AN EXPERIMENTAL STUDY DEALING WITH THE VALUE OF USING CORRECTIVE EXERCISES IN TEACHING FIRST YEAR TYPEWRITING

A THESIS

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CHAPTER I

INTRODUCTION

STATEMENT OF THE PROBLEM AND REVIEW OF THE LITERATURE

It seems to have been taken for granted that learners of typewriting should start with the small units, the letters and various combinations of them, and gradually progress to the skills of higher order, such as word and phrase automatization. Recent studies show a tendency to draw away from the use of meaningless letter combinations and toward the use of complete connected material for drill purposes. Dr. William F. Book,[1] in his analysis of learning to typewrite, states that letter and word habits are best mechanized in and through their use in the writing of sentences and connected discourse. Mr. David Pearson, in the study which he presented before the 1927 Conference, concluded that "it might be fair to assume that it is not necessary to use nonsense letter groups as practice material in teaching typewriting."[2]

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[1] William F. Book, Learning to Typewrite (New York City: The Gregg Publishing Company, 1925), pp. 168-185.

[2] David Pearson, "An Experiment with the Automatization of the 1,000 Commonest Words," Research Studies in Commercial Education, II, Monographs in Education (The College of Education and The College of Commerce, First Series No. 8. Iowa City, Iowa: The College of Education and The College of Commerce University of Iowa, Jan. 1, 1928), pp. 84-97.

I. THE PROBLEM

Statement of the problem. The purpose of this study--"The Value of Using Corrective Exercises in Teaching First Year Typewriting"--is to determine whether there is any value to be derived from the use of corrective typewriting exercises, the particular type of exercises to use, whether errors can be prevented by their use, and the amount of value in both speed and accuracy of performance.

The experimental technique following the method of parallel groups was used. The effectiveness of the method was measured by comparing the results of the experimental class and the control class. The experimental class was subjected to the corrective exercises, and the control class was taught by the traditional method of following the text book.

THE PLAN OF TREATMENT

The procedure used involves the following points:

1. The selection of significant corrective exercises. This selection was determined by the opinions of outstanding leaders in this field, of leading educators, by reports of special commissions for the study of known tendencies to error,[3] and by comparison of different types of corrective exercises.

2. The selection of students for the two classes.

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[3] D. D. Lessenberry, Error Chart, (Syracuse: L. C. Smith & Corona Typewriters Inc. 1929).

The sectioning and equalization of the experimental and the control groups was determined by:

a. Academic record

b. Equal grouping of Junior, Senior and Post-graduate students

c. Opinions of the Superintendent and Typewriting Teacher

The group subjected to the corrective exercises was the experimental group. The group taught by the text book was the control group.

3. The arrangement of class periods of suitable time of recitation, and length of period.

There is quite a bit of argument about school day efficiency, however, Betts, Sandiford and Gates agree that the highest efficiency may be obtained from 11:00 to 12:00. The lowest time is supposed to be from 9:00 to 10:00 and from 1:00 to 2:00. Thorndike maintains the hours of the school day are about the same but his experiments showed a better average efficiency from 11:00 to 12:00 also. The main thing is to keep up the interest and avoid boredom for there is practically no such thing as mental fatigue.

Experiments have shown that practically as much can be accomplished in single periods as in double periods[4] so we used the fifty-five minute periods.

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[4] Adelaide Kauzer, "Status of the Teaching of Shorthand and Typewriting in Secondary Public Schools of Kansas", Research Studies in Commercial Education, III (Iowa City, Iowa: The College of Education and The College of Commerce University of Iowa, Nov. 1, 1928), p. 78.

4. The selection of suitable material for testing student as to his achievement.[5]

5. The planning of a record sheet for both student and teacher, to determine what particular corrective exercise should be given each student and to show achievement of each student in both speed and accuracy.[6]

6. The adopting of a reliable scale for grading tests, both as to accuracy and speed, taking into consideration the amount of instruction the student has had.[7]

7. The planning of the class period.

The amount of time to be devoted to the exercises:

a. Use of exercises with music

b. Practice of exercises without music

c. Writing the exercises under time for accuracy

d. Writing the exercises under time for speed

The amount of time devoted to regular timed tests on connected material.

The amount of time devoted to text book work, and other phases of machine operation.

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[5] See Appendix

[6] Cf. post., Appendix.

[7] Cf. post., Appendix.

8. Special attention to the six points of technique:

   a. Correct position

   b. Correct technique

   c. Exercise mental and muscular control

   d. Write rhythmically and without hesitation of any kind

   e. Keep your eyes on your copy

   f. Resist the temptation to look at work in the machine or at the keyboard[8]

9. Special attention to the emotional as well as motor mechanism.[9]

10. Motivation of different types:

   a. Encouragement

   b. Discouragement

   c. Contests between classes, between boys and girls, and between chosen teams

   d. Awards--Progress cards, Medals, etc.

   e. Self competition

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[8] Harold H. Smith and Ernest G. Wiese, Seven Speed Secrets of Expert Typing (New York City: The Gregg Publishing Company, 1921), p. 25.

[9] Arthur I. Gates, Psychology for Students of Education. pp. 247-9.

II. THE SOURCES OF DATA

Sources of data. Since this is an experimental study the sources are primary and secondary. The following are the chief sources of secondary data used:

1. Books
2. Magazine articles
3. Parts of a series
4. Encyclopedia articles
5. Documentation of commercial research
6. Unpublished material (theses)
7. Newspapers
8. Publications of learned societies and organizations

CHAPTER II

METHOD OF PROCEDURE

Many methods and systems are employed in the teaching of typewriting and often teachers are content to proceed blindly following the text book without making any investigation or research to prove whether the methods they are using are benefits or hindrances to the student. When approaching teachers with reference to the subject of finger corrective typewriting exercises, it was learned that some of them had never heard of such a procedure, a few had tried some exercises and later abandoned them, while others were firm believers in corrective exercises without having any proof that these drills had been of any real value. What seemed necessary was to conduct a study which at its conclusion would demonstrate clearly the real value or lack of value of the use of corrective typewriting exercises in the teaching of typewriting. If these exercises are worth while they should be incorporated in the typewriting manuals and every teacher should be familiar with them; if they are useless then their use should be entirely abandoned.

In order to carry on this study it was found necessary to conduct a class of two sections throughout the year. This experimental technique following the method of parallel groups was directed during the school year of nineteen hundred thirty-

four and thirty-five. The beginning typewriting students of the Ashland, Kansas, Senior High School were divided into two groups of practically equal ability. The sectioning and equalization of the experimental and the control groups was determined by: a. Academic record b. Equal grouping of Junior, Senior and Post-graduate students c. Opinions of the Superintendent of Schools and the Typewriting Teacher. The experimental group met at nine-thirty-five in the morning and the control group met at two-forty-five in the afternoon. The recitation periods were fifty-five minutes as the plan is the supervised study set-up. Both groups met in the same room with the writer as instructor. The same text was used by both groups,[1] music was used,[2] and the same tests were given each group on the same day. With the exception of the corrective exercises to which the experimental class subjected, the two groups were taught in the same manner. The enrollment for each group was sixteen. This enrollment varied somewhat during the school year. There were only twelve pairs completed the course due to the dropping out of school by the post-graduates, transfer to other institutions, inability to carry the work and the like.

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[1] Rupert P. SoRelle, The New Rational Typewriting (New York City: Gregg Publishing Company, 1927).

[2] The Rational Rhythm Records, (New York City: Gregg Publishing Company) 18 Victrola Records and other records having well marked rhythm.

While this experiment may not be controlled sufficiently well to give absolutely reliable results, yet due to the care used in pairing, similar classroom conditions, and the length of the experiment (thirty-six weeks) it is reasonable to expect that results should be reliable enough upon which to base some conclusions. The complete control was:

1. The pairing of the students as described.
2. Same textbook was used.
3. Same teacher taught both classes.
4. Same music was used.
5. Same length of warming-up practice.
6. Same assignment was made each day.
7. Same length of class periods.

In every way the teaching technique was the same except for the use of the corrective typewriting exercises in the experimental division.

A test was given each week, the same test was given to each division. This test was usually given on Tuesday. The blind-fold tests were devised by the writer and the material used for the straight typing tests was selected from the typewriting text, from tests sent out by different typewriter companies, Kansas State Typing Association, and The Kansas State Teachers College, Emporia, Kansas.

The class period of the experimental group was disposed of in the following manner. The first ten minutes at least

were used in writing the corrective exercises with music. During the first three months all students kept a record of the errors made, on their tests and in practice work on their assignments. From the records thus available the teacher could readily tell just what corrective work was necessary and the student also was able to tell just where his weakness lay. Then in practicing the corrective drills, if a student had been making a certain type of error, he would practice the exercise which would give him help in correcting that difficulty. For example: if a student was having trouble with spacing either between words or between letters, he should practice the letter-space-letter type of drill; if he was making the majority of his errors with the first fingers, he should spend his time on the first finger exercises. Some days five minutes were devoted to timed tests on the corrective exercises, and five minutes to the practice of the exercises without music preceeding the tests to enable the students to increase their speed. The assignment for the following day was then given and the remainder of the period was spent in supervised practice. On Tuesday, the ten minute practice with music was followed immediately by the ten or fifteen minute test from straight material. The tests were checked carefully by the students and then handed in to be rechecked by the teacher before being entered on their record sheets. The lesson was then assigned and the remainder of the period devoted to practice on the advanced lesson. The same

followed by the control group with the exception that for their warming-up exercises they used the words, phrases, or sentences from their text.

Some interesting investigations have been made to look into and determine the facts concerning school day efficiency. Gates conducted a study of this kind using 240 fifth and sixth grade pupils and found that efficiency increases throughout the forenoon in all activities, the highest point being from eleven to twelve o'clock. In most cases a drop in the early afternoon was observed with an increasing tendency from two to three o'clock.[3] Stainer confirmed these results.[4] The hour selected for the experimental group, nine-thirty-five to ten-thirty, and the period for the control group, two-forty-five to three-forty, did not fall in the time of greatest or least efficiency as shown by the above studies.

The fifty-five minute periods were used as that was the regular length of the class periods in our school system. However, many studies have been made showing that practically as much could be accomplished in a single period of this length than in a much longer period or in double periods.

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[3] James Bart Stroud, Educational Psychology (New York: The MacMillan Company, 1935), pp. 121-22.

[4] W. J. Stainer, "Rate of Work in Schools." British Journal of Psychology, 19, 1929, pp. 430-451.

Vernal H. Carmichael found: "If both speed and accuracy are considered, the single period of 40 to 60 minutes is more suitable for the teaching of typewriting than the double period of 80 to 90 minutes."[5] Bessie A. Young in her experiment using 3300 students in seventy-five cities in twenty-three states found that the single period and the double period were yielding approximately equal results. She states:

> Inasmuch as the single period group is twelve points ahead at the median in the composite group and two points higher in the individual graphs, this fact ought to be given consideration by the North Central Association, in revising its regulations about credit for typing.[6]

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[5] Vernal H. Carmichael, "Objective Measurement of Accomplishment in Typewriting of High School Commercial Pupils in Indiana", Research Studies in Commercial Education, V (Iowa City, Iowa: The College of Education and The College of Commerce University of Iowa, Nov. 15, 1932) p. 135.

[6] Bessie A. Young, "The Relative Efficiency of Single and Double Periods in Typewriting", Ibid. p. 138.

The scale adopted for grading the ten and fifteen minute tests written from straight material was the scale published by The Gregg Publishing Company.[7] This scale grades the student on the percentage plan taking into consideration the number of errors, the net speed a minute, and the length of time he has been taking typewriting. The blind-fold tests were graded on the basis on accuracy alone, of one-hundred percent. The scholarship typewriting tests were graded by the key sent with the tests. The Kansas State Every Pupil Test was graded according to International Typewriting Contest Rules, Revised, 1926, the net speed and the percent of accuracy were added to get the final score for each contestant.

Interests and attitudes are influenced by emotion. Emotion constitutes the basis of our complexes, conflicts, repressions, and attempted adjustments. Since this is true emotion should be trained, not repressed. For effective interest and motivation school experiences should be as enjoyable as possible. Often a child says he likes school or some particular subject when in reality he likes his teacher or his associates. James B. Stroud writes:

> An influence in mental life so powerful as emotion should be carefully trained. It is a tremendous influence for good or evil. . . . . When wisely directed, the emotional reactions of the pupils are a great asset to the teacher. On the other hand, if the emotional attitudes toward the teacher or the school situation as a whole are antagonistic, the teacher's task is made especially difficult.[8]

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[7] See Appendix

[8] James Bart Stroud, op. cit. pp. 47-8.

Dr. Book also stresses the necessity for acquiring and maintaining a favorable attitude of feeling. He found the following changes in the learners' attitude as practice progressed: At first the learners were greatly interested in the work. They enjoyed the practice and were always anxious to take up the work anew each day. The pleasant feeling tone seemed to have a helpful effect on the writing, and the learner's attention seemed to remain concentrated on the work. Continued practice, however, brought a change. A general feeling of monotony and sometimes disgust, completely changed the learner's attitude. The writing became a disagreeable task, the unpleasant feelings hindered the writing by drawing attention from the work to themselves. As still greater skill was acquired this unfavorable attitude disappeared. All learners again took an interest in the work; their general feeling tone once more became favorable and the writing movements distinctly pleasurable. Their acquired habitual attention approached or even exceeded in perfection the eager spontaneous attention with which they began.[9]

Motivation is a very important factor influencing speed of learning. Human learning has not been investigated with the experimental technique as rigorously as with animals, however, some contributions have been made. A study was made by Gates

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[9] William F. Book, "The Psychology of Skill With Special Reference to its Acquisition in Typewriting", University of Montana Studies in Psychology, (Missoula: University of Montana, 1908), pp. 71-2.

and Rissland to determine the value of praise and reproof as motivating influences. They found that praise got the best results, reproof next, and no comment slight improvement.[10] Hurlock confirmed these results in her study with children.[11] Self-competition is another means of motivation and is considered the most wholesome. Sims[12] obtained good results with it in a reading experiment. Another method is that of group rivalry. It has the merit of promoting interest and zest in school work, and if conditions are properly controlled, undesirable features need not arise. Intention to learn is necessary if improvement is to be made. Dr. Stroud suggests the following statement of principle: "If we wish to improve an act by practice, we must practice doing it better."[13] The means of motivation used in this study were: Encouragement, discouragement, group rivalry, awards, and self-competition.

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[10] G. S. Gates and L. Q. Rissland, "The Effect of Encouragement and of Discouragement upon Performance," Journal of Educational Psychology, 14, 1923, pp. 21ff.

[11] E. B. Hurlock, "The Value of Praise and Reproof as Incentives for Children," Archives of Psychology, No. 71, 1924.

[12] V. M. Sims, "The Relative Influence of Two Types of Motivation on Improvement," Journal of Educational Psychology, 19, 1928. pp. 480 ff.

[13] J. B. Stroud, op. cit. p. 192.

In D. D. Lessenberry's Analysis of Errors he stresses three definite types of errors against which all pupils of typewriting must be on guard mentally and to correct which definite drills must be devised and intelligently practiced. These three types are:

1. Frequency of error for adjacent keys

2. The tendency to strike a home key instead of making the correct finger movement to the key above or below

3. The general confusion in the use of the vowels.[14]

In the study made by Hoke[15] it was found that there were only two of the thirteen most common letters which were below the median in number of errors and then by a very narrow margin. Also there were only two of the thirteen least used letters above the median in number of errors. He found that with five exceptions out of the twenty-six letters, frequency of use and accuracy go together, or infrequency of use with inaccuracy. The two common letters below the median in number of errors were "h" and "u", both first finger letters. The two least used letters above the median in number of errors were "m" and "g" also first finger letters. The five exceptions mentioned were "d" and "c" which were found to be above the median in frequency of use and below the median in

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[14] D. D. Lessenberry, Analysis of Errors, (Error Chart).

[15] Roy Edward Hoke, The Improvement of Speed and Accuracy in Typewriting (The John Hopkins University Studies in Education, No. 7. Baltimore: The John Hopkins Press, 1922). pp. 20-22.

percentage of accuracy and "b" "p" and "w" were below the median in frequency of use and above the median in percentage of accuracy. "d" and "c" are second finger letters and should be stressed in corrective exercises for that finger. The conclusions drawn from various studies and from the experience of the writer were:

I. Imperfect location of keys

1. Adjacent keys, most frequently misstruck
   a. Striking key above "home", same vertical row, for "home" key and the reverse--j for u, or u for j.
   b. Striking key below "home", same vertical row for "home" key, and the reverse--j for m, or m for j.
   c. Confusion of letters of same horizontal row--i for o.
2. Opposite hands, keys of same finger confused--e for i, d for k, and the reverse, keys on same row and also on different horizontal row--l and w.
3. Confusion of vowels--a for e.
4. Confusion of sounds in spelling--c and s.
5. Substitution of a wrong letter for a right one, in difficult combinations.

The thirteen letters misstruck for other letters the most frequently according to the Error Chart worked out by

Lessenberry were:[16]

m for n	1577 times	e for i	1019 times
r for t	1488 "	a for s	1012 "
t for r	1407 "	v for b	1001 "
o for i	1290 "	w for e	927 "
n for m	1249 "	i for o	915 "
s for d	1061 "	i for e	907 "
r for e	1043 "		

Of these letters the following are first finger letters: m, n, r, t, v, b. Those that are struck with the second fingers are: i, d, e. The third finger letters in this group are: o, s, w. This leaves the letter a, which is operated with the fourth finger. Besides the above errors which are due to imperfect location, that is letters misstruck for other letters, figures and special characters are also struck for letters. There are also what might be called mental errors.

II. Mental Errors

1. Errors which do not involve wrong muscular response
2. Errors in attention

III. Psychological Errors, imperfect control over letter-making movements. Such as:

1. Transposition of letters, or words
2. Doubling wrong letter
3. Omission of letters, words, phrases, or spaces
4. Added letters or words

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[16] D. D. Lessenberry, Error Chart.

5. Inaccurate reading of copy

6. Spacing between words or in the body of a word

7. Anticipation--some letter ahead is written instead of the correct one

8. Slurring over letters and space bar, uneven touch

9. Use of bell, and return of carriage

10. Crowding and piling

IV. Manipulation of Machine--errors not concerned with key stroking. These would include:

1. Faulty shifting

2. Tabular key--indenting paragraphs

3. Irregular spacing between lines

4. Use of bell and return of carriage (usually called mental error)

5. Hands on wrong row

V. Miscellaneous Errors--accidental errors

This class will include all errors not accounted for.[17]

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[17] Helen I. Hawkins, "An Analysis of Errors Made in first, second, and third semester typewriting classes in a High School," M. A., University of Pittsburgh, 1932.

The corrective typewriting exercises which were used in the experimental class, were a group of drills which were devised and used by the writer to some extent in the teaching of typewriting for the past few years. Before a teacher can decide just what corrective exercises to give she must have some idea of the types of error that are most likely to occur. Dr. Roy Edward Hoke, Professor of Education, Birmingham-Southern College, gives a very good discussion of these types in the chapter entitled "Errors in Typewriting and Their Causes". He closes the chapter with the following observation:

> It does not appear from a study of these data that there is any connection between accuracy and the combination of letters with which any one letter may happen to be written. This serves only to confirm the conclusion that accuracy or inaccuracy is the result of frequent or infrequent practice, due to frequent or infrequent use of the letter.[18]

With the right kind of direction learners are not so likely to push themselves into all sorts of blunders and mistakes which cause great loss of time and energy for the learners as they must be eliminated before further progress can be made. Dr. William F. Book, Professor of Psychology, Indiana University, in his complete analysis of learning to typewrite, showed that undirected learners tend to push themselves along too fast at the "critical stages," giving an opportunity for the development of interfering associations and wrong habits of response.

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[18] Roy Edward Hoke, op. cit. pp. 20-3.

Dr. Book says: "It is the duty of teachers so to guide and direct their learners that a minimum of such interfering habits will be developed and that those acquired will be promptly eliminated."[19] He states further:

> By carefully directing the activities of his students in advance a teacher may not only prevent the formation of such hindering associations and tendencies to error, but he may give help in overcoming the mistakes already made and so make sure that the elemental habits are properly fixed before the learner attempts to combine them in forming a higher-order habit.[20]

In order that the teacher may make learning economical and efficient perfect direction must include: (1) a standardization of the learning process itself to insure the gaining of right habits of response and the formation of these necessary habits in the correct psychological order and in the most direct and economical way; (2) the prevention and elimination of the many tendencies to error; (3) making favorable the external conditions for the learners; (4) standardizing the physiological conditions which affect the rate and limits of progress in learning; (5) improve the psychological conditions which intimately affect the rate, permanency and amount of improvement which learners can make; (6) make proper use of the factors which stimulate effort and tend to make the application continuous to the specific tasks which the learning presents; (7) arranging detailed practice instructions for

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[19] William F. Book, Learning to Typewrite with A Discussion of the Psychology and Pedagogy of Skill (New York; The Gregg Publishing Company, 1925), p. 433.

[20] Loc. cit.

learners, based on facts which scientific analysis of the learning process, and the experience of the best teachers in the field, have revealed.[21]

The responses made by a student while trying to learn to use a typewriter will, for example, be very different if he is really interested in the gains he is making and if he believes he can actually improve in speed and accuracy of performance, from those which he will make if he is not interested in his improvement and feels that any gains that he might make are not worth the time and effort necessary. A learner's desire or inner purpose determines the quality and character of his responses as much as the problem set for him by his teacher, or as do most of the stimuli controlled more or less by the teacher.[22] It is very important that the attitude of the student toward his work and toward his teacher be the most desirable as well as that the student have intelligence or ability to learn.[23]

It has not been definitely determined just what kind of practice will yield the best results but this will be worked out in future studies along this line and the experience of teachers of typewriting will help them decide what methods should be used. Along this line, Dr. Book writes:

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[21] W. F. Book, ibid., pp. 429-51.

[22] Ibid., pp. 67-8.

[23] Elementary School Journal., XXI, pp. 220-9.

> The practice on isolated letters, on particular words, and on practice sentences. . . . tends to insure a mastery of the lower-order habits. It also tends to counteract the normal tendency found among learners to assume a freedom of control over the keyboard which they have not yet earned, a tendency which must be successfully counteracted if the learner is to continue to improve. The use of technical drills also favors the acquisition of proper habits of touch and movement which enable a learner to make his letter-making strokes in a more uniform and more rhythmical way. . . . . It also prevents over-learning on the easier combinations of letters and words and enables learners to make all their strokes in a smoother and more even manner both as regards intensity and time. . . . . One of the chief problems of the teacher, therefore, becomes that of providing at each level of skill the kind of exercises which his learners need to develop in the most effective and permanent way, all the habits to be formed and used at that stage.[24]

When a key cannot be correctly and readily located by the right finger from any position one of three types of error will be made:

1. An inaccurate finger stroke may be made
2. An imperfect location of the proper key
3. Substitution of a wrong finger movement for the correct one

The best method of correcting the tendency of making errors is to practice suitable drills with music, gradually increasing the tempo and finally taking the drill as a short test under time. A very good group of lesson plans have been worked out by M. Mae Miller with a view to the prevention of errors in typewriting.[25]

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[24] William F. Book, op. cit., pp. 202-29.

[25] M. Mae Miller, An Experimental Study in the Prevention of Errors in Typewriting (unpublished Master's thesis, State University of Iowa, Iowa City, Iowa, 1933) pp. 93-208.

FIRST-FINGER EXERCISES

Exercise 1

Practice this exercise with music (4/4 or 2/4 time), gradually increasing the speed. The fingers should be well arched and the hand position steady. The position of the student must be correct to operate his machine with the most accuracy and speed.[26]

fff jjj ggg hhh rrr uuu ttt yyy vvv mmm bbb nnn ggg hhh ttt yyy rrr fff vvv ttt ggg bbb yyy hhh nnn uuu jjj mmm vvv ttt bbb ggg fff rrr 444 ggg ttt 555 jjj uuu 777 hhh yyy 666 rrr uuu 555 666 uuu rrr jjj fff mmm vvv nnn bbb fff jjj ggg hhh ttt yyy vvv bbb

TEST: 1st Year: Write exercise twice in one and one-half minutes.

Exercise 2

The hand position must be steady and the fingers arched. The wrists and arms should not move, all movement is with the fingers. The eyes must be kept on the copy.[27] Music will help the student avoid hesitation.

frftfgfv jujyjhjn rftfgfvf ujyjhjnj tfgfbfvf yjhjnjmj frtgbvf juyhnmj

TEST: 1st Year: Write exercise twice in thirty seconds.

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[26] Harold H. Smith and Ernest C. Wiese, Seven Speed Secrets of Expert Typing (New York: The Gregg Pub. Co.) p. 25.

[27] Loc. cit.

Exercise 3

The rhythm is greatly improved by practicing this exercise with music. Attention is called to the fact that the finger which is drawn away from the home key returns to that home key before the space bar is struck. One must learn automatically to come to rest on the home keys if he is to be accurate. If the student misstrikes letters or is generally inaccurate, practice on reaching drills of this type using a steady, even, firm, and positive stroke and making his fingers reach directly to the desired key will prove beneficial. The finger must be relaxed upon returning to home key. Another essential of correct technique is the keeping of one's attention on his work.[28]

4rvf vr4f 7umj mu7j 5tbf 6ynj vt5f ny6j rgvf uhnj vrvf nunj

TEST: 1st Year: Write exercise twice in thirty seconds.

Exercise 4

This is the same type of exercise as Exercise 3, emphasizing the automatic return to the guide row and the direct reach to every first finger key from the home keys. One must write rhythmically and without hesitation of any kind.[29] There is nothing any better than music to check the rhythm or hesitation in striking the keys.

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[28] Ibid. p. 25

[29] Loc. cit.

frftfgfbfvf jujyjhjnjmj fvfbfgftfrf jmjnjhjyjuj fgftfrfbfvf jhjyjujnjmj

TEST: 1st Year: Write the exercise twice in thirty seconds.

Exercise 5

This exercise is corrective for spacing errors. Often when a student changes from a Remington machine to a Remington Noiseless, or to an Underwood machine, or to a Woodstock typewriter, he finds that the machine double spaces between words and single spaces in the body of words, or fails to space between words and the like, and unless by some exercise this faulty touch of his can be corrected he will insist that he can write on no machine except the one on which he learned. A few minutes practice on drills of this type, the letter-space-letter thumb stroking, taking care to release each letter quickly and to strike the space bar quickly, concentrating[30] on the desired result will assist greatly in the transition from one machine to another. Use one beat of music for each stroke.

4 v g 4 b t g 5 j u m h 7 n y h 6 j r v g 4 b t g 5 f u m h 7 n y h 6 j

TEST: 1st Year: Write exercise twice in thirty seconds.

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[30] Harold H. Smith and Ernest G. Wiese, loc. cit.

Exercise 6

Practice with music is more enjoyable and the gain in speed is gradual as the music is speeded up. The temptation to look at the work in the machine or at the keyboard must be resisted.[31] One's writing must be smooth with easy, accurate reaches.

rug fur tub bury hun hungry mum grum hymn hubby jutty truth my urn runt tuft bug hub bunt nun muggy grunt rhythm untruth hubbub jury by funny gum rub ruby grunt burg buggy tug hug

TEST: 1st Year: Write the exercise in thirty seconds.

While the chief purpose of the foregoing exercises is for corrective purposes, they may also be used for class and drill work from the first day of the typewriting class. The various studies show that, although most errors, including non-keyboard errors, are individual errors, there are definite errors that are common to nearly everyone, as shown by the study of Lessenberry.[32] This has been found to be true of the first semester of typewriting, before many of the reaches have been definitely and carefully fixed. These are persistent

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[31] Harold H. Smith and Ernest G. Wiese, loc. cit.

[32] D. D. Lessenberry, Error Chart. Cf. post., Appendix.

errors, and are not the incidental errors, which may be caused by any momentary distraction.[33]

The causes of persistent errors are numerous, such as--lack of concentration, imperfect coordination, carelessness, indifference, wrong hand position, wrong type of movement, and the like.[34] It is felt that if correct drills and attention to technique are given at the beginning of typewriting these tendencies may be overcome and corrective work made less necessary.[35] This view is supported by a few students of the problems of typewriting--"If correct methods and drill are used and correct technique established to start with, going back over the ground with corrective measures should be quite unnecessary."[36] The majority of textbooks, authors or articles concerning errors, found in the literature of typewriting methods, however, still hold to the belief that errors are purely individual problems and the help must be of a corrective nature for the individual students, and it is not wise to give drill to an entire class.[37] This is a problem which can only be settled by scientific research on the problem.

The corrective exercises used in this study are especially helpful in developing concentration for if the student watches

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[33] Helen I. Hawkins, op. cit.

[34] William F. Book, Psychology of Skill (New York City: The Gregg Publishing Company, 1925), p. 93.

[35] Ibid. p. 161.

[36] Editorial Comment on Sundry Topics, American Shorthand Teacher, (February, 1930).

[37] Ester F. Debra, An Analytic Study of Present Methods of Teaching Typewriting, M. A., University of Indiana, 1926.

his copy and keeps time with the music, he has no time nor inclination to watch his hands, the keyboard, or the work in the machine.

The warming up period is always a problem but by the use of these exercises with music, the timing of the tests, the comparison of the scores made, one finds that the students really enjoy this part of the class period. According to Dr. Book it is very essential to have this part of the class period, for typewriting habits cannot be successfully used until they have been carefully exercised for a time to re-establish the connections between stimulus and response so they will work smoothly and quickly. This reviving of habits also affects the circulation of the blood thereby affecting the performance.[38] Dr. Book states:

> The fact that all habits and bonds in the nervous system weaken or deteriorate by disuse is a well-established psychological fact and gives rise to a type of difficulty which learners can be helped to overcome. Much also depends on what a learner does between practices. . . . . But in either case there must be a <u>revival of the habits</u> to be acquired during the early part of the practice each day.[39]

The music for each of the exercises given for the first finger should not be played at the same rate. The music must be rapid for Exercises 1, 5, and 6. Exercise 1 is arranged in groups of three which lends itself more easily to practice with music than do the usually commercialized exercises.

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[38] W. F. Book, Psychology of Skill, Chapter VIII.

[39] W. F. Book, Learning to Typewrite, p. 285.

The first test in typewriting was given to both classes on September twelve in their respective class periods. The experimental group had practiced on the corrective exercises given above for ten minutes each day since the beginning of school September fourth. This test was a blind-fold test. The students were instructed to set their machines with the marginal stops at ten and sixty-two and the space guage for double space. Write their name and date in the upper right hand corner of their paper (with pencil), put the paper in the machine ready to write, place a blind-fold over their eyes, and then keep hands in lap except when told what to do with them. While they were getting used to being blind-folded, we had a short test of placing the finger on different parts of the machine as they were asked to by the instructor. This test had a very definite value for both student and teacher although the grades were not taken into consideration and its chief use was to lessen the tension of the group. The student in the blind-fold test was to write one line of each combination dictated spacing between each group. The combinations were:

nu5v 6gmb h7b4 vtny rbjf

The second part of the test was to write the dictated word once. The word was pronounced and then spelled by the teacher. The words were:

hum rub thumb gun hurt untruth buggy hunt ruby rhythm

While the students were writing the teacher passed noiselessly about the room observing any mistakes in position, technique, or fingering.

RESULTS of TEST I

In Table I on the following page, the score made by each student in Test I is shown. The students are arranged so that the pair numbers are read across the page. The initials of the students were used rather than the entire name. "C. C." is paired with "J. C." and so on down the page.

The score was determined by evaluating each combination line ten points and each of the words five points. The point value of the test was one-hundred. Since the reliability of the test is not known this factor must be considered in evaluating results.

The highest score made was one-hundred and this score was made by a member of the control class. The highest score in the experimental class was ninety-nine. The lowest score was made in the experimental class, forty-three, the lowest score in the control class was fifty-nine. The median of the experimental class was ninety-two and five-tenths and in the control class eighty-eight and five-tenths. The average of the experimental class was eighty-six and of the control class eighty-two and eight-tenths.

The scores of ten students in the experimental class exceeded the scores of the students in the control class with whom they were paired; in six pairs the score made in the control class exceeded the one made by the student of the same pair in the experimental class.

The results of the test are shown by means of graphs in Figure 1 and Figure 2 on pages thirty-four and thirty-five.

TABLE I

SCORES MADE BY STUDENTS IN TEST I

Pair number	Experimental Class: Name of Student	Experimental Class: Score	Control Class: Score	Control Class: Name of Student	Difference: Ex.	Difference: Con.
1	C. C.	99	82	J. C.	17	
2	D. C. R.	90	98	G. P.		8
3	C. U.	96	92	A. S.	4	
4	G. W.	95	89	E. J.	6	
5	E. F.	82	88	N. W.		6
6	D. V.	43	100	L. L.		57
7	R. K.	99	90	L. M. F.	9	
8	L. R.	89	69	H. O.	20	
9	J. H.	93	59	E. B.	34	
10	M. M.	94	95	F. S.		1
11	V. G.	67	95	D. B.		28
12	N. B.	99	69	C. S.	30	
13	M. C.	96	94	E. B.	2	
14	D. D.	92	68	K. R.	24	
15	D. C.	88	77	F. R.	11	
16	W. J.	58	63	G. D.		5

	Experimental Class	Control Class
Median	92.5	88.5
Average	86	82.8
Range	43-99	59-100

Read table thus: Read across page. Pair number 1, Name of Student C. C. Score 99; 82 Score, Name of Student J. C. Experimental student 1 exceeded score of Control student 1 by seventeen points.

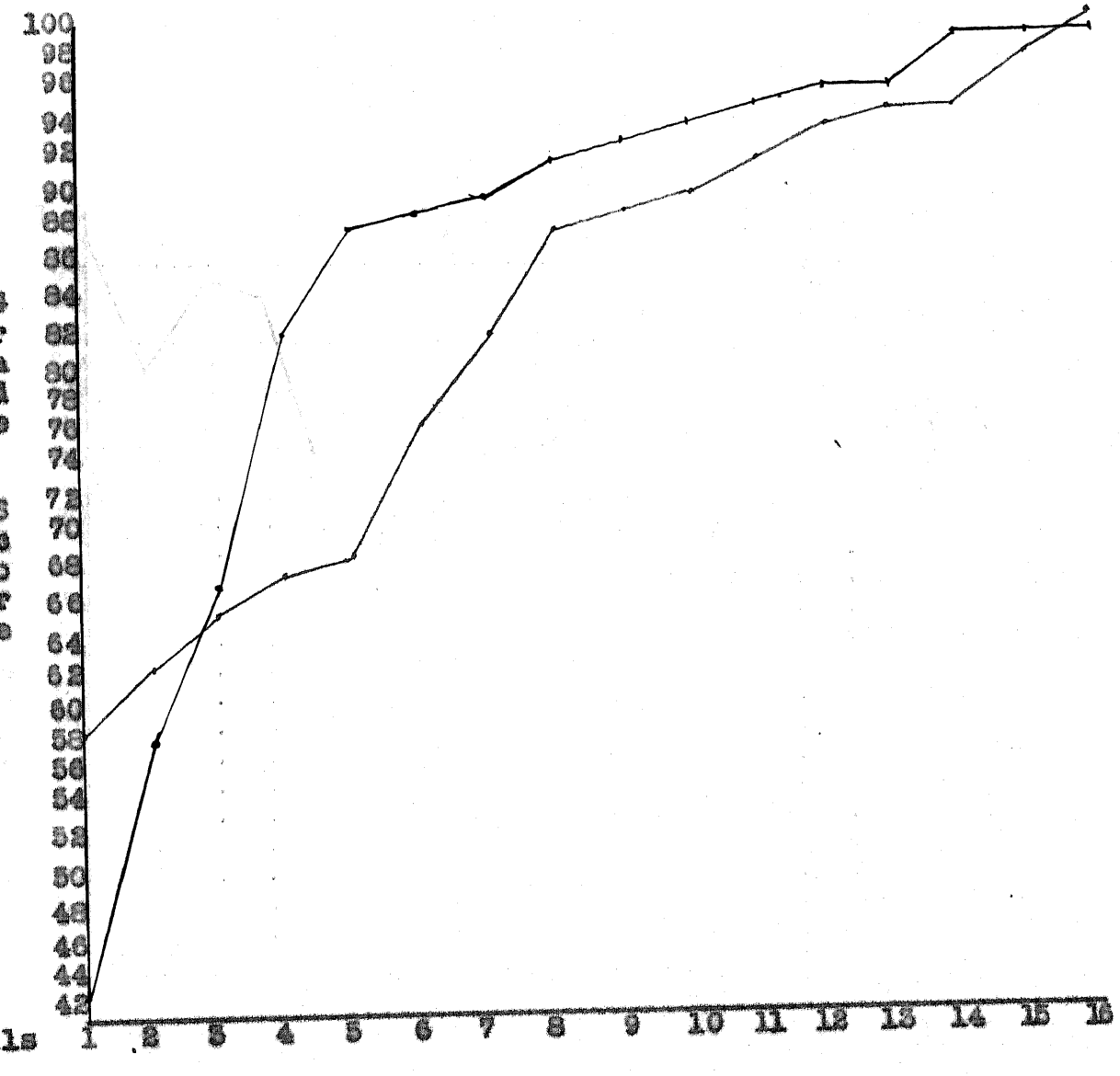

Fig. 1. Scores of two groups on Blindfold Test No. 1.

Read graph thus: Black indicates the experimental group; red indicates the control group. The highest score made by a pupil of the experimental group was 99, the highest made by a pupil of the control group was 100.

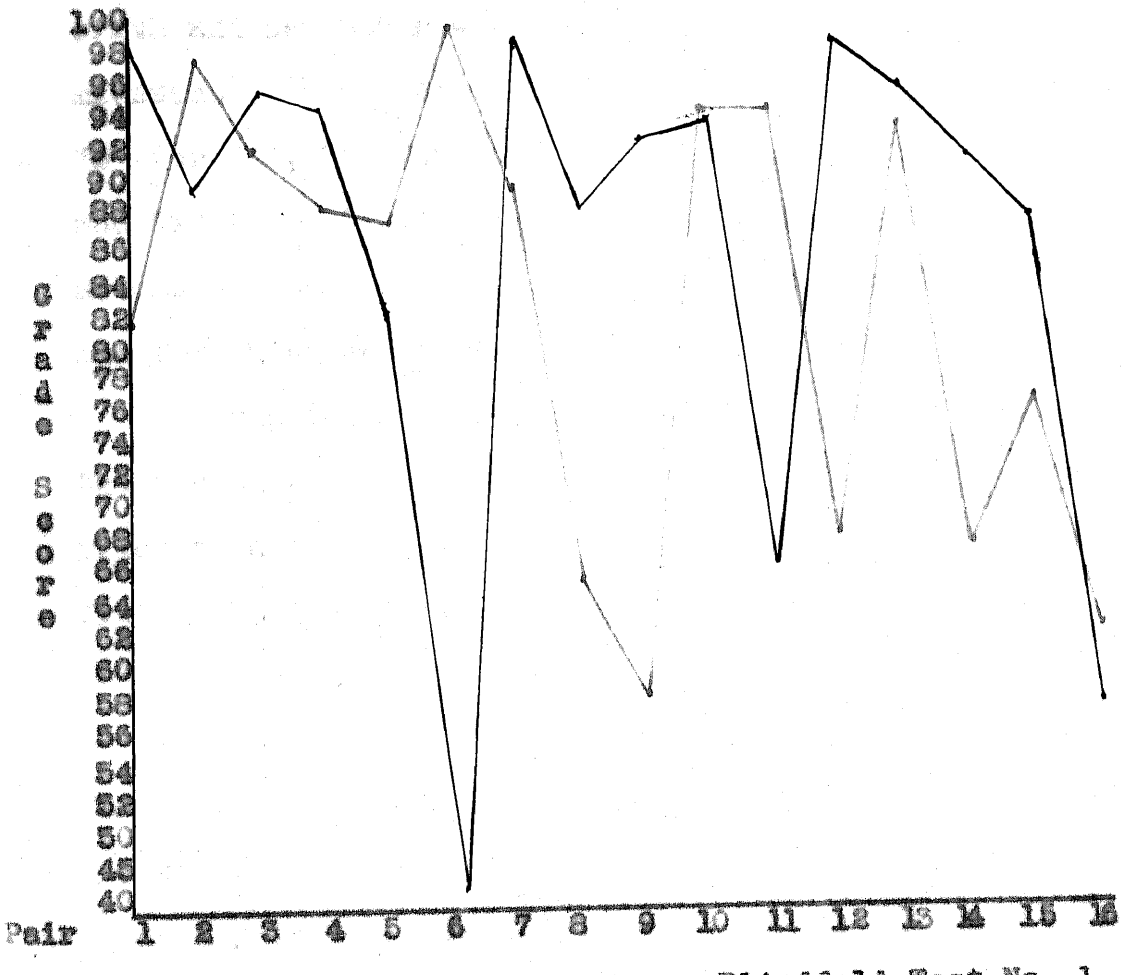

Fig. 2. Scores of two groups on Blindfold Test No. 1.

Read graph thus: Black indicates experimental group; red indicates control group. The score made by C. C. of the experimental group was 98, the score of J. C. of the control group was 82, these pupils are Pair 1 as shown by Table I.

SECOND-FINGER EXERCISES

Although the second fingers have only eight keys to take care of it was found that "i", "d", and "e" ranked fourth, sixth and seventh respectively among the letters most frequently misstruck.[40] The most common error was striking "o" for "i" with "s" for "d", "r" for "e", "e" for "i", "w" for "e", "i" for "o" and "i" for "e" well up toward the top of the list also. The second finger is not as easily controlled as the first finger and for this reason should have a great deal of intensive drill.

Even though a student apparently has no difficulty with the second finger manipulation it is well to have some rhythmic practice and thus improve his speed and accuracy by better fixing these habits.

Exercise 1

This exercise should be practiced with music using 4/4 or 2/4 time. One should start slowly and deliberately and gradually increase the speed until the strokes are as fast as the student can count 1/2/3/space. A good method is to say the letter on the first beat and then 2, 3, space. For example: say e23space 123space d23space while writing eee iii ddd. Independent finger action of the second finger should be used and the strokes struck evenly.[41]

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[40] Cf. ante, p. 18.

[41] Harold H. Smith and Ernest C. Wiese, loc. cit.

eee iii ddd kkk ccc ,,, eee ddd ccc iii kkk ,,, ddd 333 888 kkk ddd iii 333 888 ccc ,,, eee kkk 333 eee ddd ccc 888 iii ,,, 333 kkk eee iii ddd ccc 888 ,,, 333 kkk eee iii ddd ccc

TEST: 1st Year: Write exercise twice in one and one-half minutes.

Exercise 2

The practice should begin deliberately gradually increasing the speed of the music. The reaches must be made with the finger, the elbows should be kept close to the body,[42] and any movement of the elbows or wrists should be avoided.

3ed cde 8ik ,ki cde ,ik e3d i8k dce k,i ecd i,k de3 ki8 3ed ,8k

TEST: 1st Year: Write exercise twice in thirty seconds.

Exercise 3

The rhythm of the music helps to keep the writing smooth and the tendency to write by jerks is not so prevalent. The first and second finger letters are combined in this exercise. One should strike each key with a quick, even touch keeping time with the music.[43]

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[42] Harold H. Smith and Ernest G. Wiese, op. cit. p. 12.

[43] Ibid. p. 25.

tre tgf tbv tfc yui yhj ynm yj, edf ikj efv ijm 345 876 erd iuk

TEST: 1st Year: Write exercise twice in thirty seconds.

Exercise 4

This exercise is a good corrective drill for any difficulty in spacing after second finger letters and numbers. Often a student has difficulty of this kind when changing machines.[44] Every machine has a different touch but a few minutes intensive practice on an exercise of this type will aid the student in making the desired adjustment.

i k 8 , e d 3 c , k 8 i c d 3 e d k i e c k i , e k c 8 d c i , 3

TEST: 1st Year: Write exercise twice in thirty seconds.

Exercise 5

This exercise is to further correct and establish correct letter habits by using them in a series of words. The manner of practice is the same as for the preceding exercises, passing smoothly from one letter to the next and from one word to the next. Valuable practice is also given on the comma by placing it after each word in the series.

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[44] Supra, p. 26.

defect, bite, hide, regret, greeted, kick, detect, edged, debt, kink,

TEST: 1st Year: Write exercise four times in one minute.

Exercise 6

Typists having difficulty with striking "e" for "i" or "i" for "e" may correct that tendency by practice on these words. The reach to "b" is one of the longest and most difficult and often it will be found that the pupil has formed the habit of striking "b" with the right-first-finger instead of the left-first-finger. These words beginning with "b" should be mastered by any student who has formed this incorrect habit.

being behind belief believe brief brier bribe bride hide begin bruise beguile belie belittle benefit betide bier bide bidder bigger binder bite bridge bunk bicker bright

TEST: 1st Year: Write exercise once in one minute.

Exercise 7

"d" is often misstruck for "e", "k" and "s".[45] This error is liable to be made at almost any stage of typewriting. The practice of these words which contain e's, k's, or both, with music is helpful.

deck dicker dike kind kid drink drunk duck duke dinky diet

TEST: 1st Year: Write exercise twice in thirty seconds.

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[45] D. D. Lessenberry, Loc. cit.

The third fingers are the most difficult to use and control. These fingers have the same number of keys to take care of as the second fingers, but aside from the guide keys, "s" and "l", the letters are of rather infrequent occurence. The second fingers have two vowels, "e" and "i", to operate while the third fingers have only one vowel, "o". However "o" being struck 1290 times for "i" and "i" being struck 915 times for "o" shows that the wrong connection is being made. When these third finger letters are needed it is necessary that the response be accurate and rapid with the same smooth, even touch that will give a clear, concise imprint of the character that we get from the action of the first or second fingers. This means that these fingers must have extra practice so that the response comes readily. The consonants in this group are also misstruck too often: "k" was struck for "l" 521 times and "o" was struck for "l" 671 times; "a" was struck for "s" 1012 times and "d" was struck for "s" 862 times; "e" was struck for "w" 638 times and "s" was struck for "w" 410 times; "s" was struck for "x" 157 times and "c" was struck for "x" 133 times.[46]

The chief difficulty in the use of these fingers is that they are weak since they are unaccustomed to acting individually. To remedy this, exercises should be taken to strengthen them. These exercises may be taken away from the machine. Place the palms flat on the table, then raise the

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[46] D. D. Lessenberry, loc. cit.

third fingers while keeping the other fingers flat on the table. Another exercise: Same starting position, bend the third fingers to the writing position, arching them well let the tips rest on the table, keep the palms and other fingers flat on the table. When there is a great deal of stiffness, it will be found beneficial to place the palms flat on the table, bend the first and second joints of the third fingers so that the back of the fingers up to the first joint rest on the table, the other fingers and the palm should remain flat on the table. This exercise may be practiced with music using two counts to double the fingers and two to straighten them. Although this exercise is especially helpful to strengthen the third fingers, it may be used to develop individual action of any of the fingers.

Each morning when a student begins his typewriting practice he should take a few minutes for warming-up exercises. He must begin slowly to revive the habits he has learned the previous practice for all habits and bonds in the nervous system weaken or deteriorate by disuse and if the typist has been exercising habits that are antagonistic to those formed in his typewriting the deterioration by disuse is greater than if non-interfering responses had been made. This reviving of habits in typewriting is connected with the circulation of the blood, there is a direct and uniform correlation between the increase and decrease in performance and the changes in the pulse rate.[47]

[47] W. F. Book, Psychology of Skill, Chapter VIII.

Unless a learner goes slowly enough in the warming-up period to avoid errors in his relearning process he will fail to make progress that day and this failure to progress gives rise to an unfavorable attitude or mood for the day which may affect the practice on the following day. "He must learn to adjust his emotional, as well as his motor, mechanisms to the situation."[48]

Often students get to the place where they can see no improvement, they cannot get their assignments and everything seems to go wrong. These plateaus are caused by the slumps in attention and effort which naturally occur during the different stages of advancement. The teacher must know the exact cause of the learner's difficulty to be able to prevent or at least shorten the time of the plateau.

Jane E. Clem[49] gives the steps in letter making according to Dr. Book in his book "The Psychology of Skill with Special Reference to Its Acquisition in Typewriting" as:

1. Getting the copy
2. Spelling the Letter or Word
3. Mentally Locating the Corresponding Key
4. Movement Required for Reaching the Key
5. Initiation of the Letter-Making Movements.

The beginner must take these five steps in striking every key.

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[48] Arthur I. Gates, op. cit., p. 249.

[49] Jane E. Clem, The Technique of Teaching Typewriting (New York: The Gregg Publishing Company, 1929), pp. 43-5.

As soon as each step can be made with precision, a blending of the steps begins. The blending process merely means that the registered memories of movements of the motor center are more and more taking over the work of the thought center, and when the whole process can be taken over by this center, then the writing is said to be automatic, mechanical, subconscious, or motorized. Typing is mechanical only in its expert stages. Certain influences retard the blending or making of these five steps into one automatic response: Being unable to spell quickly and correctly affects step two; the inability to see clearly and quickly, or poorly developed eyesight, affects both steps one and two; the failure to have completely and positively memorized the keyboard affects steps three and four; a poor coordination of the mind and muscles affect step five.[50]

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[50] Jane E. Clem, Loc. cit.

THIRD-FINGER EXERCISES

Exercise 1

Practice this exercise with music. How one practices is more important than how much one practices. Let the fingers rest lightly on or just over the keys except when striking the key. The key should be struck positively, allowing the same time between each stroke to insure fluency or rhythm. The finger should be relaxed each time it reaches the home key or when the space bar is struck. In reaching for the keys the fingers only should be used, for the wrists, hands and arms should remain in practically the same position at all times. All movements should be made quickly, accurately, and smoothly.[51] Hesitation is fatal to efficiency in typing. The hands should be in correct home position when the keys are not being operated.[52]

www sss xxx ooo lll ... www ooo sss lll xxx ... www ooo sss lll sss www 222 lll ooo 999 sss 222 lll 999 2ws 9ol xsw .lo www ooo www ... xxx 999 sss ooo 222 lll ... xxx www ... 999 sss ooo 222

TEST: Write the exercise twice in one and one-fourth minutes.

Exercise 2

It is very important that these exercises be written with correct fingering. The same finger action should be used

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[51] Adelaide B. Hakes, Notes taken at Gregg College under the Supervision of Miss Hakes, 1929.

[52] Adelaide B. Hakes, Typewriting Speed Studies, (New York City: The Gregg Publishing Company, 1925.), p. 6.

with the third finger exercises as with the first and second finger exercises. The correct hand position should be maintained at all times. The exercise should be written slowly at first and the music gradually speeded up until the student is writing as rapidly and evenly as possible.

xsw sw2 2ws wsx xsw sw2 wsx wxs .lo lo9 9ol ol. .lo lo9 9ol ol. o.l

TEST: 1st Year: Write the exercise twice in thirty seconds.

Exercise 3

Practicing this drill with concentration and with music will assist inperfecting the technique. Adjacent keys are most frequently misstruck. If one makes an effort to maintain accurate control over the sequence movements the number of errors will be reduced.[53] The analysis of work in business offices shows that the average time used in making an error correction is about one-half minute, if there is but one carbon copy.[54] The penalty that is placed on errors in the International Typewriting Contest Rules is a deduction of ten words for each error.[55] Elimination of errors tends to increase net speed and adds infinitely to the quality of the written copy. Begin the practice at a rate that

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[53] D. D. Lessenberry, loc. cit.

[54] William E. Harned, New Typewriting Studies, Elementary Course (Chicago: Ginn Publishing Company, 1929), p. 49.

[55] International Typewriting Contest Rules.

can be maintained for a complete line striking each key without the least hesitation or variation in fluency. Each key should be struck with a positive, accurate, and fluent stroke. The wrists should be steady and the hands in correct position while practicing for fluency on these consecutive keys.

ert tre sdf fds xcv vcx oiu uio lkj jkl .,m m,. 234 432 987 789

TEST: 1st Year: Write the exercise twice in thirty seconds.

Exercise 4

This corrective exercise for the third-finger letters will correct any tendency to space incorrectly after the third-finger strokes. Attention and concentration are absolutely certain to aid greatly in the mastering of this exercise in which the coordination between the stimulus and response must be practically perfect. The keys should be struck with a firm stroke and released immediately to insure quick action of the carriage.

s l w o 2 9 x . s l w 2 o . 9 w o x l s o w 2 . l w x l o 9 w x l s

TEST: 1st Year: Write the exercise twice in thirty seconds.

Exercise 5

The combining of first, second, and third finger letters into words makes excellent material to practice with music. One should endeavor to keep the writing smooth and rhythmic striking the third finger letters with the same technique used on the first and second letters. The one fundamental thing that cannot be overlooked is correct position for these keys must be struck with the hands in relatively the same position at all times.

only. joy, link. hook, fewer. sooner, work. ought, fright. order, box.

TEST: 1st Year: Write group four times in one minute.

There is much controversy about the value of exercises, drills, and disconnected words as practice material. W. H. Pyle states: "Meaningful material has many advantages but has the disadvantage that when used for comparative purposes, it will favor certain subjects because of difference in previous experience and interest."[56] David Pearson in his Automatization Experiment gave the opinions of several authorities on this question and those mentioned were agreed to a certain extent.

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[56] W. H. Pyle, The Psychology of Learning (Baltimore: Warwick & York Inc., 1921), p. 181.

Davis Pearson writes:

> Dr. Wm. F. Book in his Learning to Typewrite declares that a learner in typewriting must make his response to a word taken as a whole by combining the individual letter responses in a certain way. Until these letter habits are sufficiently fixed to make this possible, he believes, they cannot be combined to form a higher-order habit. . . . .
>
> Professor Barton in his study, concluded that practice on meaningless units has no value in learning to typewrite and that it is better to use connected discourse as copy material from the beginning. . . . .
>
> A preliminary study to the present experiment made on one subject at the University of Iowa last year indicated that the acquirement of fairly high skill in the typing of word units alone did not have a satisfactory "carry-over" effect on sentences and complete composition material.[57]

These words composed of first, second, and third finger letters are arranged to alternate the hands. This will develop facility in stroking and independent finger technique. The fingers should be kept well arched.

sweet only tweed mill serge holly text honk rest hill serve

milk dress hook test polly sex pumpkin excess look serve

junk grew moon detest noon dessert knoll exert you severe

TEST: 1st Year: Write exercise once in forty seconds.

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[57] David Pearson, "An Experiment with the Automatiza- of the 1,000 Commonest Words.", Research Studies in Commercial Education, II, Monographs in Education (Iowa City, Iowa: The College of Commerce and The College of Education, University of Iowa, Jan. 1, 1928), pp. 84-97.

The second test in typewriting was given to both classes on September 25 in their respective class periods. This test was a blind-fold test. The experimental class had practiced on the corrective exercises for the first, second, and third fingers for ten minutes each day since the beginning of school. The students were given the same instructions for preparing their test papers, setting the machines, and blind-folding as for the first test. The same procedure was followed in giving the test.[58] The test was on the first, second, and third finger keys. The test was:

Write one line of wc4b space
" " " " 8.yl "
" " " " 2oxk "
" " " " 39,s "
" " " " eid6 "

Write each word once after the word has been pronounced and spelled.

inclose exclude welcome guilty workbox
success behold excel twist exit

The students checked their papers carefully and then handed them in to be rechecked by the teacher.

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[58] Supra, p. 30.

RESULTS OF TEST II

In Table II on the following page the score made by each student in Test II is shown. The table is constructed following the plan of Table I (p. 33).

The score was determined by evaluating each combination line ten points and each of the words five points. The point value of the test was one-hundred.

The highest score made was one-hundred and this score was received by seven students in the experimental class and by two students in the control class. The lowest score in the experimental class was fifty-five. The lowest score in the control class was forty-five. The median of the experimental class was ninety-seven and the control class median was eighty-nine and five-tenths. The average of the experimental class was ninety and eight-tenths and that of the control class was eighty-six.

The scores of ten students in the experimental class exceeded the scores of the students in the control class with whom they were paired; in five pairs the score made in the control class exceeded the one made by the student of the same pair in the experimental class; the score for one pair was the same in both divisions.

The results of this test are shown by means of graphs in Figures 3 and 4 on pages 52 and 53.

TABLE II

SCORES MADE BY STUDENTS IN TEST II

Experimental Class			Control Class			
Pair number	Name of Student	Score	Score	Name of Student	Difference Ex.	Difference Con.
1	C. C.	100	95	J. C.	5	
2	D. C. R.	100	93	G. P.	7	
3	C. U.	100	98	A. S.	2	
4	G. W.	100	66	E. J.	34	
5	E. F.	74	86	N. W.		12
6	D. V.	100	100	L. L.		
7	R. K.	97	100	L. M. F.		3
8	L. R.	100	85	H. O.	15	
9	J. H.	97	96	E. B.	1	
10	M. M.	85	86	F. S.		1
11	V. G.	55	94	D. B.		39
12	N. B.	97	65	C. S.	32	
13	M. C.	100	97	E. B.	3	
14	D. D.	90	45	K. R.	45	
15	D. C.	97	86	F. R.	11	
16	W. J.	60	84	G. D.		24

	Experimental Class	Control Class
Median	97	89.5
Average	90.8	86
Range	55-100	45-100

Read table thus: Read across page. Pair number 1, Name of Student C. C., Score 100; Score 95, Name of Student J. C. Experimental student 1 exceeded score of Control student 1 by 5 points.

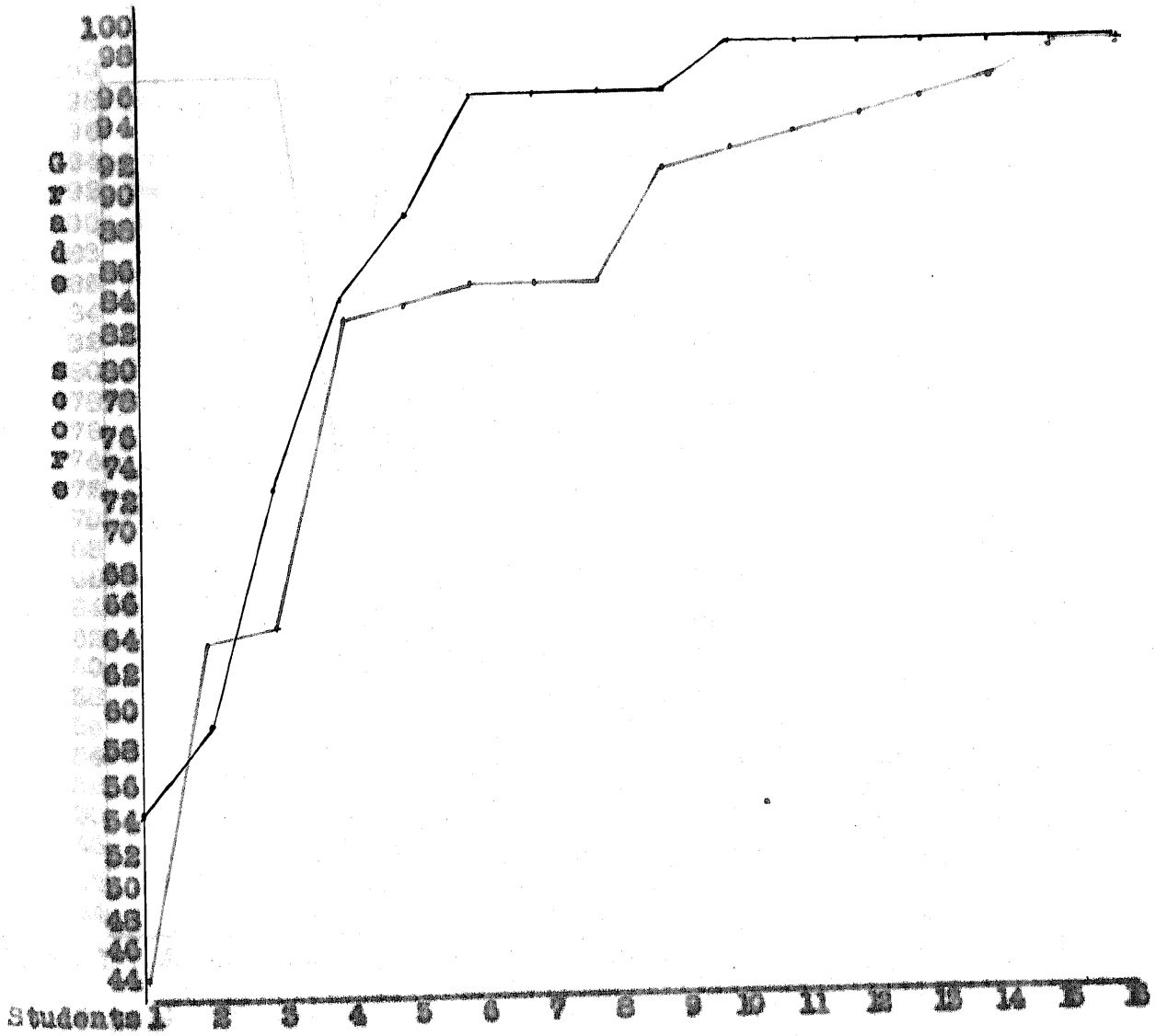

Fig. 3. Scores made by two groups on Blindfold Test 2.

Read Graph thus: Black indicates the experimental group; red indicates the control group. The highest score made by a pupil of the experimental group was 100, the highest score by a pupil of the control group was 100.

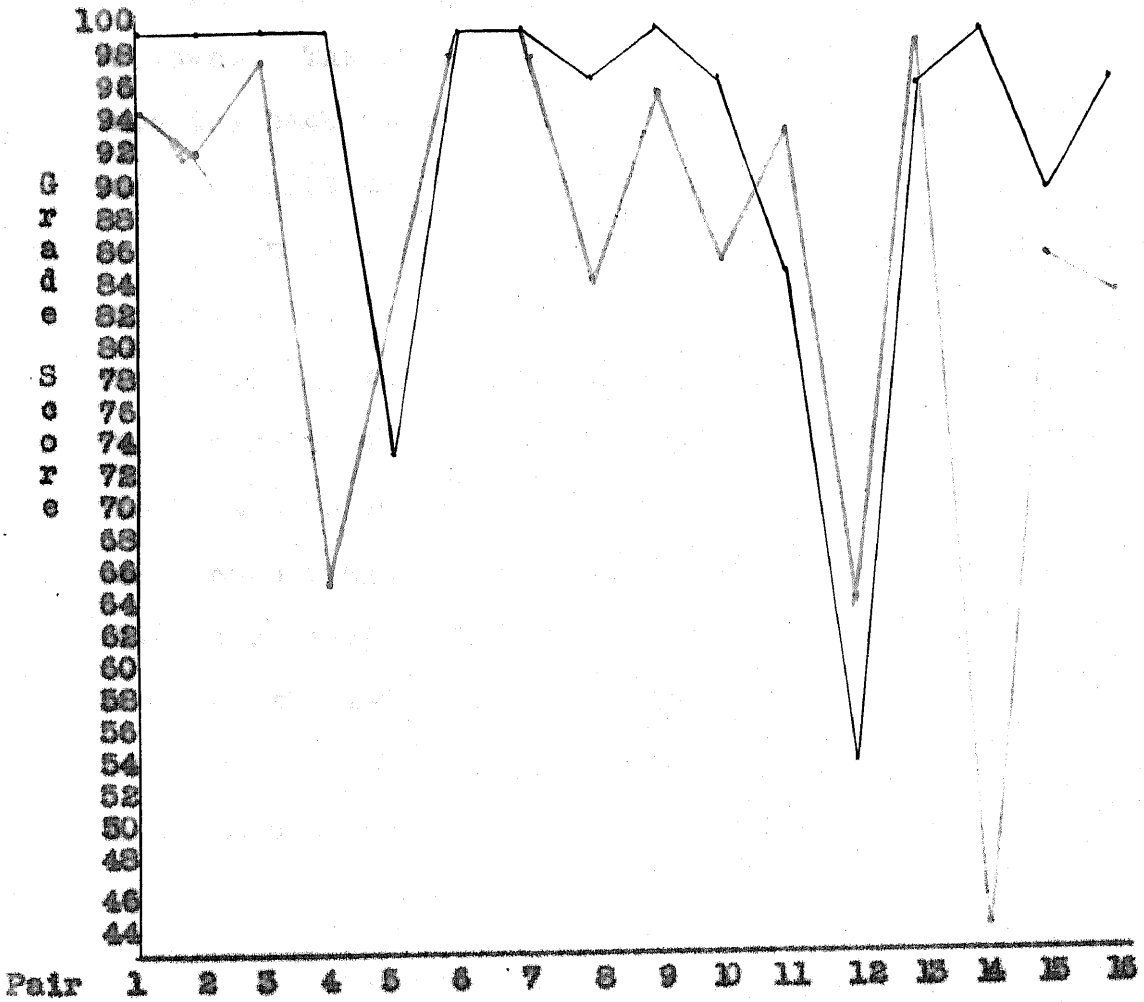

Fig. 4. Scores of two groups on Blindfold Test 2.

Read graph thus: Black indicates experimental group; red indicates control group. The score made by C. C. the experimental pupil of Pair 1 was 100, the score of J. C. the control pupil of Pair 1 was 95.

The fourth, or little, fingers are more easily controlled than the third fingers and for that reason have more work to do. The right fourth finger operates seven keys and in addition controls the shift key, shift lock, tabulator key, and margin release. The left fourth finger has three keys, the shift key and the back spacer to take care of in addition. The operation of the shift key will be discussed later in this study.

In an experiment by Roy Edward Hoke[59] to ascertain the Relative Abilities of the Eight Fingers and the Two Hands for Typewriting, three studies were made and the results of each test were practically the same. The third study was made using forty-two College Girls and Twelve Teachers. They were to tap with each finger of each hand for thirty seconds. The average taps per minute for the right hand was three-hundred-sixty-three and for the left hand three-hundred-ten, the median taps per minute for the right hand was three-hundred-sixty-five and for the left hand three-hundred-eleven. The taps in thirty-seconds for the group for each finger were:

	R1	L1	R2	L2	R3	L3	R4	L4
Averages	161	143	134	121	101	99	115	106
Medians	160	145	138	125	104	103	117	107

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[59] Roy Edward Hoke, op. cit., III, "Relative Abilities of the Eight Fingers and the Two Hands for Typewriting." pp. 24-8.

In another study Hoke worked out The Finger and Hand Loads of the Present Typewriter Keyboard and found them to be:

Finger	1	2	3	4
Right	1,490	640	996	296
Left	1,535	1,492	658	803

Adding these finger strokes we get the right hand load to be 3,422, and the left 4,488. Referring to the tables showing the relative abilities of fingers and hands Hoke writes:

> In view of the fact that in Tables X, XI, and XII we found finger abilities to be not very dissimilar, it is rather startling to find that R1, L1, and L2 are each, on the present typewriter keyboard, given more than five times as much work to do as is given to R4. In view, also, of the generally known fact that the index of right-handedness may be roughly expressed by the ratio of ten to nine, that is, that the ability of the right hand is approximately one-ninth greater than that of the left, it is surprising to find that the present keyboard gives a far heavier load to the weaker member.[60]

Exercises should be given the fourth fingers to strengthen them, to fix the habit of keeping them arched at all times, and to increase the spread between the third and fourth fingers so the fourth fingers can operate the shift key correctly. Good exercises to strengthen the fingers are to move the fingers around in a circular motion from right to left and reverse; another one is to place the fingers on a table curved just as they would be on the keys of a typewriter, practice raising

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60 Ibid., IV, "The Finger and Hand Loads of the Present Typewriter Keyboard.", pp. 29-30.

the fourth fingers as high as possible keeping them curved and then striking the table firmly with the tips of these fingers just as they would tap the keys in striking them. The habit of keeping the fingers curved can best be formed at the machine by always keeping them well-curved. To increase the spread between the fingers, hold the first three fingers together keeping them straight, then move the fourth fingers away from them as far as possible keeping them straight also. If one has difficulty spearating the fingers the opposite hand may be used to force the spread between the fingers.

To ascertain whether remedial work is needed for the fourth fingers aside from the fact that errors are made, the student should write several lines of the rhythm drill of the experts. One should always write with as nearly absolute evenness as possible. Practice the drill dlowly and gradually increase the speed until the fingers are moving at the highest possible rate of speed. If there is any tendency toward an uneven stroke with the third and fourth fingers special drill work should be given.

Rhythm Drill of the Experts[61]

a;sldkfjghfjdksla;sldkfjghfjdksla;sldkfjghfjdksla;sldkfjghfjdksla;sldkfjghfjdksla;

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[61] Adelaide B. Hakes, op. cit., p. 47.

Any tendency toward an uneven stroke with the third and fourth fingers of each hand should be attended to at once for if the stroke is uneven enough that at times the letter fails to print, the machine to space, or one letter is piled upon another letter, these are errors in typewriting and are penalized the same as an incorrect letter. In order to surmount the tendency to unevenness in these finger strokings, drill work should be done which will in a measure overcome these difficulties. Practicing words which are composed of letters written wholly by the right or left hands are valuable in this connection.

One's posture should be correct, and the proper hand position maintained at all times, but do not glue the fingers to the home keys. Since the fourth fingers are shorter than the other fingers they need not touch the home keys at all except to strike the letters, but should be poised directly over the guide keys ready for action. Difficulty in making the reaches with the fourth fingers may be overcome by keeping the elbows close to the body, but not touching it, and forcing the wrists toward each other.

FOURTH-FINGER EXERCISES

Exercise 1

This drill helps to develop control and strength in the fourth fingers. The fingers should be well arched for they are stronger in this form. The tips of the fingers should strike the keys which necessitates rather short finger nails, otherwise, there is a tendency to strike keys with the bottom of the finger about half way between the tip and the first joint. The tempo of the music should be increased gradually while writing this exercise.

aaa zzz qqq aaa ;;; /// ppp ;;; zzz /// qqq ppp aaa ;;; zzz ///
ppp aaa /// zzz qqq ;;; zzz ppp ;;; qqq /// aaa zzz ppp /// ;;;
qqq aaa /// zzz ppp ;;; zzz /// ppp ;;; aaa zzz ppp qqq zzz ///

TEST: 1st Year: Write exercise twice in one-and-one-half minutes.

Exercise 2

This exercise should be written smoothly, keeping the wrists steady and using independent finger action. No letter or combination should be written faster than the most difficult reach can be made and the key struck. Rhythm, technique, and position should be stressed in this exercise.

asdfg gfdsa ;lkjh hjkl; qwert trewq poiuy yuiop zxcvb /.,mn nm,./

TEST: 1st Year: Write exercise twice in thirty seconds.

Exercise 3

Vertical reaches are especially difficult so the student should practice this exercise very deliberately at first. The hands should be kept in correct home position with each finger poised above its particular guide key. The fingers should be curved until when on guide row they touch or almost touch the row of keys above. The reaches must be made by the little fingers while the other fingers remain in home position or the drill has little value.

aqz qaz zaq ;p/ p;/ /;p aqa aza qaq zaz ;p; ;/; p;p /;/ qza p/;

TEST: 1st Year: Write exercise twice in thirty-seconds.

Exercise 4

The wrists and hands of the operator should remain steady while making the reaches with the fingers. As the coordination improves the music should be increased in speed.

aqswdefrgt tgrfedwsqa ;plokijuhy yhujikolp; azsxdcfvgb ;/l.k,jmhn

TEST: 1st Year: Write exercise twice in thirty-seconds.

Exercise 5

This exercise gives one further practice in using the thumb for spacing between letters and will correct any tendency to space incorrectly after fourth finger letters. Concentration should be forced by the student, working for quick reaction, visual, mental and motor.

; q p w / a p q / a o z p a ; q / w ; z q p a / q ; w p z / a ;

TEST: 1st Year: Write exercise twice in thirty-seconds.

Exercise 6

Practice with music on these words containing fourth finger letters trying to give the same force to each key will improve the student's rhythm.

tranquilize applique puzzler grizzly moralize pamphlet pepper apostrophe slipper zeal heap escapade paragraph azalea grapple quadruped appropriate emblazon spare catalpa lazy loquacity adapt adept paralyze dapper apprize was squeeze grape nozzle apologize prop quizzical prize oppose exasperate haphazard maze

TEST: 1st Year: Write five lines in one minute.

There have been several experiments to discover the value of mechanizing the thousand commonest words but we find other authorities advocating practice on the less common words.

TABLE II

SCORES MADE BY STUDENTS IN TEST II

Experimental Class			Control Class			
Pair number	Name of Student	Score	Score	Name of Student	Difference Ex.	Con.
1	C. C.	100	95	J. C.	5	
2	D. C. R.	100	93	G. P.	7	
3	C. U.	100	98	A. S.	2	
4	G. W.	100	66	E. J.	34	
5	E. F.	74	86	N. W.		12
6	D. V.	100	100	L. L.		
7	R. K.	97	100	L. M. F.		3
8	L. R.	100	85	H. O.	15	
9	J. H.	97	96	E. B.	1	
10	M. M.	85	86	F. S.		1
11	V. G.	55	94	D. B.		39
12	N. B.	97	65	C. S.	32	
13	M. C.	100	97	E. B.	3	
14	D. D.	90	45	K. R.	45	
15	D. C.	97	86	F. R.	11	
16	W. J.	60	84	G. D.		24

	Experimental Class	Control Class
Median	97	89.5
Average	90.8	86
Range	55-100	45-100

Read table thus: Read across page. Pair number 1, Name of Student C. C., Score 100; Score 95, Name of Student J. C. Experimental student 1 exceeded score of Control student 1 by 5 points.

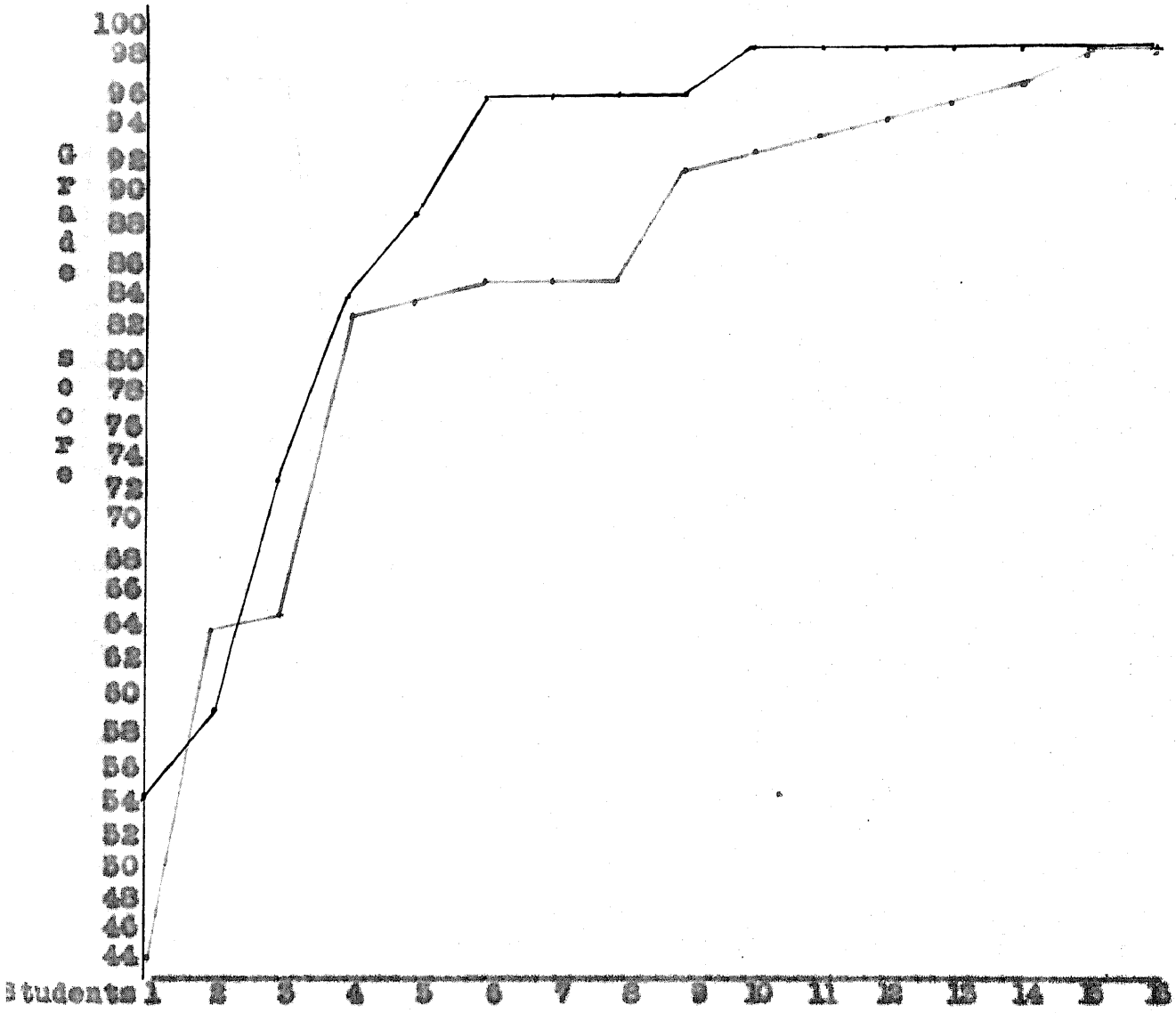

Fig. 3. Scores made by two groups on Blindfold Test 2.

Read Graph thus: Black indicates the experimental group; red indicates the control group. The highest score made by a pupil of the experimental group was 100, the highest score by a pupil of the control group was 100.

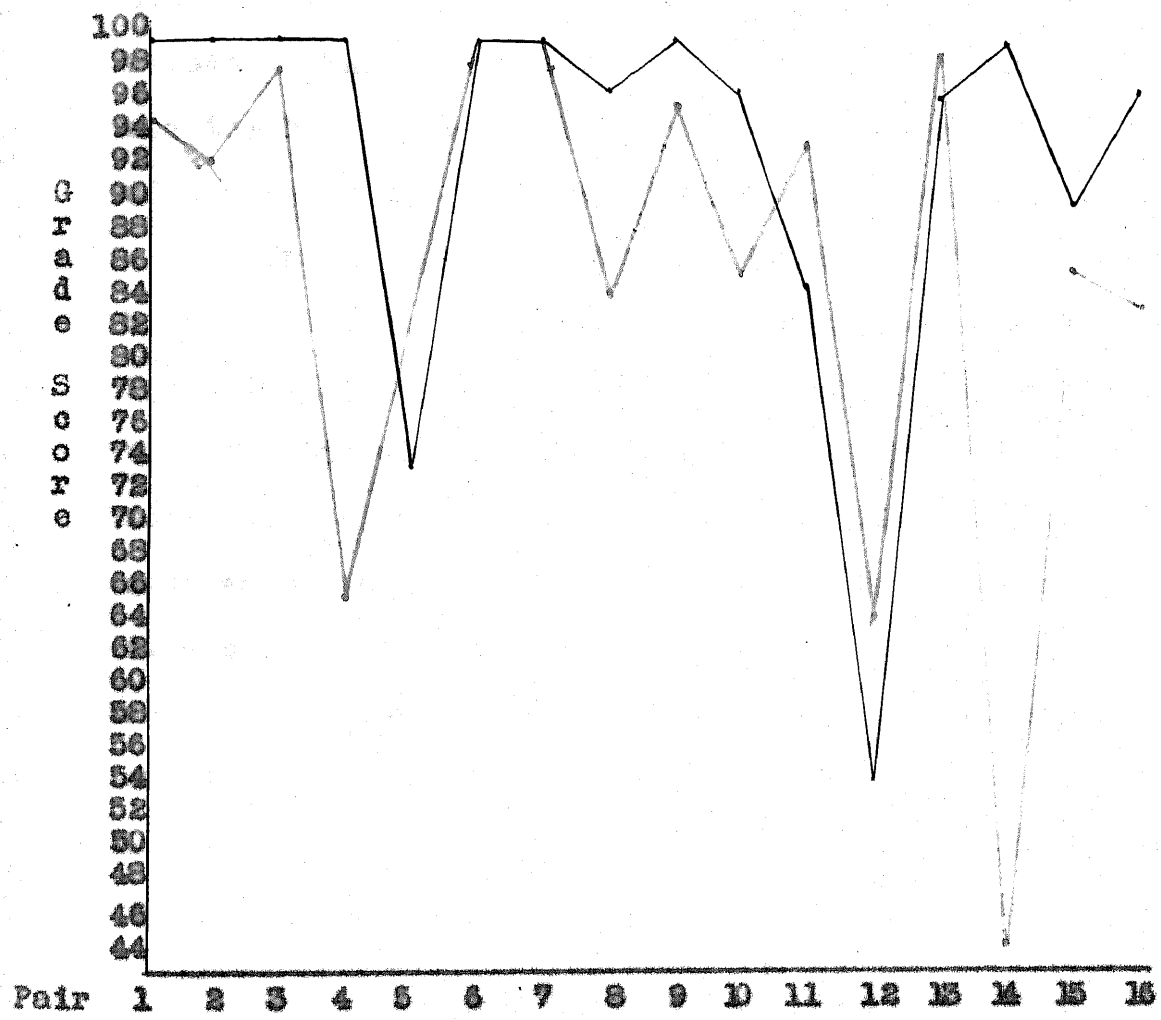

Fig. 4. Scores of two groups on Blindfold Test 2.

Read graph thus: Black indicates experimental group; red indicates control group. The score made by C. C. the experimental pupil of Pair 1 was 100, the score of J. C. the control pupil of Pair 1 was 95.

The fourth, or little, fingers are more easily controlled than the third fingers and for that reason have more work to do. The right fourth finger operates seven keys and in addition controls the shift key, shift lock, tabulator key, and margin release. The left fourth finger has three keys, the shift key and the back spacer to take care of in addition. The operation of the shift key will be discussed later in this study.

In an experiment by Roy Edward Hoke[59] to ascertain the Relative Abilities of the Eight Fingers and the Two Hands for Typewriting, three studies were made and the results of each test were practically the same. The third study was made using forty-two College Girls and Twelve Teachers. They were to tap with each finger of each hand for thirty seconds. The average taps per minute for the right hand was three-hundred-sixty-three and for the left hand three-hundred-ten, the median taps per minute for the right hand was three-hundred-sixty-five and for the left hand three-hundred-eleven. The taps in thirty-seconds for the group for each finger were:

	R1	L1	R2	L2	R3	L3	R4	L4
Averages	161	143	134	121	101	99	115	106
Medians	160	145	138	125	104	103	117	107

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[59] Roy Edward Hoke, op. cit., III, "Relative Abilities of the Eight Fingers and the Two Hands for Typewriting." pp. 24-8.

In another study Hoke worked out The Finger and Hand Loads of the Present Typewriter Keyboard and found them to be:

Finger	1	2	3	4
Right	1,490	640	996	296
Left	1,535	1,492	658	803

Adding these finger strokes we get the right hand load to be 3,422, and the left 4,488. Referring to the tables showing the relative abilities of fingers and hands Hoke writes:

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[60] Ibid., IV, "The Finger and Hand Loads of the Present Typewriter Keyboard.", pp. 29-30.

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To ascertain whether remedial work is needed for the fourth fingers aside from the fact that errors are made, the student should write several lines of the rhythm drill of the experts. One should always write with as nearly absolute evenness as possible. Practice the drill dlowly and gradually increase the speed until the fingers are moving at the highest possible rate of speed. If there is any tendency toward an uneven stroke with the third and fourth fingers special drill work should be given.

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One's posture should be correct, and the proper hand position maintained at all times, but do not glue the fingers to the home keys. Since the fourth fingers are shorter than the other fingers they need not touch the home keys at all except to strike the letters, but should be poised directly over the guide keys ready for action. Difficulty in making the reaches with the fourth fingers may be overcome by keeping the elbows close to the body, but not touching it, and forcing the wrists toward each other.

FOURTH-FINGER EXERCISES

Exercise 1

This drill helps to develop control and strength in the fourth fingers. The fingers should be well arched for they are stronger in this form. The tips of the fingers should strike the keys which necessitates rather short finger nails, otherwise, there is a tendency to strike keys with the bottom of the finger about half way between the tip and the first joint. The tempo of the music should be increased gradually while writing this exercise.

aaa zzz qqq aaa ;;; /// ppp ;;; zzz /// qqq ppp aaa ;;; zzz ///
ppp aaa /// zzz qqq ;;; zzz ppp ;;; qqq /// aaa zzz ppp /// ;;;
qqq aaa /// zzz ppp ;;; zzz /// ppp ;;; aaa zzz ppp qqq zzz ///

TEST: 1st Year: Write exercise twice in one-and-one-half minutes.

Exercise 2

This exercise should be written smoothly, keeping the wrists steady and using independent finger action. No letter or combination should be written faster than the most difficult reach can be made and the key struck. Rhythm, technique, and position should be stressed in this exercise.

asdfg gfdsa ;lkjh hjkl; qwert trewq poiuy yuiop zxcvb /.,mn nm,./

TEST: 1st Year: Write exercise twice in thirty seconds.

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Vertical reaches are especially difficult so the student should practice this exercise very deliberately at first. The hands should be kept in correct home position with each finger poised above its particular guide key. The fingers should be curved until when on guide row they touch or almost touch the row of keys above. The reaches must be made by the little fingers while the other fingers remain in home position or the drill has little value.

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TEST: 1st Year: Write exercise twice in thirty-seconds.

Exercise 4

The wrists and hands of the operator should remain steady while making the reaches with the fingers. As the coordination improves the music should be increased in speed.

aqswdefrgt tgrfedwsqa ;plokijuhy yhujikolp; azsxdcfvgb ;/l.k,jmhn

TEST: 1st Year: Write exercise twice in thirty-seconds.

Exercise 5

This exercise gives one further practice in using the thumb for spacing between letters and will correct any tendency to space incorrectly after fourth finger letters. Concentration should be forced by the student, working for quick reaction, visual, mental and motor.

; q p w / a p q / a o z p a ; q / w ; z q p a / q ; w p z / a ;

TEST: 1st Year: Write exercise twice in thirty-seconds.

Exercise 6

Practice with music on these words containing fourth finger letters trying to give the same force to each key will improve the student's rhythm.

tranquilize applique puzzler grizzly moralize pamphlet pepper apostrophe slipper zeal heap escapade paragraph azalea grapple quadruped appropriate emblazon spare catalpa lazy loquacity adapt adept paralyze dapper apprize was squeeze grape nozzle apologize prop quizzical prize oppose exasperate haphazard maze

TEST: 1st Year: Write five lines in one minute.

There have been several experiments to discover the value of mechanizing the thousand commonest words but we find other authorities advocating practice on the less common words.

H. H. Green writes:

> To quote from Pearson's report in Research Studies in Commercial Education, Volume II, "Since the thousand commonest words made up 92 per cent of all printed matter, it was believed that if the typing of these words could be made practically automatic, faster and more accurate typing could be done." In Miss Jane Clem's excellent book, "The Technique of Technique of Teaching Typewriting, the author states in regard to the importance of the thousand commonest words: "These words, then should demand much of the practice time of the would-be typist." Logically, this may be good practice, but psychologically it may be wrong. It is undeniably true that after a certain amount of practice on any skill, the ability is so developed that further practice results in gain so negligible that the time used is practically wasted. It is very possible that this may apply to typing and to practice on the thousand commonest words. Perhaps the pupils received sufficient drill on these words in test and lesson work, and, hence, extra drill is only "gilding the lily" and is wasteful of pupils' time. Perhaps drill on the less common words would be of more value.[62]

Mr. Green concluded from his experimental study that drilling on difficult letter combinations and leading very rapidly up to the infrequent and uncommon words give better results than emphasizing the thousand commonest words and that we teachers of typewriting have been guilty of "gilding the lily".[63]

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[62] H. H. Green, "The Relative Effectiveness of the Thousand Commonest Words in the Teaching of Typewriting", Research Studies in Commercial Education (Iowa City, Iowa: The College of Commerce and The College of Education, University of Iowa, Nov. 15, 1932), pp. 167 ff.

[63] Ibid. pp. 167 ff.

The third test in typewriting was given to both classes October 2 in their respective class periods. This test was connected or straight material from their text books. The material had not been written before and was what will hereafter be termed new material. The test was timed for five minutes and was graded entirely on accuracy deducting three percent for each error. The experimental class had practiced the corrective exercises for ten minutes each day but the control class had used only the words given in the text for the warming-up period with music.

The students were given warming-up exercises for ten minutes and were then told to get ready for a five minute test. Two sheets of paper were to be placed in the typewriter, the machine set for double space, stops set at five and seventy-five, tabulator set for five space indentation for paragraphs. The name of the student, the date, length of test, and type of material to be written was placed one-half inch from the top of the page on the <u>same line</u>. A pencil mark was drawn from the center of the page to the right-hand edge of the paper three-fourths inch from the bottom of the page as a warning line to show it was time to change the paper. The students were instructed to write as correctly as possible as they would be penalized three points for each error made, that it did not make any difference how much or how little they wrote but they were to write continuously from the time they started.

The Control Group were told that they could write more accurately if they just made up their minds they were going to. Their attention was called to the fact that in the test last week they had two one-hundreds and the morning class had six. They were also informed that the morning class had done very poorly on this test and that a little effort on the part of the members of the afternoon class would make their scores very close if not exceeding those made by the morning class. They were told that the morning class tried to write too fast and since this was an accuracy test their scores were low. They were given a paragraph from their texts to write with the instructions that anyone who finished the paragraph before the time was up should begin over again. The material was:

> We are not sent into this world to do anything into which we can not put our hearts. We have certain work to do for our bread and that is to be done strenuously; other work to do for our delight and that is to be done heartily; neither is to be done by halves or shifts, but with a will; and what is not worth this effort is not to be done at all.[64]

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[64] Rupert P. Sorelle, The New Rational Typewriting (New York: The Gregg Publishing Company, 1927), p. 53.

RESULTS OF TEST III

In Table III on Page 65 the score made by each pupil in Test III is shown. The table is constructed following the plan of Table I (p. 33).

The score was determined by deducting three percent for each error. The point value of the test was one-hundred.

The highest score was one-hundred. This score was made by three students in the experimental class and by two students in the control class. The lowest score was made in the experimental group, sixty-seven, the lowest score in the control class was seventy. The median for the experimental group was ninety-four and for the control group ninety-two and five-tenths. The average of the experimental class was ninety-one and six-tenths and for the control class eighty-nine and three-tenths.

The scores of six pupils in the experimental class exceeded the scores of the students in the control class with whom they were paired; the scores of six students in the control class exceeded the scores of the students in the experimental class with whom they were paired; the scores for four of the pairs were the same in both divisions.

The improvement shown by the control class would tend to show that the encouragement and confidence of the instructor expressed to the class just before taking this test had some effect in raising the scores of most of the students.

The results of this test are shown by means of graphs on pages sixty-six and sixty-seven.

TABLE III

SCORES MADE BY STUDENTS IN TEST III

Experimental Class			Control Class		
Pair number	Name of Student	Score	Score	Name of Student	Difference Ex. / Con.
1	C. C.	85	97	J. C.	12
2	D. C. R.	97	100	G. P.	3
3	C. U.	97	97	A. S.	
4	G. W.	97	97	E. J.	
5	E. F.	94	91	N. W.	3
6	D. V.	82	100	L. L.	18
7	R. K.	100	97	L. M. F.	3
8	L. R.	100	70	H. O.	30
9	J. H.	100	88	E. B.	12
10	M. M.	97	97	F. S.	
11	V. G.	91	94	D. B.	3
12	N. B.	94	76	G. S.	18
13	M. C.	67	79	E. B.	12
14	D. D.	85	91	K. R.	6
15	D. C.	85	85	F. R.	
16	W. J.	94	70	G. D.	24

	Experimental Class	Control Class
Median	94	92.5
Average	91.6	89.3
Range	67-100	70-100

Read table thus: Read across page. Pair number 1, Name of Student C. C. made a Score of 85; Score of 97, Name of Student J. C. Control Student 1 exceeded score of Experimental Student 1 by 12 points.

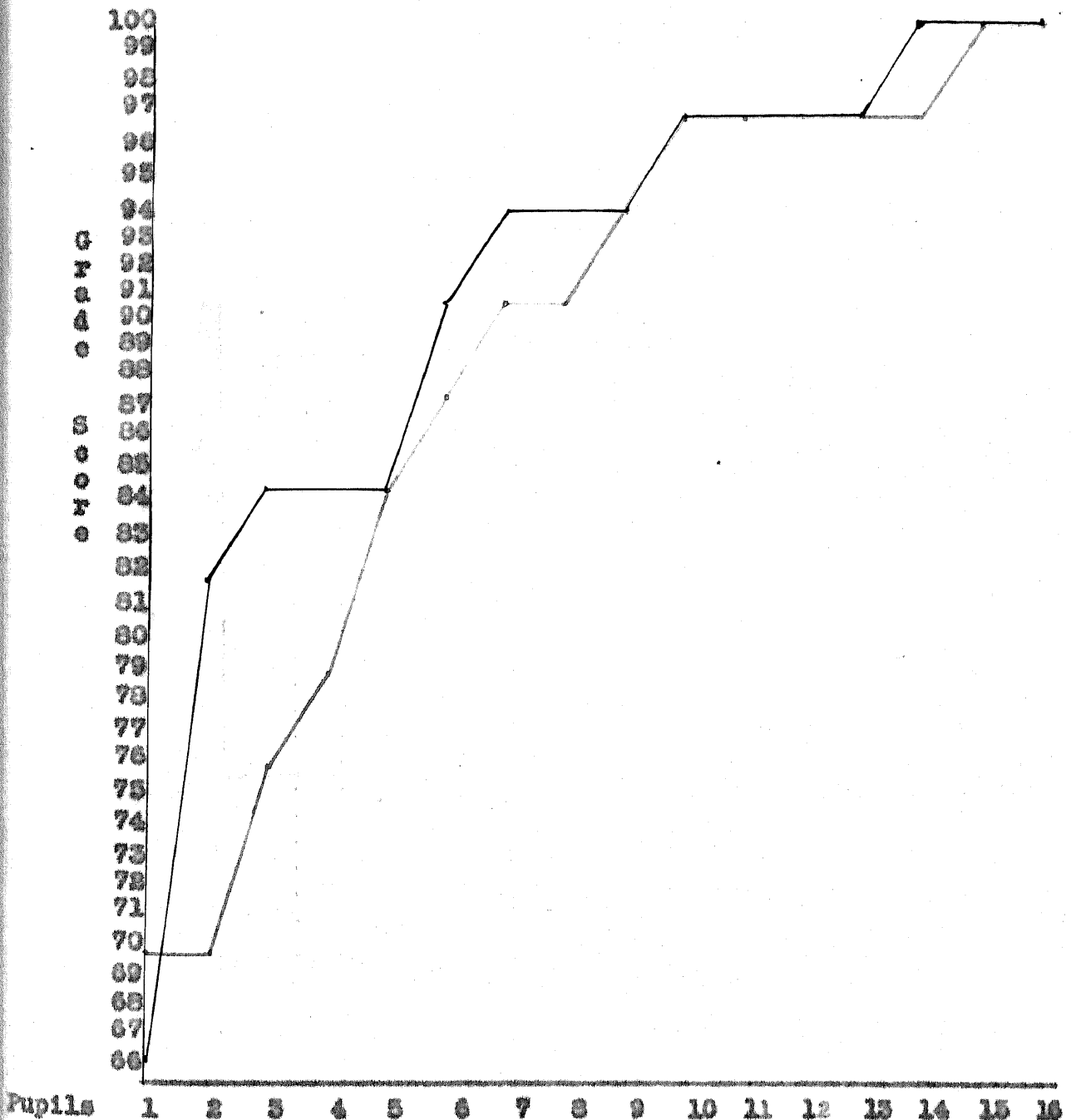

Fig. 5. Grade scores of two groups on Test 3.

Read graph thus: Black indicates experimental group; red indicates control group. The highest score made by a pupil in the experimental group was 100, the highest score made by a pupil in the control group was 100.

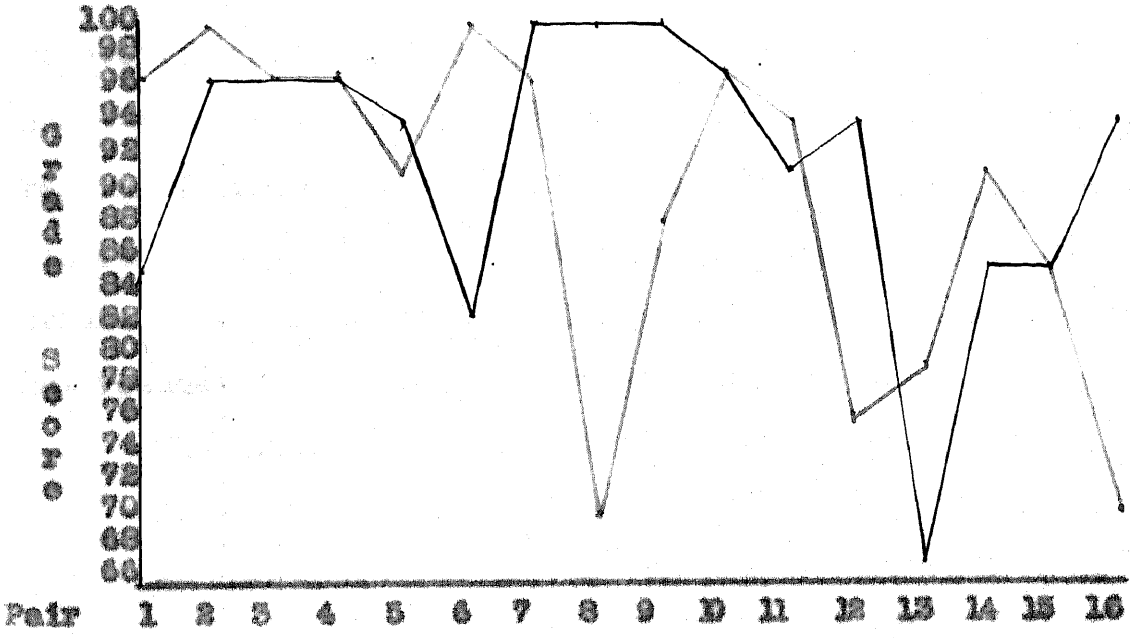

Fig. 6. Scores of two groups on Test 3.

Read graph thus: Black indicates experimental group; red indicates control group. The score made by C. C. the experimental pupil of Pair 1 was 85, the score of J. C. the control pupil of Pair 1 was 97.

FAULTY SHIFTING, DOUBLE LETTERS and STROKING

The entire aim in shifting is to confine the motion largely, if not entirely, to the small fourth finger. The span between the third and fourth fingers can be greatly increased by practice. It is necessary that the first, second, and third fingers rest on, or hover immediately over, their respective guide keys while the fourth finger makes the reach and strikes the shift key. The wrist should be kept low as raising it increases the distance to the shift key, thereby slowing down the speed and increasing the chance of making errors. Miss Hakes says: "This position should be retained, not resumed."[65] The wrists must not flop.

The main steps in shifting are:

1. Hands on guide row in relaxed position

2. Practice reaching for the proper shift key with the fourth finger alone, keeping the wrist low, eliminate motion of the arm above the wrist.

3. Practice reaching and depressing the shift key.

4. Striking of the letter key against the platen at the same time that the shift key reaches its lowest point. They are not struck at exactly the same time but as nearly so as possible.

One should practice making capital letters with music using two beats to make the capital, the first beat is used

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[65] Adelaide B. Hakes, op. cit. p.22.

to get the finger on the letter key and the fourth finger on the shift key, then on the second beat the letter is struck and capitalized simultaneously.

First Finger Shifting Exercise

Shifting should be practiced with music using two beats for each letter, getting ready to strike the letter and depress the shift key on the first beat and actually striking the letter and depressing the shift key on the second beat. The shift key should be depressed so that the lowest point is reached just as the platen is struck by the type. Since the shift key is more difficult to depress this action should be started before the key action for the letter. Under no consideration should the student be allowed to put the shift lock on while practicing these shifting exercises. The carriage must go up and down as each letter is capitalized, even though the letters are struck with the same hand, to get the full value of these shifting drills.

RUN RUB RUFF FUNNY GUM BUG RUNG TURN BUY HUG RUT RUG FUR TUB
BUR BURY HUM HURRY BUT BUGGY GRUNT HUNGRY HUBBY TUFT NUMB
TUNNY GYM TRUTH GRUFF BURN

Second-Finger Shifting Exercise

Follow instructions for First-Finger Shifting Exercise.

RIGHT FUND THINK THEIR THING EVERY NEVER EVERY THEME ENTER
BEGIN UNDER EVER DEBT BEEN THEN TIRE BET RUDE DUTY HIDE
GIVE CRY FIEND THIEF DEVINE

Third-Finger Shifting Exercise

Follow instructions for First-Finger Shifting Exercise.

LONG WHERE SHE NOW WITH ELSE HOME FOUND COULD THOSE FEW LET
SHOW LYNX TOWEL SHOOT CLOSE DOOR CROWD BEHOLD EXCEL CLOSE
FOXY BEST WOULD DOES

Fourth-Finger Shifting Exercise

Follow instructions for First-Finger Shifting Exercise.

ARE ASK WAY PAY ANY HAS ACT DAY AGO CALL PAST SAME FAST PART
SAVE QUIT HALF EASY FACT PRAY STAND LARGE SHARP PRIZE AMONG
START GREAT EQUAL AT

TEST: For each exercise: 1st Year: Write exercise in one and one-half minutes.

Exercise on Capital I

More errors are made in shifting for "I" than any other capital letter. If this difficulty appears in the student's

work he should practice this exercise rapidly with music.

I will I saw I do I think I must I wish I could I might
I shall I look

TEST: 1st Year: Write exercise three times in one minute.

Double-Letter Exercise

Many errors in rhythm are made on words containing double letters. Care must be taken to give each letter the same timing and intensity of stroke. Often the wrong letter is doubled, this is a Mental Error. "The mind naturally tends to run ahead of the finger movements and so fails to furnish adquate control over the sequence of the individual strokes."[66] Concentrate carefully on these words to get the sequence and strike all keys with equal intensity and timing.

proof alley bluff amass lobby chaff chilly osseus chubby afford speed middle weekly pebble garret recall cocoon ooze jazz drill sleep queen cross loose amiss freeze sadden ragged pillar cherry effect offset teller off dross ruffle cooper affair accept esteem school muddy occur mettle loss dismiss suggest tyranny gallant succumb twitter between

TEST: 1st Year: Write four lines in one minute.

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[66] William F. Book, Learning to Typewrite, op. cit., p. 260.

Left-Hand Stroking Exercise

Exercises of this nature improve the rhythm and also increase independent finger action. The wrists should remain steady and all movement be made with the fingers. "You may wonder why you should practice a word like "homonym"--it may never occur in copy. True, but it is a mental and manual gymnastic, and as such is valuable practice material."[67]

ace beg crew rate drew date ease aged east debt safe dear
card save cafe rage test text tree scar vase read draft
crest drear serve crate absorb acre wager crease cedar
swear serve baste edged save scar taste adder cease strew
sever start erect state tare crab card brass carat rage
case test deaf evade bread terse aster strew dead sex beg

TEST: 1st Year: Write three seventy-space lines in one minute.

Right-Hand Stroking Exercise

This exercise emphasizes rhythm and independent finger action. Mental and manual gymnastics are necessary to execute this exercise accurately and rapidly. Both hands should be in correct position with fingers hovering over the home keys. The movement must be confined to the fingers. The rhythm is aided greatly by practice with music.

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[67] Adelaide B. Hakes, op. cit., p. 28.

knop opinion uphill lily nook plum unholy nymph unpin opium kimono ill onlook humpy killjoy upon pony union mummy pupil lumpy hook in oily poplin ninny lollipop null nill junk holy joy pulp hypo hull honk milky monopoly look pumpkin kiln ink million hulk noun puny only noon mummy ninny upon union joy holy hunk only honk onlook humph lunk pomp jump lump kinky

TEST: 1st year: Write four seventy space lines in one minute.

Difficult Word Exercise

These words practiced intensively with music will give the student finger discipline and manipulative skill.

linoleum nihilism statuesque iridescent decadence tragedian trapeze galaxies juxtaposition bijoux prosceniums quizzical zylographer eccentricity inexplicable unsophisticated antonym somnambulist avoirdupois pyrotechnics bizarre quixotic jaguar valedictorian physiognomy psychology accoustics sepulcher arabesque rheumatic polyphyllous rejuvenescence vacillatory ambidextrous apotheosis hydrocephalics coordination epileptic articulation paralytic retrogression homonym diagnosed excess

TEST: 1st Year: Write three seventy space lines in one minute.

There are many phases of faulty technique that might cause errors that time and space does not permit the writer to discuss, but these exercises that have been worked out take care of the major errors and will tend to inhibit

incorrect habits and stamp in correct ones.

The six points of technique should, however, be checked daily. These points are: Correct position, Correct technique, Exercise mental and muscular control, Write rhythmically and without hesitation of any kind, Keep eyes on copy, Resist temptation to look at work in the machine or at the keyboard.[68]

Habit formation is so important in typewriting that the teacher should be alert to see that no incorrect habits are formed during the early stages and then there will be much less need for corrective and remedial drills. This unlearning and relearning is a most disagreeable and disheartening task.

Just as the great musicians have come to recognize the importance of mental control so have the expert typists learned to appreciate it. Nearly all typing errors may be traced to a lack of physical or mental control. If the mind wanders for only a fraction of a second the error may be made. Typewriting is a wonderful developer of mental alertness and concentration.

Rhythm is one of the most important things in typewriting just as it is in music. George L. Hossfield, World's Champion Typist--1918, 1920, 1921, 1922, 1926, 1927, 1929, and 1930 states:

> From my own observation and study, I am convinced that rhythm is an essential factor in gaining typing speed and accuracy. I firmly believe--and many others will admit--that the present-day high degree of accuracy could not have been attained without the aid of rhythm. . . . . The presentation of rhythm to a beginning student of typewriting is exactly the same as to a student of music; in fact, we could use to real advantage that

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[68] Harold H. Smith and Ernest G. Wiese, op. cit. p. 25.

> that instrument used to teach rhythm in music, the metronome, if we were giving individual instruction. . . . . Complete mastery of a combination of letters on the typewriter keyboard cannot be attained until the stroking is accomplished with perfect rhythm.[69]

The fourth test in typewriting was given to both classes in their regular class periods. This test was new, straight material sent out by the typewriter companies. The test was ten minutes in length and the papers were graded entirely on accuracy. Three percent was deducted for each error. This test was given October 9th.

The students were given warming-up exercises for ten minutes, the experimental students practicing the corrective exercises according to their individual needs as shown by the record on their record sheets, and the control group practiced on words from the text. Both groups warmed up with music. At the close of the warming-up period the groups were told to get ready to take a ten minute test, which meant to prepare their test paper as in the test of the previous week and to set their machines for writing tests.

The test material from which they were to write was given to them and they were instructed to begin writing when the signal was given and write continuously until time was called. They were told they would be graded entirely on accuracy with a penalty of three percent for each error deducted from one-hundred.

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[69] George L. Hossfield, "What is Rhythm in Typewriting?" The Business Education World, XV (September 1934), pp. 15-6.

The Control Group were complimented on the improvement they made on Test 3 the previous week, and were told that they were certainly accurate and that there was no reason why their class shouldn't increase their scores on this test just as they did last week.

RESULTS OF TEST IV

In Table IV on the following page the score made by each student in Test IV is shown. The table is constructed following the plan of Table I (p. 33).

The grade score was determined by deducting three percent for each error. The point value of the test was one-hundred.

The highest score was one-hundred and this score was made by two students in the experimental group and by one student in the control group. The lowest score was made in the control group, sixty-seven, the lowest score in the experimental class was seventy. The median for the experimental class was eighty-six and five-tenths, for the control class eighty-five. The average for the experimental class was eighty-five and six-tenths, for the control class, eighty-four and six-tenths.

The scores of nine pupils in the experimental class exceeded the scores of the students in the control class with whom they were paired; the scores of six students in the control class exceeded the scores of the students in the

experimental class with whom they were paired; the scores of one pair were the same in both sections.

The scores in this test are lower than in the previous test due to the increase in the length of the time of writing. When the fact that the length of the test was doubled is taken into consideration it is only reasonable to expect the grades to be lower on a straight accuracy basis.

The scores of the control group showed less of a decline than the experimental group which might be due to the encouragement given them by the teacher just before taking the test. The results of this test are shown by means of graphs in Fig. 7 and Fig. 8 on pages 79 and 80.

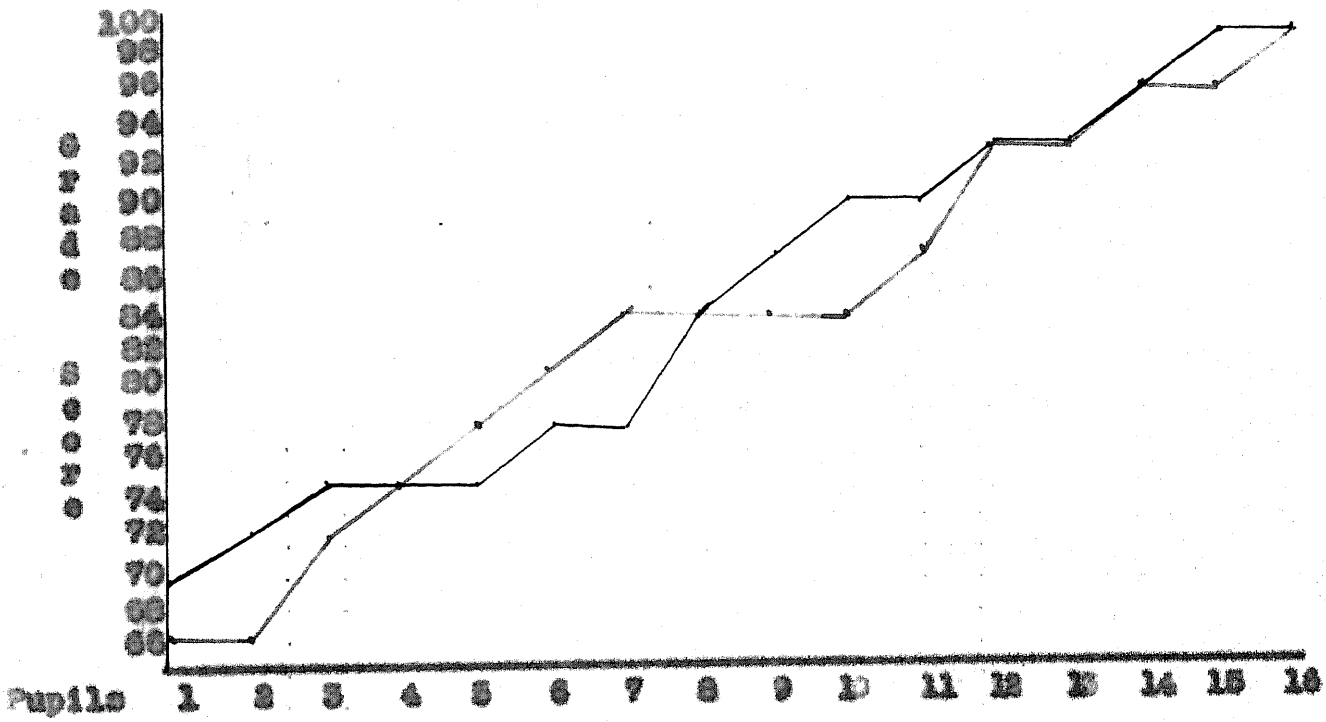

Fig. 7. Grade Scores of two groups on Test 4.

Read graph thus: Black indicates the experimental group; red indicates the control group. The highest score made by a pupil of the experimental group was 100, the highest made by a pupil of the control group was 100.

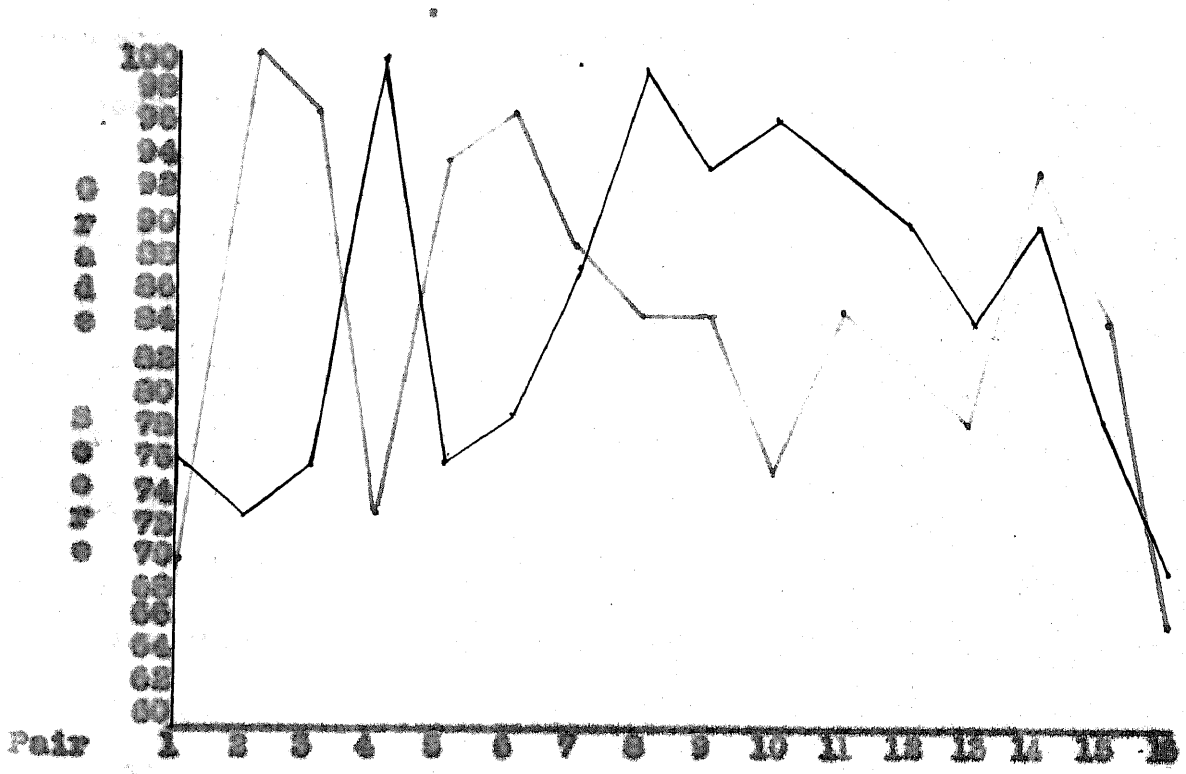

Fig. 8. Grade Scores of two groups on Test 4.

Read graph thus: Black indicates experimental group; red indicates control group. The score made by C. C. the experimental pupil of Pair 1 was 76; the score of J. C. the control pupil of Pair 1 was 67.

The fifth test in typewriting was given to both classes in their regular class periods. This was a ten minute test from unpracticed, straight material sent out by the typewriter companies. The test was graded entirely on accuracy, three percent was deducted for each error. This test was given October eleven and was the final test for the first six weeks.

The groups were given warming-up exercises for ten minutes, the experimental students practiced the corrective exercises according to their individual needs as shown by their record sheets, and the control group used words and sentences from the text. Music was used during the warming-up period.

Since this test was the final for the six weeks, both classes were urged to do their very best. The experimental class were told that the only reason they made low grades was because they tried to write faster than they were able to write with accuracy. They were told to write as fast as they could write <u>accurately</u> as "it was not so much how fast you write but <u>how much you write right</u>." They were told to concentrate on the material they were writing and try to make an accurate copy of it, to try to forget that they were taking a test at all but just pretend they were writing a copy to hand in.

RESULTS OF TEST V

The score made by each pupil on Test V is shown on the following page. The table is constructed following the plan of Table I (p. 53). The score was determined by deducting three percent for each error. The point value of the test was one-hundred.

The highest score was one-hundred and this score was made by a pupil in the control class, the highest score in the experimental class was ninety-seven. The lowest score was also made in the control class, forty-six, the lowest in the experimental class was sixty-four. The median was the same for each class, ninety-four. The average for the experimental class was ninety-one and two-tenths, for the control class eighty-seven and four-tenths.

The experimental class showed the greater improvement comparing Test IV and Test V as to averages, and the control class showed the greater improvement comparing the medians of the same two tests. The improvement on this ten minute test was probably due to a certain extent to the praise given each group just before starting to write.

The results of this test are shown by graphs on pages eighty-four and eighty-five.

TABLE V

SCORES MADE BY STUDENTS IN TEST V

Pair Number	Experimental Class: Name of Student	Score	Control Class: Score	Name of Student	Difference: Ex.	Difference: Con.
1	C. C.	94	85	J. C.	9	
2	D. C. R.	91	76	G. P.	15	
3	C. U.	94	94	A. S.		
4	C. W.	94	94	E. J.		
5	E. F.	97	94	N. W.	3	
6	D. V.	97	97	L. L.		
7	R. K.	64	94	L. M. F.		30
8	L. R.	97	46	H. O.	51	
9	J. H.	94	100	E. B.		6
10	M. M.	94	88	F. S.	6	
11	V. G.	94	97	D. B.		3
12	N. B.	79	97	C. S.		18
13	M. C.	97	97	E. B.		
14	D. D.	97	85	K. R.	12	
15	D. C.	94	82	F. R.	12	
16	W. J.	82	73	G. D.	9	

	Experimental Class	Control Class
Median	94.5	94
Average	91.2	87.4
Range	64-97	46-100

Read table thus: Read across page. Pair number 1, Name of Student C. C. made a Score of 94; Score of 85, Name of Student J. C. Experimental Student 1 exceeded score of Control Student 1 by 9 points.

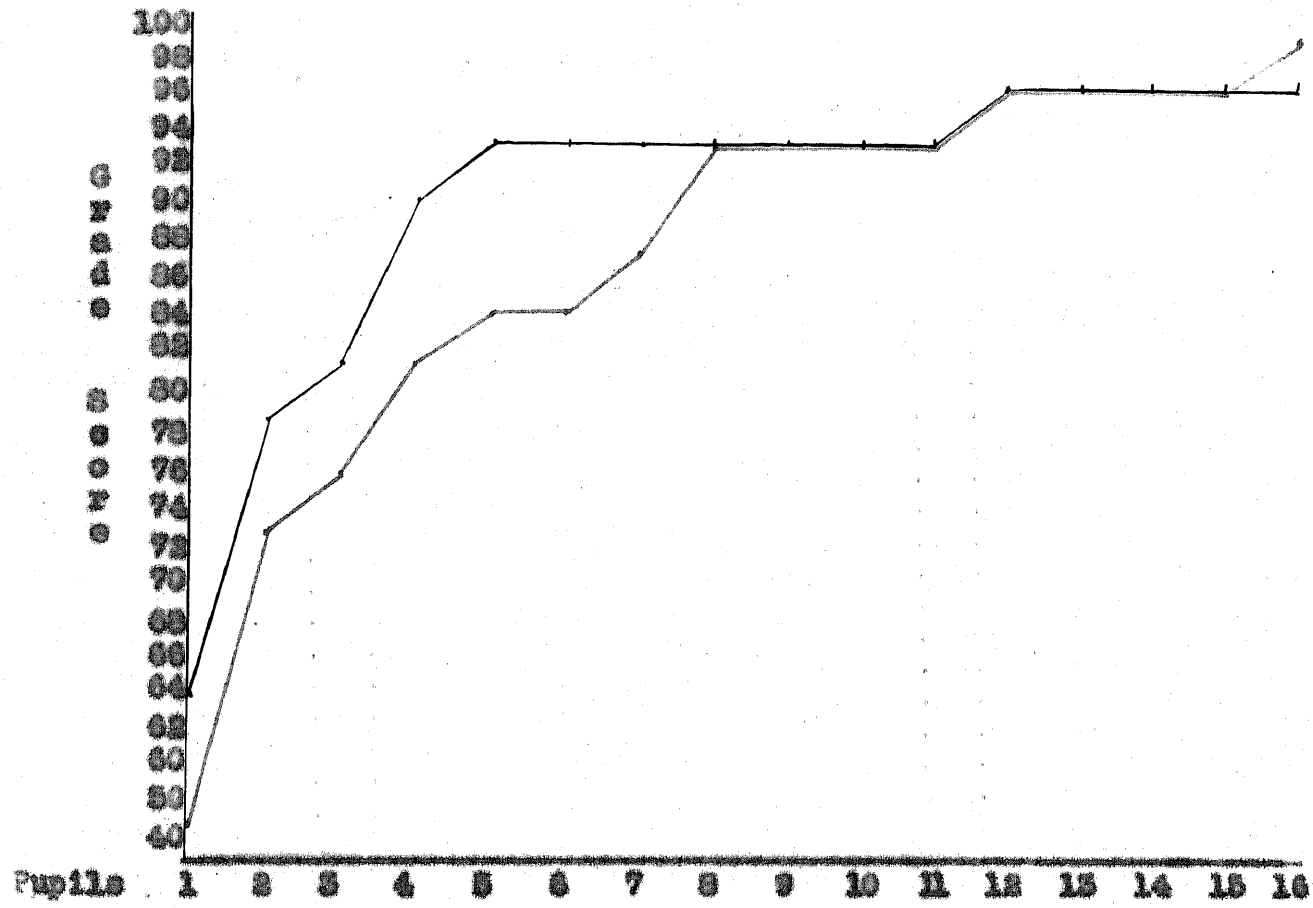

Fig. 9. Scores of two groups on Six Weeks Test, Test 5.

Read graph thus: Black indicates the experimental group; red indicates the control group. The highest score made by a pupil of the experimental group was 97, by the pupil of the control group 100.

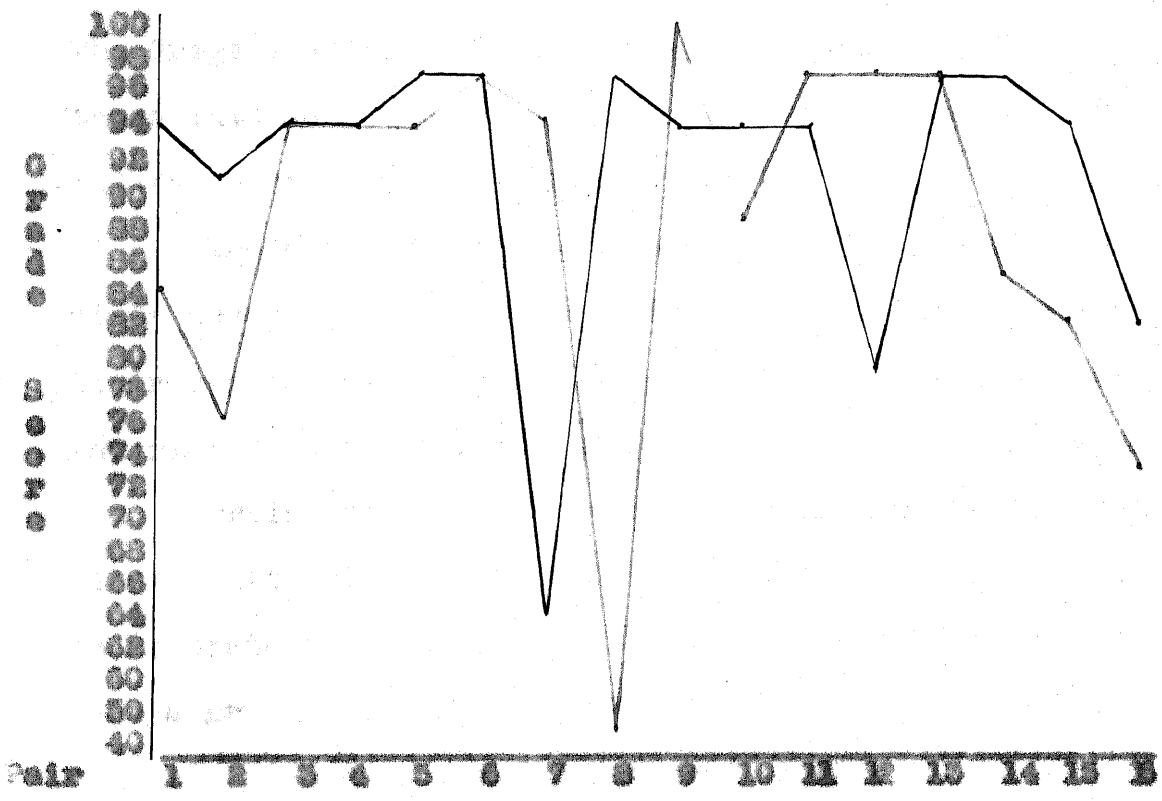

Fig. 10. Scores of two groups on Six Weeks Test, Test 5.

Read graph thus: Black indicates experimental group; red indicates control group. The score made by C. C. the experimental pupil of Pair 1 was 94, the score of J. C. the control pupil of Pair 1 was 85.

The sixth test was given to both classes on the twenty-third of October. The pupils wrote from new material sent out by the Woodstock Typewriter Company. This test was fifteen minutes in length. The pupils computed their net speed a minute and the grade score was to be obtained from The Gregg Grading Scale for Fifteen Minute Speed Tests which takes into consideration the net speed, the number of errors, and the period of the semester they are in.

The experimental group practiced the corrective exercises according to their individual needs as determined from their record sheets, the control group practiced on straight material from the text. Music was used for both classes.

Praise was again used as an incentive in the control class. Attention was called to the fact that since they were so accurate the increase in the time of the test should not make a great deal of difference with them. There were told that the morning class had done very poorly on this test.

RESULTS OF TEST VI

The grade score and net speed of each pupil on Test VI is shown in Table VI on the next page. The table is constructed similarly to the plan of Table I (p. 33). The grade score was obtained from the Gregg Grading Scale for Fifteen Minutes of writing. The speed score was determined by deducting a penalty of ten words for each error from the gross words written; the net words divided by fifteen (number of minutes written) gave the net speed a minute.

The highest score was 93 in the experimental class and 91 in the control class. The lowest grade score in each group was zero. The grade score median for the experimental class was eighty-two and for the control class eighty-one and five-tenths. The grade score average for the experimental group was seventy-seven and six-tenths, the control group score average was seventy-two and four-tenths. The Grade Score range was ninety-three to zero for the experimental class, and ninety-one to zero for the control class. The net speed highest score was twenty-one in each group. The lowest net speed in the experimental class was one word a minute; in the control class no words a minute was the lowest. The median net speed for the experimental class was twelve, for the control class nine and five-tenths. The average net speed for the experimental group was twelve and eight-tenths, for the control nine and five-tenths. The results of this test are shown by graphs on pages eighty-nine and ninety.

TABLE VI

SCORES MADE BY STUDENTS IN TEST VI

Pr. No.	Experimental Class: Name of Student	Score Gr.	Score Sp.	Control Class: Score Gr.	Score Sp.	Name of Student	Difference Ex. Gr.	Difference Ex. Sp.	Difference Con. Gr.	Difference Con. Sp.
1	C. C.	93	21	81	15	J. C.	12	6		
2	D. C. R.	89	20	75	10	G. P.	14	10		
3	C. U.	89	18	84	14	A. S.	5	4		
4	G. W.	90	20	89	14	E. J.	1	6		
5	E. F.	79	15	80	11	N. W.		4	1	
6	D. V.	85	12	00	0	L. L.	83	12		
7	R. K.	74	9	87	9	L. M. F.			13	
8	L. R.	82	9	0	0	H. O.	82	9		
9	J. H.	70	9	86	11	E. B.			16	2
10	M. M.	90	13	87	9	F. S.	3	4		
11	V. G.	82	9	76	8	D. B.	6	1		
12	N. B.	83	12	87	7	C. S.		5	4	
13	M. C.	79	15	91	21	E. B.			12	6
14	D. D.	78	11	82	11	K. R.			4	
15	D. C.	81	10	80	6	F. R.	1	4		
16	W. J.	0	1	74	6	G. D.			74	5

	Experimental Class Grade	Experimental Class Speed	Control Class Grade	Control Class Speed
Medians	82	12	81.5	9.5
Averages.	77.6	12.8	72.4	9.5
Range	93-0	21-1	91-0	21-0

Read table thus: Read across page. Pair number 1, Name of Student, C. C. made grade score of 93 with speed a minute 21; score grade 81 with net speed 15, Name of Student, J. C. Experimental Student 1 exceeded the scores of Control Student 1 the grade score by 12 points and the speed score by 6 points.

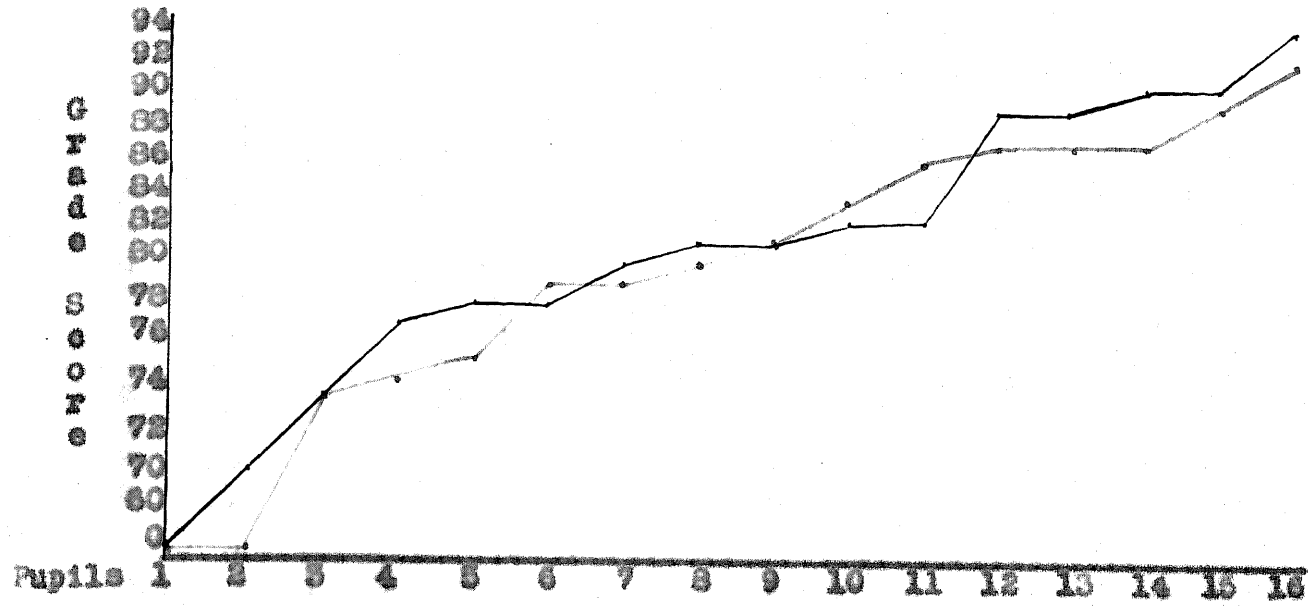

Fig. 11. Scores of the two groups on Test 6.

Read graph thus: Black indicates experimental group; red indicates control group. The highest score made by a pupil of the experimental class was 93, the highest by a pupil of the control class was 91.

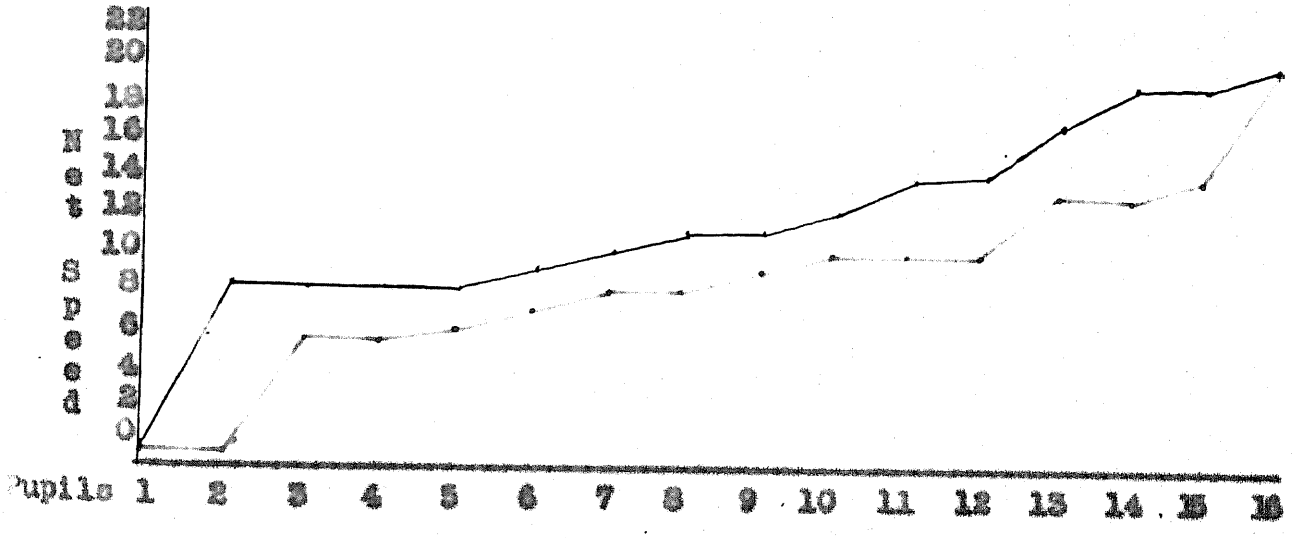

Fig. 12. Net speed a minute of the two groups on Test 6.

Read graph thus: Black indicates the experimental group; red indicates the control group. The highest speed made by a pupil of the experimental class was twenty-one, the highest speed in the control class was also twenty-one.

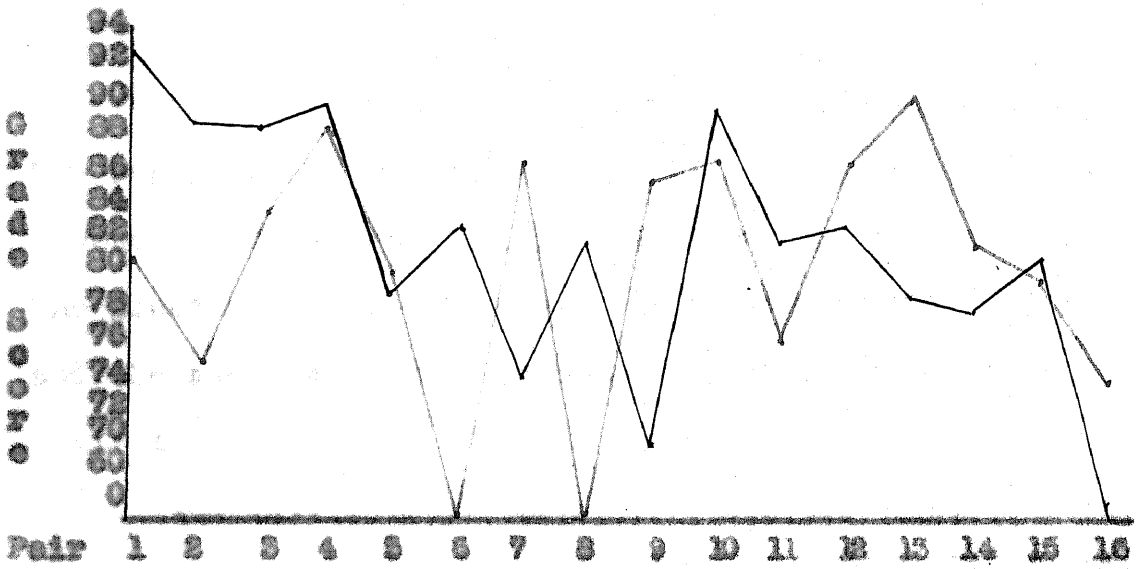

Fig. 13. Grade scores of the two groups on Test 6.

Read graph thus: Black indicates experimental group; red indicates control group. The score made by C. C. the experimental pupil of Pair 1 was 93, the score of J. C. the control pupil of Pair 1 was 81.

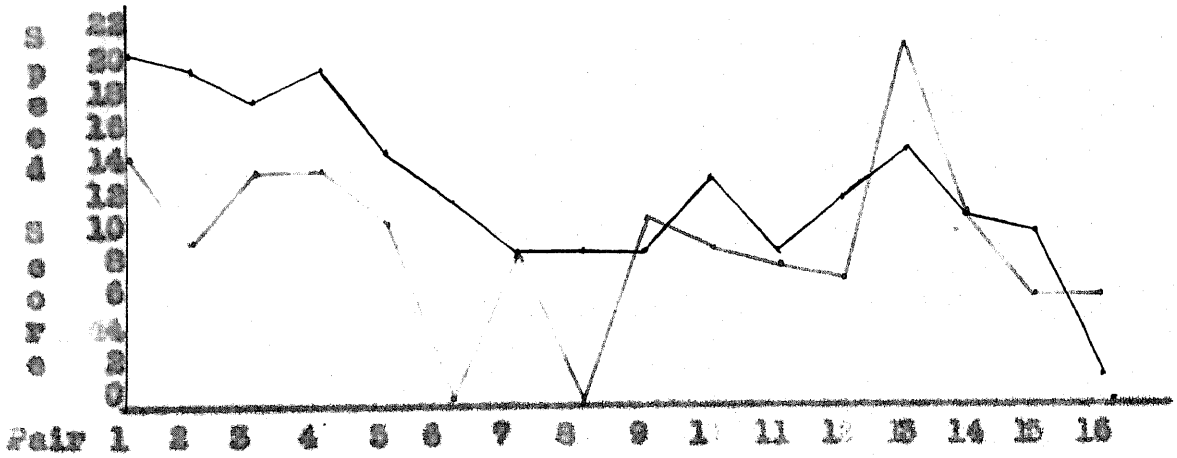

Fig. 14. Net speeds of the two groups on Test 6.

Read graph thus: Black indicates experimental group; red indicates control group. The speed made by C. C. the experimental pupil of Pair 1 was 21, the speed of J. C. the control pupil of Pair 1 was 15.

The seventh test was given October 30 to both groups. The pupils wrote from new material sent out by the Woodstock Typewriter Company. This test was fifteen minutes in length. The grade score was obtained from the Gregg Grading Chart and the speed score was computed according to International Contest Rules.

The experimental group practiced the corrective exercises according to their individual needs as determined from their record sheets, the control group practiced on straight material from the text. Music was used with both classes for the warming-up periods.

Criticism was used as an incentive on the experimental class. They were told that they couldn't write accurately enough for their work to be worth anything. Attention was called to the fact that on some tests the first of the semester they were able to write perfect but that all they thought about now was speed. Praise was used as an incentive with the control class. They were told that they were certainly accurate and that if they would concentrate just a little more they would write just as rapidly as the morning class.

RESULTS OF TEST VII

The grade score and net speed of each pupil on Test VII are shown in Table VII on the next page. The grade score was obtained from the Gregg Grading Scale for Fifteen Minute Tests. The speed score was determined by International Contest Rules.

The highest grade score was 91 in the control class and 90 in the experimental class. The lowest grade score was in the experimental class, zero, the lowest in the control was seventy-two. The median of the control class was eighty-two and five-tenths and for the experimental class seventy-nine and five-tenths. The grade score average for the control class was eighty-two and three-tenths, for the experimental class seventy-five and two-tenths. The highest speed score in the experimental class was twenty-four, for the control class twenty-one. The lowest speed was zero in the experimental class and six in the control class. The speed median was thirteen for the experimental class and twelve and five-tenths for the control class. The speed average was twelve and eight-tenths for the experimental group and twelve and three-tenths for the control group.

The pupils of the control group exceeded the score of the experimental pupil with whom they were paired in the grade score nine times and in the speed score seven times. This would tend to show that criticism was a rather poor incentive for the experimental group. Praise seems to bring out the best in the control group in both accuracy and speed. Graphs on pages 94 and 95 show these results.

TABLE VII

SCORES MADE BE STUDENTS IN TEST VII

Pr. No.	Experimental Class: Name of Student	Score Gr.	Score Sp.	Control Class: Score Gr.	Score Sp.	Name of Student	Difference Ex. Gr.	Difference Ex. Sp.	Difference Con. Gr.	Difference Con. Sp.
1	C. C.	87	20	75	13	J. C.	12	7		
2	D. C. R.	89	24	90	18	G. P.		6	1	
3	C. U.	86	18	86	16	A. S.		2		
4	C. W.	76	15	91	16	E. J.			15	1
5	E. F.	0	0	75	13	N. W.			75	13
6	D. V.	69	10	80	12	L. L.			11	2
7	R. K.	74	9	91	15	L. M. F.			17	6
8	L. R.	85	12	86	14	H. O.			1	2
9	J. H.	85	16	85	12	E. B.		4		
10	M. M.	90	17	85	10	F. S.	5	7		
11	V. G.	80	10	75	8	D. B.	5	2		
12	N. B.	83	14	80	9	C. S.	3	5		
13	M. C.	79	15	90	21	E. B.			11	6
14	D. D.	75	10	72	7	K. R.	3	3		
15	D. C.	70	6	78	7	F. R.			8	1
16	W. J.	75	8	78	6	G. D.		2	3	

	Experimental Class Grade	Experimental Class Speed	Control Class Grade	Control Class Speed
Medians	79.5	13	82.5	12.5
Averages. . . .	75.2	12.8	82.3	12.3
Range	90-0	24-0	91-72	21-6

Read table thus: Read across page. Pair number 1, Name of Student, C. C. made a score of 87 with speed of 20 net words a minute; score grade of 75 with speed of 13 net words a minute, Name of Student, J. C. Experimental Student 1 exceeded grade score 12 points and speed score 7 words a minute over Control Student 1.

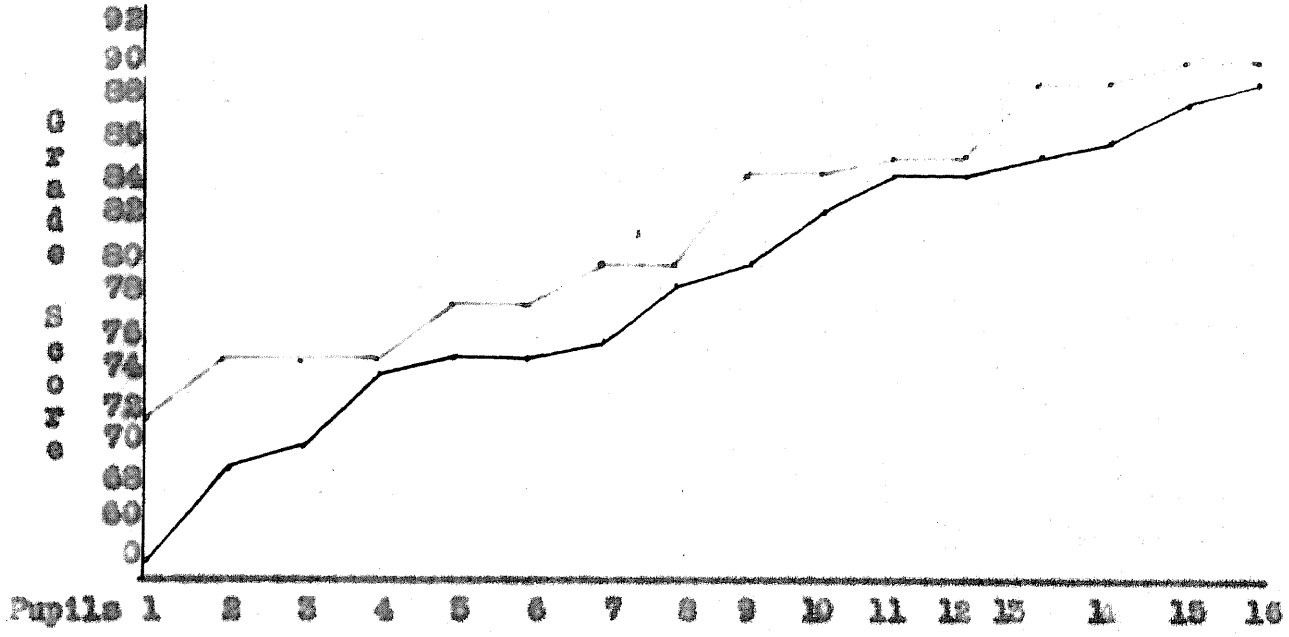

Fig. 15. Grade scores of two groups on Test 7. Encouraged Control Group and Discouraged Experimental group.

Read graph thus: Black indicates the experimental group; red indicates the control group. The highest score made by a pupil of the experimental group was 90, the highest by a pupil of the control group was 91.

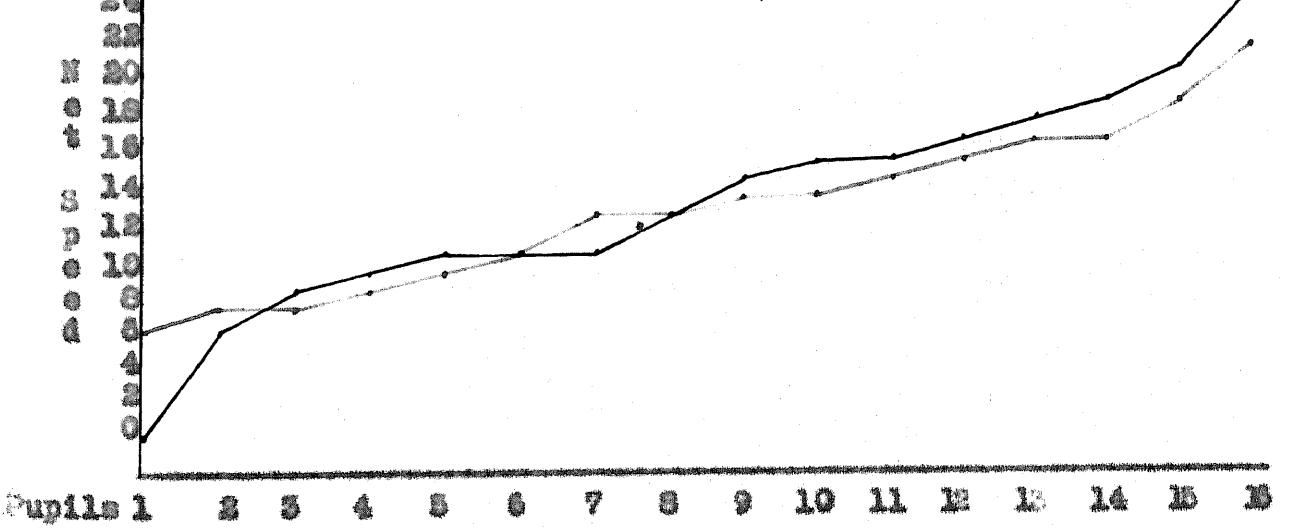

Fig. 16. Net Speed of two groups on Test 7. Control group encouraged, Experimental group discouraged.

Read graph thus: Black indicates the experimental group; red indicates the control group. The highest score made by a pupil of the experimental group was 24, of the control group 21.

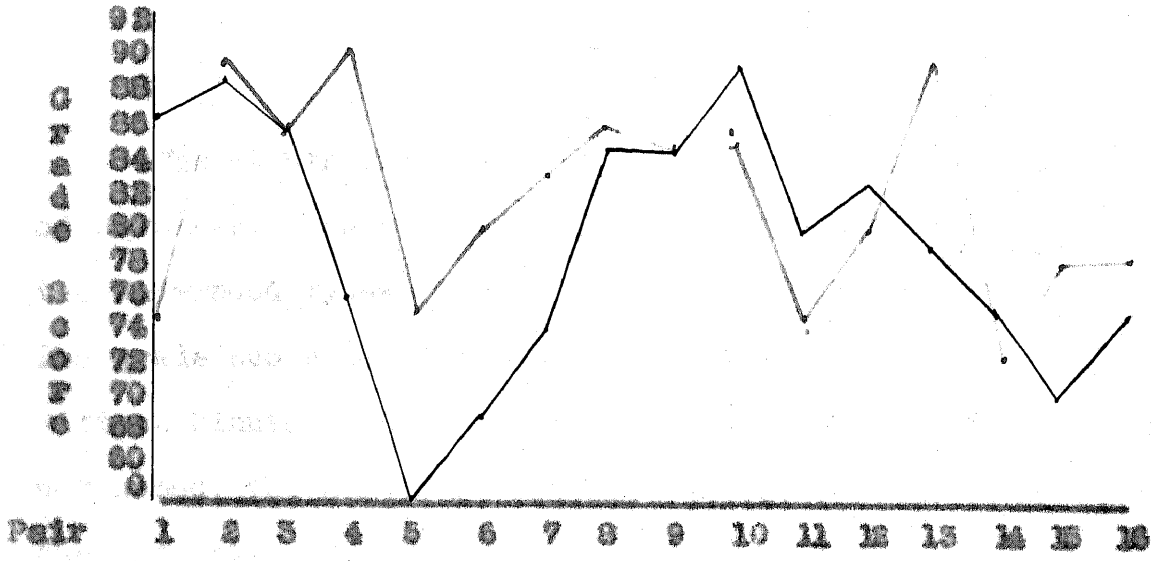

Fig. 17. Scores of two groups on Test 7.

Read graph thus. Black indicates the experimental group; red indicates the control group.
The speed made by C. C. the experimental pupil of Pair 1 was 87, the score of J. C. the control pupil of Pair 1 was 75.

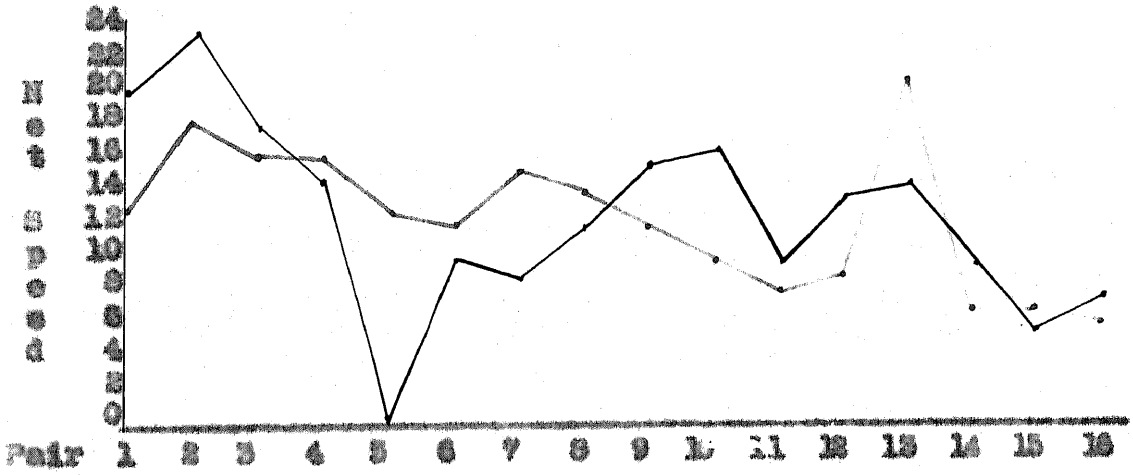

Fig. 18. Net speed of two groups on Test 7.

Read graph thus: Black indicates experimental group; red indicates control group. The score made by C. C., the experimental pupil of Pair 1 was 20, the score of J. C., the control pupil of Pair 1 was 13.

The eighth test was given to both classes on the sixth of November. The pupils wrote from new material sent out by the Underwood Typewriter Company. This test was fifteen minutes. The grade score was computed from the Gregg Grading Scale for Fifteen Minute Speed Tests which takes into consideration the net speed, the number of errors, and the period of the semester they are in.

The experimental group practiced the corrective exercises according to their individual needs as determined from their record sheets, the control group practiced on straight material from the text. Music was used for both classes.

Praise was again used as an incentive in the control class and criticism in the experimental class.

RESULTS OF TEST VIII

The grade score and net speed of each pupil on Test VIII are shown in Table VIII. The grade score was obtained from the Gregg Grading Scale for Fifteen Minute Tests.

The highest grade score was ninety-two in the experimental class and ninety-one in the control class. The lowest grade score was zero in the control class and seventy-five in the experimental class. The median of the control group was eighty-five and of the experimental group eighty-two. The average for the experimental class was eighty-one and one-tenth, for the control class seventy-nine and two-tenths.

The scores of ten pupils in the experimental class were less than the scores of the students in the control class with whom they were paired; the scores of five pupils in the control class were less than the scores of the students in the experimental class with whom they were paired.

The control class did not show a great deal of improvement. The grades were a few points higher than for the previous test. The experimental class showed little improvement as the grades were still quite low which tends to show again that adverse criticism is not a good incentive.

The results of this test are shown by graphs on page 99.

TABLE VIII

SCORES MADE BY STUDENTS IN TEST VIII

Experimental Class			Control Class			
Pair number	Name of Student	Score	Score	Name of Student	Difference Ex.	Difference Con.
1	C. C.	77	90	J. C.		13
2	D. C. R.	82	88	G. P.		6
3	C. U.	92	86	A. S.	6	
4	G. W.	84	86	E. J.		2
5	E. F.	86	90	N. W.		4
6	D. V.	75	85	L. L.		10
7	R. K.	75	91	L. M. F.		16
8	L. R.	83	85	H. O.		2
9	J. H.	81	84	E. B.		3
10	M. M.	83	86	F. S.		3
11	V. G.	86	84	D. B.	2	
12	N. B.	82	75	C. S.	7	
13	These students dropped out of school					
14	D. D.	75	81	K. R.		6
15	D. C.	78	77	F. R.	1	
16	W. J.	78	0	G. D.	78	

	Experimental Class	Control Class
Medians	82	85
Averages	81.1	79.2
Range	92-75	91-0

Read table thus: Read across page. Pair number 1, Name of Student, C. C., score 77; score 90, Name of Student J. C. Control student 1 exceeded score of Experimental student by 13 points.

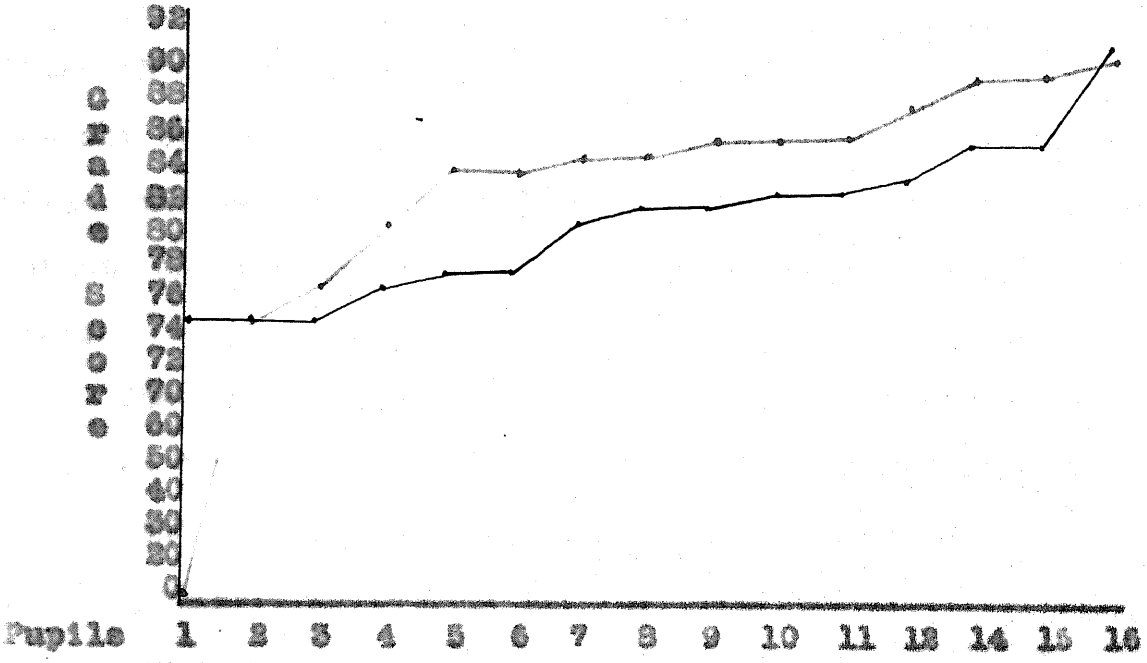

Fig. 19. Scores made by two groups on Test 8. Control group praised, Experimental group critisized.

Read graph thus: Black indicates the experimental group; red indicates the control group. The highest score in the experimental group was 92, in the control group 91.

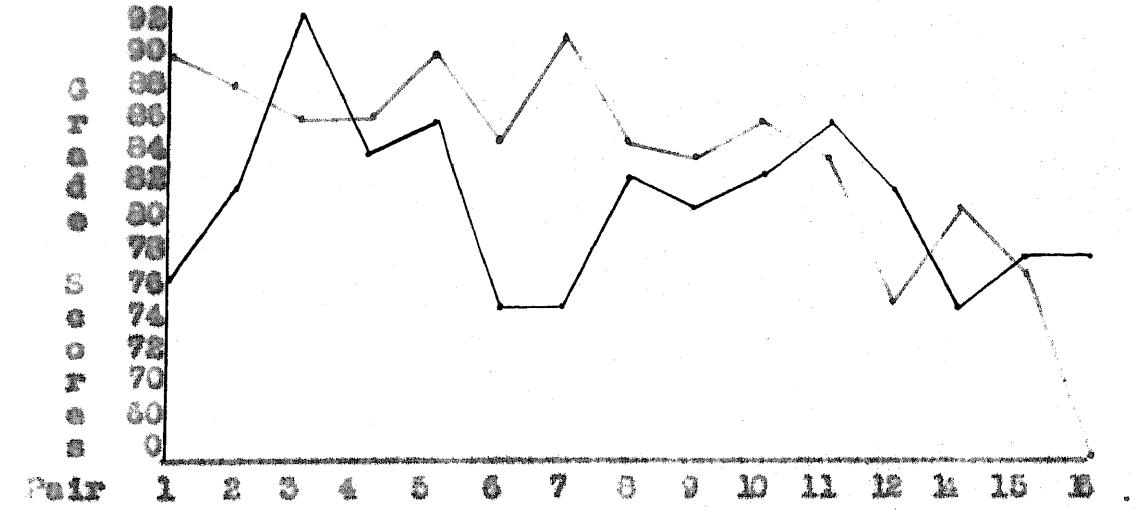

Fig. 20. Scores of two groups on Test 8.
Read graph thus: Black indicates experimental group; red indicates control group. The score of C. C. the experimental pupil of Pair 1 was 77, the score of J. C. the control pupil of Pair 1 was 90.

The ninth test was given to both classes on the fifteenth of November. The pupils wrote from new material sent out by the L. C. Smith Typewriter Company. This was a fifteen minute test. The pupils computed their net speed a minute and the grade score was determined from the grading chart.

The experimental group had practiced the corrective exercises for at least ten minutes each day since the beginning of the school year and the control group has practiced on words, phrases and sentences from their texts.

The experimental group practiced the exercises they needed according to the information on their record sheets, and the control group practiced straight material from the text for ten minutes with music.

Criticism was used as the incentive for both classes. They were informed that they were certainly very poor as far as accuracy was concerned and that their speed wasn't anything unusual. That as low as they were going on their tests the writer was surprised that they were able to get their assignments in at all.

RESULTS OF TEST IX

The grade score and net speed of each pupil on Test IX is shown in Table IX on the next page.

The highest score was 95 in the experimental class and 90 in the control class. The lowest score in each group was zero. The median for the experimental class was eighty-three and for the control class was eighty-one. The average for the experimental class was seventy-three and thirteen-hundredths, for the control class fifty-five and fifty-three-hundredths. The highest net speed for the experimental class was thirty-four, for the control class, twenty-five. The lowest net speed was four for the experimental group and three for the control group. The median net speed for the experimental class was sixteen, for the control class, twelve. The average net speed was eighteen and four-tenths for the experimental class, and twelve and six-hundredths for the control class.

The decided lowering of practically all the grade scores and net speeds would tend to show that perhaps criticism is not one of our best incentives. The scores of the control group showed more decrease than those of the experimental.

The results of this test are shown by graphs on pages one-hundred-three and one-hundred-four.

TABLE IX

SCORES MADE BY STUDENTS IN TEST IX

	Experimental Class			Control Class				
Pr. No.	Name of Student	Score Gr.	Score Sp.	Score Gr.	Score Sp.	Name of Student	Difference Ex. Gr.	Difference Ex. Sp.	Difference Con. Gr.	Difference Con. Sp.
1	C. C.	87	25	88	25	J. C.			1	
2	D. C. R.	92	34	86	17	G. P.	6	17		
3	C. U.	95	27	90	20	A. S.	5	7		
4	G. W.	83	25	81	14	E. J.	2	11		
5	E. F.	87	26	89	19	N. W.		7	2	
6	D. V.	88	21	81	16	L. L.	7	5		
7	R. K.	81	15	88	16	L. M. F.			7	1
8	L. R.	84	15	0	11	H. O.	84	4		
9	J. H.	74	12	0	9	E. B.	74	3		
10	M. M.	91	18	74	10	F. S.	17	8		
11	V. G.	0	4	81	12	D. B.			81	8
12	N. B.	0	12	0	3	C. S.		9		
13	These students dropped out of school									
14	D. D.	78	16	0	9	K. R.	78	7		
15	D. C.	80	14	75	7	F. R.	5	7		
16	W. J.	77	12	0	5	G. D.	77	7		

	Experimental Class Grade	Experimental Class Speed	Control Class Grade	Control Class Speed
Medians.	.83	16	81	12
Averages	73.13	18.4	55.53	12.06
Range.	95-0	34-4	90-0	25-3

Read Table thus: Read across page. Pair number 1, Name of Student, C. C., made a score of 87 with speed 25; score grade 88 with speed 25, Name of Student, J. C. Control student 1 exceeded grade score of Experimental student 1 by one point. The speed was 25 for each student.

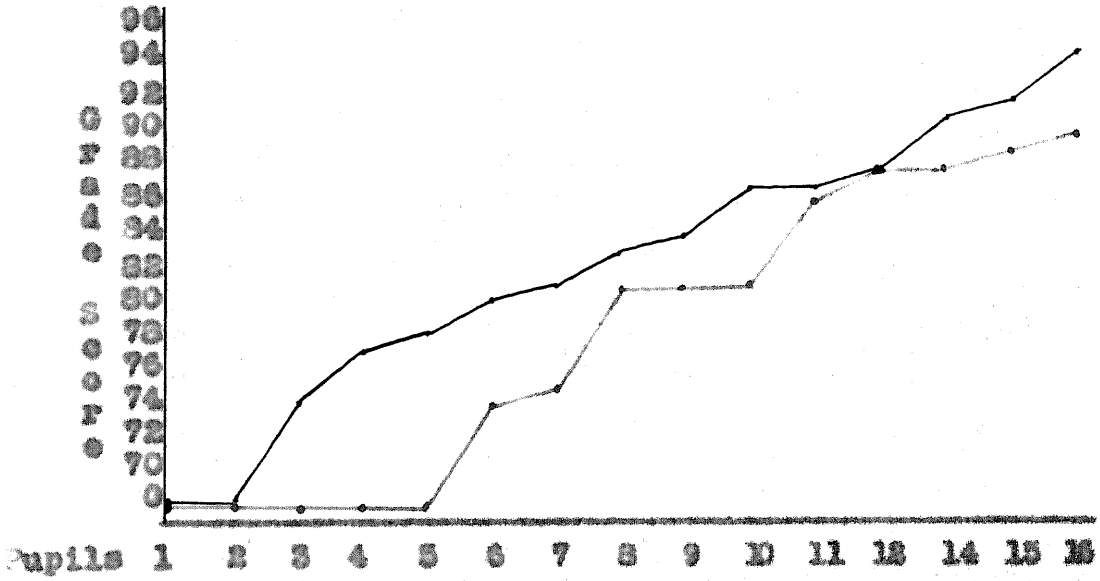

Fig. 21. Scores made by two groups on Test 9. Both groups criticized as incentive.

Read graph thus: Black indicates the experimental group; red indicates the control group. The highest score made by a pupil of the experimental group was 95, the highest by a pupil of the control group was 90.

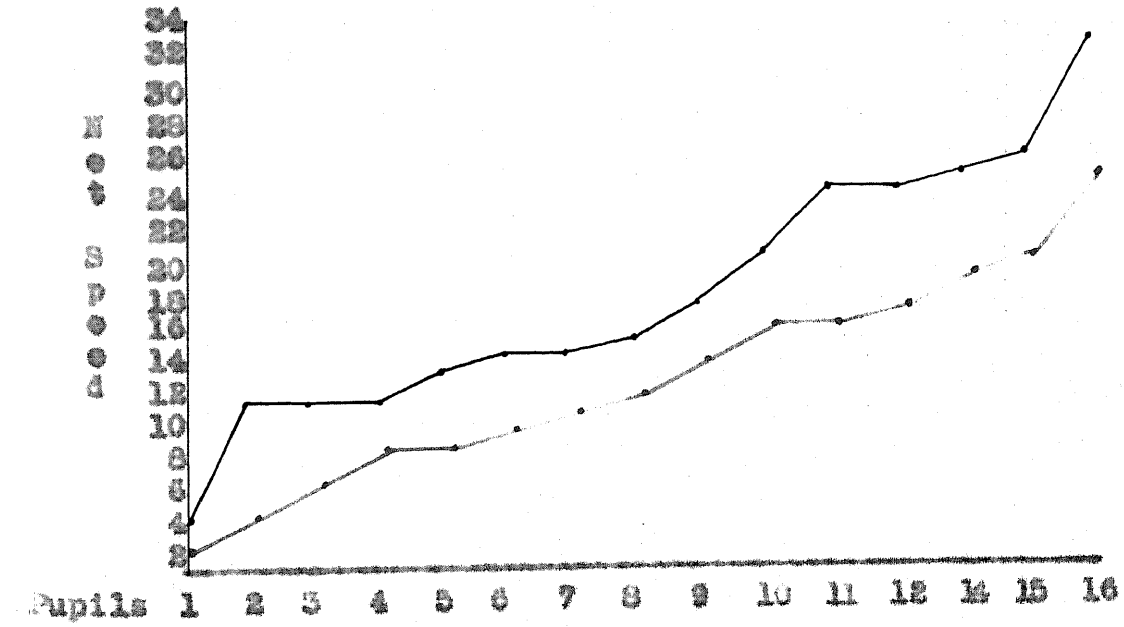

Fig. 22. Net speed of two groups on Test 9.

Read graph thus: Black indicates the experimental group; red indicates the control group. The highest speed made by a pupil of the experimental group was 34, the highest by a pupil of the control group was 25.

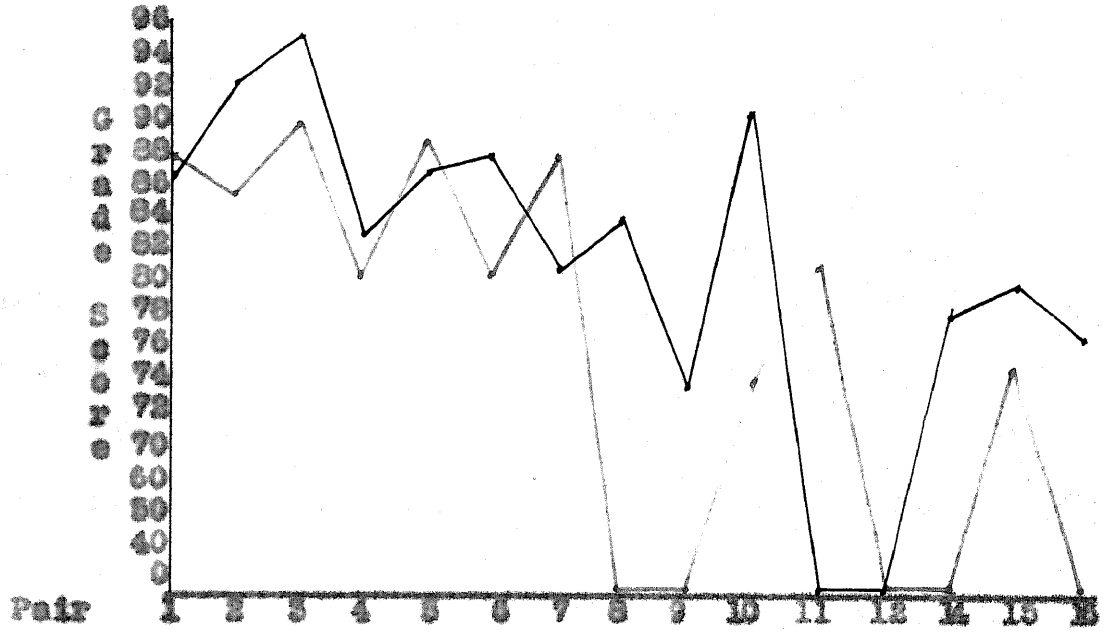

Fig. 23. Scores of two groups on Test 9. Both of the groups were criticized as an incentive.

Read graph thus: Black indicates experimental group; red indicates control group. The score made by C. C., the experimental pupil of Pair 1, was 88, the score of J. C., the control pupil of Pair 1, was 87.

Fig. 24. Net Speed of two groups on Test 9.

Read graph thus: Black indicates experimental group; red indicates control group. The net speed of C. C., the experimental pupil of Pair 1, was 25; the net speed of J. C., the control pupil of Pair 1, was 25.

The tenth test was given to both classes December eleventh. The material was new straight matter sent out by the Underwood Typewriter Company. This was a fifteen minute test. The pupils computed their net speed a minute and the grade score was determined from the grading chart.

The experimental class practiced the exercises from the corrective exercises according to their individual needs as determined from their record sheets. The control class wrote from straight material in their texts. Music was used.

Praise was used as the incentive for the control group to improve their accuracy. They were told to forget all about speed and try to write accurately and they would find when the test was finished that they had speed as well as accuracy.

RESULTS OF TEST X

The grade score and net speed of each pupil on Test X is shown in Table X on the next page.

The highest scores were: ninety-six in the experimental class, ninety-three in the control class. The lowest scores were: sixty-eight in the experimental class, sixty-five in the control class. The median was seventy-sight and five-tenths in the experimental group and eighty-one for the control class. The average was seventy-nine and nine-tenths for experimental, and eighty and six-tenths for the control group. The high and low speed for the experimental class was thirty-four and ten; for the control class twenty-seven and eight. Praise seemed to make the Control group improve. Graphs on pages 107 and 108.

TABLE X

SCORES MADE BY STUDENTS IN TEST X

Experimental Class					Control Class				
Pr. No.	Name of Student	Score Gr.	Score Sp.	Score Gr.	Score Sp.	Name of Student	Difference Ex. Gr.	Difference Ex. Sp.	Difference Con. Gr.	Difference Con. Sp.
1	C. C.	80	29	82	26	J. C.		3	2	
2	D. C. R.	88	32	93	25	G. P.			7	5
3	C. U.	96	34	90	27	A. S.	6	7		
4	G. W.	84	26	80	16	E. J.	4	10		
5	E. F.	91	33	90	24	N. W.	1	9		
6	D. V.	75	21	91	24	L. L.			16	3
7	R. K.	71	16	89	21	L. M. F.			18	5
8	L. R.	85	20	67	16	H. O.	18	4		
9	J. H.	68	21	74	16	E. B.		5	6	
10	M. M.	87	21	79	16	F. S.	8	5		
11	V. G.	77	14	70	14	D. B.	7			
12	N. B.	70	10	72	11	C. S.			2	1
13	These students withdrew from school									
14	D. D.	Quit School		86	20	K. R.				
15	D. C.	77	16	65	8	F. R.	12	8		
16	W. J.	70	12	Dropped		G. D.				

	Experimental Class		Control Class	
	Grade	Speed	Grade	Speed
Medians . . .	78.5	21	81	20
Averages . . .	79.9	21.8	80.6	18.9
Range.	96-68	34-10	93-65	27-8

Read table thus: Read across page. Pair number 1, Name of Student C. C. made score of eighty with speed twenty-nine; score grade eighty-two with net speed of 26, Name of Student J. C. Experimental student 1 exceeded speed of Control student 1 by three words a minute. Control student 1 exceeded grade score of Experimental student 1 by two points.

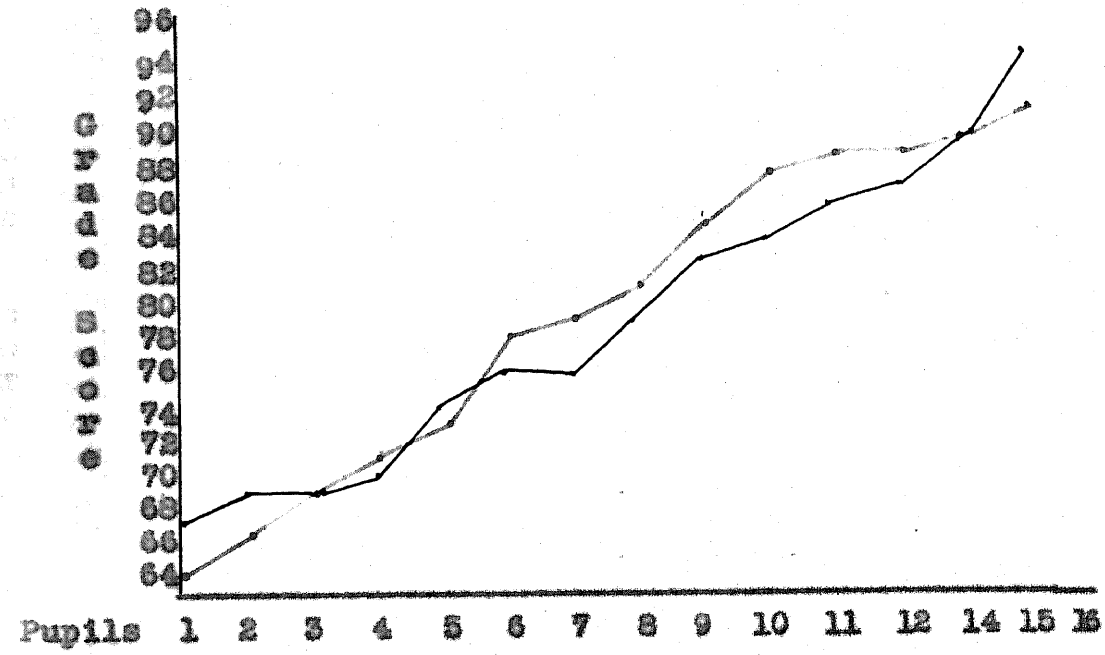

Fig. 25. Scores of two groups on Test 10.

Read graph thus: Black indicates the experimental group; red indicates the control group. The highest score made by a pupil of the experimental group was ninety-six, the highest by a pupil of the control group was ninety-three.

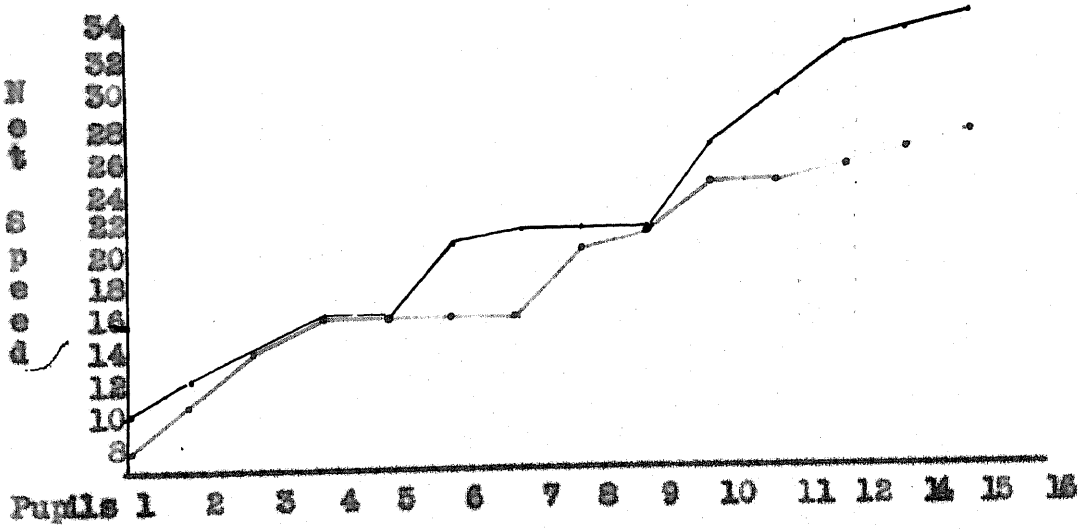

Fig. 26. Net speed of two groups on Test 10.

Read graph thus: Black indicates the experimental group; red indicates the control group. The highest speed made by a pupil of the experimental group was thirty-four, the highest by a pupil of the control group was twenty-seven.

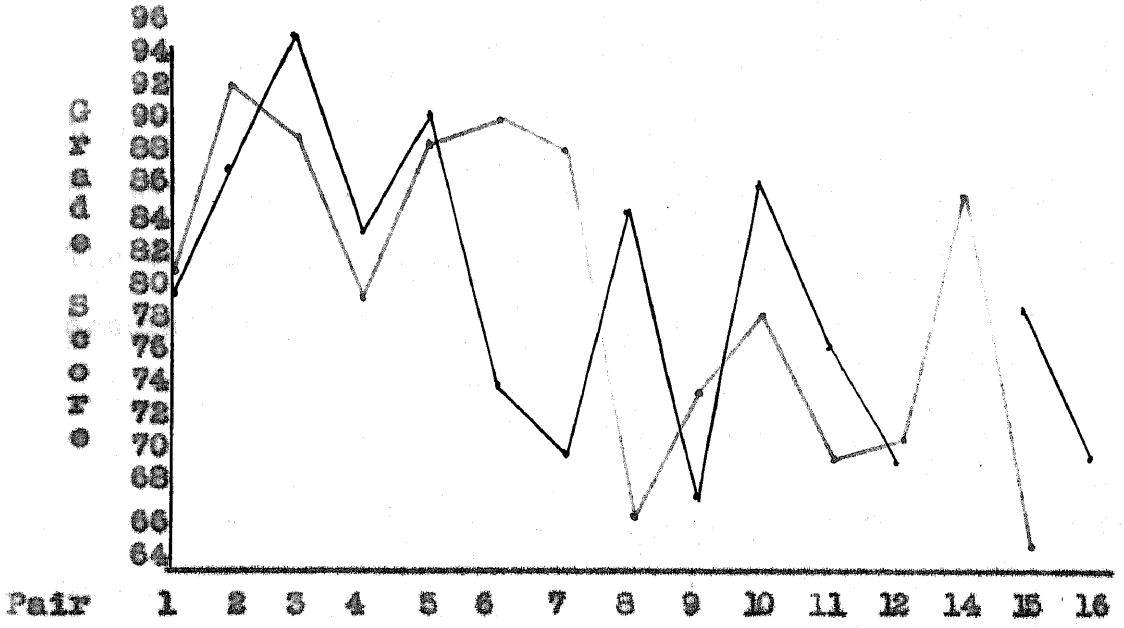

Fig. 27. Scores of two groups on Test 10

Read graph thus: Black indicates the experimental group; red indicates control group. The score made by C. C., the experimental pupil of Pair 1, was eighty, the score of J. C. the control pupil of Pair 1 was eighty-two.

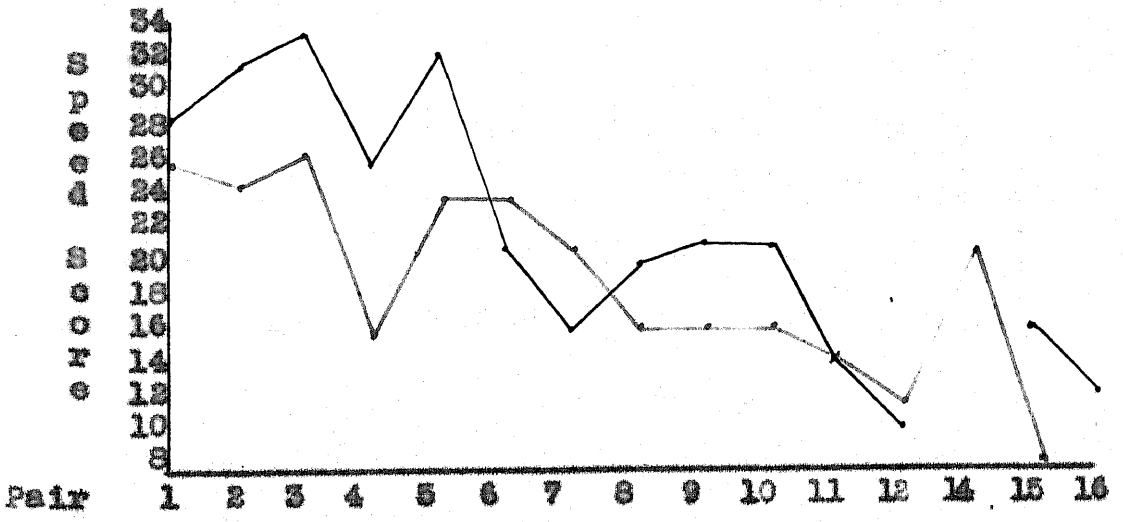

Fig. 28. Net speed of two groups on Test 10.

Read graph thus: Black indicates experimental group; red indicates control group. The score made by C. C., experimental pupil of Pair 1, was twenty-nine, the score of J. C., the control pupil of Pair 1 was twenty-six.

The eleventh test was given January third. The material was from the Woodstock Company. This was a fifteen minute test on which the grade score was determined from the grading chart. The Control group was again praised for their ability to write accurately.

RESULTS OF TEST XI

The grade score of each pupil on Test XI is shown in Table XI on the next page.

The highest scores were: ninety-eight in the experimental, ninety-three in the control. The lowest scores were: seventy in both sections. The median was eighty-five in the experimental class and eighty-eight in the control class. The average was eighty-three and eight-hundredths in the experimental group and eighty-four and seventy-six hundredths in the control group.

The pupils of the control class exceeded the score of the pupil with whom they were paired in the experimental class seven times. There were only five pupils in the experimental class who exceeded the score of the control pupil with whom they were paired.

It would seem that praise has a very good effect on the emotions of the Control group as they can exceed the accuracy score of the Experimental group when praise is used as an incentive.

Graphs on page one-hundred-eleven show the result of Test XI.

TABLE XI

SCORES MADE BY STUDENTS IN TEST XI

Pair Number	Experimental Class: Name of Student	Score	Control Class: Score	Name of Student	Difference: Ex.	Difference: Con.
1	C. C.	98	91	J. C.	7	
2	D. C. R.	94	92	G. P.	2	
3	C. U.	92	93	A. S.		1
4	G. W.	85	83	E. J.	2	
5	E. F.	70	89	N. W.		19
6	D. V.	70	83	L. L.		13
7	R. K.	86	89	L. M. F.		3
8	L. R.	88	75	H. O.	13	
9	J. H.	77	88	E. B.		11
10	M. M.	85	78	F. S	7	
11	V. G.	75	79	D. B.		4
12	N. B.	77	92	C. S.		5
14	Quit School		70	K. R.		

	Experimental Class	Control Class
Median	85	88
Average	83.08	84.76
Range	98-70	93-70

Read table thus: Read across page. Pair number 1, Name of Student C. C. made score of ninety-eight; score of ninety-one, Name of Student J. C. Experimental student 1 exceeded score of Control student 1 by seven points.

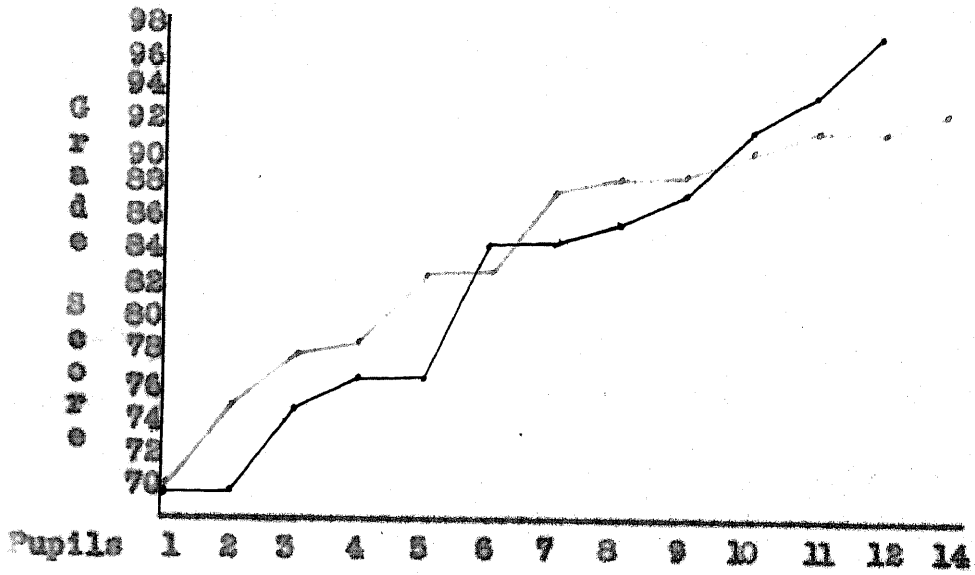

Fig. 29. Scores made by two groups on Test 11. Praise used on Control Group.

Read graph thus: Black indicates the experimental group; red indicates the control group. The highest score made by a pupil of the experimental group was ninety-eight, the highest score by a pupil of the control group was ninety-three.

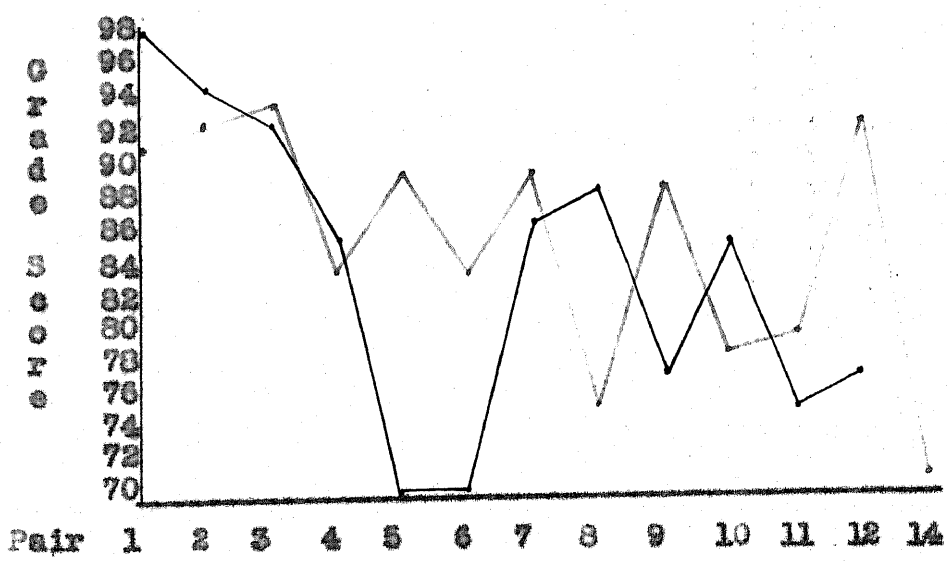

Fig. 30. Scores of two groups on Test 11.

Read graph thus: Black indicates experimental group; red indicates control group. The score made by C. C., experimental pupil of Pair 1, was ninety-eight, the score of J. C., the control pupil of Pair 1, was ninety-one.

The twelfth test was given January 9, 1935. This test was the Twenty-First Nation-Wide Every Pupil Scholarship Test[70] from The Kansas State Teachers College, Emporia, Kansas.

RESULTS OF TEST XII

The grade score and net speed of each pupil in Test XII is shown in Table XII on the next page.

The median of the medians reported on this test was seventy-seven. The median of the experimental class was eighty-six and five-tenths, and for the control class eighty-six. The average of the control class was eighty-three and seventy-six hundredths, of the experimental class eighty-five and eighty-three hundredths. The highest grade was in the control class, ninety-six, for the experimental class ninety-five. The lowest score was in the control class, seventy, for the experimental class seventy-three. The median speed for the experimental class was twenty-six and five-tenths, for the control class twenty-six. The average speed for the experimental class was thirty and twenty-five hundredths, for the control class twenty-six and seven-hundredths. The highest speed was in the experimental class, forty-four, in the control class, thirty-four. The lowest speed in the experimental class was twenty-one, in the control class, twenty-two.

Six pupils in the experimental class exceeded the speed of the control pupil with whom they were paired; four of the control pupils exceeded the speed of the experimental pupil with whom they were paired. Six of the control pupils exceeded the grade of the experimental pupil with whom they were paired. Graphs on pages 114 and 115 show these results.

TABLE XII

SCORES MADE BY STUDENTS IN TEST XII
TWENTY-FIRST
NATION-WIDE EVERY PUPIL SCHOLARSHIP TEST
January 9, 1935

	Experimental Class			Control Class						
Pr. No.	Name of Student	Score Gr.	Score Sp.	Score Gr.	Score Sp.	Name of Student	Difference Ex. Gr.	Difference Ex. Sp.	Difference Con. Gr.	Difference Con. Sp.
1	C. C.	88	39	90	34	J. C.		5	2	
2	D. C. R.	89	44	78	26	G. P.	11	18		
3	C. U.	93	41	96	30	A. S.		11	3	
4	G. W.	86	35	86	27	E. J.		8		
5	E. F.	87	36	86	23	N. W.	1	13		
6	D. V.	85	27	73	25	L. L.	12	2		
7	R. K.	87	26	88	26	L. M. F.			1	
8	L. R.	95	22	86	25	H. O.	9			3
9	J. H.	73	26	90	27	E. B.			17	1
10	M. M.	81	25	82	25	F. S.			1	
11	V. G.	85	21	75	23	D. B.	10			2
12	N. B.	81	21	89	26	C. S.			8	5
14	Quit School			70	22	K. R.				

	Experimental Class		Control Class	
	Grade	Speed	Grade	Speed
Medians	86.5	26.5	86	26
Averages	85.83	30.25	83.76	26.07
Range	95-73	44-21	96-70	34-22

Read Table thus: Read across page. Pair number 1, Name of Student C. C. made a score of 88 with speed of 39; score grade 90 with net speed 34, Name of Student J. C. Control student 1 exceeded grade score of Experimental student 1 by two points. Experimental student 1 exceeded speed score of Control student 1 by five net words a minute.

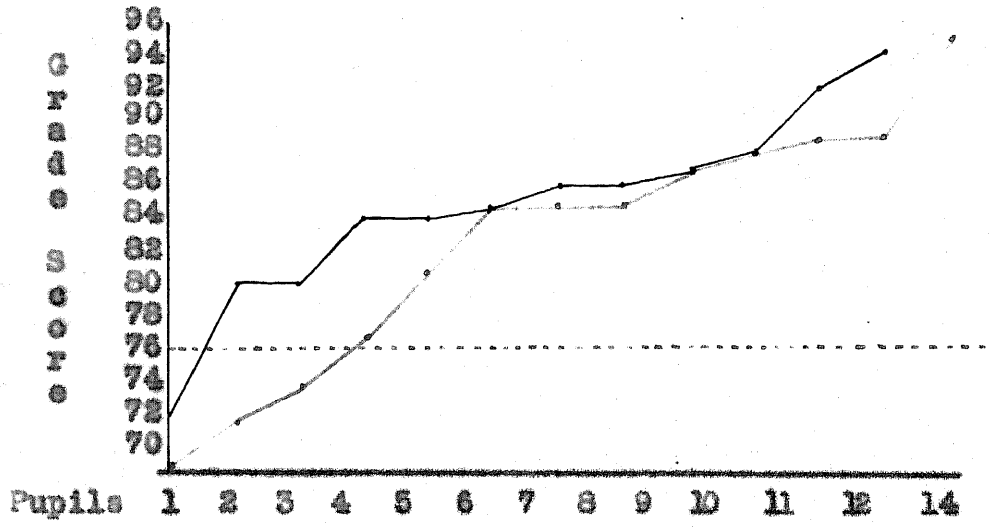

Fig. 31. Scores of two groups on Scholarship Test, January 9, 1935. Test 12.

Read graph thus: Black indicates experimental group; red indicates control group. The score of C. C., experimental pupil of Pair 1, was eighty-eight; the score of J. C., control pupil of Pair 1, was ninety. The highest experimental score was 95, the highest control score was 96.

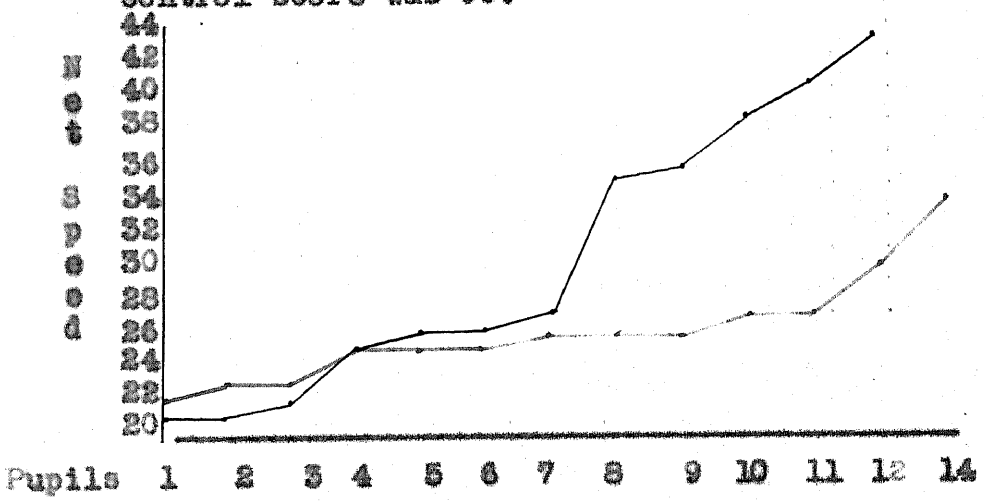

Fig. 32. Net speed of two groups on Scholarship Test, January 9, 1935, Test 12.

Read graph thus: Black indicates experimental group; red indicates control group. The net speed of C. C., experimental pupil of Pair 1, was 39; the net speed of J. C., control pupil of Pair 1, was 34. The highest experimental score was fourty-four, the highest control score was thirty-four.

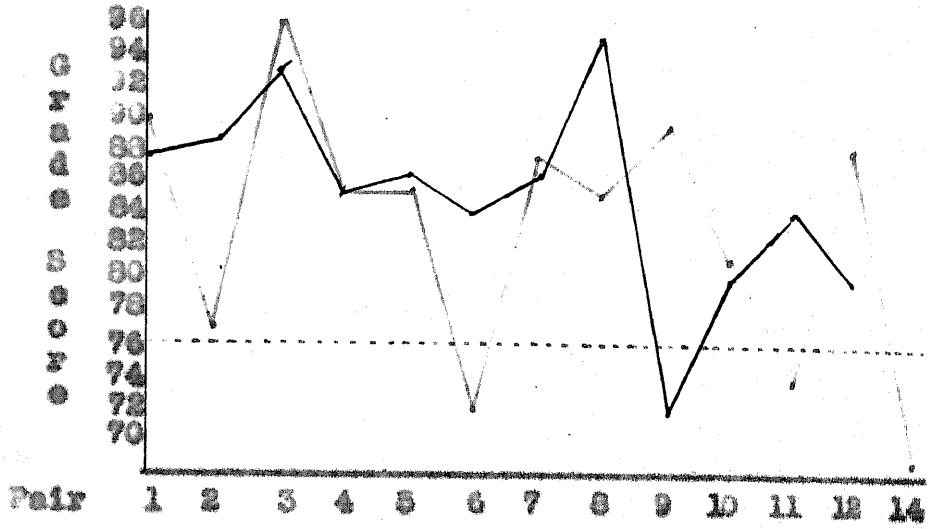

Fig. 33. Scores of two groups on Scholarship Test, January 9, 1935. Test 12.

Read graph thus: Black indicates experimental group; red indicates control group. The score of C. C., experimental pupil of Pair 1, was eighty-eight; the score of J. C., control pupil of Pair 1, was ninety.

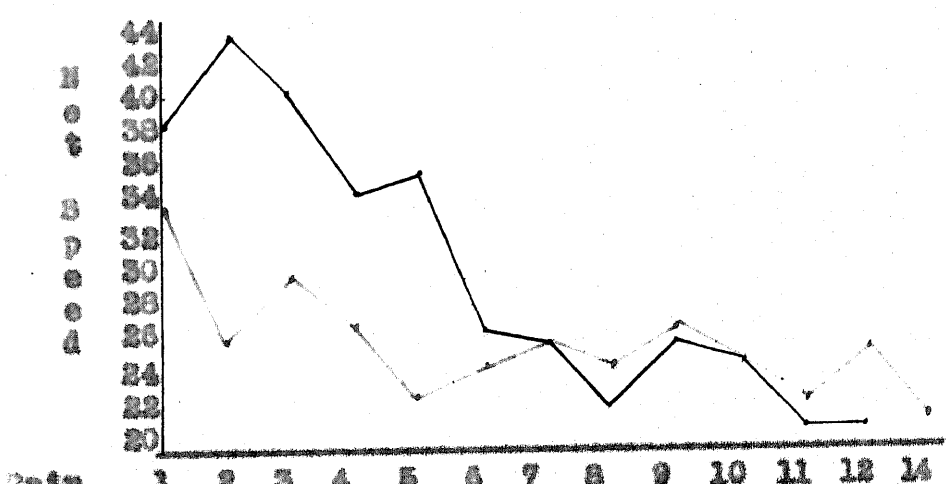

Fig. 34. Net speed of two groups on scholarship Test, January 9, 1935, Test 12.

Read graph thus: Black indicates experimental group; red indicates control group. The net speed of C. C., experimental pupil of Pair 1, was 39; the net speed of J. C., control pupil of Pair 1, was 34.

The thirteenth test was given February 12. The usual suggestion that they write accurately was given to both classes.

RESULTS OF TEST XIII

The grade score and net speed of each pupil in Test XIII is shown in Table XIII on the next page.

The highest scores were: ninety-six in each class. The lowest scores were: seventy-one in the experimental class and seventy-three in the control class. The average was eighty-eight in each class. The median in the experimental class was ninety and in the control class ninety-two. The highest speeds were: forty-four words a minute in the experimental class and thirty-eight in the control class. The lowest speeds were: twenty-one words a minute in the experimental class and twenty in the control class. The medians were: thirty-five words a minute for the experimental class and twenty-nine for the control. The averages were: thirty-four for the experimental and twenty-nine for the control.

Nine pupils in the experimental class exceeded the speed of the pupil in the control class with whom they were paired. One pupil of the control class exceeded the speed of the experimental pupil with whom he was paired. Two pupils had the same speed in each class. Eight pupils of the control class exceeded the grade score of the experimental pupil with whom they were paired.

The thirteenth test was given February 12. The usual suggestion that they write accurately was given to both classes.

RESULTS OF TEST XIII

The grade score and net speed of each pupil in Test XIII is shown in Table XIII on the next page.

The highest scores were: ninety-six in each class. The lowest scores were: seventy-one in the experimental class and seventy-three in the control class. The average was eighty-eight in each class. The median in the experimental class was ninety and in the control class ninety-two. The highest speeds were: forty-four words a minute in the experimental class and thirty-eight in the control class. The lowest speeds were: twenty-one words a minute in the experimental class and twenty in the control class. The medians were: thirty-five words a minute for the experimental class and twenty-nine for the control. The averages were: thirty-four for the experimental and twenty-nine for the control.

Nine pupils in the experimental class exceeded the speed of the pupil in the control class with whom they were paired. One pupil of the control class exceeded the speed of the experimental pupil with whom he was paired. Two pupils had the same speed in each class. Eight pupils of the control class exceeded the grade score of the experimental pupil with whom they were paired.

TABLE XIII

SCORES MADE BY STUDENTS IN TEST XIII

Pr. No.	Experimental Class: Name of Student	Score Gr.	Score Sp.	Control Class: Score Gr.	Score Sp.	Name of Student	Difference Ex. Gr.	Difference Ex. Sp.	Difference Con. Gr.	Difference Con. Sp.
1	C. C.	82	34	92	38	J. C.			10	4
2	D. C. R.	94	44	95	34	G. P.		10	1	
3	C. U.	87	36	96	36	A. S.			9	
4	G. W.	90	36	92	29	E. J.		7	2	
5	E. F.	91	42	92	33	N. W.		9	1	
6	D. V.	90	36	92	34	L. L.		2	2	
7	R. K.	96	36	91	29	L. M. F.	5	7		
8	L. R.	88	27	77	23	H. O.	11	4		
9	J. H.	87	32	85	28	E. B.	2	4		
10	M. M.	71	21	80	21	F. S.			9	
11	V. G.	94	30	73	20	D. B.	21	10		
12	N. B.	89	30	93	29	C. S.		1	4	
14	Quit school			88	26	K. R.				

	Experimental Class Grade	Experimental Class Speed	Control Class Grade	Control Class Speed
Medians	90	35	92	29
Averages	88	34	88	29
Range.	96-71	44-21	96-73	38-20

Read table thus: Read across page. Pair number 1, Name of Student C. C., Grade Score eighty-two with a Net Speed of thirty-four words a minute; Grade Score ninety-two with a Net Speed of thirty-eight words a minute, Name of Student J. C. Control Student 1 exceeded grade score of Experimental Student 1 by ten points and Net Speed score by four net words a minute.

The fourteenth test was given February 19. This was a fifteen minute test written from material sent out by the Remington Typewriter Company. Both classes were trying to increase their speed and improve their accuracy. The experimental class had practiced on the corrective exercises at least ten minutes each day since the beginning of school.

RESULTS OF TEST XIV

The grade score and net speed of each pupil in Test XIV is shown in Table XIV on the next page.

The highest scores were: ninety-nine in the experimental class and ninety-five in the control class. The lowest scores were: eighty in the experimental class and fifty in the control class. The medians were: ninety-three and five-tenths in the experimental class and ninety-one in the control class. The averages were: ninety-two and seventy-five hundredths in the experimental group and eighty-six and seventy-six hundredths in the control group. The highest speed in the experimental class was forty-four and in the control class, thirty-five. The lowest speed was twenty-three in the experimental class and ten in the control class. The median speeds were: thirty-eight and five-tenths in the experimental class and thirty in the control class. The average speeds were: thirty-six in the experimental class and twenty-eight and thirty-eight hundredths in the control class.

The paired results of this test are shown by graphs on page 120.

TABLE XIV

SCORES MADE BY STUDENTS IN TEST XIV

	Experimental Class				Control Class				
Pr. No.	Name of Student	Score Gr.	Score Sp.	Score Gr.	Score Sp.	Name of Student	Difference Ex. Gr.	Difference Ex. Sp.	Difference Con. Gr.	Difference Con. Sp.
1	C. C.	99	44	92	35	J. C.	7	9		
2	D. C. R.	97	44	90	30	G. P.	7	14		
3	C. U.	97	41	88	30	A. S.	9	11		
4	G. W.	98	43	91	30	E. J.	7	13		
5	E. F.	93	42	95	34	N. W.		8	2	
6	D. V.	94	38	77	25	L. L.	17	13		
7	R. K.	97	39	93	29	L. M. F.	4	10		
8	L. R.	89	28	88	32	H. O.	1			4
9	J. H.	90	32	93	33	E. B.			3	1
10	M. M.	80	25	92	28	F. S.			12	5
11	V. G.	89	25	87	25	D. B.	2			
12	N. B.	90	30	92	28	C. S.		2	2	
14	Quit School			50	10	K. R.				

	Experimental Class		Control Class	
	Grade	Speed	Grade	Speed
Medians	93.5	38.5	91	30
Averages	92.75	36	86.76	28.38
Range	99-80	44-23	95-50	35-10

Read table thus: Read across page. Pair number 1, Name of Student C. C., Grade Score ninety-nine with net speed of forty-four words a minute; Grade Score ninety-two with net speed of thirty-five words a minute, Name of Student J. C. Experimental Student 1 exceeded the grade score by seven points and the net speed nine words a minute, the record made by Control Student 1.

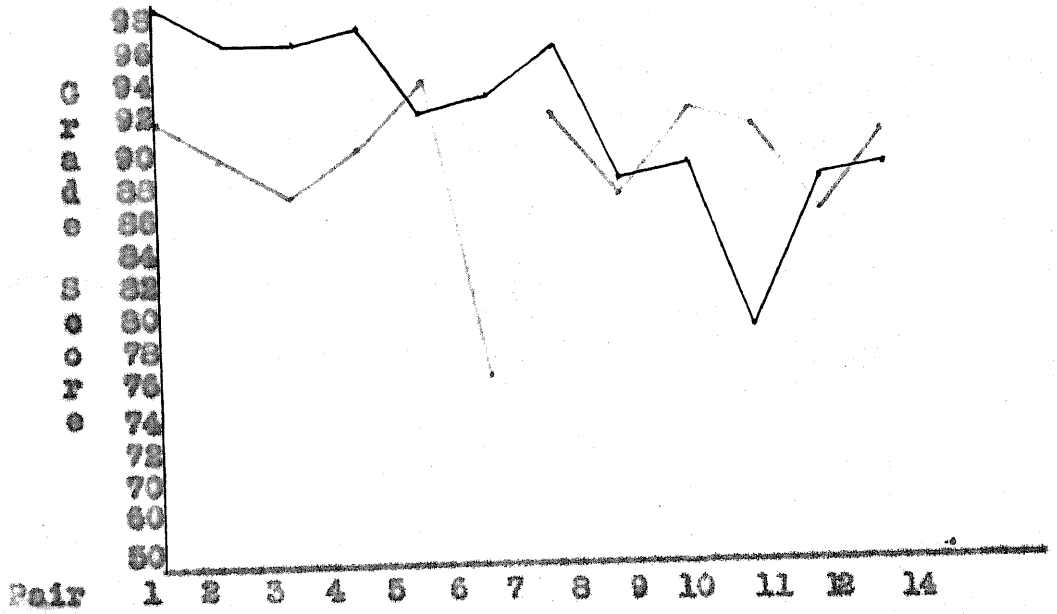

Fig. 35. Grades of two groups on Test 14.

Read graph thus: Black indicates experimental group, red indicates control group. The grade made by C. C., experimental pupil of Pair 1 was ninety-nine, the grade of J. C., control pupil of Pair 1 was ninety-two.

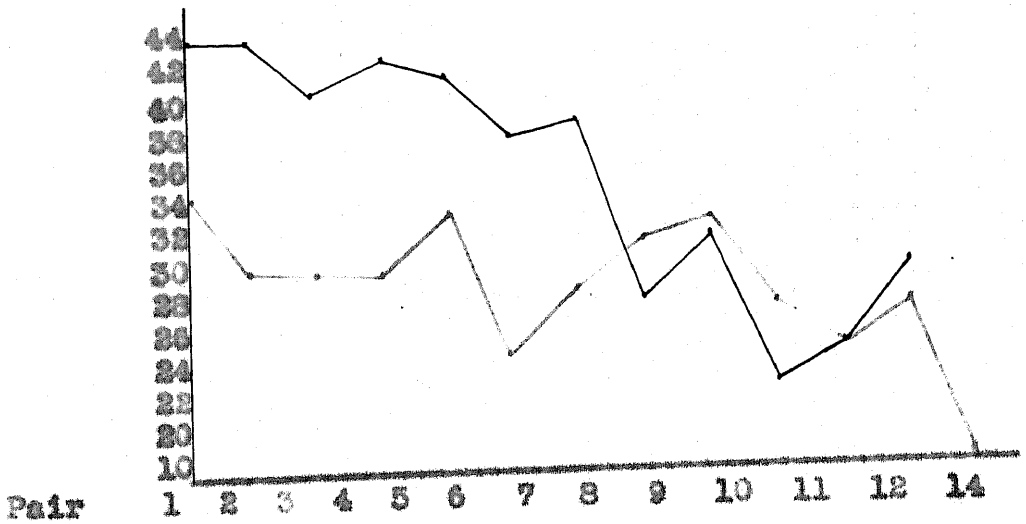

Fig. 36. Net speed a minute of two groups on Test 14.

Read graph thus: Black indicates experimental group, red indicates control group. The net speed of C. C., experimental pupil of Pair 1 was forty-four, the net speed of J. C., control pupil of Pair 1 was thirty-five.

The boys of the typewriting classes challenged the girls to a contest. This contest was conducted as the Every Pupil State Typewriting Contest and proved quite exciting. The tests were ten minutes in length and the scores were obtained by adding the percent of accuracy to the speed a minute.

RESULTS of the BOYS VERSUS GIRLS CONTEST

The average grade score and the average net speed of each pupil in this contest is shown in Table XV in the composite score.

The highest scores were: one-hundred-fifty-three in the experimental class and one-hundred-thirty-six in the control class. The lowest scores were: one-hundred-thirteen in the experimental class and one-hundred-seventeen in the control class. The medians were the same for each class, one-hundred twenty-eight and five-tenths. The average for the experimental class was one-hundred-thirty and for the control class one-hundred-twenty-seven.

Seven pupils of the experimental class exceeded the score of the control pupil with whom they were paired. Five of the control class exceeded the score of the experimental pupil with whom they were paired.

This contest seemed to encourage the members of the control group and they did some very good work. A contest was given between the two classes but the results were over-whelmingly in favor of the experimental class due to the fact that the control class were discouraged.

TABLE XV

AVERAGE OF SCORES MADE BY STUDENTS
IN
BOYS VERSUS GIRLS
CONTEST
TESTS GIVEN MARCH 13, 15, and 20

Experimental Class			Control Class			
Pair number	Name of Student	Score	Score	Name of Student	Difference Ex.	Con.
1	C. C.	142	136	J. C.	6	
2	D. C. R.	153	134	G. P.	19	
3	C. U.	146	133	A. S.	13	
4	G. W.	140	128	E. J.	12	
5	E. F.	130	134	N. W.		4
6	D. V.	136	124	L. L.	12	
7	R. K.	123	129	L. M. F.		6
8	L. R.	127	120	H. O.	7	
9	J. H.	118	130	E. B.		12
10	M. M.	117	119	F. S.		2
11	V. G.	118	117	D. B.	1	
12	N. B.	113	117	C. S.		4

	Experimental Class	Control Class
Medians	128.5	128.5
Averages	130	127
Range	153-113	136-117

Read table thus: Read across page. Pair number 1, Name of Student C. C. made a score of one-hundred-forty-two; score one-hundred-thirty-six, Name of Student J. C. Experimental student 1 exceeded score of Control student 1 by six points.

The Every Pupil State Typewriting Contest was March 26, and was conducted the same as our Boys-Girls Contest. The test was ten minutes in length and the material was sent out by the Kansas State Typewriting Association from Topeka.[71] The composite score was obtained by adding the net speed to the percent of accuracy.

RESULTS of THE EVERY PUPIL STATE TYPEWRITING CONTEST

The net speed, percent of accuracy, and composite score of each pupil in this test is shown in Table XVI on the next page.

The highest composite score was one-hundred-forty-four in the experimental class and one-hundred-thirty-five in the control. The highest speeds were: forty-eight words a minute in the experimental class and forty in the control class. The highest percent of accuracy was one-hundred percent in the experimental class and ninety-seven in the control class. The medians were: thirty-five net speed for the experimental class and thirty-four and five-tenths for the control; eighty-nine and five-tenths percent of accuracy for the experimental group and eighty-seven and five-tenths for the control group; one-hundred-twenty-six and five-tenths composite score for the experimental class and one-hundred twenty-three for the control.

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[71] See Appendix for this test.

The averages were: thirty-six and nine-tenths net speed for the experimental group and thirty-four and sixteen-hundredths for the control group; ninety and six-tenths percent of accuracy for the experimental group and eighty-nine and twenty-five hundredths for the control; one-hundred-twenty-six and seven-tenths composite score for the experimental class and one-hundred-twenty-two and nine-tenths for the control class.

The pupils of the experimental class exceeded the composite score of the pupils of the control class with whom they were paired except twice. Two pupils of the control exceeded the score of the experimental class with whom they were paired.

The scores were in all probability lower than they might have been had the measles not been so prevalent. However, the classes ranked third in the state despite this fact.

The results of this test are shown by graphs on page 126.

TABLE XVI

SCORES MADE BY STUDENTS IN TEST XVI

EVERY PUPIL STATE TYPEWRITING CONTEST
MARCH 26, 1935

	Experimental Class				Control Class				
Pr. No.	Name of Student	Net Sp.	% of Accur.	Comp. Score	Net Sp.	% of Accur.	Comp. Score	Name of Student	Differ. Comp. Sc. Ex. / Con.
1	C. C.	43	88	131	40	89	129	J. C.	2
2	D. C. R.	48	90	138	38	97	135	G. P.	3
3	C. U.	Absent			37	87	124	A. S.	
4	G. W.	Absent			33	87	120	E. J.	
5	E. F.	40	93	133	34	94	128	N. W.	5
6	D. V.	44	100	144	36	88	124	L. L.	20
7	R. K.	36	83	119	31	87	118	L. M. F.	1
8	L. R.	30	88	118	36	86	122	H. O.	4
9	J. H.	34	88	122	35	94	129	E. B.	7
10	M. M.	33	89	122	29	88	117	F. S.	5
11	V. G.	27	92	119	29	81	110	D. B.	9
12	N. B.	34	97	131	32	87	119	C. S.	12

	Experimental Class			Control Class		
	Speed	Accur.	Comp. Sc.	Speed	Accur.	Comp. Score
Medians	35	89.5	126.5	34.5	87.5	123.0
Averages	36.9	90.6	126.7	34.16	89.25	122.9
Range	48-27	100-83	144-118	40-29	97-81	135-110

Read table thus: Read across page. Pair number 1, Name of student C. C., net speed 43, % of accuracy 88, composite score of 131; net speed 40, % of accuracy 89, composite score 129, Name of student J. C. Experimental Student 1 exceeded Control Student 1 composite score by two points.

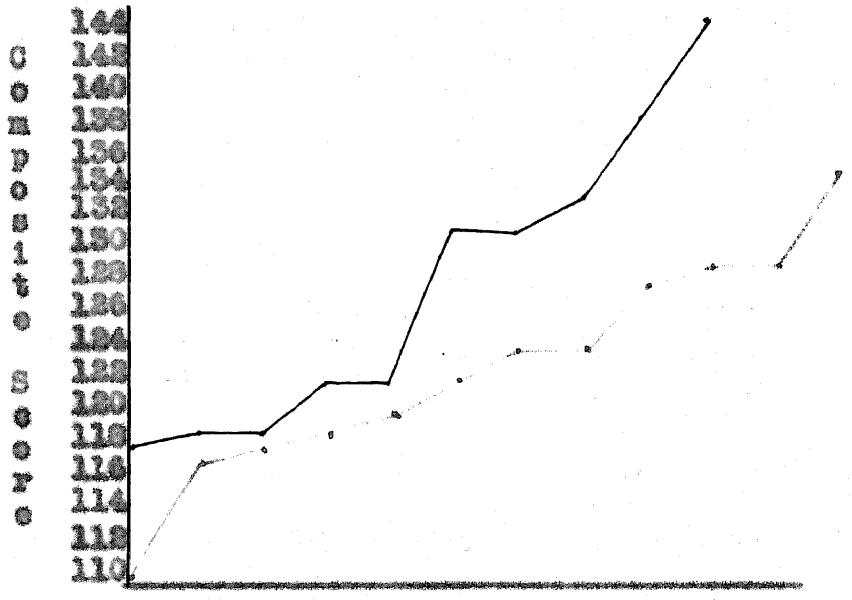

Fig. 37. Composite scores of two groups in the Every Pupil State Typewriting Contest, March 26.

Read graph thus: Black indicates experimental group, red indicates control group. The highest score made by a pupil in the experimental class was 144; the highest score made by a pupil in the control class was 135.

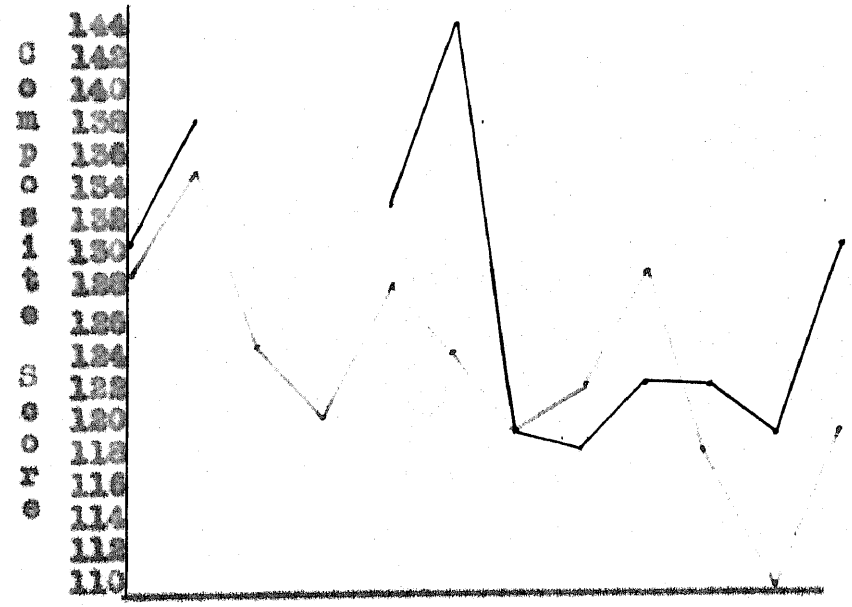

Fig. 38. Composite scores of two groups.
Read graph thus: Black--experimental, red--control. Pair 1 pupils, Experimental C. S. 131, Control J. C. 129.

The Twenty-Second Nation-Wide Every Pupil Scholarship Test was given April 10, 1935.[72] This was a fifteen minute test and the grade score was determined from the key attached to the test.

RESULTS of the TWENTY-SECOND NATION-WIDE EVERY PUPIL SCHOLARSHIP TEST

The grade score and net speed of each pupil in Test XVII is shown in Table XVII.

The highest scores were: ninety-four for the experimental class and ninety-three for the control class. The lowest scores were: twenty-eight for the experimental and eight for the control. The medians were: eighty-two and five-tenths for the experimental class and eighty-one and five-tenths for the control class. The averages were: forty and forty-one net speed for the experimental class and thirty-four and five tenths for the control. The median speeds were: forty-one for the experimental and thirty-five and five-tenths for the control. The highest speeds were: fifty-two for the experimental and forty-four for the control. The lowest speeds were: twenty-three for the experimental class and twenty-four for the control.

The median of the medians reported to the Kansas State Teachers College, Bureau of Educational Measurements, was seventy-four. The median of the experimental class was eight points above this and the median of the control class was seven points above seventy-four.

The results of this test are shown by graphs on pages 129 and 130.

TABLE XVII

SCORES MADE BY STUDENTS IN TEST XVII

TWENTY-SECOND
NATION-WIDE EVERY PUPIL SCHOLARSHIP TEST
APRIL 10, 1935

	Experimental Class			Control Class				
Pr. No.	Name of Student	Score Gr.	Sp.	Score Gr.	Sp.	Name of Student	Difference Ex. Gr.	Sp.	Con. Gr.	Sp.
1	C. C.	84	47	93	44	J. C.		3	9	
2	D. C. R.	91	52	77	36	G. P.	14	16		
3	C. U.	94	52	91	37	A. S.	3	15		
4	G. W.	90	50	90	38	E. J.		12		
5	E. F.	72	43	87	35	N. W.		8	15	
6	D. V.	83	40	8	24	L. L.	65	16		
7	R. K.	74	33	85	34	L. M. F.			11	1
8	L. R.	80	53	80	38	H. O.				5
9	J. H.	85	42	82	37	E. B.	3	5		
10	M. M.	82	37	81	31	F. S.	1	6		
11	V. G.	28	23	71	32	D. B.			43	9
12	N. B.	78	33	76	28	C. S.	2	5		

	Experimental Class Grade	Speed	Control Class Grade	Speed
Medians	82.5	41.0	81.5	35.5
Averages		40.41		34.5
Range	94-28	52-23	93-8	44-24

Read table thus: Read across page. Pair number 1, Name of Student C. C., Grade Score eighty-four with a net speed of forty-seven words a minute; Grade Score ninety-three with a net speed of forty-four words a minute, Name of Student J. C. Experimental Student number 1 exceeded the net speed of Control Student number 1 by three net words a minute; Control Student number 1 exceeded in the Grade Score by nine points over Experimental Student number 1.

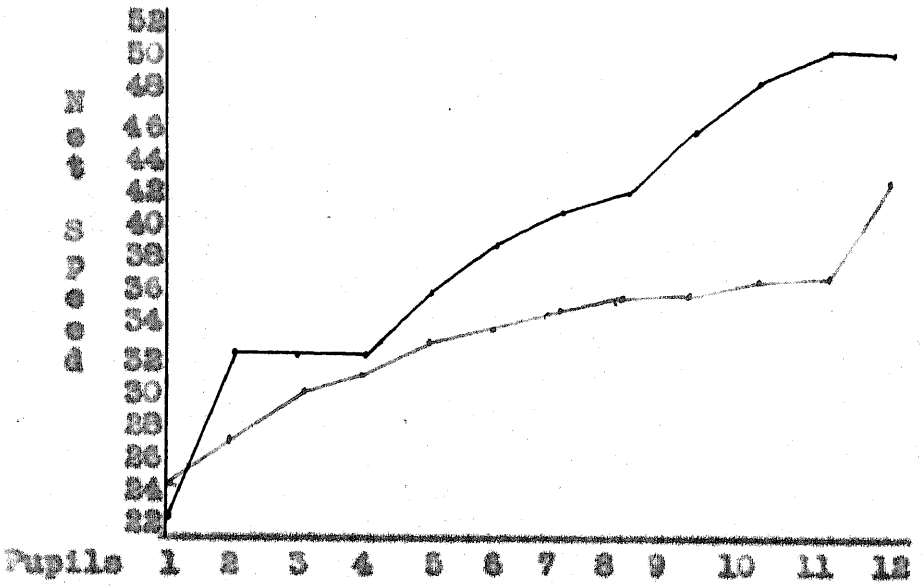

Fig. 39. Net speeds of two groups on the Twenty-second Nation-wide Every Pupil Scholarship Test.

Read graph thus: Black indicates experimental group, red indicates control group. The highest speed made by a pupil in the experimental class was fifty-two.

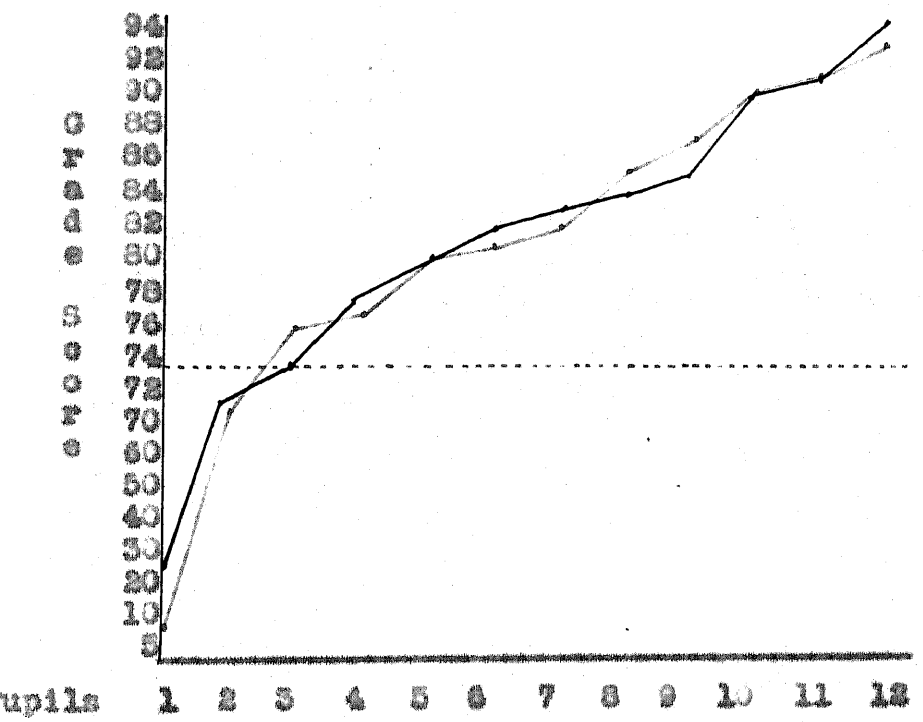

Fig. 40. Scores of two groups on Scholarship Test, April 10, 1935.
Read graph thus: Black indicates experimental group, red indicates control group. The highest score made by a pupil in the experimental class was ninety-four, in the control group the highest was ninety-three.

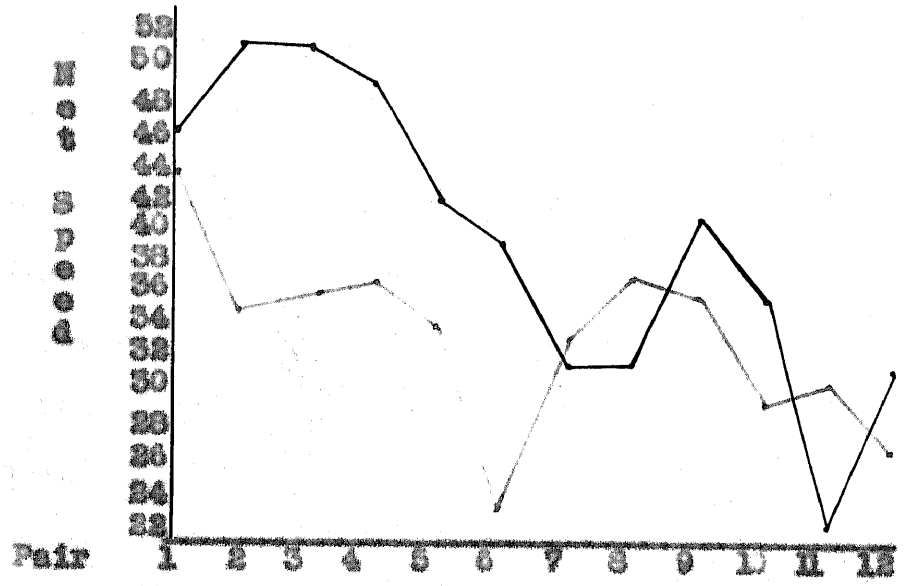

Fig. 41. Net speed of two groups on Twenty-second Nation-wide Every Pupil Scholarship Test, April 10.

Read graph thus: Black indicates experimental group, red indicates control group. The net speed of C. C., experimental pupil of Pair 1, was forty-seven, the net speed of J. C., control pupil of Pair 1, was forty-four.

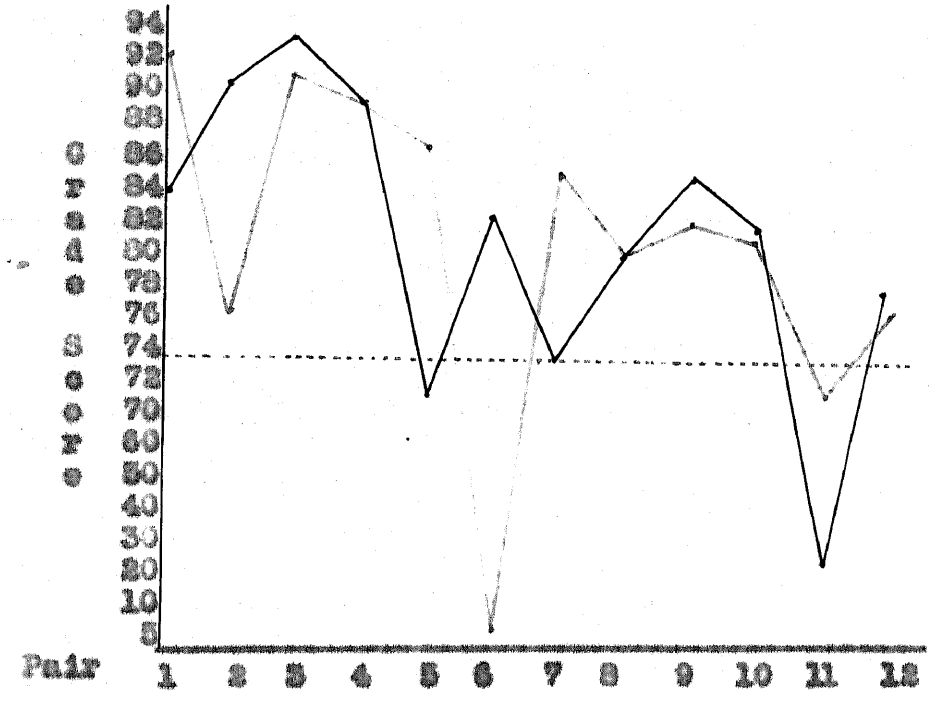

Fig. 42. Grade score of two groups on the Every-Pupil Scholarship Test, April 10, 1935.

Read graph thus: Black indicates experimental group, red indicates control group. The score of C. C., experimental pupil of Pair 1, was eighty-four, the grade score of J. C., control pupil of Pair 1, was ninety-three.

The tests which were given after the scholarship test were given with the view of increasing the speed of the students. The reason for this was two-fold: the pupil must have written forty-words a minute for fifteen minutes to be eligible to take the second year of typewriting and the pupils were working for typewriting awards that were given by the Woodstock Typewriter Company. The pupils could take three tests each day and were to hand in the best test. Tests were given May first, second, third, seventh, eighth, and ninth.

RESULTS OF SPEED TESTS

The results of these speed tests are shown in Tables XVIII, XIX, and XX on the following pages.

When the tension regarding accuracy was removed many of the students improved rapidly in both speed and accuracy. The error limit for Woodstock Awards was one error for each one-hundred gross words.

In the tests given May second and first the pupils of the experimental group exceeded the speed of the pupil of the control group with whom they were paired all but twice. In the tests given May third and seventh the result was the same. In the tests given May eighth and ninth the pupils of the experimental class exceeded the speed of the control pupil with whom they were paired with the exception of five cases.

The paired results are shown by graphs on the page following each table.

TABLE XVIII

NET SPEED RECORDS MADE BY STUDENTS

MAY 1 and MAY 2

Pr. No.	Experimental Class: Name of Student	Speed M.1	Speed M.2	Control Class: Speed M.1	Speed M.2	Name of Student	Difference Ex. M.1	Difference Ex. M.2	Difference Con. M.1	Difference Con. M.2
1	C. C.	51	53	47	45	J. C.	4	8		
2	D. C. R.	52	55	41	40	G. P.	11	15		
3	C. U.	52	54	41	41	A. S.	11	13		
4	G. W.	47	49	38	38	E. J.	9	11		
5	E. F.	47	48	37	38	N. W.	10	10		
6	D. V.	40	43	30	32	L. L.	10	11		
7	R. K.	39	37	34	35	L. M. F.	5	2		
8	L. R.	33	36	29	35	H. O.	4	1		
9	J. H.	36	38	32	32	E. B.	4	6		
10	M. M.	32	35	32	32	F. S.	5	5		
11	V. G.	29	33	34	30	D. B.		3		5
12	N. B.	33	35	34	32	C. S.		3		1

	Experimental Class May 1	Experimental Class May 2	Control Class May 1	Control Class May 2
Medians	39.5	40.5	34.0	35.0
Averages	40.92	43	35.33	35.75
Range	52-29	55-33	47-27	45.30

Read table thus: Read across page. Pair number 1, Name of Student C. C., May 1 speed fifty-one, May 2 speed fifty-three, May 1 speed forty-seven, May 2 speed forty-five, Name of Student J. C. Experimental student 1 exceeded the speed of Control student 1 by four words on the May 1 test, and by eight words on the May 2 test.

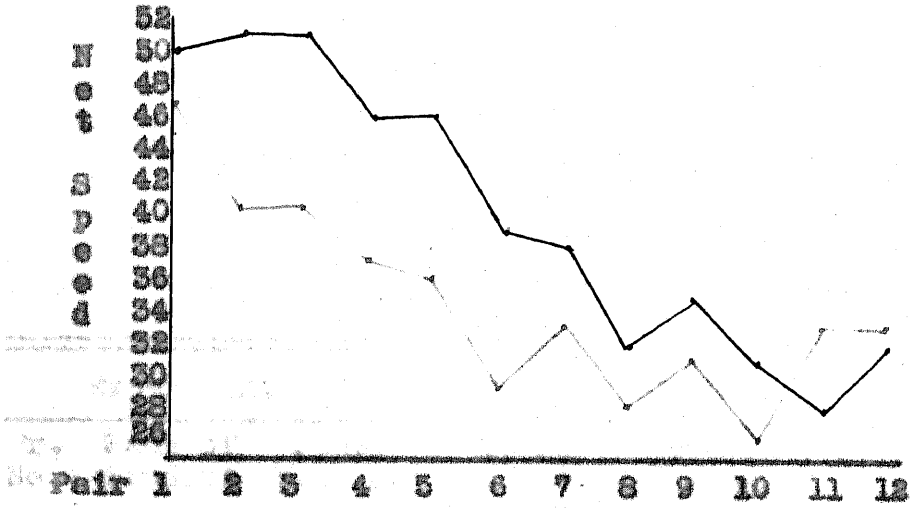

Fig. 45. Net speed of two groups on fifteen minute test, May 1, 1935.

Read graph thus: Black indicates experimental group, red indicates control group. The net speed of C. C., experimental pupil of Pair 1, was fifty-one; the net speed of J. C., control pupil of Pair 1, was forty-seven.

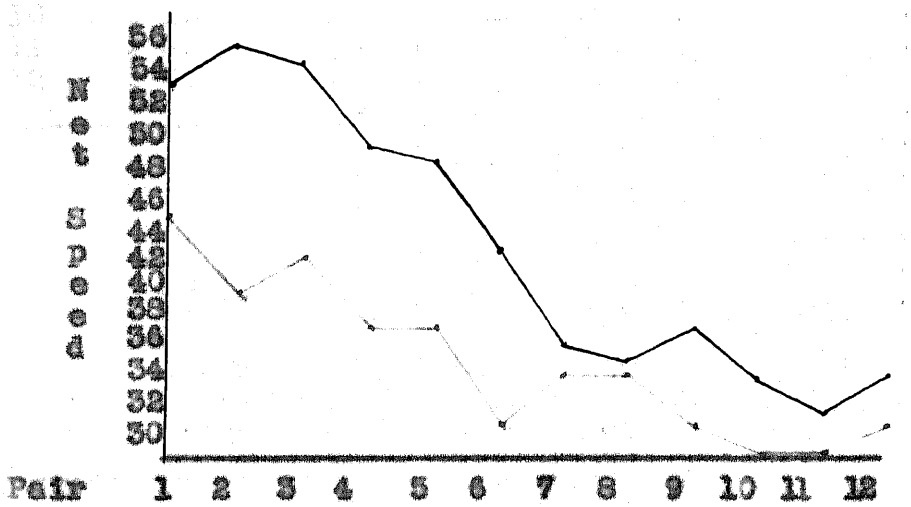

Fig. 44. Net speed of two groups on fifteen minute test, May 2, 1935.

Read graph thus: Black indicates experimental group, red indicates control group. The net speed of C. C., experimental pupil of Pair 1, was fifty-three; the net speed of J. C., control pupil of Pair 1, was forty-five.

TABLE XIX

NET SPEED RECORDS MADE BY STUDENTS

MAY 3 and MAY 7

Pr. No.	Experimental Class: Name of Student	Speed M.3	Speed M.7	Control Class: Speed M.3	Speed M.7	Name of Student	Difference Ex. M.3	Difference Ex. M.7	Difference Con. M.3	Difference Con. M.7
1	C. C.	54	56	44	48	J. C.	10	8		
2	D. C. R.	56	57	42	42	G. P.	14	15		
3	C. U.	56	56	41	43	A. S.	15	13		
4	G. W.	50	52	37	38	E. J.	13	14		
5	E. F.	48	49	37	38	N. W.	11	11		
6	D. V.	45	47	32	30	L. L.	13	17		
7	R. K.	39	40	35	36	L. M. F.	4	4		
8	L. R.	38	38	37	40	H. O.	1			2
9	J. H.	40	38	37	36	E. B.	3	2		
10	M. M.	36	35	32	34	F. S.	4	1		
11	V. G.	34	32	32	28	D. B.	2	4		
12	N. B.	34	32	33	35	C. S.	1			4

	Experimental Class		Control Class	
	May 3	May 7	May 3	May 7
Medians	42.5	43.5	37.0	37.0
Averages	44.17	44.33	36.58	37.33
Range	56-34	57-32	44-32	48-28

Read table thus: Read across page. Pair number 1, Name of Student C. C., May third speed fifty-four, May seventh speed fifty-six; May third speed forty-four, May seventh speed forty-eight, Name of Student J. C. Experimental student 1 exceeded in speed on both tests, May third by ten words a minute and May seventh by eight words a minute.

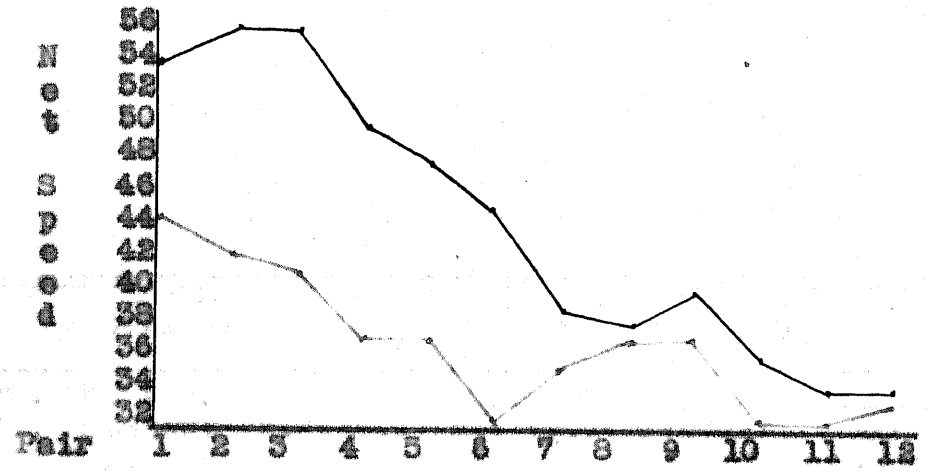

Fig. 45. Net speed of two groups on fifteen minute test, May 3, 1935.

Read graph thus: Black indicates experimental group, red indicates control group. The net speed of C. C., experimental pupil of Pair 1, was fifty-six; the net speed of J. C., control pupil of Pair 1, was forty-four.

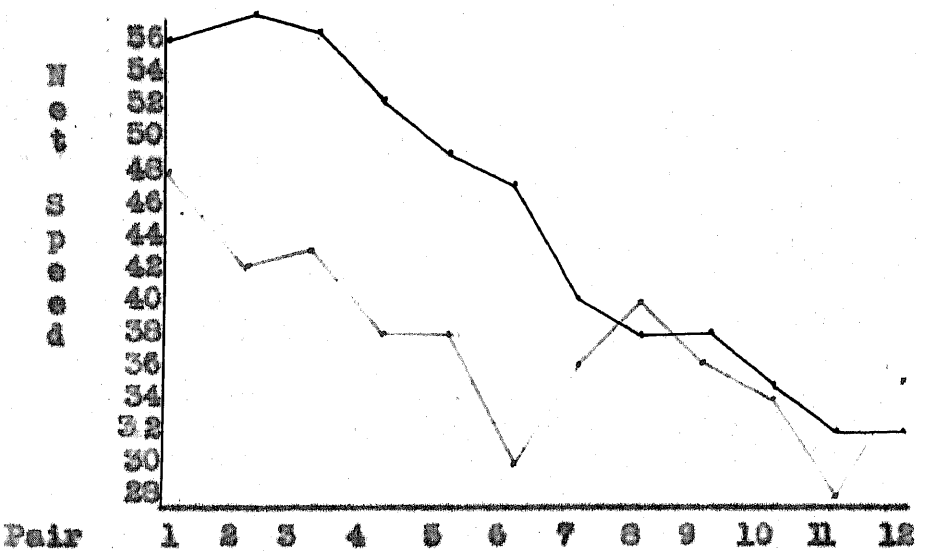

Fig. 46. Net speed of two groups on fifteen minute test, May 7, 1935.

Read graph thus: Black indicates experimental group, red indicates control group. The net speed of C. C., experimental pupil of Pair 1, was fifty-six; the net speed of J. C., control pupil of Pair 1, was forty-eight.

TABLE XX

NET SPEED RECORDS MADE BY STUDENTS

MAY 8 and MAY 9

Pr. No.	Experimental Class: Name of Student	Speed M.8	Speed M.9	Control Class: Speed M.8	Speed M.9	Name of Student	Difference Ex. M.8	Ex. M.9	Con. M.8	Con. M.9
1	C. C.	55	59	48	48	J. C.	7	11		
2	D. C. R.	56	58	45	43	G. P.	11	15		
3	C. U.	57	57	46	45	A. S.	11	12		
4	G. W.	51	52	40	40	E. J.	11	12		
5	E. F.	50	51	40	40	N. W.	10	11		
6	D. V.	47	49	36	38	L. L.	11	11		
7	R. K.	38	40	39	38	L. M. F.		2	1	
8	L. R.	39	40	41	42	H. O.			2	2
9	J. H.	38	39	37	38	E. B.	1	1		
10	M. M.	37	38	35	36	F. S.	2	2		
11	V. G.	36	34	35	36	D. B.	1			2
12	N. B.	33	37	38	36	C. S.		1	5	

	Experimental Class May 8	Experimental Class May 9	Control Class May 8	Control Class May 9
Medians	43.0	44.5	39.5	39.0
Averages	44.75	46.17	40.0	40.0
Range	57-33	59-34	48-35	48-36

Read table thus: Read across page. Pair number 1, Name of Student C. C., May eighth speed fifty-five, May ninth speed fifty-nine; May eighth speed forty-eight, May ninth speed forty-eight, Name of Student J. C. Experimental student 1 exceeded in both speed tests, May eighth by seven words a minute and May ninth by eleven words a minute.

Fig. 47. Net speed of two groups on fifteen minute test, May 8, 1935.

Read graph thus: Black indicates experimental group, red indicates control group. The net speed of C. C., experimental pupil of Pair 1, was fifty-five; the net speed of J. C., control pupil of Pair 1, was forty-eight.

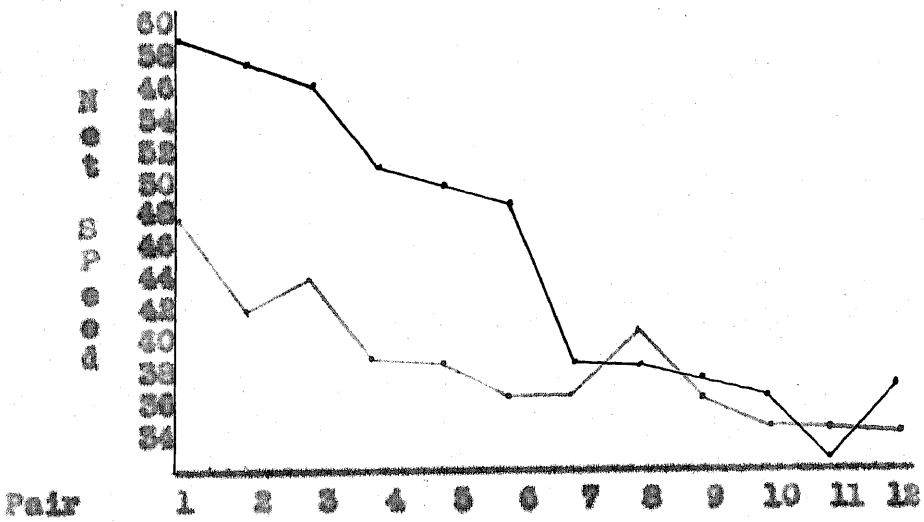

Fig. 48. Net speed of two groups on fifteen minute test, May 9, 1935.

Read graph thus: Black indicates experimental group, red indicates control group. The net speed of C. C., experimental pupil of Pair 1, was fifty-nine; the net speed of J. C., control pupil of Pair 1, was forty-eight.

The graphs on pages one-hundred-thirty-nine and one-hundred-forty show the averages of all grade scores on all tests and the averages of all net speeds the second semester tests.

AVERAGE RESULTS AS SHOWN BY GRAPHS

The highest grade score average for the experimental class was ninety-three and the highest grade score average for the control class was eighty-nine. The lowest grade score average was seventy-two for the experimental group and fifty-six for the control group. The median of the grade score averages was eighty-five and seven-tenths for the experimental class and eighty-four and sixty-nine hundredths for the control class. Only three times on the entire group of tests did the average of the control class exceed that of the experimental class. In the paired group graph it is shown that only four times out of the sixteen possible times did the control students' average exceed the average of the experimental student with whom they were paired.

In the speed graph averages for the second semester tests the experimental class ranked ahead on every test. The highest average net speed made by the experimental class was forty-six and for the control class forty. The median of the averages in net speed was forty-one for the experimental class and thirty-five for the control class.

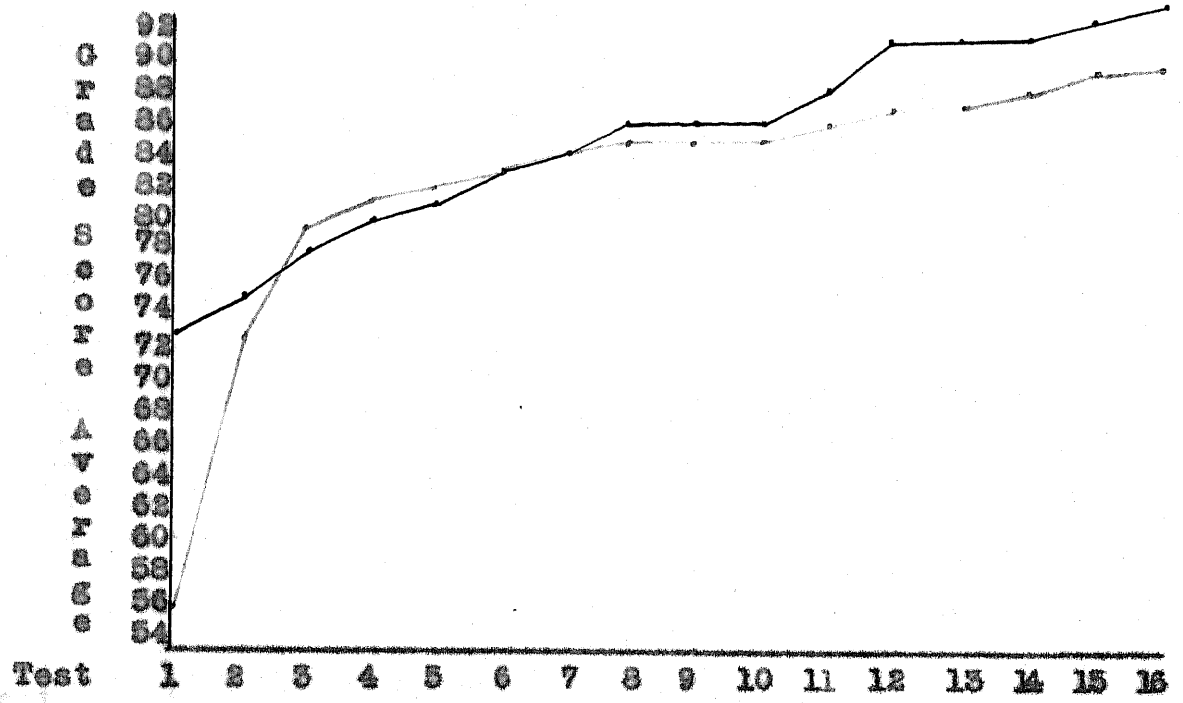

Fig. 49. Grade score average on all tests.

Read graph thus: Black indicates the experimental group; red indicates the control group. The highest average made by the experimental group was ninety-three, the highest average made by the control group was eighty-nine.

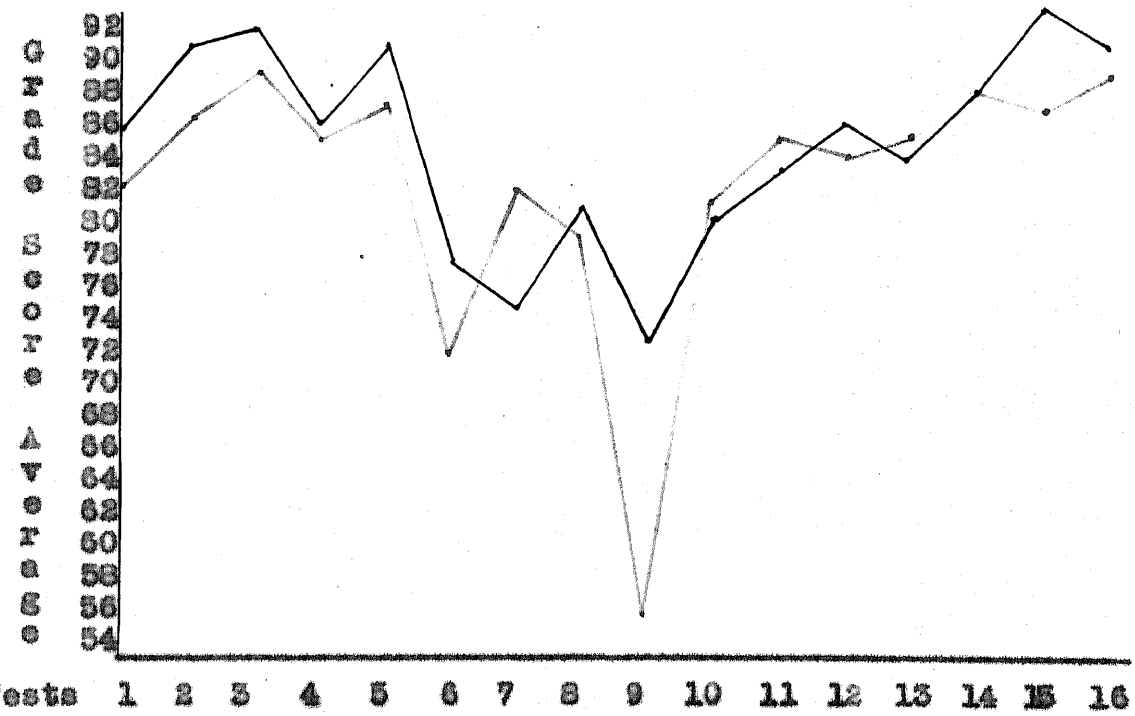

Fig. 50. Grade score average of two groups on tests in the order tests were given.

Read graph thus: Black indicates the experimental class, red indicates the control class. On test 1 the average of the experimental class was eighty-six and the control class average was eighty-three.

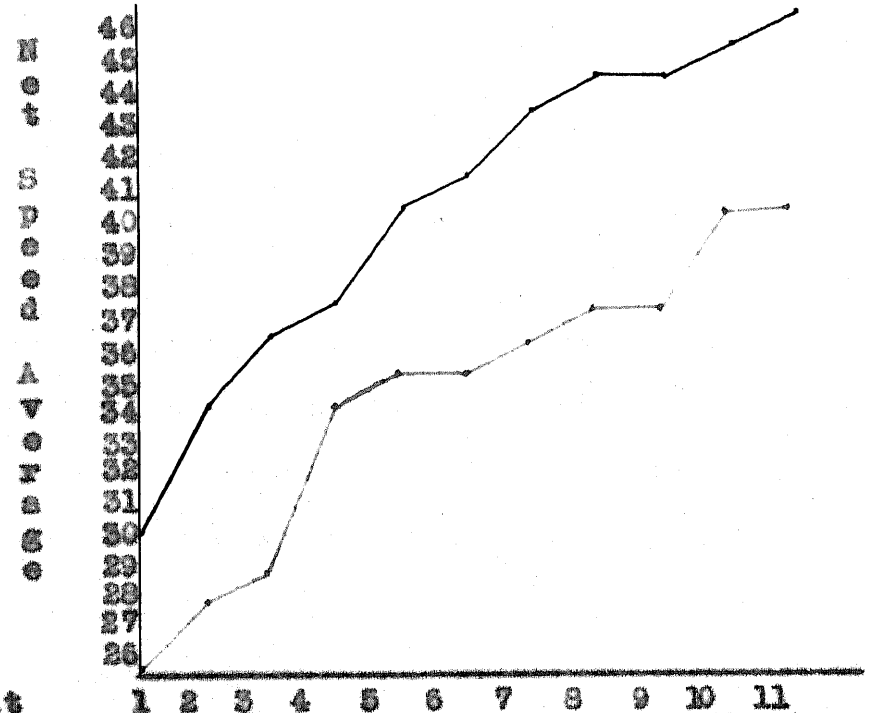

Fig. 51. Average net speeds on the ten and fifteen minute tests the second semester for the two groups.

Read graph thus: Black indicates the experimental group, red indicates the control group. The highest average speed in the experimental group was forty-six, the highest for the control group was forty.

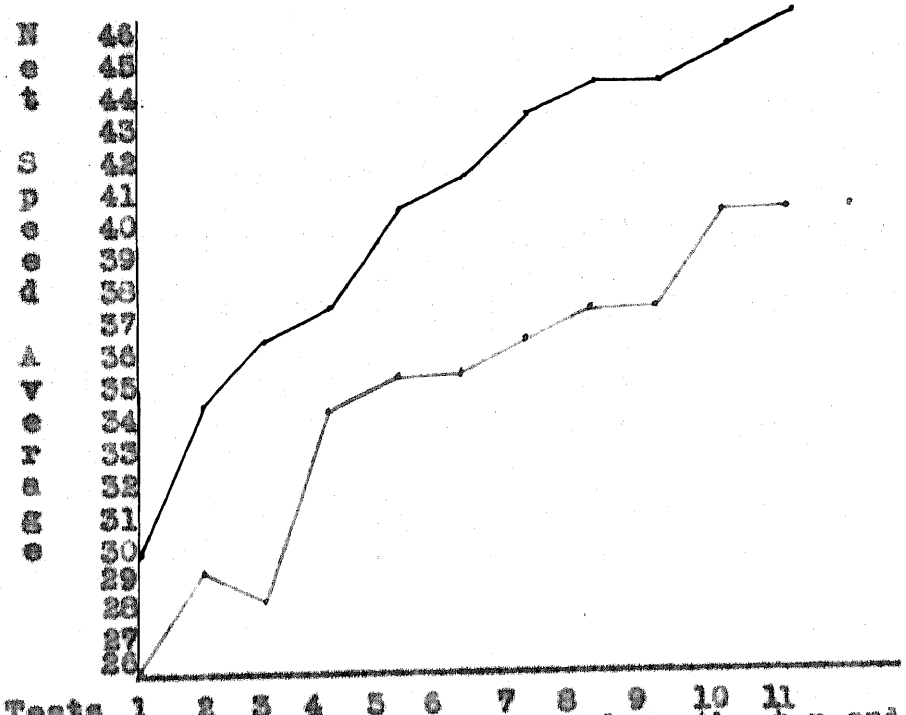

Fig. 52. Average net speed on the ten and fifteen minute tests given the second semester, showing parallel speed of two groups on each test.

Read graph thus: Black indicates the experimental group, red indicates the control group. On Test 1 the experimental average was thirty, the Control average was twenty-six.

CHAPTER III

SUMMARY OF STUDY

The purpose of this study was to determine the relative effectiveness of a group of corrective typewriting exercises designed to correct known tendencies to keyboard errors that are likely to appear in the work of students of beginning typewriting.

The experimental technique following the method of parallel groups was used. Two classes of the same size, years of training, and grade point average, were enrolled in the Senior High School at Ashland, Kansas. One group, the Experimental class, was subjected to these corrective exercises for at least ten minutes each day throughout the year; and the Control class was taught by the traditional method or textbook method. Both classes were conducted in the same way, except as to the corrective exercises. They had the same instructor and were tested by the same tests. Sixteen matched pairs were used for comparison.

The practice on the corrective exercises was general at first, but later the students kept a record sheet upon which were recorded the errors made on tests. From this record, the individual student could determine the particular type of error was most prevalent and practice the corrective drill to correct his tendency to error.

Twelve tests were given the first semester and every error recorded on the record sheets. Eleven tests were given the second semester and the errors recorded. The classes were compared as to achievement in the Twenty-First Nation-Wide Scholarship Test, in the Every Pupil State Typewriting Contest, and in the Twenty-Second Nation-Wide Scholarship Test.

Five different types of motivation were tried. Encouragement, discouragement, contests, awards and self-competition were used. Encouragement, contests and awards were the best incentives as shown by this study.

Both classes were far above the median in the Scholarship Tests and ranked third in the State in the Every Pupil State Typewriting Contest. In all three tests the Experimental class was superior to the Control class. The results of the matched-pair groups were similar to the results of the classes. In the Twenty-Second Scholarship Test the Experimental student exceeded the speed score of the Control student with whom he was paired in all but three cases, and the accuracy or grade score in all but four cases. In the tests given the last of the year for awards all but two or three of the twelve matched pairs showed the Experimental student to be superior.

On the basis of the evidence collected, it was believed by the writer, that the use of these corrective exercises to correct known tendencies to error was beneficial to both speed and accuracy. The students using the corrective exercises

were more accurate and acquired a much higher rate of speed as well.

It is realized that the number of cases was far too small to consider this experiment of any great value, but the results were such that it warrants trial on larger groups.

CONCLUSIONS AND RECOMMENDATIONS

The results of an experimental study, such as this, cannot be used as scientific evidence or a basis for definite conclusions. The number of cases was too small. Each class had sixteen pupils making a total of thirty-two pupils for the experiment. It is believed that these corrective exercises could be extended and revised to include some very interesting material such as phrases and alphabetic sentences which would make greater variety, but as they were, the class using them came out decidedly ahead of the other class.

There is no way of determining what the results might have been had both classes used the same method--Experimental or Traditional. However, the results are interesting and, the writer feels, worthy of consideration.

The object of the experiment was to determine whether there was any value to be derived from the use of this particular group of corrective exercises which had been worked out to prevent known tendencies to error and to ascertain the amount of value in terms of efficiency measured by the ability of the student in both speed and accuracy of performance. The method used for this study may not be the best method for developing the needed skills of typewriting but the results are interesting and the following conclusions were reached:

1. On the basis of the evidence collected, it appeared that the accuracy was improved by using the designed corrective exercises as warming-up material to improve the technique.

2. That the students of the Experimental Class were able to write much faster than those of the Control Class.

3. That both classes exceeded the median , seventy-seven, of the medians reported in the Twenty-first Nation-wide Every Pupil Scholarship Test, January 9, 1935. The median of the Control Class was eighty-six and that of the Experimental Class was eighty-six and five-tenths.

4. The Kansas State Every Pupil Test ranked the first year students third in the State. The median of the Control Class was one-hundred-twenty-three and the Experimental Class median was one-hundred-twenty-six and five-tenths.

5. That both classes made a favorable showing in the Twenty-second Nation-wide Every Pupil Scholarship Test, April 10, 1935. The median of the medians for this test was seventy-four, the median for the Control Class was eighty-one and five-tenths, and the Experimental Class median was eighty-two and five tenths.

6. That the Experimental Class exceeded the Control Class in the median speeds from six to fourteen words a minute on all tests the second semester.

7. That the Experimental Class exceeded the Control Class in the average speeds from six to sixteen words a minute on all tests the second semester.

8. That a comparison of the grade score averages showed that the Experimental average exceeded the Control average eleven tests, the Control average exceeded the Experimental average four tests, and the averages were the same on one test. (Fig. 50.)

9. That the use of these corrective exercises showed a greater increase in speed than was shown in the grade scores which took into consideration the speed, number of errors, and length of time in the course.

10. That encouragement was the best stimulus to greater effort, that criticism was second, and that no comment of any kind was least effective in increasing the quality or quantity of work done.

11. That competition between boys and girls of this age caused greater effort than contests between the two classes.

12. That Awards in the form of Progress Cards, Medals, and the like were a great inducement to greater effort. The reason for this might be due to the publicity attending the awarding of these awards and the write-up in the paper concerning them.

The writer believes that a class using these corrective exercises or similar exercises designed to prevent and correct known tendencies to error will write more accurately and rapidly than a class using only the textbook material. It is suggested,

however, that:

1. A comparative study with control groups in a large number of schools be made--one group using the material used in this experiment, or similar material, and one using ordinary textbook material.

2. That the Corrective Typewriting Exercises used in this study be enlarged and revised to include phrases and sentences, thereby giving the learner a more varied group of exercises and practice on larger units. In this way the time needed to learn typewriting may be shortened and the discouragement caused by making errors and the corresponding plateaus may to a certain extent be eliminated.

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APPENDIX

Read across the page: "a" was struck for "b" 69 times; for "c" 106 times; for "e" 560 times, etc.

Prepared by D. D. Lessenberry, Head, Department of Commercial Education, School of Education, University of Pittsburgh, Pittsburgh, Pa.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
was struck for		69	106	71	560	102	24	139	148	26	15	136	58	61	126	60	89	104	1012	116	46	96	100	33	46	139
was struck for	36		37	43	33	44	163	42	12	8	3	25	57	262	43	13	1	7	28	40	21	773	7	6	15	9
was struck for	59	43		486	98	67	22	19	36	7	27	14	20	84	25	1	7	30	174	28	14	466	22	133	8	9
was struck for	65	43	436		755	394	117	23	73	27	484	58	7	80	27	6	2	72	862	119	22	21	30	22	11	1
was struck for	494	28	149	651		72	76	114	1019	20	25	141	66	75	174	27	5	813	276	273	95	44	638	17	77	7
was struck for	43	80	92	524	72		586	56	66	176	24	38	6	27	56	47	3	419	71	153	12	159	12	1	8	1
was struck for	35	241	34	166	75	541		461	24	54	41	17	9	59	8	5	8	37	30	267	18	51	9	3	8	3
; was struck for	40	44	43	22	42	47	389		100	207	111	21	19	275	46	15	6	26	36	117	44	11	9	4	99	1
was struck for	159	10	17	73	907	28	25	84		30	211	81	50	90	915	21	13	59	78	160	560	54	20	2	27	1
was struck for	11	6	10	11	21	140	62	489	46		217	49	242	188	28	7	1	6	4	40	128	5	1	2	10	2
was struck for	17	10	34	287	29	11	16	66	172	101		521	37	44	56	10	2	17	23	16	7	2	2	4	3	
was struck for	119	44	16	59	116	54	24	42	106	54	413		62	97	567	92	7	40	150	77	29	3	8	7	14	3
: was struck for	52	16	11	8	41	6	15	13	27	60	56	21		1577	77	24	5	17	25	14	36	39	6	3	2	2
: was struck for	93	135	33	44	87	19	68	151	90	28	17	50	1249		68	10	6	27	74	67	25	63	8	6	22	3
; was struck for	210	18	23	30	134	82	20	68	1290	26	52	671	54	63		346	36	154	78	112	154	22	104	8	22	3
was struck for	33	11	9	6	56	11	10	14	28	3	6	46	15	24	405		36	23	14	43	19	6	13	3	15	1
: was struck for	232	6	5	3	21	11	12	7	9	3		4	10	3	10	22		6	16	66	20	17	109	3	6	6
: was struck for	111	15	40	139	1043	334	36	24	92	5	7	27	14	70	140	33	8		186	1488	398	58	67	19	28	7
was struck for	954	23	260	1061	300	106	23	16	69	6	24	162	27	91	68	12	8	156		150	57	59	410	157	15	19
: was struck for	97	38	24	105	212	185	254	129	157	26	20	65	15	58	79	23	55	1407	168		58	7	55	45	327	5
: was struck for	33	59	10	28	64	17	15	49	519	124	23	40	13	35	123	21	40	217	81	99		22	25	52	419	12
: was struck for	45	1001	430	39	71	137	38	28	35	1	2	10	34	101	17	2	18	44	24	11	40		11	11	20	1
: was struck for	89	9	10	76	927	26	6	19	15	3	1	17	16	22	122	30	96	136	382	95	18	26		10	12	26
: was struck for	33	12	292	35	24	1	3	11	8	5	1	2	9	8	11	5	5	21	225	23	23	10	12		16	191
: was struck for	44	10	5	18	57	11	26	109	33	13	3	12	18	31	12	11	5	32	138	508	502	90	43	13		8
: was struck for	288	7	6	7	6	2	3	2	10	1	3	3	1	5	4	4	6	13	34	6	2	9	30	108	6	

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(See Other Side)

ANALYSIS OF ERRORS

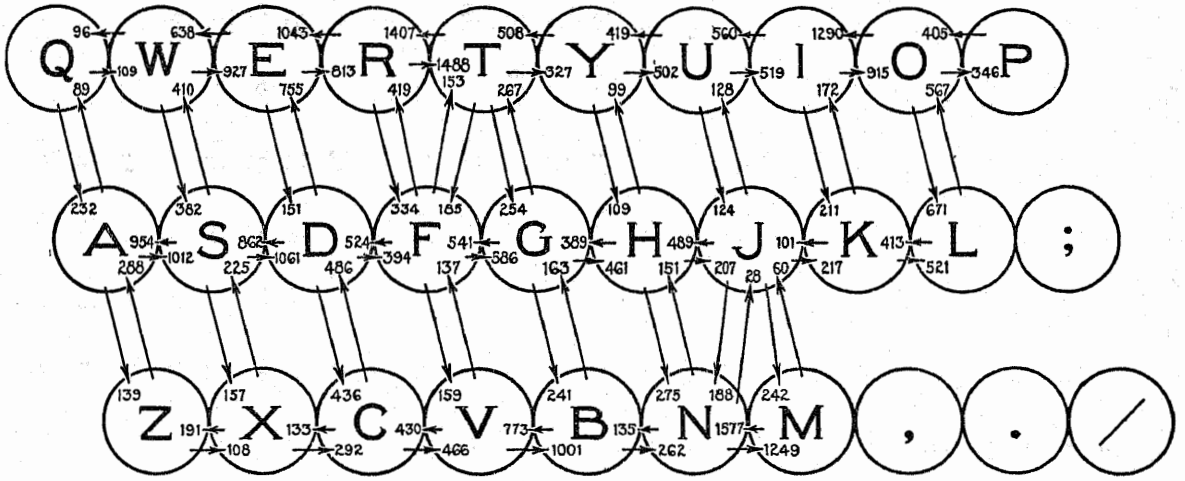
In an ANALYSIS OF ERRORS, printed on the back of the Error Chart which was published in March, 1927, it was said: "It must be admitted that corrective drills are largely a matter for the individual pupil, yet a comprehensive study of a number of papers has revealed certain uniformity of errors and has made possible the formulation of a chart showing the probable major errors likely to occur in the course of an ordinary day's work." In working out that first error chart, more than 2,000 papers were studied. The chart gave indications of definite kinds of errors, but the number of errors tabulated did not justify more than general statements as to the types of errors uniformly found in the work of all student-typists. The present analysis of errors is based upon a study of more than 60,000 errors tabulated and sent in by teachers from all sections of the United States. This larger study gives added emphasis to the general conclusions reached from the first and less comprehensive analysis, and the cumulative evidence points to three definite types of errors against which all pupils of typewriting must be on guard mentally and to correct which definite drills must be formulated and intelligently practiced.

Even a casual reading of the chart will show that adjacent keys are the most frequently misstruck. In reading the following chart, follow the arrow and read as follows:

a was struck for s 1012 times
s was struck for a 954 times
s was struck for d 1061 times
d was struck for s 862 times
d was struck for f 394 times (etc)

Also follow the arrows pointing to the keys above and to the keys beneath the home row, and read as follows:

q was struck for a 232 times
a was struck for q 89 times
a was struck for z 139 times
z was struck for a 288 times (etc.)



In addition to showing the frequency of error for adjacent keys, the above chart also shows that the tendency to strike a home key instead of making the correct finger movement to the key above or below is a frequent cause for errors.

The third type of error noted from the ERROR CHART is the general confusion in the use of the vowels. Note the following summary:

e was struck for	a	494	times
	i	1019	"
	o	174	"
	u	95	"
a was struck for	e	560	"
	i	148	"
	o	126	"
	u	46	"
i was struck for	e	907	"
	a	159	"
	o	915	"
	u	560	"
o was struck for	a	210	times
	e	134	"
	i	1290	"
	u	154	"
u was struck for	a	33	"
	e	64	"
	i	519	"
	o	123	"

This analysis of errors should guide us in formulating corrective drills. If the pupils are familiar with the tendency to make errors of these general types, it will tend to increase their effort to maintain accurate control over the sequence movements, and, through this very caution on their part, will reduce the number of errors made while typing.

BY D. D. LESSENBERRY

STUDENT'S RECORD SHEET

Name. . . . . .

Date	Time	Gross Strokes	Er.	Net Words	Sp. Min.	CLASSIFICATION OF ERRORS							
						f1	f2	f3	f4	Sp.	Cap.	Tr.	Rhy.

Write correctly the words you made errors in writing on the back of this sheet for practice.

AN AUTOMATIC GRADING CHART FOR 15-MINUTE TYPING TESTS

This is adapted from a chart worked out by Mr. J. F. Bowers for use in the Fresno Technical High School, Fresno, California. This chart is based upon six weeks of five periods each. In a business school where several typing periods occur in each day's program the scale will be found to fit a time interval of two or three weeks between groups. It is based upon the "International Contest Rules" with a ten-word penalty for errors.

NET WORD RATE Semester Divisions											PERCENTAGE SCALE										
I			II			III			IV												
Marking Period			Marking Period			Marking Period			Marking Period												
1	2	3	1	2	3	1	2	3	1	2	3	Number of Errors									
												0	1	2	3	4	5	6	7	8	9	10
28	31	35	38	41	45	48	51	55	58	61	65	100	99	98	97	96	95	94	93	92	91	90
27	30	34	37	40	44	47	50	54	57	60	64	99	98	97	96	95	94	93	92	91	90	89
26	29	33	36	39	43	46	49	53	56	59	63	99	98	97	96	95	94	93	92	91	90	89
25	28	32	35	38	42	45	48	52	55	58	62	98	97	96	95	94	93	92	91	90	89	88
24	27	31	34	37	41	44	47	51	54	57	61	98	97	96	95	94	93	92	91	90	89	88
23	26	30	33	36	40	43	46	50	53	56	60	97	96	95	94	93	92	91	90	89	88	87
22	25	29	32	35	39	42	45	49	52	55	59	97	96	95	94	93	92	91	90	89	88	87
21	24	28	31	34	38	41	44	48	51	54	58	96	95	94	93	92	91	90	89	88	87	86
20	23	27	30	33	37	40	43	47	50	53	57	96	95	94	93	92	91	90	89	88	87	86
19	22	26	29	32	36	39	42	46	49	52	56	95	94	93	92	91	90	89	88	87	86	85
18	21	25	28	31	35	38	41	45	48	51	55	95	94	93	92	91	90	89	88	87	86	85
17	20	24	27	30	34	37	40	44	47	50	54	94	93	92	91	90	89	88	87	86	85	84
16	19	23	26	29	33	36	39	43	46	49	53	94	93	92	91	90	89	88	87	86	85	84
15	18	22	25	28	32	35	38	42	45	48	52	93	92	91	90	89	88	87	86	85	84	83
14	17	21	24	27	31	34	37	41	44	47	51	93	92	91	90	89	88	87	86	85	84	83
13	16	20	23	26	30	33	36	40	43	46	50	92	91	90	89	88	87	86	85	84	83	82
12	15	19	22	25	29	32	35	39	42	45	49	91	90	89	88	87	86	85	84	83	82	81
11	14	18	21	24	28	31	34	38	41	44	48	90	89	88	87	86	85	84	83	82	81	80
10	13	17	20	23	27	30	33	37	40	43	47	89	88	87	86	85	84	83	82	81	80	79
9	12	16	19	22	26	29	32	36	39	42	46	88	87	86	85	84	83	82	81	80	79	78
8	11	15	18	21	25	28	31	35	38	41	45	87	86	85	84	83	82	81	80	79	78	77

INSTRUCTIONS: Find the net word rate. Locate the Marking Period Column 1, 2, or 3 in the semester division to which you belong, I, II, III, or IV. Run down this column until you come to your Net Word Rate. Place a ruler under this number to act as a guide and run a pencil along the row until you reach the column under the number of errors you made in the test. The number at which your pencil stops is the percentage grade of your paper.

ILLUSTRATION: You are in the last third of the first semester in typing. Your test was written at the net word rate of 25 with 6 errors. Locate Column 3 in Division I. Locate 25 in that column. Run along that row until your pencil is under Number 6 in the Error Scale. Your pencil stops on the number 89. Your percentage rating on that test is 89%.

(Copy)
EVERY PUPIL SCHOLARSHIP TEST
Bureau of Educational Measurements
Kansas State Teachers College, Emporia
TYPEWRITING, FIRST YEAR
(For one-half year of typing)
January 9, 1935
By Adelaide Kauzer, Kansas State Teachers College
Emporia, Kansas

DIRECTIONS: All material in this test will be graded according to International Contest Rules. Five (5) minutes are allowed at the beginning of the test for warming up on some practice material. Write as accurately as you can; erasures will count as errors.

Write from the following copy for exactly (10) minutes. Return to the beginning if you complete the copy in less than ten minutes.

This is the time of the year when we may expect to have snow, that gift of winter which is sent to place over all a soft blanket and to protect every living thing from the cold which the north wind brings with him when he makes his friendly call. The trees reach up to receive the flakes and to keep the wind from blowing them away. Under the trees the flakes are shaded from the sun of the first days of spring, which would otherwise melt them too soon. When, regardless of all this care, the waters run away, the roots of the great plants hold onto the ground in which they live and protect it from the running water, which would carry it to the sea. And so withheld, the water sinks down through the leaves and the ground, bringing life to the plants during the weeks and weeks of summer, when hot days and nights make beggars of even the grasses. The springs which supply many of our streams are also kept alive by this same source. If it were not for this restraining power, in times of much rain our streams would fill rapidly and flood the land; and in times of drought they would be without water; and man, as well as every other form of life, would be made to suffer.

In this great service the little trees are just as helpful as the big ones; and each little bush does its part. It has been shown at different times that brush is just about as good as forest when it comes to holding snow and ground water and to keeping the soil from being carried away. If you will look at the waters in the ditches after a rain, you will see that they contain mud, which is soil carried from the fields. Or, if you will look at the dust in the air on a windy day, you will see that this, too, is ground moving from one place to another. After a time so much may be blown away in some places that the plants will die.

The regard which man places on this gift of snow may be seen by the interest with which the people in the valleys look to the mountains and study the weather reports, and by the care with which the engineers measure the rainfall and make their estimates by putting long tubes into the banks and weighing the samples that they take out. Heavy snows will fill the reservoirs to which the people look for water and without which they can not live; they fill the rivers from which the men in the West irrigate the land; they cover the wheat on the plains so that there may be bread for all.

Before man made his home in a new region, there were great sections of the country covered with trees or with brush or grass. In sections of this kind, water stood for days at a time or for weeks after a rain, and in winter the snow stayed on the ground for a very long time. Of course, when the moisture was held in one place for so long, much of it sank into the ground and there it kept the springs running throughout the year. But man cut the trees, and he broke up the ground. The work of erosion, which seemed to be waiting only for the clearing of the land, began at once. The water, no more withheld by the roots of the plants, flowed off very rapidly; and the swift running of the water formed gullies in the ground. One need but examine the ground after a hard shower to see how changes of this kind are brought about. The same thing has happened on land which has been grazed too closely. At times such places may have floods, and at other times they may have drought. Springs have dried up long ago; the water under ground has gone down so that there is no longer enough moisture for the grasses or for any of the other growing things. In the last stage, such land comes to be a desert. We say that the climate is changing, but we do not wish to say that we have had any part in bringing about the change.

It may be that man will yet learn to live in harmony with nature, being content to let her have her way about some parts of the country while he rules some others. He may even, by and by, see the harm he has done and attempt to make things right. Far more ground has been planted than is needed for food, and men who are far seeing are now willing for nature to have her way about that on which man needs to work hard to make a living. These men would like to plant a large part of our country to trees, forming a band from one side to the other. Their hope is that the land farther east would benefit by a better climate. A plan of this kind probably would be all right if the trees would grow; but it may be too late for that now. In the last three years much of the best soil has been lost, and it would now be hard to raise anything. (4589 strokes)

International Typing Test
J. N. KIMBALL
453 East 141st Street, New York City

A good many years ago I was taught a lesson that has stood me in good stead many times since then. Stated as briefly as possible it was to the effect that in building anything--and it matters not what that thing may be, a house, a packing case, or an education--the last nail that one drives is fully as important as the first, in fact it may be the most important of all. The lesson I speak of was learned from something that occurred over fifty years ago and yet the details stand out strongly in my memory.

At the time to which I refer I was engaged as a civil engineer more or less in charge of two parallel streaks of rusty iron, commonly called a railroad which had their beginning at tidewater and ran back into the country some hundred and fifty miles. If there is anything worse than third-class then the railroad I speak of was just that thing. It was a fine example of what a road should not be, and it is my impression that it has not improved since that time.

My labors were not onerous, in fact I had plenty of time on my hands and I was permitted to take advantage of anything in the way of an outside job that might come to me. The road tapped but a few towns, all small, the largest having a population of not more than twenty or thirty thousand. One day an invitation came to me from the trustees of one of the smaller places, the outcome of which was that I was asked to make a map of the town as it was needed for filing away at the county seat.

There was nothing out of the ordinary in the job and I went to work at it. Much of the business portion of the town was situated in a valley through which flowed a trifling sort of stream, hardly big enough to call a river, and the main street ran along its banks something like eight feet above the water. I made a careful survey and then drew a pretty map on which was to be seen the correct position of every street, every building and every fence, and also the meandering of the little creek.

It so happened that the survey lines ended on a hill about seventy-five feet above the main street and the floor of the valley, and when I was ready to quit I told one of my assistants to get a railroad spike and drive it down flush with the surface of the asphalt sidewalk to mark the end of my line. Then I went to work on the map and having finished it sent it to the trustees with my bill. The map itself was pronounced perfect, but not so the bill and it was some time before I could bring that board around to my side of the argument, but at last they capitulated and paid me what they owed me and I proceeded to forget it. . .
. . . . . .

(5893 strokes)

(Copy)

TYPEWRITING I
April 10, 1935
By Adelaide Kauzer and Vera Davis
Kansas State Teachers College
Emporia, Kansas

DIRECTIONS: Five (5) minutes are allowed at the beginning of the test for warming up on some practice material. Write as accurately as you can. No erasures are to be made on any part of this test.

Write from the following copy for exactly fifteen (15) minutes. Return to the beginning if you complete the copy in less than fifteen minutes.

How Indian summer got its name is not known, for no reference to the term is to be found in any Indian legend. The settlers did not use the name, but it is believed that it was in common use when this country was very young. But regardless of what it is called, the season is one of delight.

Indian summer is that part of the year which appears some time after the first frost of fall and before the cold, dark days which come at the beginning of the winter. It is a time of gentle winds, warm days and cool nights, and calm, hazy weather which brings with it a feeling of comfort that is too good to last for very long. All out-of-doors seems to feel that something new is about to take place and that every living thing must make ready for that something. The landscape is full of the reds and golds and browns of the changing trees and the fall flowers; birds gather into flocks; small animals are busy putting away their supply of winter food; and insects are on the lookout for homes for the winter. Each creature knows just what to do to get ready for the cold days that are to come, and each knows just how to go about doing it. Some will make their homes in trees; and some will dig deep into the ground, where they keep their food supply.

This is the time of year when the trees pay the earth for what they have taken from it. Fruits are mature; the falling leaves add to the richness of the ground and keep the small plants which have been living in their shade from the cold, at the same time holding the moisture which will give the little plants an early start in the spring. Everywhere there is endless splendor. It is hard to think of a shade or a tint which cannot be found in this second childhood of the year, this time which has been called "October's bright, blue weather"; and no master artist could blend the parts into a more perfect whole. . . . . .
. . . . . (4705 strokes)