AN EXPERIMENTAL STUDY OF THE DICTAPHONE METHOD OF TEACHING TYPEWRITING TO RETARDED STUDENTS

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INTRODUCTION

This study of Dictaphone typewriting was made at the suggestion of the Secretarial Training Staff of the School of Commerce, Oklahoma Agricultural and Mechanical College, Stillwater, Oklahoma, which was desirous of ascertaining whether the Dictaphone Method is superior to the Traditional Method in the remedial teaching of typewriting.

One semester of typewriting is required of all students enrolled in the School of Commerce who have not acquired the skill elsewhere. Many students are uninterested and have no aptitude for the subject. Because of this inaptitude and lack of interest, the retarded students constitute an important problem.

The rate of failure in these beginning classes is high. An analysis of the enrollment of the classes in beginning typewriting for the four years preceding this experiment revealed 660 students. Of this number 7.9 per cent dropped the course before the end of the semester; 12.2 per cent failed the course; 4.8 per cent received "E" which is a conditional grade; and 11.9 per cent received a grade of "D". These data are shown in Table I. There were 247 students or 36.8 per cent of the total enrollment of 660 that failed to make a grade above "D". These figures show that there has been no appreciable decrease in the number of low grades, failures, and drop-outs during the past four years.

Some of the common causes of retardation, errors, and failure in typewriting, according to recent writers, are as follows: indifference, carelessness, fatigue, sluggishness, lack of rhythm, lack of initiative or resourcefulness, imperfect automatization, excessive action,

TABLE I

Enrollment in Beginning Typewriting Classes,

Showing Drop-Outs, "F", "E", and "D", grades

for years 1933-1937

Year	Number Enrolled	Drop-Outs		F		E		D		Totals	
		No.	%	No.	%	No.	%	No.	%	No.	%
1933-34	151	18	2.7	11	1.6	13	1.9	23	3.4	65	9.6
1934-35	110	11	1.6	21	3.3	9	1.3	20	3.0	61	9.2
1935-36	215	8	1.2	30	4.5	11	1.6	14	2.1	63	9.4
1936-37	184	16	2.4	19	2.8			23	3.4	58	8.6
TOTAL	660	53	7.9	81	12.2	33	4.8	80	11.9	247	36.8

inaccurate reading, lack of proper incentive, and ignorance of the correct method of handling a given situation in typing.[1]

The Secretarial Training Staff decided the Dictaphone might be of value in eliminating the large number of failures in beginning typewriting classes. The Dictaphone method gives the instructor more time for individual help because he does not have to stop the entire class to help one or two students. The machine dictation also provides the instructor a better opportunity to watch the student at work.

The Educational Division of the Dictaphone Corporation claims the system develops the mental and muscular coordination which is a most important trait in learning typewriting. It also claims to eliminate errors due to inaccurate reading, and to improve rhythm. This system claims to develop alertness by keeping the student writing at a speed which requires his best efforts, and to provide a greater incentive because the student works in groups.

The Dictaphone uses an additional sense in covering the subject, that of hearing. Miss Ramona Beall, Director of the Educational Division of the Dictaphone Sales Corporation claims that

> . . . . inasmuch as one must concentrate more deeply when learning a subject through the sense of hearing than is necessary with a sense of touch, concentration is developed to a high degree in this subject.[2]

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1. E. G. Blackstone and S. L. Smith, Improvement of Instruction in Typewriting, p. 409; A. Dvorak, N. L. Merrick, W. L. Dealey, and G. C. Ford, Typewriting Behavior, passim.

2. Personal letter under date of December 29, 1937.

CHAPTER I

PURPOSE, MATERIALS, AND METHOD OF THE STUDY

PURPOSE OF THE STUDY

The purpose of the study was to determine the value of the Dictaphone method in remedial work in the teaching of typewriting to retarded students as compared with the value of the traditional method of teaching typewriting.

MATERIALS

The experiment was conducted in the regular typewriting room of the Secretarial Training Department of the School of Commerce, Oklahoma Agricultural and Mechanical College. It was equipped with sixty standard typewriters of various makes, the customary type of individual typewriter tables, Remington Rand typewriter chairs, and the Dictaphone transcribing machine.

The materials used for the experimental group included the transcribing machine equipped with multiple tube unit, rhythm ring, permanent practice records, eight textbooks, and other material such as the course of study, error analysis charts, and monthly typewriting tests. The Dictaphone Sales Corporation cooperated in promoting the experiment by supplying the materials used. The textbooks furnished were Miller Dictaphone System of Typewriting, 1935 Edition, by Charles Miller.

The Dictaphone transcribing machine was placed on a pedestal in the northeast corner of the room, where the light was good. It was easily accessible to the eight students who used the individual hearing tubes attached to it.

The students learning typewriting by the traditional method furnished

their own books. The textbook they used was Gregg Typing Techniques and Projects, College Course, by Rupert SoRelle and Harold Smith, 1932. They had no other books or materials except mimeographed copies of corrective drills.

The subjects of the study were permitted to choose the typewriters they were to use during the experiment.

The tests used were the Educational Research Bureau Typewriting Tests.

METHOD

The method used in this study was what is commonly known as the experimental method.

> "Experimentation is the name given to the type of educational research in which the investigator controls the educative factors to which a child or group of children is subjected during the period of inquiry and observes the resulting achievement."[3]

This study compared the progress attained in learning typewriting by four classes of retarded college students enrolled in first year typewriting classes in the Secretarial Training Department of the School of Commerce, Oklahoma Agricultural and Mechanical College, during the first semester of 1937-38. In each of the four classes there were sixteen retarded students; eight were taught the skill by the traditional method; eight were taught by the Dictaphone method. The sixty-four students used in this study were selected from a group of 151 students taking first year typewriting.

During the first six weeks of the semester all students enrolled

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3. Carter V. Good, A. S. Barr, and Douglas Scates, The Methodology of Educational Research, p. 485.

in first year typewriting were taught the mastery of the keyboard, the essential typewriter parts, and the writing of simple copy matter. The traditional method was used in teaching the groups during this time. After six weeks the retarded students were selected from the group by means of a series of Educational Research Bureau Typewriting Tests. Thirty-two students formed the control group, and thirty-two students were in the experimental group. The classes were taught by three instructors in the Secretarial Training Department, one of whom was the experimenter.

The students in each class were tested simultaneously each week, writing ten-minute tests of the Educational Research Bureau. A careful record of their progress was kept as shown in Chapter III.

The first copy test was given at the end of two weeks. Subsequent tests were given weekly until the end of the semester, making a total of eight tests. The experimenter graded all tests according to the International Typewriting Contest Rules.[4]

The experiment represented the measurement of fifty-minute daily periods, five days each week, for a period of ten weeks. Classes met for the first time on September 13, 1937, and the final test was given January 12, 1938.

DEFINITION OF TERMS

Certain terms as used in this study should be understood, and they are defined as follows:

The Traditional Method

The traditional method as used in this study is the method or practice that is used in teaching, for no reason except that it is the way

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4. Copy of International Typewriting Rules is included in the Appendix

the teachers learned or were taught. They use it because it is the custom or because it has been handed down from one generation to another.

In this experiment the teachers taught the traditional method by following very largely the material as outlined in the textbook. Special remedial drills were provided on mimeographed sheets for the class as a whole.

The Dictaphone Method

The Dictaphone method of teaching typewriting advances the idea that teaching typewriting should be by means of direct dictation from reproducing machines. It is sometimes known as the Miller method.

> "It combines the sense of touch, sight, and hearing in acquiring typewriting skill. In other words, an additional sense is added in covering this subject and inasmuch as one must concentrate more deeply when learning a subject through the sense of hearing than is necessary with a sense of touch, concentration is developed to a high degree in this subject."[5]

This method differs from the traditional method in that the traditional does not use direct dictation as is used in teaching the Dictaphone method. The traditional method does not involve systematic remedial drills. The Dictaphone method requires more repetition than the traditional method by using a rhythm ring and records. The student writes the same material using the rhythm ring after he has copied it from the textbook. He then writes the same material from the record.

Remedial Work

Remedial work in typewriting consists of selecting for corrective practice those words, phrases, sentences, or lines in which an error has been made, and practicing to correct them as soon as possible after the

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5. Personal letter from Miss Ramona Beall, loc. cit., December 29, 1937.

error has been discovered. It involves the analysis of causes of errors.

Remedial work includes consideration of errors in typing, speed, accuracy, fluency, or technique. The practice or drill work is directed toward improving the weak points by repetition. Mimeographed sheets of corrective drills were supplied the students in the control group,[6] while the experimental group used the remedial drills in their own textbooks.

Retarded Students

The students in this study were retarded as to speed and accuracy in typewriting. They were the lowest one-third of all students enrolled in beginning typewriting.

REVIEW OF OTHER STUDIES IN THE FIELD

As far as could be determined, there have been no specific studies of the use of the Dictaphone in remedial work. Several studies relating to this problem and mainly to determine the value of the Dictaphone as compared to the traditional method of teaching typewriting have been made.

The Pearson Experiment

To test the claims of the Dictaphone method of teaching typewriting, an experiment was conducted by Pearson in the Commercial Department of the University High School at the State University of Iowa during the semester beginning September 17, 1925, and ending January 30, 1926.[7]

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6. Detailed Exercises shown in Appendix.

7. David C. Pearson, "An Experiment with the Miller Dictaphone Method of Teaching Typewriting." University of Iowa Monographs in Education, I, pp. 77-87.

Two classes in typewriting furnished the subjects for the comparison. The same instructor taught both groups, one class was taught by the traditional method, the other by the Dictaphone method. The traditional class, consisting of seventeen students, had an average intelligence percentile rank of 51.3. The Dictaphone class of 19 students had an average of 58.3, (Otis Intelligence Scale.) The Dictaphone class showed an average of 7 points higher than the traditional class.

There was approximately a little more than half a year's difference in the chronological ages of the classes; the traditional class averaged 19.8 years; the Dictaphone class 20.4 years.

The traditional class averaged 12 years in school training; the Dictaphone class averaged 13.5, a difference of approximately 1.5 years.

Blackstone speed tests were given to both classes at about weekly intervals, and the results carefully checked. The scores of the traditional class averaged 57 points; the Dictaphone class averaged 81 points, a difference of 24 points or 42 per cent in favor of the Dictaphone class. The statistical significance of this difference was not indicated.

The Dictaphone class had the advantage in intelligence, chronological age, and school training, although no attempt was made to get the brightest students, the oldest students, or the students with the most school training into the Dictaphone class. Nothing was known of these advantages when the classes were organized. Pearson thinks the differences in the intelligence percentile rank and chronological ages of the two classes are probably of little or no significance and that the difference of an average of one and one-half years more of school training in favor of the Dictaphone class is probably of importance.

Pearson concluded as follows:

> "The highest score of the traditional class represents about 53% greater achievement than is ordinarily made in one semester. The Dictaphone class reached a score 58% greater than the average class achieves in one semester. The Dictaphone class was typing at a rate about 68½ points faster than the traditional class at the end of the semester and had made a net gain in speed 63% greater than that of the traditional class. The individual pairs shown on the charts were the best obtainable comparisons, and in each case show a marked superiority in typing ability on the part of the students using the Dictaphones."

The Commercial Department at the University High School regarded the results as significant and decided to continue the use of the Miller Dictaphone method in all typewriting classes.

Experimentation in the Chicago Public Schools

The Dictaphone method of teaching typewriting is being used on a large scale in the Chicago Public Schools. Marion Tedens, Supervisor of Typewriting in the Chicago School System tells why Chicago adopted the new plan for teaching typewriting, how the program was worked out, and what the results of the experiment were.[8]

Chicago began experimenting with methods of teaching typewriting several years ago by investigating the soundness of the currently accepted theory that mastery of keyboard manipulation and advanced typewriting work should be merged. Various typewriting texts and instruction methods using this theory were employed. The result of the experiments showed scarcely any difference in methods of presentation or of textbooks. However, individual teachers, experimenting with methods for increasing speed and mental alertness, found direct dictation effective. Continued experiments showed that dictation by voice was not practical on account

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8. Marion F. Tedens, "Typewriting in Three Terms Instead of Four." The Journal of Business Education, IV, pp. 21-22.

of the severe strain upon the teachers.

During the process of these experiments, Chicago introduced Dictaphone machines and other office appliances in an endeavor to extend the vocational training department.

In 1928 the Chicago schools introduced the Dictaphone method of teaching typewriting into as many schools as they were financially able to equip. A small manual which had been prepared by Charles Miller during the course of his early work with the Dictaphone method of teaching typewriting was recommended by the manufacturer who supplied the Dictaphone equipment.

The testing program was broad in scope. Tests were given to every typewriting class at six week intervals for a period of two years. A comparison of results over the two years gave a trustworthy basis for judging the worth of the new typewriting plan.

That the Chicago schools have accomplished their purpose was plain, according to Mrs. Tedens.

> "First semester high school people in June, 1930, were writing approximately 20 words a minute (Blackstone Scores) under severe handicaps . . . . . The commercial curriculum . . . has as its basis a method of typewriting instruction that in two years has eliminated one semester of the typewriting program. Pupils now achieve in three semesters the same degree of skill formerly reached in four terms."[9]

The Experiment of Marie Marik

In September, 1928, Marie Marik conducted an experiment in Dictaphone typewriting in the Haaren Cooperative High School, New York City, a high school for girls. The pupils used for her experiment were girls enrolled in two classes beginning the study of typewriting. One class was taught by the Dictaphone method, the other by the traditional

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9. Ibid., pp. 21-22.

method.[10]

In comparing the two groups, Miss Marik found them to be quite evenly matched in all respects except chronological ages, intelligence quotients, and median ratings in English.

From the first typewriting test to the last one the two classes made approximately equal improvement, 68 points for the traditional class and 67 points for the Dictaphone class. The Dictaphone class made an average of 1.56 errors per pupil while the traditional class made 1.57 errors per pupil.

Summarizing the results of the experiment, Miss Marik decided that learning to typewrite by the Dictaphone method did not seem to result in a greater degree of speed or accuracy than learning the skill by the traditional method when doing simple copy work. If the students were really taught typewriting and not left to learn it by merely copying exercises from a text, the method used was of less importance than other factors, such as interest in the subject, a high degree of motivation, and a favorable learning atmosphere.

A relatively small percentage of typewriting students react favorably to machine dictation. Its greatest appeal was to those of superior ability. Favorable results in learning typewriting by the Dictaphone method may be influenced by some factor or factors which do not help to bring about success in learning typewriting by the traditional method.

Chronological age (when within the limits of approximately 12.75 and 15.5 years) and intelligence quotients do not appear to be valid

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10. Marie E. Marik, "Comparative Study of the Dictaphone and the Traditional Method of Learning Typewriting." Master's Thesis, New York University, 1929, Chapter V.

criteria in predicting success in learning typewriting.

Many factors affected the performance of pupils and probably conditioned their advancement in learning to typewrite. Some of these factors were attitude toward the learning, mind-set, physiological condition, etc.

Additional Studies

The Dictaphone method of teaching typewriting has been introduced in other schools in the form of controlled experiment, comparative study, and regular class work. The following comments and comparative test results are published by the Educational Division of the Dictaphone Corporation.

> "The Mary Miller Vocational School of Minneapolis, Minnesota, reported the following scores for the Dictaphone typewriting class in June, 1932:
>
> (Less than one year of training)
> Low . . . . . 28 (words a minute)
> High 50
> Median 39
>
> Note: This score is approximately 20 words a minute higher than the average traditional scores.
>
> "The Mary Miller Vocational School has definitely eliminated one semester in the teaching time for typewriting."[11]

Press comments on the Mechanic Arts High School experiment were as follows:

> "Pupils complete the direct dictation course in three semesters," said Commissioner Pearce, "while under the old system it took four semesters. A minimum speed of 40 words a minute on 15-minute tests is required under both systems."
>
> "Economy was the reason for the experiment--economy of learning time for the pupils."[12]

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11. Educational Division of the Dictaphone Corporation, Dictaphone Typewriting Facts, p. 1.

12. Ibid., p. 2.(Quoted from the Saint Paul Pioneer Press, Sunday, May 28, 1933.

Comparative results of Dictaphone and non-Dictaphone classes in Eveleth High School, Eveleth, Minnesota, were as follows:

"At the end of the first semester my beginning class made these scores (words a minute using the Dictaphone method) on their last fifteen-minute test:

Low 15
High 40
Median 22

"At the end of the second semester the same students made these scores:

Low 26
High 58
Median 40

"Of the two classes which began the work the second semester one class made these scores on their last test in June:

Low 15
High 36
Median 23

"And the other:

Low 13
High 36
Median 24

Note: It is evident that the "all-Dictaphone" group did nearly as well in one semester as the non-Dictaphone group did in two semesters, who began this method in the second half of the year."[13]

TABLE II

Comparison of the Dictaphone and Traditional Method[14]

The following figures cover a controlled test given at the Madison Vocational School

Week of Test	Median Strokes	Median Words	Blackstone Norms *Str.	Blackstone Norms Words	% above Blackstone Norm
6	75	15	40	8	87
9	108	21	51	10	112
10½	115	23	57	11	102
20	154	31	88	18	75

*Strokes a minute

Note: Blackstone norms are considered good figures for typewriting results with traditional methods.

13. Ibid., p. 5. From a talk by Irene Campbell at the M.E.A. Divisional Meeting, September 31, 1931 at Hibbing, Minnesota.

14. Ibid., p. 3.

CHAPTER II

SELECTION OF CONTROL AND EXPERIMENTAL GROUPS

SELECTION OF RETARDED STUDENTS

The students used as subjects in this experiment were enrolled in first year typewriting in the Secretarial Training Department of the School of Commerce, Oklahoma Agricultural and Mechanical College, Stillwater, Oklahoma, during the fall semester of 1937-38. Their classification ranged from freshmen to graduate students, and both sexes were included as shown in Tables V and VII.

All beginning typewriting classes were taught typewriting by the traditional method for six weeks. This was done in order to select the retarded students. On three consecutive days toward the end of the six weeks period, three three-minute accuracy copy tests were given in each class to decide which students should compose the retarded group to be used in the experiment. The Educational Research Bureau Typewriting Tests were used, and each student was given nine tests. The highest score for each day was selected, and the three highest scores were recorded and averaged.[1] The experimenter graded the tests as follows:

$$\frac{\text{gross strokes}}{\text{errors} + 1} = \text{accuracy}$$

The above formula, although it does not figure the percentage of accuracy the usual way, does give reliable scores from which the grader can arrange the results in ascending and descending order.

The averages of the retarded students were arranged in descending order as shown in Table III. The sixty-four students selected to comprise

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1. Detailed Table shown in Appendix.

the four classes of retarded students used in this experiment were those making the lowest averages in the tests. They were chosen alternately for the experimental group and the control group as shown in Table III.

The scores of the 151 students enrolled in beginning typewriting had a range of 563. The highest score was 592 and the lowest one 29. These are arbitrary numerical point scores, figured according to the formula.

The upper two-thirds of the scores had a range of 477, the highest score being 592 and the lowest 115. The lower one-third had a range of 83, the highest score being 112 and the lowest 29. Comparatively, then, the retarded students constituted a fairly homogeneous group.

The students were selected alternately to make the groups comparable. The experimental group had a range of 86, the largest score being 133 and the smallest 47. The control group had a range of 101, the highest score being 130 and the lowest 29.

During the experiment five students withdrew from the course; three were being taught by the Dictaphone method and two by the traditional method.

The Tryout Period

The typewriting course is planned to cover 160 periods ranging from 35 to 45 minutes. The class periods are fifty minutes in length.

The course was divided into three budgets of ten units each. During the six weeks in which one budget of ten units was completed, the student was taught the fundamentals of operating the typewriter; how to insert the paper in his machine and how to remove it; how to adjust the paper; how to start a new line, and how to space for it. Other parts of

TABLE III

Average Scores on Accuracy Tests Made by Retarded Students and Selected Alternately for the Experimental and the Control Groups.

(1)	(2)	(1)	(2)	(1)	(2)
133			106	83	
	130	105			80
127			100	79	
	127	100			78
127			99	78	
	124	97			77
124			97	76	
	122	96			76
121			96	76	
	120	92			75
118			91	73	
	117	91			66
117			90	59	
	117	90			58
115			89	56	
	112	89			56
112			88	56	
	112	87			53
110			86	51	
	109	84			50
106			83	47	
					29

(1) Experimental Group

(2) Control Group

the typewriter and the technique of operating them were introduced as the course progressed and they were needed. The student was taught the relaxed position that should be used when not typing and the alert typing position that should be employed when using the typewriter.

The keyboard was then taught. The index fingers were trained first, and then, the second, third, and fourth fingers in succession. The student was drilled on correct stroking, reached stroking, and shift stroking, words, and sentences. The keyboard was covered in the first five units of the budget.

The last five units of the budget were devoted to teaching the student to adjust the marginal stops, paragraphing, centering, error checking, facility drills, keyboard reviews, and accuracy tests. Corrective drills were given for keyboard errors and errors in manipulation.

Part of each period, usually at the beginning, was used for a brief review, and the latter part of the hour was devoted to individual instruction. After the keyboard had been covered, the student was drilled on the alphabet, the fifty commonest words, and practice material consisting of easy sentences. He was timed on one-, two-, and three-minute copy tests. These tests were planned to promote speed and surmount the inclination to listlessness which retards the student who is left to set his own pace in typewriting.

THE CONTROL GROUP

Analysis of Students

The control group was composed of 30 students; of whom 18 were men and 12 were women. The median chronological age was 19.7 years. Their median psychological score was 86. The range of the psychological scores

was 111, the highest one being 142 and the lowest 51. The upper quartile of the psychological scores was 105, and the lower quartile was 70. This group consisted of 16 freshmen, 9 sophomores, 3 juniors, and 2 seniors. The number of years of school training ranged from 12 to 15 years.

Teaching Procedure

The work in general was conducted as it had been during the first six weeks of the semester. The work outlined for the second budget consisted of accuracy and fluency tests, ten-minute copy tests, facility and keyboard review drills, the use of the error chart on which the student analyzed his errors, and corrective drills. The mimeographed copies of corrective drills which were used were not included in the text.[2]

The exercises were used as corrective drills in order to develop accuracy, rhythm, concentration, and technique. They were used individually and for group work, but were especially effective for individual improvement drills. The student analyzed his difficulties and was conscious of the fact that some remedial work was needed. When the student took this attitude, a great deal of good resulted from working up a page of these drills.

The student was instructed to write one exercise trying for a perfect copy or as few errors as possible. If an error was made, he was told to analyze it and write a line or two perfectly, then re-write the entire exercise just to be sure that the trouble had been corrected. He then wrote the exercise through two or three times as a test to determine whether or not he was having difficulty with any other letters or

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2. Copy of drills included in Appendix.

combinations of letters.

The sentences were used for relaxation. Of course, they required very little concentration, but accuracy, rhythm, and technique played a part in writing them also. The student wrote one sentence for a minute. He wrote for another minute and tried to write ten additional strokes. If he made errors, he decreased his speed and wrote for one minute without errors.

The entire sheet of drills was used in this manner. There was usually a noted improvement in the essentials mentioned above.

THE EXPERIMENTAL GROUP

Analysis of Students

The experimental group consisted of 29 students, of whom 21 were men and 8 women. The median chronological age of the students was 19.8 years. The median psychological score was 101. The range of the psychological scores was 149, the highest score being 185 and the lowest 36. The upper quartile was 127, and the lower quartile was 75. The number of years of school training ranged from 12 to 16 years. There were 15 freshmen, 6 sophomores, 5 juniors, 2 seniors, and 1 graduate student in the group.

Teaching Procedure

During the first six weeks of the semester the students in the experimental group were taught by the traditional method as previously explained.

Beginning with the seventh week the students selected for the Dictaphone classes were taught to handle the Dictaphone equipment, to develop the rhythmic key stroke through the use of the rhythm ring,

and to accustom themselves to transcribing from records. This latter took some time as the students did not look at their books while transcribing from records, and it was difficult for them to understand the voices of the records. They, also, had to accustom themselves to using the hearing tubes.

The course of study supplied by the Educational Division of the Dictaphone Sales Corporation was followed as closely as possible, the student beginning with the first unit in the textbook. The first part of the work was covered rapidly as the students were already familiar with the keyboard. This helped them to become accustomed to the new method of teaching, and to direct dictation from the machine.

The general plan of teaching Dictaphone typewriting was as follows. (1) The students copied the exercise from the textbook. (2) They wrote the same exercise as in (1) to the beat of the rhythm ring. (3) They transcribed a master record (test) which was supplied for the end of each unit, and which covered the work given in the unit. (4) They wrote word and phrase drills which were in the textbook, using words which followed the relative location of each row of keys. This drill was used to fix the placement of each key and to strengthen the weak fingers. (5) They were given accuracy tests, copied from the book, and facility drills which were copied from the Dictaphone book and were forerunners of the speed test. (6) Finally, speed tests were taken by the entire class, including both the control and experimental groups.

Each student kept a chart analyzing his errors made on the ten-minute copy tests to be used as a basis for remedial work. He also scored his own tests which were later graded by the experimenter. The chart used for the analysis of errors was not the chart supplied by the

Dictaphone Company, but one used by all first year typewriting students in the Secretarial Training Department. However, the remedial drills in the Dictaphone typewriting book were used, as they are an important part of the Dictaphone course.

Thirty units of the textbook were completed during the semester so that an equal amount of work would be covered in both the control and experimental classes. Twenty-seven records were completed. The Dictaphone students were able to transcribe the first twenty-four records at the rate of speed at which the dictation was given. It appeared to the instructors in charge that records 25, 26, and 27 were more difficult for the students, and the retardation of the students was evidenced by their inability to keep up with the dictation.

The Miller Dictaphone System of Typewriting, 1935 Edition, by Charles Miller, was the textbook used in teaching the Dictaphone group.

COMPARABILITY OF GROUPS

A comparison of the experimental and control groups reveals that in all respects for which data were available they were essentially equal. The two groups were compared as to (1) psychological score, (2) sex, (3) chronological age, and (4) school training.

The psychological scores were obtained from the college files, each student having been given the Ohio Psychological Examination on entering college. Information concerning sex, age, and school training was obtained from the college records.

There is a wide difference of opinion as to the relationship between certain criteria and the ability to learn to type swiftly and accurately. Educators have made many attempts to find a method for predicting typing

skill, but there seems to be no common agreement as to how best to do it.

White finds as a basis for forecasting the achievement the following types:

> "(1) Mental traits or native capacities, as general intelligence; (2) Mental skills, as reading, code learning, substitution, etc.; (3) Motor abilities, as tapping speed, eye-hand coordination, reaction time, etc.; and (4) Personal factors as age, school grade placement, vocational interests, purpose in learning to typewrite, etc."[3]

He states that no one factor alone is responsible for achieving typewriting success, but a number of independent factors, and he advises that the best basis for deciding any person's aptitude for typewriting is a multiple regression equation based upon the correlation of each factor to typewriting achievement and the inter-relationship of the factors.

Psychological Scores

Puckett found that a student ranking high in I.Q. will also be likely to rank high in typing grades. He believes that the greater mental capacity a student has, the better typist he can become.[4]

Pearson considers the difference in the intelligence percentile rank and chronological ages of his classes as "probably of little or no importance."[5]

George is of the opinion that there is some relationship between intelligence and the ability to learn to type.[6]

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3. Bruce White, "Prediction of Typewriting Success." The Journal of Business Education, X, pp. 15-16.

4. Cecil Puckett, "The Rank of the Inferior Student in Typewriting," The Balance Sheet, XI, p. 262.

5. David C. Pearson, Op. Cit. I, p. 81.

6. Guy G. George, "The I. Q. as a Criterion of Ability to Learn Typewriting," The Balance Sheet, XII, pp. 235-238.

Bradford obtained the I. Q.'s and typing scores from 287 cases and, as a result of her study, reached the conclusion that there is no relationship between typing ability and mental ability as disclosed by a Terman Group Test of Mental Ability and the inclination to make errors. If a student ranking high in mental ability by the group test is likely to become a poor typist, and one ranking low by the same test is likely to become a good typist, it would seem that mental ability, as measured by intelligence testing, is not the only factor entering into the developing of competent typists.[7]

The mean psychological score of the control group was 87.5±3.4 The range was 111, the highest score being 142 and the lowest 31. The standard deviation was 27.1±2.4. The mean psychological score of the experimental group was 101.1±4.3 The range was 149, the highest score being 185 and the lowest 36. The standard deviation was 34.3±3.0.

The difference in means is 13.6±5.5. This is not statistically significant and can be accounted for on the basis of chance. The difference in standard deviation 7.2±3.8 is a statistically insignificant difference. Hence, the control and experimental groups were essentially the same in intellectual ability as measured by the Ohio State Psychological Examination.

Sex Differences

A careful check of available material revealed no study which had been made in relation to sex differences in learning to typewrite. However, Starch, is of the opinion that men and boys are superior to

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7. Lilah Bradford, "Does Typing Ability Depend on Mentality or Dexterity?" The Journal of Business Education, IV, pp. 23-24.

TABLE IV

Comparison of Psychological Scores

of Control and Experimental Groups of Retarded Students

Scores	CONTROL GROUP Male	Female	Total	EXPERIMENTAL GROUP Male	Female	Total
185-194				1		1
175-184						
165-174						
155-164						
145-154					1	1
135-144	1	1	2	1		1
125-134	1		1	2	3	5
115-124	3		3	2		2
105-114	1	1	2	2		2
95-104	2		2	2	3	5
85- 94	2	2	4	3		3
75- 84	3	4	7		1	1
65- 74	2		2	2		2
55- 64	1		1	2		2
45- 54	2	1	3	1		1
35- 44				2		2
25- 34		1	1			
*Total	18	10	28	20	8	28
	Mean 87.5 ± 3.4			Mean 101.1±4.3		
	Difference 13.6 ± 5.5					
	S D 27.1 ± 2.4			S D 34.5±3.0		
	Difference 7.2 ± 3.8					
	Range 111			Range 149		

*Scores not available for 3 students.

women and girls in motor activities.[8] Motor activity is one of the factors involved in typewriting ability.[9]

There were 19 men and 13 women in the control group, and 23 men and 9 women in the experimental group.

The four classes in beginning typewriting consisted of 97 men and 54 women; 64.2 per cent of those enrolled were men, and 35.8 per cent were women. As typewriting is required of all students in the School of Commerce and there are more men than women enrolled, this may account for the greater number of men.

Of the 64 students selected for the retarded group, 42 or 65.6 per cent were men; 34.4 per cent, 22 subjects, were women. Thus, the ratio of men and women in the retarded group was essentially the same as in the entire group.

While the ratios of men to women were approximately the same, this is actually not indicative of the situation because of the fact that men are deemed to have higher motor ability than women,[10] and motor ability is one of the important factors contributing to typewriting achievement. Actually then, the retarded group was weighted more heavily with men. Whether this influenced the results is not known because individual motor ability tests were not given.

TABLE V

Differences in Sex

	Total	Male	Female
Control Group	30	18	12
Experimental Group	29	21	8
Number dropped	5	3	2
TOTAL	64	42	22

8. Daniel Starch, Educational Psychology, p. 68.

9. William F. Book, Learning to Typewrite, p. 424.

10. Starch, loc. cit.

Chronological Age

The personal factor of age as a trait for forecasting the ability to learn typewriting has received very little study. Thorndike in his experiment with learning by adults in secretarial schools compared five age groups, 15 to 16, 17 to 19, 20 to 24, 25 to 29, and 30 or over. The experiment was difficult because the age groups were unlike in intelligence and in time spent upon learning. The result was that ages 17 to 19 and 20 to 24 were undistinguishable. The groups 25 to 29 and 30 or over learned almost as well as those 17 to 24. There was no apparent difference between learning typewriting and learning shorthand in the age effect.[11]

Davis considers chronological age among the criteria which do not foretell ability to learn to typewrite.[12]

Chronological age as one of the factors in learning the typewriting skill was considered in the investigation made under a grant from the Carnegie Foundation for the Advancement of Teaching. White in a review of part of the investigation reports the typewriting achievement of 417 students was correlated with their ages, which ranged from 12 to 65 years. It was found that the correlation here was not linear, that is, ability to type rises with age up to a certain point, from 27 to 30 years for accuracy, and from 21 to 24 for speed. Both speed and accuracy increase rapidly up to about 21 years. Then there was very little change until about 35 years, after which there is a gradual decrease. The students who were 16 years of age and the group from 45 to 48 learned at about

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11. E. L. Thorndike, Adult Learning, p. 79.

12. H. H. Davis, "Measurement in Commercial Education in the St. Louis Schools." University of Iowa Monographs in Education, I, p. 43.

the same rate of speed.[13]

Thorndike made an experiment with adult men of low mentality. He found that the curve of ability to learn in relation to age from 22 to 42 is a very slow decline and is no greater for low intelligence than for high intelligence.[14]

There was a difference of one month in the median age of the two groups used in this experiment. The control group had a median age of 256 months and the experimental group had a median age of 257 months.

The ages of the control group had a range of 398 months, the highest age being 600 and the lowest 202. The quartile deviation was 22.97 months. The ages of the experimental group had a range of 83 months, the highest age being 296 and the lowest 213 months with a quartile deviation of 31.05 months. Thus it is apparent that there is very little difference in the learning ability of the two groups as far as age is concerned.

School Training and Classification

The effect of the number of years spent in school on the ability to learn typewriting was studied by the Carnegie Typewriting Investigation Committee. This investigation of factors affecting the acquisition of typewriting skill was made possible by a grant from the Carnegie Corporation through the Carnegie Foundation for the Advancement of Teaching. White, in his report of the part of the investigation connected with school training, states that it was found that, when age was held

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13. White, loc. cit.

14. Thorndike, op. cit. p. 59

TABLE VI

The Age in Months of 30 Control Group Students and 29 Experimental Group Students

Interval in Months	Control	Experimental
600	1	
290-296		2
284-290	1	
278-284		
272-278	2	1
266-272	2	1
260-266	1	1
254-260		
248-254	5	5
242-248	3	2
236-242	1	3
230-236	7	2
224-230	2	1
218-224	2	6
212-218	2	5
206-212		
200-206	1	
TOTAL	30	29
Median	236	237
Mean	234.6	242.9
S D	22.17	29.09

constant, it made little difference how long the learner had attended school.[15]

A comparison of Dictaphone and traditional method classes at the University of Iowa in 1926 showed an average of one and one-half years more of school training in favor of the Dictaphone class. In Blackstone tests given throughout the time of the experiment, the Dictaphone class made 24 points above the traditional class. Pearson, who conducted the experiment, expressed the opinion that the difference in school training is probably significant. Whether it can serve as an explanation for the difference of 42 per cent in support of the Dictaphone class in typewriting scores is open to question.[16]

The number of years of school training of the control group ranged from 12 to 15 years. The school training of the experimental group showed a range from 12 to 16 years. More than one-half of the students in each group were freshmen. The experimental group was about one-half a semester more advanced than the control group which indicates that the groups as far as school training is concerned are essentially equal.

TABLE VII

Classification of Retarded Students

	Total	Fresh	Soph	Jr.	Sr.	Grad.
Control Group	30	16	9	3	2	0
Experimental Group	29	15	6	5	2	1
TOTAL	59	31	15	8	4	1

15. White, loc. cit.

16. Pearson, op. cit. I, p. 81.

SUMMARY

The students used as subjects of this study were those enrolled in first year typewriting. Their classification ranged from freshmen to graduate students with more than half being in the freshman class.

They were selected as retarded students on the basis of their scores on three-minute copy tests given on three consecutive days to all students enrolled, and were approximately the lowest one-third of all beginning typewriting students.

Both groups were taught by the traditional method for six weeks. At the beginning of the seventh week, the students were divided into two groups, and the experiment was begun.

There were 32 students in the control group which was taught by the traditional method. The experimental group consisted of 32 students, and they were taught by the Dictaphone method.

The two groups were compared as to psychological scores, sex, chronological age, the school training. It was found that the two groups were essentially equal and therefore comparable as to the above data.

CHAPTER III

ANALYSIS OF RESULTS

In the preceding chapter it was shown that the control and experimental groups were essentially comparable. The results of the experiment are analyzed in this chapter by a comparison of the achievement of the two groups on periodic speed and accuracy tests, by an analysis of the types and extent of errors made on these tests, and by comparison of the final achievement and grades at the end of the semester.

Speed Tests

Analysis of the data shown in Table VIII reveals the fact that the two groups progressed similarly in the average number of words per minute written on eight tests. The tests used were the Educational Research Bureau Typewriting Tests and the same test was given to each group at the same time, each Wednesday during the regular class period. The tests were scored in the usual manner and according to the International Typewriting Contest Rules.[1]

During the semester the control group increased from an average of 15.8 words per minute on the first test to 23.7 words per minute on the eighth test, an increase of 9.9 words per minute. The experimental group increased from 14.6 words per minute on the first test to 23.3 words per minute on the eighth test, an increase of 8.7 words per minute. That the difference is statistically insignificant may be seen from the probable error of the differences of the several tests.

The average score of the control group was consistently, although insignificantly, higher than the average score of the experimental group.

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1. Copy in the appendix.

TABLE VIII

Mean W.P.M* of 8 Typewriting Tests

Test No.	Date	Control		Experimental		Difference	
		Mean	SD	Mean	SD		
1	Nov.10	13.8±.9	7.6	14.6±.9	7.12	.8	±1.2
2	Nov.17	14.5±.9	7.4	14.0±.8	6.24	.5	±1.2
3	Nov.23	17.2±.73	6.1	16.7±.81	6.6	.5	±1.1
4	Dec. 1	17.0±.73	6.5	16.0±.93	7.58	1.0	±1.2
5	Dec. 8	19.8±.84	7.0	19.4±.83	6.76	.4	±1.2
6	Dec.15	19.4±.93	7.7	17.9±.93	7.6	1.5	±1.3
7	Jan. 5	22.5±1.02	8.46	20.0±1.00	8.12	2.5	±1.4
8	Jan.12	23.7±1.1	8.4	23.3±.73	6.1	.4	±1.3

*Words per minute

These data reveal that neither group was superior, as far as average scores were concerned, to the other group.

The fact that both groups made lower average scores on the same tests, the fourth and sixth, raises some doubt concerning those particular tests or the time at which they were given. The fourth test was given following Thanksgiving vacation and the sixth test was given immediately preceding the Christmas vacation.

The highest scores made on each test are shown in Table IX.

TABLE IX

Highest W. P. M. Made on Each Test

Test	Control Group	Experimental Group
1	31	30
2	29	32
3	29	29
4	29	35
5	31	30
6	33	35
7	37	39
8	39	43

The distribution of the highest scores made by each student during the experiment and the mean score made by each student is shown in Table X. Study of the highest score made by each student shows that while the highest score made at any time was made by a student in the experimental group, the control group as a whole made higher scores than the experimental group. The difference, however, is statistically insignificant and may be due to chance.

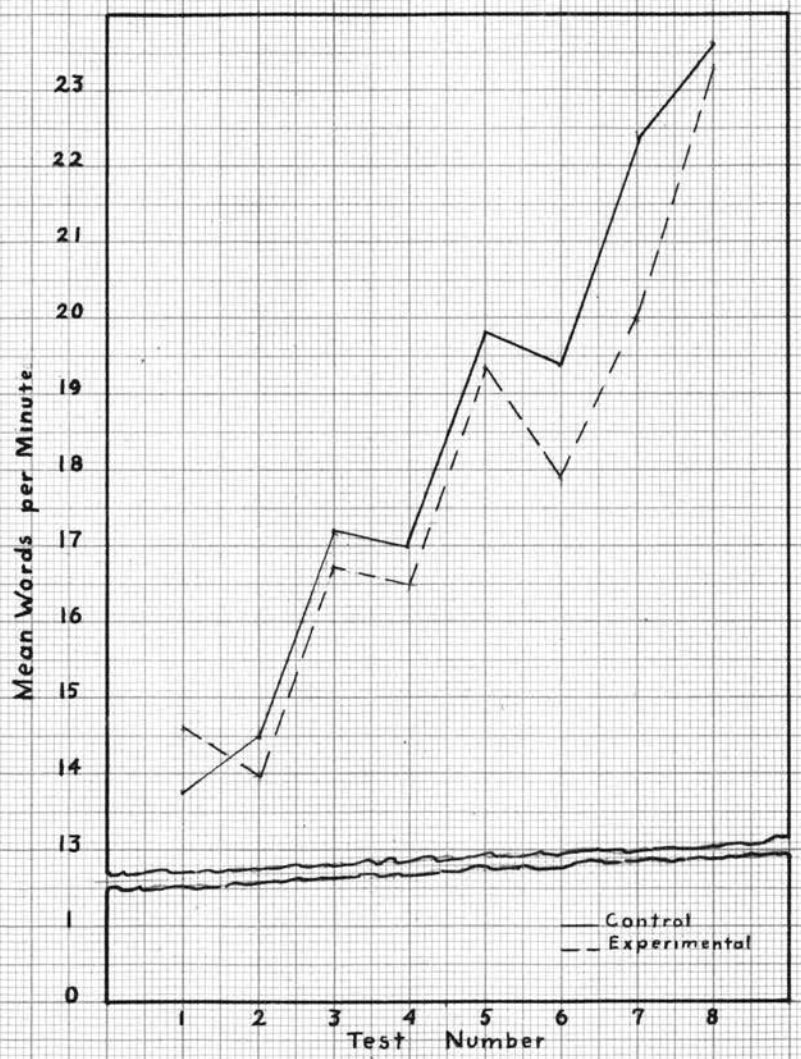

Figure I

MEAN WORDS PER MINUTE ON EACH OF EIGHT TESTS

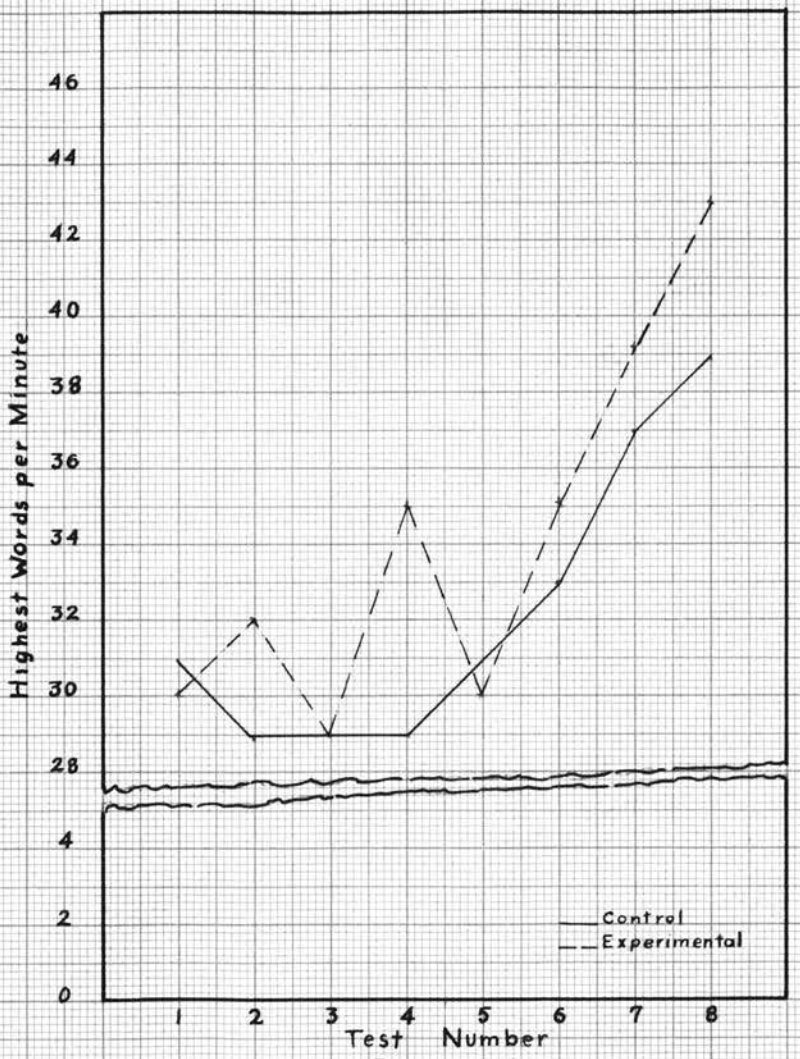

Figure II

HIGHEST WORDS PER MINUTE ON EACH OF EIGHT TESTS

TABLE X

Comparison of the Highest and Average Number of Words per Minute Students in the Control and Experimental Groups Made on Speed and Accuracy Tests

Scores	Highest Score		Mean Score	
	Control	Experimental	Control	Experimental
43-45		1		
40-43				
37-39	2			
34-36	4	2		
31-33	3	1		1
28-30	3	5	1	
25-27	4	7	3	1
22-24	5	6	5	4
19-21	5	2	6	6
16-18	2	1	6	7
13-15		1	3	5
10-12	2	3	2	1
7- 9			2	1
4- 6			2	3
Total	30	29	30	29
Mean (Diff. (Means)	25.7±1.3 1.0±1.8	24.7±1.3	17.8±.7 .7±1.1	17.1±.8
S D (Diff (SD)	7.4± .7 .1±1.4	7.3 ± .6	5.75±.5 .65±1.4	6.4±.5
Range	29	33	24.4	29.2

The standard deviation of each group of the distribution of the higher scores of each group was identical. The difference in the mean scores of the students in each group was also insignificant. A comparison of the data from the eight tests indicates that the achievement of neither was superior to that of the other group. However, it should be noted that the poorer and better students in the control group had higher highest scores and higher mean scores than the poorer and better students in the experimental group. The average students in the experimental group had higher highest and higher mean scores than the average students in the control group. This may be due to the fact that all experimental students were required to maintain the same rate of speed while practicing from the Dictaphone records.

Analysis of Errors

A comparison of the control and experimental groups, classified by tests and according to the types of errors made on each of the several tests, is shown in Tables XIa and XIb. A study of the total errors made on each test irrespective of type shows that on five tests the control group made fewer errors per student than did the experimental group; that on three tests the experimental group made fewer errors than the control group. However, the average number of errors per student per test shows that the control group averaged only one less error than did the experimental group. This difference is so small as to be negligible.

An analysis of the relationship of the two groups on different types of errors shows that there may be a tendency for students using the Dictaphone to make more errors of substitution. Students in the control group tended to make more errors classified as rewriting and failure to print.

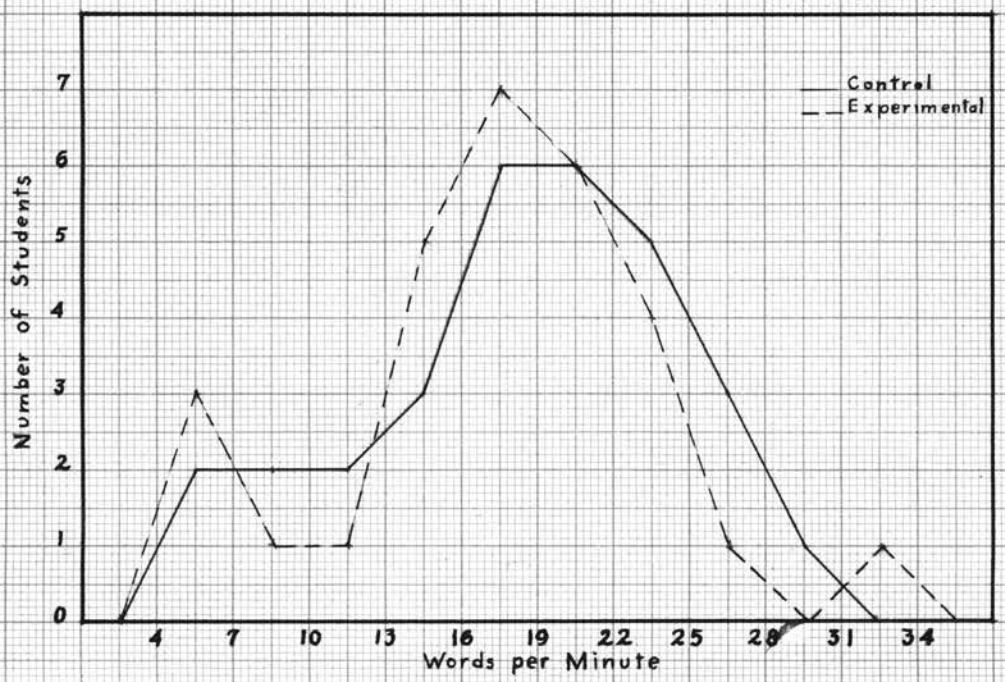

Figure III

MEAN WORDS PER MINUTE MADE BY EACH STUDENT ON THE EIGHT TESTS

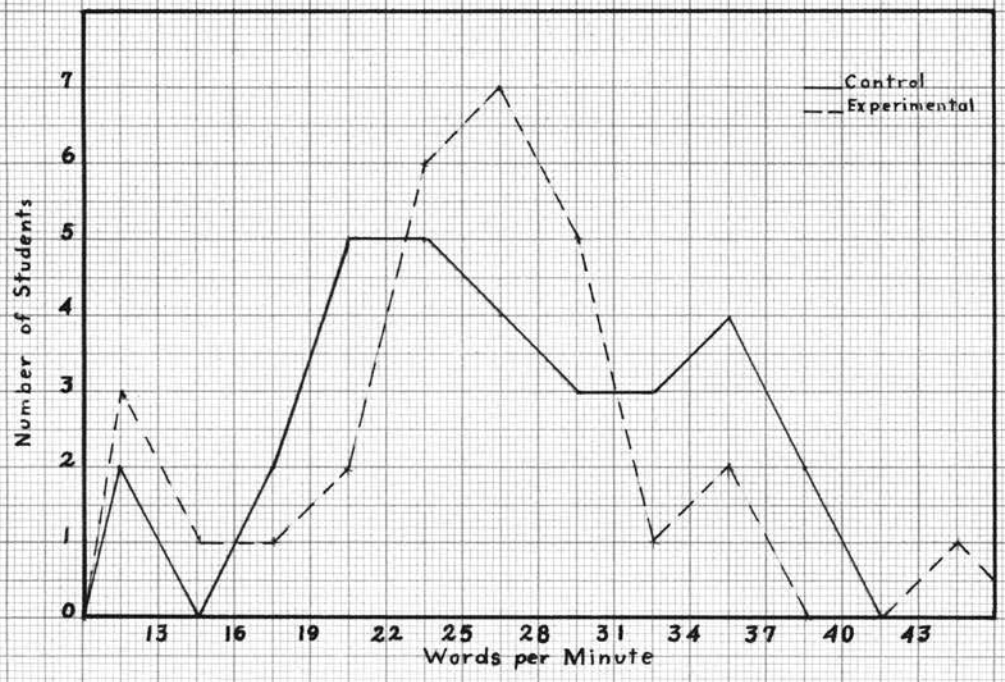

Figure IV

HIGHEST WORDS PER MINUTE MADE BY EACH STUDENT AT ANY TIME

In interpreting the error chart, one should remember that at the beginning of the experiment the control group was accustomed to its material and that the Dictaphone group was learning to master the Dictaphone technique. It should also be remembered that all the practice of the control group was similar to the practice demanded on the tests, whereas, the Dictaphone group had only one-half as much practice typing from the written page as the control group. It may be that if the tests given the experimental group had been recorded on the Dictaphone records so that each group would have an equal chance on the tests as compared with their practice work, a real difference might be apparent.

As far as these data are concerned, however, there is no difference in either the type of errors made or the extensiveness of making errors.

Grades and Final Achievement

A comparison of the final grades of the control and experimental groups and of the grades given all other students enrolled in typewriting for the years 1937-38 is shown in Table XII.

Final grades on speed and accuracy tests were assigned in accordance with the following schedule:

Grade	Words a Minute	Accuracy
A	35	93%
B	30	88%
C	25	85%
D	25	80%

Speed tests in addition to the ones used in this experiment were given to both groups, but only one test in which the control and experimental groups were compared was given each week. However, all tests given during the semester were considered when the grades at the end

TABLE XIa

Analysis of Errors

Error	Test 1		Test 2		Test 3		Test 4		Test 5		Test 6	
	C	E	C	E	C	E	C	E	C	E	C	E
Misstrokes	146	165	166	117	167	134	140	169	130	118	100	142
Syllabication	3	10	11	6	3	11	3	9	9	5	3	3
Omission	14	22	12	14	14	21	19	23	21	26	22	27
Insertion	10	21	7	19	13	15	14	9	14	17	10	20
Rewriting	2	1	3	1	2	0	3	0	2	1	2	0
Substitution	14	44	45	63	36	48	24	42	16	46	27	48
Transposition	6	7	13	14	14	13	9	8	17	11	16	19
Margin	3	0	0	0	1	0	0	0	1	0	0	0
Failure to Space	13	15	20	20	5	12	20	16	9	16	26	26
Skipped Spaces	11	9	8	12	7	6	5	9	7	7	3	5
Faulty Shift	2	7	4	3	0	3	5	3	2	5	9	2
Faulty Carriage Return	0	3	2	0	1	0	0	1	0	0	0	0
Failure to Print	4	1	6	2	4	1	2	1	2	1	1	0
Total	228	303	297	271	267	264	244	290	230	253	219	292
Average per student	7.6	10.4	9.9	9.3	8.9	9.1	8.1	10.0	7.6	8.7	7.3	10.1

TABLE XIb

Analysis of Errors

Error	Test 7		Test 8		Total		Average per Test		Av. per Test per Student	
	C	E	C	E	C	E	C	E	C	E
Misstrokes	169	151	119	112	1137	1086	142.1	135.8	4.7	4.7
Syllabication	3	2	1	4	36	50	4.5	6.3	.2	.2
Omission	20	25	22	16	144	174	18.0	21.8	.6	.8
Insertion	15	13	7	14	90	128	11.3	16.0	.4	.6
Rewriting	2	1	2	0	18	4	2.3	.5	.1	.02
Substitution	19	36	18	20	199	347	24.9	43.4	.8	1.5
Transposition	10	10	19	14	104	96	13.0	12.0	.4	.4
Margin	0	0	0	0	5	0	.6	0.0	.02	0.0
Failure to Space	15	10	19	14	127	129	15.8	16.1	.5	.6
Skipped Spaces	7	5	9	12	57	65	7.1	8.1	.3	.3
Faulty Shift	1	0	5	7	28	30	3.5	3.8	.1	.1
Faulty Carriage Return	0	0	2	2	5	6	.6	.8	.02	.03
Failure to Print	0	0	2	1	21	7	2.6	.9	.1	.03
Total	261	253	225	216	1971	2122	246.3	265.3	8.24	9.28
Average per Student	8.7	8.0	7.5	7.4	65.7	73.2	8.2	9.1		

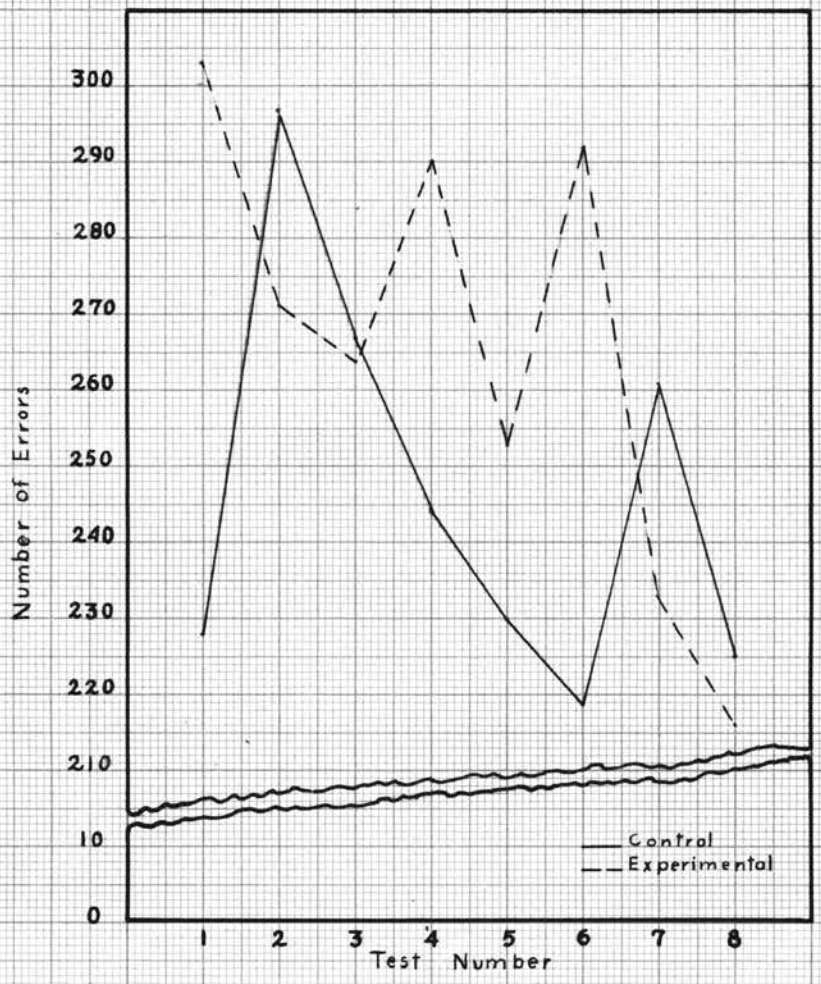

Figure V

TOTAL NUMBER OF ERRORS ON EACH OF EIGHT TESTS

of the semester were made out.

Budgets of work were handed in by both groups, and were considered by the teachers in making out the final grades. A subjective element entered into the grading of the budgets. This may account for some variation in the final grades.

That the group as a whole is retarded is apparent from an analysis of the final grades as compared with the grades received by the non-retarded students. The grades earned by the control group were decidedly superior to the grades earned by the experimental group. Of the control group 12 of the 30 students earned grades of "A" or "B". Only 3 of the experimental group earned grades of "B".

In the light of the other data of the study, these final grades cannot be taken as indicative of a superiority of the control over the experimental group. If a satisfactory grade is considered, that is "C" grade or better, there is no difference whatsoever in the two groups.

TABLE XII

Final Semester Grades of 30 Control Group Students and 29 Experimental Group students

Distribution	Control	Experimental	Total	%	Other Scores	%
A	2	0	2	3.4	19	23.7
B	10	3	13	22.0	32	40.0
C	7	17	24	40.7	24	30.0
D	9	7	16	27.0	3	3.7
E	2	2	4	6.8	2	2.5
TOTAL	30	29	59*	99.9	80*	99.9

*5 Students withdrew from school.

*7 Students withdrew from school.

SUMMARY

The results of the experiment were analyzed by a comparison of the achievement of the two groups on periodic speed and accuracy tests, errors made on these tests, and the final grades at the end of the semester. The data revealed that neither group was superior to the other.

The standard deviation of the distribution of the highest scores of each group was the same. The difference in mean scores of the students in each group statistically was insignificant. A comparison of the data from the eight tests shows that neither group excelled in achievement.

An analysis of errors of the two groups showed that the difference in the average number of errors per student was so small as to be negligible. As far as the data relative to errors are concerned, there is no difference in either the type of errors made or the extensiveness of making them.

Scores made on all tests given to the two groups were considered when the final grades were made out. These test grades were averaged with the budget grades, each teacher being the judge as to how much weight each should have on the final grade. The grades earned by the control group were decidedly superior to the grades earned by the experimental group, but if a "C" grade is considered a satisfactory one, there is no difference whatsoever in the two groups.

CHAPTER IV

SUMMARY

The students used as subjects of this study were selected from the first year typewriting classes at the Oklahoma Agricultural and Mechanical College the first semester of 1937-38 on the basis of accuracy scores made on a series of copy tests. These tests were given to determine which students should be selected as retarded students.

The averages of the retarded students were arranged in descending order, and the students were chosen alternately for the control group and the experimental group. Sixty-four students were selected. They constituted approximately the lowest one-third of all beginning typewriting students. Thirty-two students formed the control group which was taught typewriting by the traditional method. The experimental group, consisting of a like number, was taught by the Dictaphone method.

A comparison of the two groups showed that they were essentially equal as to psychological scores, chronological age, school training, and scores made on the series of accuracy tests. The ratios of men to women were approximately the same.

All students were taught the mastery of the keyboard, essential typewriter parts, and the writing of simple copy matter for six weeks. After that the experimental group had to become accustomed to taking direct dictation and to the peculiarity of the Dictaphone itself.

Tests were given for eight weeks. An analysis of the achievement of the groups on periodic tests, errors made, and final grades given showed that neither group was superior to the other.

Study of the series of eight tests showed that the mean words per

minute on the individual tests showed no statistically significant difference in the groups. The two groups progressed at approximately the same rate. The highest individual scores on all but two tests were made by the experimental group. The highest average scores on the several tests were divided between the two groups. The distribution of the highest scores made at any time during the experiment was identical. There was no statistically significant difference in the homogeneity of the two groups as determined by the study of the standard deviations.

The difference in the average number of errors per student made by the two groups was negligible, and the types of errors they made were similar. However, the experimental group seemed to make more errors of substitution than the control group, and the control group tended to make more errors classified as rewriting and failure to print. The difference of the average number of errors per student per test was only one error.

Scores made on all tests, including the experiment and other tests, given to the two groups were considered in the making of the final grades. Both the test grades and the budget grades were considered. The teachers were the judges as to how much weight each should have on the final grade. The grades earned by the control group were decidedly superior to the grades earned by the experimental group, but as a subjective element entered into the grading of the budgets, this may account for some variation in the final grades.

CONCLUSIONS

Teaching typewriting to retarded students by the Dictaphone method does not seem to result in a greater degree of speed or accuracy than teaching them the skill by the traditional method.

Remedial exercises for correction of errors in typewriting and improvement of technique proved beneficial alike to students learning typewriting by the Dictaphone method and those learning it by the traditional method.

The fact that the Dictaphone classes were taught by instructors who were inexperienced in teaching typewriting by that method may have had some bearing on the results of the experiment.

The Dictaphone classes covered more material during the time devoted to this study than the traditional method classes and were probably hurried over the first part of the Dictaphone course. This, too, may have been significant in determining the outcome of the study.

Retarded students learning to typewrite by the Dictaphone method appeared to be more alert during the typing period than the students in the traditional method classes.

As far as the data gathered in this study are concerned, there appears to be no statistical difference in the results attained by the two groups during the course of the experiment.

The findings of this limited experiment cannot be considered as a criterion of what can be accomplished in remedial teaching of typewriting to retarded students by the Dictaphone method. Further experiments might result in more conclusive evidence.

RECOMMENDATIONS

Although the data show that neither the Dictaphone or the traditional method is superior in teaching retarded students typewriting, the teachers believe that further experimentation is advisable before a definite conclusion can be drawn, because of the fact that the teachers were inexperienced with the Dictaphone method, and that the number of students involved in the experiment was small. It is therefore recommended:

(1) That the Dictaphone be used in remedial teaching of typewriting to retarded students in experiments covering a longer period of time than that employed in this study in order to get results that are more meaningful.

(2) That research toward better diagnostic testing as a basis for remedial teaching of typewriting be continued.

(3) That investigation of learning processes and teaching methods which are beneficial to retarded students in acquiring typewriting skill by the Dictaphone or any other method be made, and that some basis of selection other than a series of accuracy tests should be devised so that the experimental and control groups both could start out on equal bases.

(4) That some methodology be devised to control certain abilities necessary for achievement in typewriting, and that an experiment be devised which would control the various factors such as mental lassitude, which enter into the achievement in typewriting, so that we could test certain other factors.

(5) That the Dictaphone people determine definitely some study to

show in what respects that they think that their method is superior.

APPENDIX

Scores on Accuracy Tests to Determine Retarded Students

Students				Average
1	339	712	726	592
2	368	721	681	590
3	213	614	566	464
4	425	779	161	455
5	614	553	176	448
6	393	149	798	447
7	262	510	528	433
8	563	457	270	430
9	414	433	417	421
10	333	214	702	416
11	241	668	242	384
12	451	437	228	372
13	280	265	550	365
14	296	571	220	362
15	115	459	478	351
16	262	234	524	340
17	427	200	391	339
18	133	573	304	337
19	403	436	153	331
20	255	451	279	328
21	380	210	348	313
22	536	133	250	306
23	117	487	261	288
24	249	313	299	287

Students				Average
25	288	189	345	274
26	382	225	205	271
27	296	252	250	266
28	256	256	270	261
29	155	408	221	261
30	159	100	517	259
31	300	154	305	253
32	325	158	269	251
33	115	315	318	249
34	179	88	468	245
35	205	136	389	243
36	280	136	301	240
37	291	105	316	237
38	245	215	249	236
39	368	200	122	230
40	237	132	310	226
41	158	199	316	224
42	89	86	495	225
43	290	190	188	223
44	191	195	279	222
45	177	259	244	220
46	96	279	252	209
47	77	274	270	207
48	109	343	187	206
49	378	70	160	203
50	170	123	316	203
51	101	207	288	199

Students				Average
52	213	250	128	197
53	178	182	230	197
54	207	195	187	196
55	91	306	190	196
56	331	67	186	195
57	226	220	139	195
58	127	226	253	195
59	269	87	221	192
60	198	217	152	189
61	280	139	141	187
62	171	204	181	185
63	230	240	82	184
64	98	123	316	179
65	97	196	235	176
66	289	133	103	175
67	127	170	228	175
68	224	110	180	171
69	96	266	144	169
70	214	163	126	168
71	176	172	142	163
72	196	234	51	160
73	93	202	184	160
74	86	109	281	159
75	161	58	259	159
76	177	195	98	157
77	54	330	84	156

Student				Average
78	71	179	208	153
79	225	68	152	148
80	107	143	192	147
81	189	141	111	147
82	57	299	69	142
83	99	160	168	141
84	145	129	133	136
85	62	86	258	135
86	150	80	176	135
87	102	144	156	134
88	181	88	130	133
89	156	156	79	130
90	123	133	126	127
91	86	117	179	127
92	184	52	145	127
93	77	146	150	124
94	226	51	95	124
95	116	114	135	122
96	185	84	94	121
97	70	181	109	120
98	81	178	94	118
99	55	178	118	117
100	72	143	137	117
101	122	72	158	117
102	107	67	171	115
103	69	111	157	112
104	67	94	175	112

Student				Average
105	140	87	110	112
106	65	84	181	110
107	102	111	115	109
108	149	63	106	106
109	141	85	94	106
110	51	93	171	105
111	67	113	119	100
112	58	111	130	100
113	123	111	62	99
114	54	134	103	97
115	77	95	121	97
116	74	71	143	96
117	158	88	41	96
118	60	146	71	92
119	146	73	54	91
120	44	88	141	91
121	69	111	90	90
122	47	135	87	90
123	92	86	89	89
124	46	65	157	89
125	37	93	134	88
126	107	45	110	87
127	134	53	72	86
128	79	84	88	84
129	66	110	74	83
130	37	108	105	83

Student				Average
131	37	139	63	80
132	78	69	90	79
133	71	100	64	78
134	133	64	37	78
135	90	68	74	77
136	48	64	115	76
137	55	71	101	76
138	91	70	66	76
139	105	60	60	75
140	53	96	71	73
141	86	76	35	66
142	47	90	39	59
143	59	46	69	58
144	44	66	59	56
145	64	36	67	56
146	29	107	31	56
147	55	56	48	53
148	49	64	40	51
149	49	61	40	50
150	43	40	58	47
151	21	26	41	29

INTERNATIONAL TYPEWRITING CONTEST RULES

Line Spacing: Work must be double spaced.

Length of Page: When paper used is 8½ x 13, each page except the last, must have at least 35 lines of writing, double spaced; and on paper 8½" x 11", each page, except the last, must have at least 29 lines of writing, double spaced.

Length of Line: Any line having fewer than 61 or more than 76 characters and spaces, except at the end of paragraph,--that is any line under 60 and over 75 on the scale, is penalized one error in addition to all other errors in same line.

Paragraphing: Paragraphs must be indented five spaces and five spaces only.

Spaces and Punctuation Points: All spaces and punctuation points are treated as parts of the preceding word, but if incorrectly made, inserted, omitted, or in any manner changed from the printed copy, an error must be charged, unless the preceding word has already been penalized.

One Error per Word: But one error shall be penalized in any one word.

Lightly Struck Letters: If the outline of any character is discernible there is no error--otherwise it must be penalized.

Words Wrongly Divided: Any word wrongly divided at the end of a line must be penalized. A word may appear hyphenated at the end of a line in the printed copy, but which may or may not need the hyphen if found medially in the typewritten copy.

Faulty Shifting: An error must be charged against every word where the shift key is incorrectly used.

Crowding: No word shall occupy less than its proper number of spaces. If so, it is an error.

Gross Words: The gross number of strokes shall be reckoned from the printed copy of matter to be used, and shall be divided by five, the result being the number of gross words from which all deductions for errors shall be made. The strokes in rewritten matter are not to be counted in the gross. When a typist ends his test with an unfinished word, he shall be given credit for each character written.

NOTE: It will be seen that this rule gives the value of five strokes to each and every word written.

General Rule: Every word omitted, inserted, misspelled, or in any manner changed from the printed copy, must be penalized.

Penalty: For every error ten words must be taken from the gross number of words--shown by dividing the gross strokes by five.

RHYTHMIC DRILLS

S. T. 112

(Margins 5 and 75) Record No. 4

EXERCISE I

asdfgfa ;lkjhj; asdfgfa ;lkjhj; asdfgfa ;lkjhj; asdfgfa ;lkjhj;
asdfdsa ;lkjkl; asdfdsa ;lkjkl; asdfdsa ;lkjkl; asdfdsa ;lkjkl;
afsgdsa ;jlhkl; afsgdsa ;jlhkl; afsgdsa ;jlhkl; afsgdsa ;jlhkl;
afgfasd ;jhj;lk afgfasd ;jhj;lk afgfasd ;jhj;lk afgfasd ;jhj;lk
asadafa ;l;k;j; asadafa ;l;k;j; asadafa ;l;k;j; asadafa ;l;k;j;
a;sldkf ;alskdj a;sldkf ;alskdj a;sldkf ;alskdj a;sldkf ;alskdj

(10 and 75) No. 2

EXERCISE II

if he is to go if he is to go if he is to go if he is to go
to be up at 11 to be up at 11 to be up at 11 to be up at 11
so do as we do so do as we do so do as we do so do as we do
he is up to me he is up to me he is up to me he is up to me
is it on my xx is it on my xx is it on my xx is it on my xx
as we go at it as we go at it as we go at it as we go at it

(5 and 75) No. 3

EXERCISE III

she lit the gas did the lad eat she lit the gas did the lad eat
you saw the owl pay day for all you saw the owl pay day for all
dry the wet hut put the keg off dry the wet hut put the keg off
you fry the egg she lit the gas you fry the egg she lit the gas
her tie was red how far she saw her tie was red how far she saw
the lid was off the pot was hot the lid was off the pot was hot

EXERCISE IV

air ale aft ape aye ask awl ash asp apt ade day hay lay hat had
eat elf ere err ewe eye ell see fee she let yet dye the her yes
ill rit lid die did fir sit hit lit tip lie fit his pit tie wit
old top off hot for dog opo log lot hog ore jog oar hoe too pot
use rug ule auk ugh due out guy you hue sue hut sup jug rut out

RHYTHMIC DRILLS

75-space line — Exercise 1 — Record No. 1

asdfg ;lkjh asdfg ;lkjh asdfg ;lkjh asdfg ;lkjh asdfg ;lkjh asdfg ;lkjh
asdfg gfdsa asdfg gfdsa asdfg gfdsa asdfg gfdsa asdfg gfdsa asdfg gfdsa
;lkjh hjkl; ;lkjh hjkl; ;lkjh hjkl; ;lkjh hjkl; ;lkjh hjkl; ;lkjh hjkl;
gfdsa hjkl; gfdsa hjkl; gfdsa hjkl; gfdsa hjkl; gfdsa hjkl; gfdsa hjkl;
fgdsa jhkl; fgdsa jhkl; fgdsa jhkl; fgdsa jhkl; fgdsa jhkl; fgdsa jhkl;
asada ;l;k; asada ;l;k; asada ;l;k; asada ;l;k; asada ;l;k; asada ;l;k;

70-space line — Exercise 2 — Record No. 8

average opinion average opinion average opinion average opinion
average average average average opinion opinion opinion opinion
average opinion average opinion average opinion average opinion
musical numbers musical numbers musical numbers musical numbers
musical musical musical musical numbers numbers numbers numbers
musical numbers musical numbers musical numbers musical numbers
average opinion musical numbers average opinion musical numbers

75-space line — Exercise 3 — Record No. 9

paper boxes stood there paper boxes stood there paper boxes stood there
paper boxes stood there paper boxes stood there paper boxes stood there
paper boxes stood there paper boxes stood there paper boxes stood there
brown brush their house brown brush their house brown brush their house
brown brush their house brown brush their house brown brush their house
paper boxes stood there brown brush their house paper boxes stood there

4, 6

70-space line — Exercise 4 — Record No. or 7

abandon the cut collect his pay elevate her job discuss our war
abandon the cut collect his pay elevate her job discuss our war
payable not now justify the use contain red ink capsule was wax

RHYTHMIC TYPE RITING DRILLS

Exercise 1

70-space line Record No. 3

asa sds dfd fgf ;l; lkl kjk jhj asa sds dfd fgf ;l; lkl kjk jhj
asd sdf dfg fga ;lk lkj kjh jh; asd sdf dfg fga ;lk lkj kjh jh;
afg ;jh adf ;kj asd ;lk afg ;jh afg ;jh adf ;kj asd ;lk afg ;hj
asa ada afa aga ;l; ;k; ;j; ;h; asa ada afa aga ;l; ;k; ;j; ;h;
a;a sls dkd fjf ghg fjf dkd sls a;a sls dkd fjf ghg fjf dkd sls
;a; lsl kdk jfj hgh jfj kdk lsl ;a; lsl kdk jfj hgh jfj kdk lsl

Exercise 2

70-space line Record No. 7

abcdefghijklmn- abcdefghijklmn- abcdefghijklmn- abcdefghijklmn-
abcdefghijklmn- abcdefghijklmn- abcdefghijklmn- abcdefghijklmn-
opqrstuvwxyz,.- opqrstuvwxyz,.- opqrstuvwxyz,.- opqrstuvwxyz,.-
opqrstuvwxyz,.- opqrstuvwxyz,.- opqrstuvwxyz,.- opqrstuvwxyz,.-
abcdefghijklmnopqrstuvwxyz,.;-- abcdefghijklmnopqrstuvwxyz,.;--
abcdefghijklmnopqrstuvwxyz,.;-- abcdefghijklmnopqrstuvwxyz,.;--

Exercise 3

70-space line Record No. 3

The hat box was too big for her The hat box was too big for her
Any one may use the old cut now Any one may use the old cut now
She had the lid cut off the top She had the lid cut off the top
Not one man saw him cut the log Not one man saw him cut the log
She had use for her new red fan She had use for her new red fan
For the end was off the big saw For the end was off the big saw

Exercise 4

65-space line Record No. 2

as s2 ds d3 df f4 fg g5 23 45 as s2 sd d3 df f4 fg g5 23 45
l2 ;l l9 lk k8 kj j7 jh h6 ;- l2 ;l l9 lk k8 kj j7 jh h6 ;-
g5 gf f4 fd d3 ds s2 sa fa 5a g5 gf f4 fd d3 ds s2 sa fa 5a
h6 hj j7 jk k8 kl l9 l; ;- 0; h6 hj j7 jk k8 kl l9 l; ;- 0;
f4 f5 fg ft fr fd fb fv d3 da f4 f5 fg ft fr fd fb fv d3 da
j7

Scores of 8 Typewriting Tests

Control Group

	1	2	3	4	5	6	7	8	Total	Ave.
A	13	13	12	18	12	17	18	0	103	12.85
B	13	9	9	15	11	14	19	19	109	13.63
C	0	2	15	12	20	15	17	20	101	12.63
D	20	17	21	17	16	23	16	28	158	19.75
E	5	8	10	12	11	10	9		65	9.29
F	3	0	12	5	8	0	0	19	47	5.88
G	16	5	13	10	16	19	18	20	117	14.63
H	11	20	21	25	21	26	34	30	188	23.50
I	23	11	22	18	24	22	27	26	173	21.63
J	16	26	26	28	30	28	35	34	223	27.88
K	16	15	17	20	18	18	22	18	144	18.00
L	7	7	5	4	0	5	7	10	45	5.63
M	25	24	27	25	30	29	30	32	222	27.75
N	21	24	26	27	31	33	31	30	223	27.88
O	11	28	13	26	26	24	35	30	193	24.13
P	15	15	13	19	19	10	19	21	131	16.38
Q	2	13	22	19	25	23	26	15	145	18.13
R	17	15	18	23	17	28	24	31	173	21.63
S	16	20	20	19	19	20	25	28	167	20.88
T	9	6	20	11	17	21	21	23	128	16.00
U	12	20	20	21	26	23	36	33	191	23.88
V	31	29	24	29	29	30	37	31	240	30.00
W	17	11	11	17	19	9	24	23	131	16.38
X	10	16	15	16	17	20	19	23	136	17.00
Y	0	13	14	8	16	9	6	7	73	9.13
Z	20	14	11	25	26	20	27	39	182	22.75
AA	10	10	11	10	23	16	21	26	127	15.88
BB	14	19	18	16	22	21	23	27	160	20.00
CC	20	23	21	20	20	24	19	18	165	20.63
DD	27	12	29	11	26	27	30	28	190	23.75

Scores of 8 Typewriting Tests

Experimental Group

	1	2	3	4	5	6	7	8	Total	Ave.
A	9	10	12	11	8	12	11	6	79	9.88
B	17	18	16	15	27	27	23	23	166	20.75
C	18	15	20	19	19	19	25	26	161	20.13
D	0	6	0	5	10	7	3		31	4.43
E	26	25	22	25	22	22	30	22	194	24.25
F	6	8	20	13	17	19	19	21	123	15.38
G	30	16	25	23	23	35	16	29	197	24.63
H	21	22	21	33	28	25	30	27	207	25.88
I	10	12	13	18	17	9	22	20	121	15.13
J	13	12	18	16	13	10	16	25	123	15.38
K	5	0	0	7	0	11	10	15	48	6.00
L	17	18	21	15	27	23	29	27	177	22.13
M	18	19	21	14	20	24	20	34	170	21.25
N	9	9	2	16	20	17	26	13	112	14.00
O	14	11	22	20	24	23	25	28	167	20.88
P	28	32	29	35	30	33	39	43	269	33.63
Q	13	10	14	8	15	15	15	26	116	14.50
R	1	7	10	5	10	0	3		36	5.14
S	17	14	21	14	24	27	26	30	173	21.63
T	16	13	19	18	15	19	19	24	143	17.88
U	10	14	15	23	20	20	21	19	140	17.50
V	14	16	12	13	23	15	23	25	141	17.63
W	11	15	16	18	21	15	16	15	127	15.88
X	17	18	20	22	26	23	24	26	176	22.00
Y	23		20	17	28	12	28	23	151	21.57
Z	18	12	21	12	19	10	17	24	133	16.63
AA	8	21	19	21	18	24	15	20	146	18.25
BB	9	11	16	9	13	15	10	15	98	12.25
CC	18	19	20	0	19	13	21	23	133	16.63

BIBLIOGRAPHY

Source Materials

Blackstone, E. G. and Smith, S. L. Improvement of Instruction in Typewriting. Prentice-Hall, Inc., 1936.

Book, William F. Learning to Typewrite. The Gregg Publishing Company, 1925.

Bradford, Lilah, "Does Typing Ability Depend on Mentality or Dexterity?" The Journal of Business Education, IV (December, 1930), 23-24.

Davis, H. H., "Measurement in Commercial Education in the St. Louis Schools." University of Iowa Monographs in Education, First Series, No. 7 (July, 1926), 43.

Dvorak, August; Merrick, Nellie L.; Dealey, William L.; and Ford, Gertrude Catherine. Typewriting Behavior. American Book Company, 1936.

Educational Division of the Dictaphone Corporation. Dictaphone Typewriting Facts. No Date.

George, Guy G., "The I. Q. as a Criterion of Ability to Learn Typewriting." The Balance Sheet, XII (March, 1931), 235-238

Good, C. V.; Barr, A. S.; Scates, D. E. The Methodology of Educational Research. D. Appleton-Century Company, 1936.

Marik, Marie E. Comparative Study of the Dictaphone and the Traditional Method of Learning Typewriting. Master's Thesis, New York University, 1929.

Pearson, David C., "An Experiment with the Miller Dictaphone Method of Teaching Typewriting." University of Iowa Monograph of Education, First Series, No. 7, (July, 1926), 77-87.

Puckett, Cecil, "The Rank of the Inferior Student in Typewriting." The Balance Sheet, XI (May, 1930), 282.

Pyle, William H. Psychology of Learning. Warwick and York, Inc., 1921.

Saint Paul Pioneer Press (The), Sunday, May 28, 1933.

Starch, Daniel, Educational Psychology. The Macmillan Company, 1925.

Tedens, Marion F., "Typewriting in Three Terms Instead of Four." The Journal of Business Education, IV (September, 1930), 21-22.

Thorndike, E. L. Adult Learning. The Macmillan Company, 1928.

White, Bruce, "Prediction of Typewriting Success." The Journal of Business Education, X (April, 1935), 15-16.

SECONDARY WORKS

Garret, Henry E. Statistics in Psychology and Education. Longmans, Green and Company, 1929.

Miller, Charles. Miller-Dictaphone System of Typewriting. Miller Textbook Company, Inc., 1935.

Ruggs, H. O. Statistical Methods Applied To Education. Houghton Mifflin Company, 1917.

SoRelle, Rupert P. and Smith, Harold M. Gregg Typing Techniques and Projects, College Course. The Gregg Publishing Company, 1932.

Typist M. Fred Tidwell