriting on 1500 Words</td>
<td>58</td>
</tr>
</tbody>
</table>
13. Relationship Between a Student's Ability to Spell as Measured by the Combined Handwriting and Typewriting Scores, Class--CllA........................................... 59

14. Relationship Between a Student's Ability to Spell as Measured by the Combined Handwriting and Typewriting Scores, Class--CllB........................................... 60

15. Means and Medians of Spelling Scores for Twenty-two Students When Tested by Handwriting and Typewriting on 400 Words.............................................. 66

16. Means and Medians of Spelling Scores for Thirty-one Students When Tested by Handwriting and Typewriting on 400 Words.............................................. 66

17. Means and Medians of Spelling Scores for Fifty-three Students When Tested by Handwriting and Typewriting on 400 Words.............................................. 67
# LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Comparison of Scores Made by Seventeen Students When Tested in Spelling by Handwriting and by Typewriting on 1500 Words</td>
<td>51</td>
</tr>
<tr>
<td>2.</td>
<td>Comparison of Scores Made by Thirty Students When Tested in Spelling by Handwriting and by Typewriting on 1500 Words</td>
<td>53</td>
</tr>
<tr>
<td>3.</td>
<td>Comparison of Scores Made by Forty-seven Students as Measured by the Combined Handwriting and Typewriting Scores</td>
<td>54</td>
</tr>
<tr>
<td>4.</td>
<td>Comparison of Scores Made by Eighteen Students When Tested in Spelling by Handwriting and by Typewriting, Class--C11A</td>
<td>61</td>
</tr>
<tr>
<td>5.</td>
<td>Comparison of Scores Made by Thirty-one Students When Tested in Spelling by Handwriting and by Typewriting, Class--C11B</td>
<td>63</td>
</tr>
<tr>
<td>6.</td>
<td>Comparison of Scores Made by Forty-nine Students as Measured by the Combined Handwriting and Typewriting Scores</td>
<td>64</td>
</tr>
<tr>
<td>7.</td>
<td>Comparison of Scores Made by Twenty-two Students When Tested in Spelling by Handwriting and by Typewriting, Class--C11A</td>
<td>69</td>
</tr>
<tr>
<td>8.</td>
<td>Comparison of Scores Made by Thirty-one Students When Tested in Spelling by Handwriting and by Typewriting, Class--C11B</td>
<td>70</td>
</tr>
<tr>
<td>9.</td>
<td>Comparison of Scores Made by Fifty-three Students When Tested in Spelling by Handwriting and Typewriting, Classes C11A and C11B</td>
<td>71</td>
</tr>
</tbody>
</table>
CHAPTER 1

THE PROBLEM

Introduction

The ability to spell correctly is a valuable asset to anyone. The teacher expects to find every word of a written assignment correctly spelled. The businessman expects to find his typewritten letters free from spelling errors. The student himself expects assistance in improving his ability to spell.

The advantages of good spelling ability amply justify a carefully planned and systematic method of teaching and testing for spelling. This involves (1) the selection of words, (2) the choice of efficient methods of teaching, and (3) the use of tests for guiding instruction and determining results.

Wilson says:

...Research results since 1900 supported the following conclusions; (a) Spelling words should be presented in lists rather than in context; (b) Spelling should be studied systematically; (c) the test-study method of teaching was found superior to the study-test method....Each child of the test-study group studied the words he misspelled in the first and final tests of the week and in the review tests two weeks later. The study-test

1 Donald Elmo Wilson, The Development of Spelling in the Elementary School Curriculum, (University of California, Los Angeles, 1951), (Doctor’s Thesis), p. 343.
group studied all words before testing, and their hard words after final review test. . . Average learning gains by the test-study children were significantly superior to those of the study-test children.

The Problem

The problem in this study is to determine the relative advantage of improving spelling by typewriting as opposed to handwriting.

Purposes

The author's purposes in carrying out these experiments are (1) to investigate the improvement of spelling ability in business education; (2) to compare the similarities and differences in achievement by the two methods; and (3) to develop an effective procedure of teaching spelling in business education.

The Need for the Study

Spelling has been given no formal place in many high school curricula. It is taught incidentally in grades nine and ten. In grade eleven many students are faced with the serious problem of their spelling deficiency. Students have given some of the following reasons as an explanation of their inability to spell correctly: (1) carelessness, (2) laziness, (3) lack of knowledge of the meaning of words, (4) lack of ambition, (5) vocabulary deficiency, (6) limited reading experience, (7) poor penmanship, (8) unfamiliarity with words, and (9) poor spelling study habits.
The need for the study is based on the assumption that a student's knowledge of spelling has to be transferred to the typewriter to use this skill effectively in a business office.

"By 'transfer of training' is meant the effect of practice in one activity on accomplishment in another activity." The student finds that what he has learned in one situation influences his performance in another. The majority of students have learned to spell some words before they acquired mastery in typewriting. When typewriting becomes automatic, the students may readily transfer their knowledge of spelling to the typewriter.

From views expressed in business periodicals, there appears to be unanimity of opinion among business teachers that improving spelling in business education is a necessity.

Lewis^2 points out that teaching students to spell is worth the effort. Since students are often judged by their ability to spell, they should be taught words that are commonly used. She recommends giving them a test, training them to spell and then retesting to determine the effectiveness of the training.

---


Clark suggests that teachers put forth a greater effort to stimulate students to become more interested in wanting to improve their spelling in order to meet the demands of businessmen who expect their employees to spell correctly. Poor spellers should be encouraged to use the dictionary; they should strive to improve their vocabulary and be made to realize that correct spelling is basic to success in all forms of written work.

MacGregor believes that poor spellers can be helped by having them memorize a few words a week and thus achieve a fair vocabulary. She experimented in teaching ten common words each week. Days or weeks later, she tested them on these words. She found that students learned the words in list form but could not write the same words in context from. Then she began testing by giving them sentences. By this method, better results were achieved in spelling.

"Businessmen complain about the spelling disability of our students. Spelling disability is handicapping our students, curtailing their job success, depriving

---


2 Mrs. Geraldine MacGregor, "Let's Try to Teach Spelling," The Balance Sheet, April, 1953, p. 239 and p. 351.
them of raises, limiting their pride in their work.¹

Noyes suggests four ways to make students aware of correct spelling and to encourage them to improve their spelling. These are: (1) All business teachers should stress the importance of spelling; (2) Students should be reminded that people do not particularly note correct spelling, but they certainly notice incorrect spelling; (3) When businessmen are advertising for stenographers or clerks, they invariably include "ability to spell" as one of their requirements; and (4) Tests and quizzes should play a part in improving ability to spell.

In the typewriting class, students should typewrite lists of words repeatedly so that they may learn to spell automatically.

Proofreading misspelled words is another device which aids in the teaching of spelling.

Learning to spell a few words which occur in the transcription class is another incentive to encourage correct spelling.

**Definitions**

1. The study-test method—Students study all the words before testing.

2. The test-study method--Students study the words they misspelled in the first lesson by typewriting or writing each word three times; then they are tested later.

3. Term--The period of time from September to June of any school year.

4. C11A--Commercial grade eleven, clerical option group.

5. C11B--Commercial grade eleven, shorthand group.

6. Rotation--A definite period of time in this study, at the end of which the groups exchanged from writing to typewriting and vice versa.

7. First year experiment--September, 1957 to June, 1958.


10. Column form--Dictation of isolated words.

11. Phrase form--Dictation of one spelling word in a phrase.

12. Sentence form--One spelling word dictated in a sentence.

13. Paragraph form--Several spelling words dictated in a paragraph.
Selection of Words

For the first experiment, the author chose words\textsuperscript{1} for spelling based on her opinion of their usefulness in business.

For the second experiment, the words were chosen at random—every second word—from a spelling dictionary textbook.\textsuperscript{2}

For the third experiment, the author chose words taken from a spelling textbook,\textsuperscript{3} beginning with Lesson One and continuing until the completion of the experiment.

Selection of Methods of Teaching and Testing

For the first two experiments, the author used the study-test method; that is, the students studied the spelling lists independently and were tested twice a week on these words.

For the third experiment, the test-study method was employed; that is, the students were given a preliminary test on Wednesday of each week to discover the words they


\textsuperscript{2} W. J. Downes, Spelling and Vocabulary Studies, Sir Isaac Pitman & Sons (Canada) Ltd., Toronto, 1950.

\textsuperscript{3} Ibid.
did not know how to spell. They were drilled on these words, and on Friday of the same week, they were tested on their misspelled words on the preliminary test.

Some teachers of spelling have advocated the use of context exercises as a means of securing ability to spell in context form. For the purpose of determining the relative efficiency of the column form of teaching and testing spelling and certain context forms, McKeel carried out three experiments.

These experiments included, Experiment A, the Column-phrase form; Experiment B, the Column-sentence form; and Experiment C, the Column-paragraph form.

Experiment A, The Column Phrase Form

The purpose of Experiment A was to determine the relative efficiency of the column-phrase form in learning spelling.

A preliminary test was given. From the results of the test, the students were placed in groups of equal spelling ability. They were called Group A, which was the column section, and Group B, the phrase section. The experiment consisted of eight lessons. During the first week, the results of this experiment showed that the column group achieved a mean improvement greater

---

than that achieved by the phrase group.

The three outstanding facts provided by the results of the column-phrase experiment are:
1. As determined in this investigation, pupils who studied and were tested by the column form seemed to have acquired a greater amount of spelling ability than did the pupils who studied and were tested by the phrase form. 2. The pupils of the Column-Group procured better scores than the Phrase Group when tested in their ability to spell words previously studied. 3. The two groups seemed possessed of approximately equal ability to spell words previously studied when the words were used in a new phrase form.

Experiment B, The Column-sentence Form

The results of teaching and testing by the column-sentence form showed that pupils who used the column form secured results superior to those who used the sentence form. The two groups showed equal ability when tested by the sentence form on words that they had previously studied.

Experiment C, The Column-paragraph Form

The results of Experiment C, the Column-paragraph form, were the same as Experiment A and Experiment B.

McKee summarized his conclusion as follows:

The conclusion to be drawn from the results of the three experiments is that context exercises, as used in this investigation, do not constitute a procedure in the teaching of spelling which is as efficient as the common column form. When to the fact of their inferiority is added the amount of time and energy necessary for the construction and

1

Ibid., p. 254.
administration of these context forms in the classroom, they become not only inefficient but also impracticable. ¹

From a study of the preceding investigations the author considered it more advantageous to use the Column form for all teaching and testing throughout the three experiments.

"All the alphabets in the world have one common ancestry inasmuch as they all ultimately derive from the pictograms of ancient Egypt." About 1500 B.C. these pictograms were modified by associating sounds with symbols to form the North Semite syllabary, which became the alphabet of the Phoenicians. The Greeks learned the new alphabet from the Phoenicians. The Romans, influenced by Greek writings, established their own alphabet which they passed on to Britain. The Runic or national Germanic alphabet of twenty-four letters, a combination of Greek and Latin, was used by the Anglo-Saxons before they were converted to Christianity. Then they adopted the Latin alphabet in its British form.

After the Norman Conquest, French writing, inherited direct from the Latin, prevailed in Britain. During the Middle English period, the scribes did their best to

1 Simeon Potter, Our Language, Sounds and Spelling, Ch. VI, William Clowes and Sons, Ltd., London and Beccles, reprinted 1957, Great Britain.

2 Ibid. p. 69.
record sounds with clearness and meaning. The early printers continued to follow the scribal traditions, and even long after the invention of movable types, there was no fixed spelling. The idea of uniformity in spelling is recent. Shakespeare used different spellings for his own name. In order to have an even right margin, Elizabethan compositors varied spelling. Even on one page of the same book, different spellings of the same word could be found.

Gradually the printers stopped using alternative forms of spelling, but individual writers spelled as they pleased. Samuel Johnson's Dictionary of the English Language was published in 1755. Dr. Johnson made an attempt to introduce consistent spelling, but he really remained conservative in his attitude towards spelling changes.

'I have attempted few alterations,' he said, 'and among these few perhaps the greater part is from the modern to the ancient practice; and I hope I may be allowed to recommend to those whose thoughts have been, perhaps, employed too anxiously in verbal singularities not to disturb, upon narrower views, or for minute propriety, the orthography of their fathers.'

In general, Johnson's spellings have remained to the present day although some of his spellings have alternative forms.

---

English spelling is less phonetic than French, yet it has some advantages. First, the consonants represent the sounds fairly well. Secondly, English spelling does not use diacritical marks placed above or beneath the letters. Thirdly, English spelling has conserved some international characteristics of our speech so that people of other nations can recognize some words which they otherwise could not if our language were phonetic. If phonetic spelling were introduced, much of the Latin and French elements would not be recognized.

As a matter of fact, the pendulum of fashion across the Atlantic is swinging back towards European English again. Hundreds of discriminatory spellings introduced by Noah Webster into his Compendious Dictionary of the English Language of 1828 have been rejected by subsequent editors of that famous lexicon. Many Americans deliberately prefer English forms and the new Merriam-Webster Pocket Dictionary, which is now in use all over the world, includes a remarkably high percentage of permissible variant spellings.¹

In the following summary, Mencken,² an American writer, expresses somewhat different views from those of Potter, an English writer.

The Influence of Noah Webster

"At the time of the first English settlement in America the rules of English orthography were beautifully vague,

---

¹ Ibid.

and so we find the early documents full of spellings that seem quite fantastic today.¹

There were no dictionaries at the time, but as printing increased, there was a tendency to adopt uniform spelling. At the beginning of the eighteenth century, English writers were spelling almost alike, and by 1711, they were spelling as they do now.

In 1755, Johnson's Dictionary became a guide to orthography. He met with contradictions, but on the whole, his spellings were accepted. When he was confronted with conflicting views, he preferred to remain conservative. He retained the -our ending in words like labour and honour. He attempted to change the two l's in some words to one l but was not successful.

In America, Johnson's spellings were not challenged until the Revolution. In 1768, Benjamin Franklin published *A Scheme for a New Alphabet and a Reformed Mode of Spelling,* but his reforms were not accepted, and it was Noah Webster who finally separated American from English spelling. In his "Grammatical Institute of the English Language," published in 1783, he followed Johnson's spellings, but he desired to establish a "Federal" language in the new Republic. He suggested many changes, but his greatest

argument was a patriotic one:

A capital advantage of this reform in these States would be that it would make a difference between the English orthography and the American. This will startle those who have not attended to the subject; but I am confident that such an event is an object of vast political consequence.

The alteration, however small, would encourage the publication of books in our own country. It would render it, in some measure, necessary that all books should be printed in America. The English would never copy our orthography for their own use; and consequently the same impressions of books would not answer for both countries. The inhabitants of the present generation would read the English impressions; but posterity, being taught a different spelling, would prefer the American orthography.

Webster's American Dictionary of the English Language, 1828, was considered "the father of all the Websters of today." He revised it in 1838, abandoning many spellings that appeared in his dictionary of 1828.

Although other dictionaries were published in the United States, Webster's remained the most popular. He changed the -our ending to -or; he reduced many words having double consonants to one consonant; and he established the s instead of c in words like defense. His spellings, which survive today, are American in character and represent many of the differences between American and English spelling.

1 Ibid., p. 382.
2 Ibid., p. 384.
American spelling shows all the characters that marked the common tongue in the days of Elizabeth in the Seventeenth and Eighteenth Centuries. Standard English must always strike an American as a bit stilted and precious. Its vocabulary is patently less abundant than his own, it has lost to an appreciable extent its old capacity for bold metaphor and in pronunciation and spelling it seems to him to be extremely uncomfortable and not a little ridiculous.¹

SUMMARY OF WILSON'S DISSERTATION²

Wilson, in 1951, made a study of spelling in the elementary school curriculum. His purpose was to trace the development of spelling from early colonial times to the present. He divided his study into three periods: 1647-1840; 1840-1900; and 1900-1950. By analyzing the characteristics of each period, he hoped to set up criteria for a more scientific method of teaching spelling.

First Period—1647-1840

Spelling was emphasized during this period primarily to teach children how to read. The child was first taught all the letters of the alphabet and then learned the syllabarium, which meant placing a vowel before a consonant and then pronouncing the sound. Not much attention was given to teaching methods. Words were assigned to be

¹ Ibid., The Future of the Language, Ch. XII, p. 608.
² Donald Elmo Wilson, The Development of Spelling in the Elementary School Curriculum, June, 1951, University of California, Los Angeles, (Doctor's Thesis).
learned and later tested orally or by writing.

The Webster Spellers helped to standardize American spelling, and the spelling bee became a fad. Spelling became one of the most important subjects in the elementary curriculum.

**Second Period--1840-1900**

American educators, who had studied abroad, introduced new methods of teaching spelling. They were the 'word' and 'phonic' methods. In the 'word' method, the students learned the whole word by seeing it, pronouncing it and learning its meaning. By the 'phonic' method, words were learned by vocal sounds, using always the same letter for the same sound.

**Third Period--1900-1950**

During this period research played an important role in the teaching of spelling.

The four main problems which research has mostly concerned itself are: (1) the discovery of words most frequently written by children and adults; (2) the determination of effective methods of teaching; (3) the measurement of results; and (4) the content, arrangement, and sequence of the curriculum by grades.

During this period, different methods of teaching spelling were proposed. Research in spelling showed

---

1. Ibid.
that some methods were superior to others in attaining proficiency in spelling.

In 1897, Rice,¹ who became interested in education, claimed that spelling ability did not depend on the type of school the student attended; that social status did not influence his spelling ability; and that it did not make any difference whether the student was native or foreign born. He also claimed that fifteen minutes a day was sufficient time to spend in teaching spelling.

Spelling Rules

Although the teaching of spelling rules had been a debatable question, research in this field indicates that some spelling rules are advantageous in teaching students in the elementary schools.

Wheat² made an analysis of 1,498 words with thirty-eight per cent of their derivatives. He found that, with the exception of slightly more than one per cent, four spelling rules covered his total selection of words.

His four rules were:

(1) Words ending in silent 'e' drop the 'e' when adding a suffix beginning with a vowel and keep the 'e' when adding a suffix beginning with a consonant.

---


(2) Words ending in 'y' preceded by a consonant change 'y' to 'i' when adding a suffix except one beginning with 'i'; but words ending in 'y' preceded by a vowel leave the base form unchanged when adding any suffix.

(3) Monosyllables and words of more than one syllable with the accent on the last syllable which end in a single consonant preceded by a single vowel double the final consonant when adding a suffix beginning with a vowel.

(4) In the same syllable, 'i' before 'e' except after 'c' or when sounded like 'a' as in 'neighbor' and 'weight.'

Sartorius also advocated the teaching of spelling rules. She made a study of twenty spelling texts to determine how much emphasis should be placed on spelling rules. From the results of her study, she recommended that spelling rules be limited to those which were simple in form and which were the most useful.

Foran made eight generalizations regarding the teaching of spelling rules which are:

(1) Only a few rules should be taught. There is no justification for the practice of requiring children to memorize rules which apply to only a small number of words. When there are too many exceptions to the rule, the learning of it is not worth the trouble.

---


(2) Some rules should be taught, for children will generalize what they have learned and such generalizations should be directed as far as the spelling of English words permits. The more proficient spellers will need to spell many more words than they learn in the elementary schools and these pupils are probably able to profit more from the learning of rules than are those whose ability and needs are more limited.

(3) Only one rule should be taught at a time. There is enough difficulty in learning one rule without aggravating it by having to learn several at about the same time. A small amount of knowledge learned effectively is far better than a smattering of facts that become confused.

(4) A rule should be taught only when there is a need of it.

(5) The teaching of the rules should be integrated with the arrangement of grouping of words in the textbook.

(6) Rules should be taught inductively rather than deductively. The statement of a rule and the demonstration of examples increases substantially the learning difficulty for the children have not found out the rule themselves—they have been told it. The only learning which is effective is that which the child does himself.

(7) There should be ample reviews of the rules both in the grades in which they have been learned and in the following grades.

(8) Tests of knowledge of the rule should insist not so much upon logical precision as on comprehension and ability to use the rule.

In the abstract of his dissertation, Wilson concluded with the following statements:

In evaluating general methods used in teaching spelling, research indicated: (1) that words
should be presented in some formal manner; (2) that words were learned more easily through systematic study; (3) that studying words in lists was superior to studying words in context; and (4) that the Test-Study method is more efficient than the Study-Test method. Concerning specific techniques in spelling instruction, research indicated: (1) that there is little statistical difference whether two or three tests are given a week; (2) that fifteen minutes a day is generally sufficient time for a spelling lesson; and (3) that for permanent retention, homonyms should be taught separately.

WATSON'S DISSERTATION

The purpose of Watson's study was to find a more effective method of teaching spelling in elementary and high schools. Spelling was taught for one year in the Jefferson High School, and experiments were conducted to enable Watson to compile data for her dissertation in educational psychology.

The thesis is therefore offered that scientific principles of method in the teaching of spelling are not yet established; and the corollary thesis is here proposed, as a starting-point and unifying theme of this dissertation, that there is an open field and a genuine need for progressively more scientific experimentation in the psychology and pedagogy of spelling.2

The organization of the English Department was

---

1 Alice E. Watson, Experimental Studies in the Psychology and Pedagogy of Spelling, Bureau of Publication, Teachers College, Columbia University, New York City, 1935.
2 Ibid.
as follows: All beginners were required to attend a class in spelling for ten weeks. Students who obtained satisfactory marks were exempt from spelling during the remainder of their high school course. Students who obtained a low passing mark were given credit but had to attend spelling classes in the next grade for ten weeks. Students who failed had to repeat the course.

In grade eleven, an English examination was given in the fundamentals of English which included an examination in spelling. Students who failed to pass this examination in spelling were sent to a hospital class in spelling and remained Juniors in status until they made up this deficiency.

**Preliminary Assumptions**

The preliminary assumptions were that standardized lists and textbook lists would be used for testing; that each student would assemble, in alphabetical order, his own list of spelling difficulties; that syllabication would be emphasized; that difficult parts of words should receive special attention; that certain spelling rules would be taught; and that each student would use his dictionary as a reference.

**Spelling Vocabularies**

Spelling vocabularies in this study meant words which the students used correctly but spelled incorrectly.
The list was to consist of approximately two hundred words, which would include all words misspelled in dictation tests or written compositions and additional words which they thought they might need in any of their school subjects.

The first tabulated list contained words selected at random from the notebooks of the students. It contained 6,011 different words. A study was made of the importance of these words by looking up each of the words in the Thorndike Word Book. It was found that 56 per cent of the words occurred in Thorndike's 10,000.

Watson quotes an article from Suhrie:¹

It should not be inferred that the mastery of a foundation writing vocabulary will meet all the spelling needs of all children and adults. The school must make further provision. Beyond this basal vocabulary, however, spelling needs are largely individual, and may vary widely, many of them also may be only temporary. Economic provision for meeting these special needs can not be made by overloading spelling lists for class or group study. Such needs must be met by training each pupil in an effective method for acquiring the correct spelling of additional words as he comes to need them while in school or after leaving school.

Studies in Spelling Errors of High School Students

In an effort to understand the spelling difficulties of the students and to provide efficient techniques for

---
overcoming these difficulties, lists of misspellings were compiled from words occurring in the lists. Only those words which were misspelled five times or more were listed.

**Probable Causes of Misspellings**

Two probable causes of misspellings are natural characteristics of the learner and difficulty of the words. Other causes are sensory and speech defects; lack of familiarity with the word; and attitude towards learning.

Watson classifies habits for correct spelling as habits of giving attention to syllables; habits of seeing the word in its correct form; and habits of transfer from previously learned words.

Poor handwriting is another cause of misspelling. Although this may not be a cause of inability to spell, the handwriting may be so poor as to cause the observer to consider the word misspelled.

**General Conclusions**

These excursions into the spelling field have resulted in a strong conviction that the field itself has scarcely been broken, that it is open and inviting exploration, and that it is likely to prove a fertile one for further intense cultivation.

The second general conclusion reached as a result of these studies (experimental, empirical, theoretical, and bibliographical) is that economy in learning to spell appears to be likely to result from re-emphasis upon the importance
of developing efficient techniques for dealing with relationships among spelling units (such techniques as might result from valid procedures of linking, grouping, comparing, or contrasting). Such a technique would in general seek to integrate each specific detail of the pupil's learning into harmonious relationship with his larger thought-patterns, in contradiction to the recently prevalent doctrine that the spelling of each word should be memorized as a unique and totally dissociated spelling problem.¹

AN EXPERIMENTAL STUDY²

During the spring semester of 1933, Almack and Staffelbach carried out an experiment in the low-seventh grade of the Woodrow Junior High School of San Jose, California.

The purpose of the study was to help eliminate spelling errors from written compositions. They assumed that students knew how to use certain words in their compositions but did not know how to spell them. On this basis they felt that the experiment would have to be diagnostic in character. They divided the problem into three parts: (1) They attempted to discover what words the students were able to use but could not spell. (2) They provided conditions to help students master the spelling of words within their own vocabularies.

¹ Ibid., p. 124.
They checked the results of their experiment. The students were presented with a mimeographed list of five hundred stimulus words. Fifty words were given each day for a period of ten days. Five spaces were provided opposite each word for the students to write their responses. They were told to write any words that came to their minds whether or not they could spell the words. Nothing was deducted for misspellings. The students were allowed eighteen minutes to write responses to the fifty words.

The responses of each student were tabulated. From this tabulation it was possible to measure the extent of the students' vocabularies. The students were given individual lists for study and drill. Then three compositions were collected from each student.

Almack and Staffelbach found that when the students knew the meaning and spelling of a word, their errors in spelling decreased about two per cent. Their experiment also showed that lack of interest and carelessness were attributed to poor spellers whether or not the students were dull, normal or superior. They also concluded that phonetic knowledge plays an important part in spelling ability.
The purpose of Finger's study was to determine whether typewriting could be made a valuable aid in the teaching and learning of spelling.

This study was conducted at the City High School, Whitewater, Wisconsin, from January to June, 1955.

Six typewriting classes participated, four of which were first-year classes, and two of which were second-year classes. The total number of students was ninety-eight.

At the beginning of the semester, a pre-test of one hundred frequently misspelled words was given to all the students. The students were divided into three groups.

Group I, called the intensive-instruction group, consisted of one first-year class and one second-year class, making a total of thirty-three students. They were taught spelling ten to fifteen minutes each class period. The text used was SPELLING AT YOUR TYPEWRITER.

The first week was devoted to spelling rules and drill sheets. Beginning with the second week, the students studied a new lesson each day in the form of

---

1 Kendall A. Finger, A Study of the Effectiveness of Teaching Spelling as an Integral Part of Typewriting, University of Wisconsin, M. S. Thesis, 1956.
warmup typewriting drills.

Group II, called the limited-instruction group, also consisted of one first-year class and one second-year class, making a total of twenty-nine students. The first week the procedure was the same as that of Group I. The second week the students began to accumulate a word list. They studied seven or eight words each day from the REMINGTON RAND pamphlet, HOW TO SPELL IT. Each day the words were dictated and the students were asked to find out the meaning and be prepared to write the words in sentences. The students then typed the words. About five hundred words were studied.

Group III, called the no-instruction group, received no formal instruction in spelling. They consisted of two first-year typewriting classes, making a total of thirty-six students.

At the end of the semester, the ninety-eight students were given the same 100-word test. The results were compared to determine the achievement made in each group.

The results showed that students in the limited-instruction group had the highest average achievement although they had the lowest median and mean scores on the pre-test.

In both the intensive-instruction and limited-instruction groups, the second-year typewriting students
achieved higher scores than the first-year students.

The students in the group receiving no spelling instruction showed very little improvement in spelling ability.

**Conclusions**

The limited-instruction spelling course proved to be the best method of integrating spelling and typewriting instruction. The students achieved better results when they looked up the meanings of words and typed the words in sentences.

Studying seven or eight words a day was more effective than studying fifteen or more words.

The second-year students in both the intensive and limited-instruction group benefited more from this type of instruction than did the first-year students.

The students who received no instruction showed very little improvement in spelling ability.

**Recommendations**

1. A brief introduction to spelling may be accomplished effectively by giving students spelling rules and drill sheets of words.

2. Using words in sentences may contribute to the spelling ability of students.

3. Requiring students to use their dictionaries is
another contributing factor.

4. More satisfactory progress is made if the students learn only seven or eight words a day.

5. It is only necessary to devote about ten minutes of the class time to achieve improvement in spelling ability.

6. Lists of business words might be an effective measure for use in the typewriting classes.

The English Journal offers the following suggestions for teaching spelling.

Fitzgerald asserted that one of the most costly mistakes in the teaching of spelling is that of 'teaching' all the children of a class the same words whether they know them or not. Because he found that a list of 449 words and their repetitions comprised more than seventy-five per cent of all the running words that normal people ever will write, he recommended teaching these words to beginning spellers and to slow or retarded learners who would do well to master 500 words. From a survey of children's letters written outside school, of pupils' themes written in school, and of adults' letters written in life outside the school, Fitzgerald selected 2,650 words which comprise ninety-four per cent of the words useful to the normal individual for life.

---


CHAPTER 3
PROCEDURE

Selection of Problem

The author selected spelling for research primarily to assist pupils to master the art of spelling. She also wished to stimulate the pupils’ interest in the subject by making them aware of the importance of correct spelling.

It has been said that there are three types of spellers:

Those who are poor and know they are poor but do nothing about it; those who are poor and know they are poor but do something about it by checking with the dictionary or by compiling and studying a special list of troublesome words; and those who are poor spellers but do not know it.

The author found that one student, who fitted into the first category, did nothing about it until she was confronted with failure. She then learned to spell correctly.

To achieve these objectives, the author endeavored to develop an effective procedure of teaching spelling in business education.

---

Selection of Students

The author carried out these experiments with two grade 11 classes in Business English. According to school policy, the students are divided into two groups, one taking shorthand and the other, clerical practice.

The First Experiment

There were seventeen students in C11A and thirty students in C11B.

The highest I. Q. of C11A was 129, and that of C11B, 125. The average I. Q. of C11A was 95, and that of C11B, 99.

A mimeographed list of twenty-five words for each lesson was distributed to the students. The words on this list were chosen from a booklet entitled "Frequency Selection of Words Taken from 'Compilation of Words Appearing in Certain Commercial Spellers.'" ¹

The tests were given each Monday and Wednesday to the two classes beginning September 18, 1957, and ending June 2, 1958. Every tenth test was a review of the preceding nine lessons based on the students' error frequency.

Since there were sixty lessons, each student had a possible score of 1500--750 for handwriting and 750 for

typewriting. The students studied independently; there was no preview of words before the tests.

The author gave all the tests, checked the papers and recorded the scores.

A rotation schedule, illustrated in Table 1, was adopted.

<table>
<thead>
<tr>
<th>Frequency of Rotation</th>
<th>Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td>First 20 lessons</td>
<td>C11A</td>
</tr>
<tr>
<td></td>
<td>Handwriting</td>
</tr>
<tr>
<td>Second 20 lessons</td>
<td>Typewriting</td>
</tr>
<tr>
<td>Third 10 lessons</td>
<td>Handwriting</td>
</tr>
<tr>
<td>Fourth 10 lessons</td>
<td>Typewriting</td>
</tr>
</tbody>
</table>

The Second Experiment

There were eighteen students in C11A and thirty-one students in C11B.

The highest I. Q. of C11A was 129, and that of C11B 125. The average I. Q. of C11A was 100, and that of C11B, 99.

The twenty-five words for each lesson were selected from a spelling dictionary at the end of a spelling textbook.¹

The tests were given each Wednesday and Friday to the two classes beginning September 8, 1958, and ending May 27, 1959.

Every tenth lesson was a review of the preceding nine lessons. The words selected for review were taken at random—every ninth word from the dictionary.

A rotation schedule, illustrated in Table 2 was adopted.

**TABLE 2**

**Rotation Schedule for the Second Experiment**

<table>
<thead>
<tr>
<th>Frequency of Rotation</th>
<th>Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td>First 10 lessons</td>
<td>Handwriting</td>
</tr>
<tr>
<td>Second 10 lessons</td>
<td>Typewriting</td>
</tr>
<tr>
<td>Third 10 lessons</td>
<td>Handwriting</td>
</tr>
<tr>
<td>Fourth 10 lessons</td>
<td>Typewriting</td>
</tr>
<tr>
<td>Fifth 10 lessons</td>
<td>Handwriting</td>
</tr>
<tr>
<td>Sixth 10 lessons</td>
<td>Typewriting</td>
</tr>
</tbody>
</table>

**The Third Experiment**

There were twenty-one students in C11A and thirty-one students in C11B.

The highest I. Q. of C11A was 113 and that of C11B, 120. The average I. Q. of C11A was 96 and that of C11B, 98.

The twenty words for each lesson were chosen from a
spelling textbook,\(^1\) beginning with Lesson One and continuing until the end of the experiment. Since there were twenty lessons, each student had a total possible score of 400 for handwriting and 200 for typewriting.

On Wednesday of each week beginning September 9, 1959, the author used the following procedure to teach spelling.

1. She dictated all the words in the lesson once.
   The students wrote or typed these words.
2. She spelled the words back for correction.
3. She determined the number of errors for each word by a show of hands and kept a record of the misspelled words.
4. Each word that was misspelled by any student was dictated by the author and typed or written three times by the whole class.
5. The misspelled words were dictated once, and students checked their own from the textbook.
6. The students were told to study their own misspelled words by using either handwriting or typewriting according to their rotation schedule for a test on Friday of the same week.

When the classes missed their spelling period on Wednesday, the procedure was reversed; that is, the drill work was taken on Friday, and Wednesday became the day for the test.

Tables 3 and 4 show the rotation schedule for teaching and testing.

\(^1\) Ibid.
### TABLE 3

**Rotation Schedule for Teaching Spelling**

<table>
<thead>
<tr>
<th>Lessons</th>
<th>CLLA</th>
<th>CLLB</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-5</td>
<td>Learn new words by handwriting</td>
<td>Learn new words by typewriting</td>
</tr>
<tr>
<td>6-10</td>
<td>Learn new words by typewriting</td>
<td>Learn new words by handwriting</td>
</tr>
<tr>
<td>11-15</td>
<td>Learn new words by handwriting</td>
<td>Learn new words by typewriting</td>
</tr>
<tr>
<td>16-20</td>
<td>Learn new words by typewriting</td>
<td>Learn new words by handwriting</td>
</tr>
</tbody>
</table>

### TABLE 4

**Rotation Schedule for Testing Spelling**

<table>
<thead>
<tr>
<th>Lessons</th>
<th>CLLA</th>
<th>CLLB</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-5</td>
<td>Handwriting</td>
<td>Typewriting</td>
</tr>
<tr>
<td>6-10</td>
<td>Typewriting</td>
<td>Handwriting</td>
</tr>
<tr>
<td>11-15</td>
<td>Handwriting</td>
<td>Typewriting</td>
</tr>
<tr>
<td>16-20</td>
<td>Typewriting</td>
<td>Handwriting</td>
</tr>
</tbody>
</table>
Questionnaire

In order to obtain the reactions of students towards the spelling experiments, the author gave a questionnaire to thirty students who took part in the first experiment. (See Appendix, page 82.)

1) Seventeen students admitted that they made mistakes in spelling because of lack of study and concentration.

2) The majority preferred handwriting spelling because they had more time to think about the word. The students who preferred the typewriting method said that typewriting created a vivid mental picture of the word that helped them to retain a more lasting image of it.

3) Most of the students agreed that spelling rules helped them.

4) Knowledge of a foreign language had practically no effect on spelling ability.

Students who speak Dutch, Hungarian, Ukrainian, Croatian, and Italian said that a second language did not interfere with their ability to spell in English.

Three students who speak French said that the French language helped them in spelling since many English words are derivatives of the French language.

One student who speaks Polish said that another language hindered her spelling ability as the vowels in Polish have a different sound from those in English.
(5) Some of the students said that they found it interesting to learn new words; that it widened their vocabularies; and that they wanted to know the meaning of each new word.
An examination of the mean and median scores in Table 5 reveals that ClIA students obtained higher scores when their spelling was tested by handwriting as compared to typewriting. There was a difference of 57 in the means and a difference of 94 in the medians, both in favor of handwriting. The statistical analysis appears on page 62.

Table 6 shows that the mean for the ClIB students is the same for both handwriting and typewriting. There is a difference of 11 in the medians in favor of handwriting.

Table 7 combines the two classes. The means showed a difference of 21 in favor of handwriting, but the medians showed a difference of only 3 in favor of handwriting.

The first and third quartile scores were also higher when tested by handwriting; there was a difference of 58 in the first quartile scores but just 4 in the third quartile scores.

The standard error of the mean is 11.82 for handwriting and 15.41 for typewriting. The standard error of the median is 14.66 for handwriting and 19.31 for typewriting. (See Appendix, pages 86 and 87.)
TABLE 5
MEANS AND MEDIANS OF SPELLING SCORES FOR SEVENTEEN STUDENTS WHEN TESTED BY BOTH HANDWRITING AND TYPEWRITING ON 1500 WORDS

<table>
<thead>
<tr>
<th>Experiment 1</th>
<th>Mean</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>Handwriting</td>
<td>580</td>
<td>600</td>
</tr>
<tr>
<td>Typewriting</td>
<td>523</td>
<td>506</td>
</tr>
<tr>
<td>Differences</td>
<td>+57 H*</td>
<td>+94 H</td>
</tr>
</tbody>
</table>

* H means Handwriting

TABLE 6
MEANS AND MEDIANS OF SPELLING SCORES FOR THIRTY STUDENTS WHEN TESTED BY BOTH HANDWRITING AND TYPEWRITING ON 1500 WORDS

<table>
<thead>
<tr>
<th>Experiment 1</th>
<th>Mean</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>Handwriting</td>
<td>681</td>
<td>704</td>
</tr>
<tr>
<td>Typewriting</td>
<td>681</td>
<td>693</td>
</tr>
<tr>
<td>Differences</td>
<td>Same</td>
<td>+11 H</td>
</tr>
<tr>
<td></td>
<td>Experiment 1</td>
<td></td>
</tr>
<tr>
<td>----------------------</td>
<td>------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td>1st Quartile</td>
</tr>
<tr>
<td>Handwriting</td>
<td>645</td>
<td>600</td>
</tr>
<tr>
<td>Typewriting</td>
<td>624</td>
<td>542</td>
</tr>
<tr>
<td>Differences</td>
<td>+21H</td>
<td>+58H</td>
</tr>
</tbody>
</table>
Ability to Spell and the I. Q.'s of Students

The relationship between a student’s over-all ability to spell as measured by the combined handwriting and typing scores is shown in Table 8. From an inspection of this table, which shows no linear relationship, the I. Q.'s of these students do not seem to have any significant bearing on their ability to spell.

The student with an I. Q. of 61, which was the lowest, obtained a score of 26 points below the median. The student with the second lowest I. Q., 70, obtained the third highest score in the class.

The lowest score was made by a student having an I. Q. of 85, which is two points above the median I. Q.

Table 9 confirms the previous statement that the I. Q. of a student has very little bearing on his ability to spell in these experiments. Three students with I. Q.'s between 70 and 80 achieved scores well above the median score, while a student having an I. Q. of 109 had the lowest score.

Comparison of Frequency Distribution

Figure 1 represents the frequency distribution of seventeen, Cl1A students. It is evident that these students spelled better when they wrote their spelling than they did when they typed their spelling since seven students achieved scores within the 580-629 range as
TABLE 8

RELATIONSHIP BETWEEN A STUDENT'S ABILITY TO SPELL
AS MEASURED BY THE COMBINED HANDWRITING AND TYPEWRITING
SCORES

Class--C11A

<table>
<thead>
<tr>
<th>No. of Words</th>
<th>I. Q.</th>
<th>60</th>
<th>70</th>
<th>80</th>
<th>90</th>
<th>100</th>
<th>110</th>
</tr>
</thead>
<tbody>
<tr>
<td>1450</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1400</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>1350</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1300</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1250</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1200</td>
<td></td>
<td></td>
<td></td>
<td>xx</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1150</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1100</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1050</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1000</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>950</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>900</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>850</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>800</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

x's represent students

Scores are out of a possible 1500

I. Q.
Mean 95
Median 96
### TABLE 9

**RELATIONSHIP BETWEEN A STUDENT'S ABILITY TO SPELL AS MEASURED BY THE COMBINED HANDWRITING AND TYPING WRITING SCORES**

**Class—C11E**

<table>
<thead>
<tr>
<th>No. of Words</th>
<th>I. O.</th>
<th>70</th>
<th>80</th>
<th>90</th>
<th>100</th>
<th>110</th>
</tr>
</thead>
<tbody>
<tr>
<td>1500</td>
<td></td>
<td>xx</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>1450</td>
<td></td>
<td>xx</td>
<td>xx</td>
<td>xxx</td>
<td>xxx</td>
<td></td>
</tr>
<tr>
<td>1400</td>
<td></td>
<td>xx</td>
<td>xx</td>
<td>xxx</td>
<td>xxx</td>
<td></td>
</tr>
<tr>
<td>1350</td>
<td></td>
<td>x</td>
<td>xx</td>
<td>xxx</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1300</td>
<td></td>
<td>x</td>
<td>x</td>
<td>xx</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>1250</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1200</td>
<td></td>
<td></td>
<td>xx</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1150</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>1100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>1050</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>950</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
</tbody>
</table>

x's represent students

Scores are out of a possible 1500

I. O.  
Mean 99

Median 96
FIGURE 1

COMPARISON OF SCORES MADE BY SEVENTEEN STUDENTS WHEN TESTED IN SPELLING BY HANDWRITING AND BY TYPEWRITING, CLASS CL1A, 1957-1958

Handwriting_________

Typewriting------------
compared to two students who obtained the same scores. However, two students obtained the highest scores, 680-729, by both methods.

Figure 2 represents the frequency distribution of thirty, CllB students. The differentiation is practically negligible as seventeen students obtained scores of 680-729 when they wrote their spelling, while eighteen students obtained the same scores when they typed their spelling. Four students obtained scores of 730-750 when they wrote their spelling as compared to one student who obtained the same score when she typed her spelling.

Figure 3, which combines the two classes, does not disclose much variation. Nineteen students made scores in the 680-729 range when they wrote their spelling as compared to twenty students who made the same scores when they typed their spelling.

Statistical Analysis

A general review of the tables and figures shows that students made somewhat higher scores when tested by handwriting than they did by typewriting. In order to confirm the above findings, the author computed the standard deviations for both experiments.

Forty-seven students participated in the first experiment; the possible score for each student was 750
FIGURE 3

COMPARISON OF SCORES MADE BY FORTY-SEVEN STUDENTS AS MEASURED BY COMBINED HANDWRITING AND TYPWRITING SCORES, C11A, C11B, 1957-1958

Handwriting

Typewriting
for each method, which made a total of 35,250. The actual score for handwriting was 30,308 and for typewriting, 29,316.

The mean of the distribution for handwriting was found to be 644.85 as compared to 623.74 for typewriting.

The standard deviation was 81.03 for handwriting and 105.65 for typewriting.

The Z-score expresses deviation from the arithmetic mean in terms of standard deviation units. The Z-score of 1.087 in favor of handwriting is 1.087 sigmas above the mean, which has practically no statistical significance. (See Appendix, page 85.) The null hypothesis is rejected at the 5 per cent level for Z-scores of 1.96 or higher and at the 1 per cent level for Z-scores of 2.58 or higher.

**Second Experiment—1958-1959**

An examination of the mean and median scores in Table 10 reveals that the C11A students obtained higher scores when their spelling was tested by handwriting as compared to typewriting. There was a difference of 12 in the means and a difference of 8 in the medians, both in favor of handwriting. The statistical analysis appears on page 62.

In Table 11, the C11B students showed an increase in the mean for typewriting by one point; the median showed a difference of 14 in favor of handwriting.
### TABLE 10
MEANS AND MEDIANS OF SPELLING SCORES FOR EIGHTEEN STUDENTS WHEN TESTED BY BOTH HANDWRITING AND TYPEWRITING ON 1500 WORDS

<table>
<thead>
<tr>
<th>Experiment 2</th>
<th>Mean</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>Handwriting</td>
<td>494</td>
<td>516</td>
</tr>
<tr>
<td>Typewriting</td>
<td>482</td>
<td>510</td>
</tr>
<tr>
<td>Differences</td>
<td>+12 H</td>
<td>+8 H</td>
</tr>
</tbody>
</table>

### TABLE 11
MEANS AND MEDIANS OF SPELLING SCORES FOR THIRTY-ONE STUDENTS WHEN TESTED BY BOTH HANDWRITING AND TYPEWRITING ON 1500 WORDS

<table>
<thead>
<tr>
<th>Experiment 2</th>
<th>Mean</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>Handwriting</td>
<td>609</td>
<td>403</td>
</tr>
<tr>
<td>Typewriting</td>
<td>610</td>
<td>389</td>
</tr>
<tr>
<td>Differences</td>
<td>+1 T</td>
<td>+14 H</td>
</tr>
</tbody>
</table>
Table 12 combines the two classes. The means showed a difference of one in favor of handwriting, but the medians showed a difference of 8 in favor of typewriting. The first quartile scores were higher when tested by handwriting, but the third quartile scores were the same for both handwriting and typewriting. There was a difference of 15 in favor of handwriting in the first quartile.

The standard error of the mean is 12.44 for handwriting and 13.36 for typewriting. The standard error of the median is 15.58 for handwriting and 16.74 for typewriting. (See Appendix, pages 91 and 92.)

**Ability to Spell and the I. Q.'s of Students**

An examination of Table 13 shows that the student having the lowest I. Q. obtained the highest score.

Table 14 also reveals similar information; that is, students with low I. Q.'s achieved above-average scores.

**Comparison of Frequency Distribution**

Figure 4 represents the frequency distribution of eighteen, C11A students. It is evident that these students spelled better when they wrote their spelling than they did when they typed their spelling since six students achieved scores with the 460-509 range as
# Table 12

Means and Medians of Spelling Scores for Forty-Nine Students (Classes Combined) When Tested by Both Handwriting and Typewriting on 1500 Words

<table>
<thead>
<tr>
<th>Experiment 2</th>
<th>Mean</th>
<th>1st Quartile</th>
<th>Median</th>
<th>3rd Quartile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Handwriting</td>
<td>564</td>
<td>473</td>
<td>585</td>
<td>668</td>
</tr>
<tr>
<td>Typewriting</td>
<td>563</td>
<td>458</td>
<td>593</td>
<td>668</td>
</tr>
<tr>
<td>Differences</td>
<td>+1 H</td>
<td>+15 H</td>
<td>+8 T</td>
<td>Same</td>
</tr>
</tbody>
</table>
### TABLE 13

**RELATIONSHIP BETWEEN A STUDENT'S ABILITY TO SPELL AS MEASURED BY THE COMBINED HANDWRITING AND TYPEWRITING SCORES**

Class—C11A

<table>
<thead>
<tr>
<th>No. of Words</th>
<th>I. Q.</th>
<th>80</th>
<th>90</th>
<th>100</th>
<th>110</th>
<th>120</th>
</tr>
</thead>
<tbody>
<tr>
<td>1350</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1300</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1250</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1200</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1150</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>1050</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>1000</td>
<td></td>
<td>x</td>
<td>x</td>
<td>xx</td>
<td></td>
<td></td>
</tr>
<tr>
<td>950</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>900</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>850</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>800</td>
<td></td>
<td></td>
<td></td>
<td>xx</td>
<td></td>
<td></td>
</tr>
<tr>
<td>750</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>700</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>650</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>600</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
</tr>
</tbody>
</table>

*x's represent students

Scores are out of a possible 1500

I. Q.

Mean 100

Median 101
<table>
<thead>
<tr>
<th>No. of Words</th>
<th>I. Q.</th>
<th>70</th>
<th>80</th>
<th>90</th>
<th>100</th>
<th>110</th>
<th>120</th>
</tr>
</thead>
<tbody>
<tr>
<td>1500</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1450</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>1400</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1350</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1300</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1250</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1200</td>
<td>x</td>
<td></td>
<td>xx</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1150</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1100</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1050</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>1000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>950</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>900</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>850</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>800</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>750</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

x's represent students
Scores are out of a possible 1500

Mean 99
Median 99
FIGURE 4

COMPARISON OF SCORES MADE BY EIGHTEEN STUDENTS WHEN TESTED IN SPELLING BY HANDWRITING AND BY TYPING, CLASS 31A, 1958-1959
compared to three students who obtained scores within the same range.

Figure 5 represents the frequency distribution of thirty-one, C11B students. This time the frequency distribution was somewhat higher for typewriting, ten students scoring within the 680-729 range as compared to eight students for handwriting. The highest scores showed the same results.

Figure 6 represents a combination of the two classes, forty-nine students. The frequency distribution is a little higher for typewriting, eleven students with scores of 680-729 as compared to eight students for handwriting. Again the highest scores are the same.

**Statistical Analysis**

Forty-nine students took part in the second experiment; the possible score for each student was 750, making a total score of 36,750. The actual score for handwriting was 27,760 and for typewriting, 27,592.

The mean of the distribution for handwriting was 566.53 as compared with 563.10 for typewriting.

The standard deviation for handwriting was 111.93 and for typewriting, 120.27.

The Z-score expresses deviation from the arithmetic mean in terms of standard deviation units. The Z-score was .146 which was even less than the Z-score for the first experiment. (See Appendix, page 90.)
FIGURE 5

COMPARISON OF SCORES MADE BY THIRTY-ONE STUDENTS WHEN TESTED IN SPELLING BY HANDWRITING AND BY TYPEWRITING, CLASS CLUB, 1958-1959

Handwriting

Typewriting
FIGURE 6

COMPARISON OF SCORES MADE BY FORTY-NINE STUDENTS AS MEASURED BY COMBINED HANDWRITING AND TYPEWRITING SCORES, CILA, 1958-1959

Typewriting

Handwriting
Analysis of Data
Third Experiment—1959–1960

An examination of the mean and median scores in Table 15 reveals that ClIA students obtained slightly higher scores when their spelling was tested by typewriting as compared to handwriting. There was a difference of .85 in the mean and a difference of 2 in the median, both in favor of typewriting.

Table 16 shows that ClIB students obtained slightly higher scores when their spelling was tested by typewriting as compared to handwriting. There was a difference of 1.39 in the mean and a difference of 1 in the median, both in favor of typewriting.

Table 17 combines the two classes. The means show a difference of 1.18 in favor of typewriting, but the medians are the same.

The first and third quartile scores were also higher when tested by typewriting; there was a difference of 7 in the first quartile and a difference of 3 in the third quartile scores.

The standard error of the mean is 2.22 for typewriting and 2.15 for handwriting. The standard error of the median is 2.78 for typewriting and 2.7 for handwriting. (See Appendix, pages 96, 97.)
TABLE 15
MEANS AND MEDIANs OF SPELLING SCORES FOR TWENTY-TWO STUDENTS WHEN TESTED BY HANDWRITING AND TYPEWRITING ON 400 WORDS

<table>
<thead>
<tr>
<th></th>
<th>Experiment 1</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Median</td>
<td></td>
</tr>
<tr>
<td>Typewriting</td>
<td>173.41</td>
<td>176</td>
<td></td>
</tr>
<tr>
<td>Handwriting</td>
<td>172.56</td>
<td>174</td>
<td></td>
</tr>
<tr>
<td>Differences</td>
<td>+.85 T</td>
<td>+2 T</td>
<td></td>
</tr>
</tbody>
</table>

TABLE 16
MEANS AND MEDIANs OF SPELLING SCORES FOR THIRTY-ONE STUDENTS WHEN TESTED BY HANDWRITING AND TYPEWRITING ON 400 WORDS

<table>
<thead>
<tr>
<th></th>
<th>Experiment 1</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Median</td>
<td></td>
</tr>
<tr>
<td>Typewriting</td>
<td>182.42</td>
<td>189</td>
<td></td>
</tr>
<tr>
<td>Handwriting</td>
<td>181.03</td>
<td>188</td>
<td></td>
</tr>
<tr>
<td>Differences</td>
<td>+1.39 T</td>
<td>+1 T</td>
<td></td>
</tr>
</tbody>
</table>
TABLE 17
MEANS AND MEDIANS OF SPELLING SCORES FOR FIFTY-THREE STUDENTS WHEN TESTED BY HANDWRITING AND TYPING ON 400 WORDS

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>1st Quartile</th>
<th>Median</th>
<th>3rd Quartile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typewriting</td>
<td>178.68</td>
<td>170</td>
<td>183</td>
<td>192</td>
</tr>
<tr>
<td>Handwriting</td>
<td>177.50</td>
<td>163</td>
<td>183</td>
<td>189</td>
</tr>
<tr>
<td>Differences</td>
<td>+1.18T</td>
<td>+7T</td>
<td>Same</td>
<td>+3T</td>
</tr>
</tbody>
</table>
Comparison of Frequency Distribution

Figure 7 represents the frequency distribution of twenty-two, C11A students. Six students came within the 170-179 range when tested by handwriting as compared to five students within the same range when tested by typewriting. The ratio was the same for the 180-189 range. Four students came within the 190-199 range when tested by typewriting as compared to three students when tested by handwriting.

Figure 8 represents the frequency distribution of thirty-one, C11B students. Ten students obtained scores within the 180-189 range when tested by handwriting as compared to six students when tested by typewriting. Fourteen students came within the 190-199 range when tested by typewriting as compared to ten students when tested by handwriting. One student obtained a perfect score of 200 when tested by typewriting. The same student obtained a score of 197 when tested by handwriting.

Figure 9, which combined the two classes, does not disclose much variation.

Ten students came within the 170-179 range when tested by typewriting as compared to nine students when tested by handwriting.

Eighteen students came within the 190-199 range when tested by typewriting as compared to thirteen students by handwriting.
FIGURE 8
COMPARISON OF SCORES MADE BY THIRTY-ONE STUDENTS WHEN TESTED IN SPELLING BY HANDWRITING AND BY TYPEWriting, CLASS 11B, 1959-1960
Statistical Analysis

A general review of the tables and figures shows that students made slightly higher scores when tested by typewriting than they did when tested by handwriting. In order to confirm the above findings, the author computed the standard deviation.

Fifty-three students participated in this experiment; the possible score for each student was 200 for each method, which made a total of 10,600. The actual score for typewriting was 9,470, and for handwriting was 9,408.

The mean of the distribution was found to be 178.68 for typewriting as compared to 177.51 for handwriting.

The standard deviation was 16.1603 for typewriting and 15.667 for handwriting.

The Z-score expresses deviation from the arithmetic mean in terms of standard deviation units. The Z-score of .3788 in favor of typewriting is .3788 sigmas above the mean, which has practically no statistical significance. The null hypothesis is rejected at the 5 per cent level for Z-scores of 1.96 or higher and at the 1 per cent level for Z-scores of 2.58 or higher.
CHAPTER 5

Summary

Since the ability to spell correctly is an essential qualification for the beginner in business, the author carried out three experiments in an effort to investigate the improvement of spelling ability in business education.

The primary purpose of this study was to determine the relative advantages of improving spelling by typewriting as compared with handwriting.

These experiments took place at the Welland High and Vocational School over a period of three school terms. In all, one hundred and forty-nine grade eleven students participated; forty-seven, the first term; forty-nine, the second term; and fifty-three, the third term.

The first two experiments were similar in nature; that is, sixty spelling tests were given, two each week, alternating handwriting spelling and typewriting spelling. In the first experiment, the students rotated after the first twenty lessons and then after the next ten lessons.

In the second experiment, the students rotated at the end of ten lessons.

In the third experiment, part of one class period was devoted to drill work in spelling. During the same week, a test was given on these words, alternating typewriting and handwriting every five lessons until twenty lessons were completed.
CHAPTER 6

Results

The three experiments showed the following results:

(1) Out of forty-seven students who took part in the first experiment, twenty-one students had approximately the same scores when tested by handwriting and by typewriting; nineteen students had higher scores on the tests by handwriting; and seven students obtained higher scores on the typewriting tests.

The handwriting mean was 645 and the typewriting mean was 624; the handwriting standard deviation was 81.032 and the typewriting standard deviation was 105.653; the Z-score of 1.087 did not indicate a rejection of the null hypothesis.

(2) Out of forty-nine students who participated in the second experiment, twenty-two had approximately the same scores; sixteen had higher scores on the typewriting tests; and eleven had obtained higher scores on the handwriting tests.

The handwriting mean was 564 and the typewriting mean was 563; the handwriting standard deviation was 111.93 and the typewriting standard deviation was 120.27; the Z-score of 146 did not indicate a rejection of the null hypothesis.

(3) Out of fifty-three students in the third experiment, twenty-seven had approximately the same scores; seventeen had higher scores on the typewriting tests, and nine obtained higher scores on the handwriting tests.
The handwriting mean was 177.50; the typewriting mean, 178.68; the handwriting standard deviation was 15.667; the typewriting standard deviation, 16.1603; and the Z-score of .3788 did not indicate a rejection of the null hypothesis.
Conclusions

(1) From the above findings, in Experiments 1 and 2, it is evident that it made very little difference on spelling accuracy whether the students used typewriting or handwriting in their spelling.

(2) Since the statistical analysis of the scores also showed a negligible difference between tests done by typewriting and handwriting in Experiment 3, no advantage of teaching spelling by typewriting as compared with handwriting was revealed.

(3) From the results of these experiments, it can be concluded that an improvement of spelling ability does not depend on the method in which the spelled words are written. Improvement in spelling depends on variables other than those experimentally treated in this study.
CHAPTER 8

Recommendations

In view of the results obtained from these three experiments, review of the literature, and the experience gained through the research, the author offers the following recommendations:

1. A combination of different techniques should be used to advantage in stimulating the interest of students and making them aware of the need to improve their spelling and achieve their goals.

2. Students should have access to dictionaries and know how to use them.

3. The rules of syllabication should be taught to students who are contemplating office work.

4. Students should know how to pronounce words correctly, learn the meaning of new words, and be able to use them in sentences.

5. Students should keep a daily list of spelling errors in all subjects in order to become spelling-conscious.

6. Since spelling is an individual problem, students should formulate their own plans for studying spelling.

7. Some students should be taught the application of one spelling rule at a time.

8. Ten to fifteen minutes each day should be used by the teacher to improve spelling ability.

9. Spelling should be given a place in the high school
curriculum. At present it appears to be taught only incidentally with English.
BIBLIOGRAPHY


MacGregor, Mrs. Geraldine, "Let's Try to Teach Spelling," *The Balance Sheet*, April, 1953.


Potter, Simeon, *Our Language,* Sounds and Spelling, Ch. VI, William Clowes and Sons Ltd., London and Beccles, reprinted 1957, Great Britain.


Sartorius, Ina C., "Generalization in Spelling," *Contributions to Education,* No. 472, Teachers College, Columbia University, 1931.


Wilson, Donald Elmo, *The Development of Spelling in the Elementary School Curriculum,* University of California, Los Angeles, 1951, (Doctor's Thesis).
The vita has been removed from the scanned document.
APPENDIX

Questionnaire

1. Why do you make mistakes in spelling?
2. How do you study spelling?
3. What has helped you most to improve your spelling?
4. What is your opinion of learning spelling by typewriting dictation?
5. Which system did you prefer, handwriting or typewriting, and why?
6. What is your greatest difficulty in learning spelling?
7. What is the advantage of learning to spell correctly?
8. Has a speaking knowledge of a second language helped or hindered you in learning to spell?
9. Have spelling rules helped you? Why?
10. If you are not familiar with a word, do you try to spell it phonetically?
11. Which method do you think improved your spelling, handwriting or typewriting? Why?
12. Does reading help you? Why or why not?

Comments:
FIRST EXPERIMENT, 1957-1958

Standard Deviation

Handwriting

\[
\sum_{x} x^2 = 19,852,696
\]

\[
\sum x = 30,308
\]

\[
S_H = \sqrt{\frac{19,852,696 - (30,308)^2}{47}}
\]

\[
S_H = \sqrt{422,397.79 - (644.85)^2}
\]

\[
S_H = \sqrt{6,566.27}
\]

\[
S_H = 81.032
\]
FIRST EXPERIMENT, 1957-1958

Standard Deviation

Typewriting

\[
\sum_{i=1}^{n} x_i^2 = \sum_{i=1}^{n} x_i = 18,810,070
\]

\[
N = 29,316
\]

\[
S_T = \sqrt{\frac{18,810,070 - \left(\frac{29,316}{47}\right)^2}{47}}
\]

\[
S_T = \sqrt{\frac{400,214.26 - (623.74)^2}{47}}
\]

\[
S_T = \sqrt{\frac{400,214.26 - 389,051.59}{47}}
\]

\[
S_T = \sqrt{1162.67}
\]

\[
S_T = 105.653
\]
FIRST EXPERIMENT, 1957-1958

**Z-Score**

\[
S_w = \sqrt{\frac{6566.27}{47} + \frac{11162.67}{47}}
\]

\[
\sqrt{139.71 + 236}
\]

\[
\sqrt{377.21}
\]

\[
Z = \frac{x - \bar{x}}{s}
\]

\[
Z = \frac{644.85 - 623.74}{4.2} = 1.087
\]}
FIRST EXPERIMENT, 1957-1958

Standard error of means

Handwriting

\[ S_{\bar{x}} = \frac{S}{\sqrt{N}} \]

\[ S_{\bar{x}} = \frac{81.032}{\sqrt{47}} \]

\[ S_{\bar{x}} = \frac{81.032}{6.8556} \]

\[ S_{\bar{x}} = 11.82 \]

Typewriting

\[ S_{\bar{x}} = \frac{105.653}{\sqrt{47}} \]

\[ S_{\bar{x}} = \frac{105.653}{6.8556} \]

\[ S_{\bar{x}} = 15.41 \]
FIRST EXPERIMENT

Standard Error of Medians

**Handwriting**

\[ \sigma_{\text{mdm}} = \frac{1.253.9}{\sqrt{N}} \]
\[ = \frac{1.253 \times 81.032}{\sqrt{47}} \]
\[ = \frac{101.533096}{6.8556} \]
\[ = 14.66 \]

**Typewriting**

\[ \sigma_{\text{mdm}} = \frac{1.253 \times 106.653}{\sqrt{47}} \]
\[ = \frac{132.383209}{6.8556} \]
\[ = 19.31 \]
SECOND EXPERIMENT, 1958-1959

Standard Deviation

Handwriting

\[ \sum_{i=1}^{n} x_i^2 = 16,340,772 \]

\[ \sum_{i=1}^{n} x_i = 27,760 \]

\[ S_H = \sqrt{16,340,772 - \left(\frac{27,760}{49}\right)^2} \]

\[ S_H = \sqrt{3,334,851.14 - (566.53)^2} \]

\[ S_H = \sqrt{3,334,851.14 - 320,956.24} \]

\[ S_H = \sqrt{12,528.90} \]

\[ S_H = 111.93 \]
SECOND EXPERIMENT, 1958-1959

Standard Deviation

Typewriting

\[ \sum_{i=1}^{n} x_i^2 = 16,245.918 \]
\[ \sum_{i=1}^{n} x_i = 27.592 \]

\[ S_T = \sqrt{\frac{16,245.918}{49} - \left(\frac{27.592}{49}\right)^2} \]

\[ S_T = \sqrt{331,549.35 - (5.6310)^2} \]

\[ S_T = \sqrt{331,549.35 - 317.081.61} \]

\[ S_T = \sqrt{14,467.74} \]

\[ S_T = 120.27 \]
Second Experiment, 1958-1959

Z-Score

\[ S_w = \sqrt{\frac{1252.90 + 514467.74}{49} + \frac{255.69 + 295.26}{49} - \frac{550.95}{49}} \]

\[ Z = \frac{x - \bar{x}}{s} \]

\[ Z = \frac{3.43}{.146} = .146 \\
\text{2347} \]
SECOND EXPERIMENT, 1958-1959

Standard Error of Means

**Handwriting**

\[
\text{mean } \bar{x} = \frac{S}{\sqrt{N}}
\]

\[
\bar{x} = \frac{111.93}{\sqrt{49}}
\]

\[
\bar{x} = 12.44
\]

**Typewriting**

\[
\bar{x} = \frac{120.27}{\sqrt{49}}
\]

\[
\bar{x} = 13.36
\]
SECOND EXPERIMENT, 1958-1959

Standard Error of Medians

Handwriting

\[ S_{medm} = 125.3 \]

\[ S_{medm} = \frac{1253}{\sqrt{9}} \]

\[ S_{medm} = 140.24829 \]

\[ S_{medm} = 15.58 \]

Typewriting

\[ S_{medm} = 1.253 \times \frac{120.27}{\sqrt{9}} \]

\[ S_{medm} = 150.6953 \]

\[ S_{medm} = 16.74 \]
THIRD EXPERIMENT, 1959-1960

Standard Deviation

Handwriting

\[
\bar{X} = \frac{\sum x^2}{n} = 1,683,010
\]

\[
\sum x^2 = 9408
\]

\[
S_H = \sqrt{\frac{1683010}{53} - \left(\frac{9408}{53}\right)^2}
\]

\[
S_H = \sqrt{31754.9057 - 31509.415}
\]

\[
S_H = \sqrt{245.4607}
\]

\[
S_H = 15.667
\]
THIRD EXPERIMENT, 1959-1960

Standard Deviation

Typewriting

\[ \sum_{i=1}^{n} x^2 = 1,705.948 \]
\[ \sum_{i=1}^{n} x_i = 9470 \]

\[ S_T = \sqrt{\frac{17059.48}{53} - \left(\frac{9470}{53}\right)^2} \]

\[ S_T = \sqrt{32187.699 - (178.679)^2} \]

\[ S_T = \sqrt{261.1526} \]

\[ S_T = 16.1603 \]
THIRD EXPERIMENT, 1959-1960

Z-Score

\[ Z = \frac{X - \overline{X}}{S} \]

\[ Z = \frac{178.680 - 177.509}{S} \]

\[ Z = \frac{1.171}{3.0917} \]

\[ Z = 0.3788 \]
THIRD EXPERIMENT, 1959-1960

Standard Error of Means

**Handwriting**

\[ S_{\bar{x}} = \frac{S}{\sqrt{N}} \]

\[ S_{\bar{x}} = \frac{15.667}{\sqrt{53}} \]

\[ S_{\bar{x}} = \frac{15.667}{7.28} \]

\[ S_{\bar{x}} = 2.15 \]

**Typewriting**

\[ S_{\bar{x}} = \frac{S}{\sqrt{N}} \]

\[ S_{\bar{x}} = \frac{16.1603}{\sqrt{53}} \]

\[ S_{\bar{x}} = \frac{16.1603}{7.28} \]

\[ S_{\bar{x}} = 2.22 \]
THIRD EXPERIMENT

Standard Error of Medians

Handwriting

\[ S_{mdm} = \frac{1.253 \times S}{\sqrt{N}} \]

\[ = \frac{1.253 \times 15.667}{\sqrt{53}} \]

\[ = \frac{19.630751}{2.78} \]

\[ S_{mdm} = 2.7 \]

Typewriting

\[ S_{mdm} = \frac{1.253 \times S}{\sqrt{N}} \]

\[ = \frac{1.253 \times 16.1603}{\sqrt{53}} \]

\[ = \frac{20.248859}{7.28} \]

\[ = 2.78 \]
ABSTRACT

The primary purpose of this study was to determine the relative advantage of improving spelling by typewriting as compared with handwriting.

The author carried out three experiments at the Welland High and Vocational School over a period of three years. Six eleventh grade classes participated, two each year.

The first two experiments were similar in nature; that is, sixty spelling tests were given, two each week, alternating spelling by typewriting and handwriting.

In the third experiment, part of one class period was devoted to drill work in spelling. The drill was alternately conducted by typewriting and in handwriting. During the same week, a test was given on these words, alternating typewriting and handwriting.

The results of the first two experiments showed no statistically significant difference when tested either by typewriting or handwriting. Therefore it can be concluded that it was immaterial whether the students were tested either by typewriting or handwriting.

The results of the third experiment showed no statistically significant difference when spelling was practiced either by typewriting or handwriting. Therefore it can be concluded that the differences were so slight that it was
immaterial whether the students practice their spelling on the typewriter or in handwriting.

It can be further concluded that an improvement of spelling ability does not depend on the method in which the spelled words are written. Improvement in spelling depends on variables other than those experimentally treated in this study.

In view of the results obtained from these three experiments, the author recommends that a combination of different techniques should be used to advantage in stimulating the interest of students to make them aware of the need to improve their spelling and to achieve their goals.