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MCKOWN, ELLEN HUNT

A COMPARATIVE STUDY OF STUDENTS' ACHIEVEMENT IN BEGINNING TYPEWRITING USING TWO METHODS OF INSTRUCTION

The University of Oklahoma PH.D. 1979

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GRADUATE COLLEGE

A COMPARATIVE STUDY OF STUDENTS' ACHIEVEMENT IN BEGINNING TYPEWRITING USING TWO METHODS OF INSTRUCTION

A DISSERTATION

SUBMITTED TO THE GRADUATE FACULTY

in partial fulfillment of the requirements for the

degree of

DOCTOR OF PHILOSOPHY

BY

ELLEN HUNT McKOWN

Norman, Oklahoma

1979

A COMPARATIVE STUDY OF STUDENTS' ACHIEVEMENT IN

BEGINNING TYPEWRITING USING TWO

METHODS OF INSTRUCTION

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A COMPARATIVE STUDY OF STUDENTS' ACHIEVEMENT IN BEGINNING TYPEWRITING USING TWO METHODS OF INSTRUCTION

CHAPTER I

THE PROBLEM

Introduction

One of the most effective tools of communication is the use of the typewriter. The typewriter provides written material that is inexpensive, easy to produce, and easy to read. Thus, typewritten material becomes an integral part of the modern world in which communication among individuals takes on added importance as the world seems to shrink due to technology. Technology allows people to travel farther and faster and to see and hear events in remote parts of the world.

The ability to communicate is one's most valuable asset. To function in this day of modern technology, one must be able to communicate. In 1964, the need for effective communication was noted by Stewart, Lanham, and Zimmer who stated the following:

> Effective and efficient communication must be accomplished between employees and supervisors; between employees; and between the business and its customers, its suppliers, and the general public.
>
> Communication is necessary for evoking action, for acquiring cooperation, and for maintaining the day-to-day

> working equilibrium necessary for business stability. Good communication can make a friend, build goodwill, or sell a product. Poor communication can create misunderstandings and losses of business, time, and money.[1]

Business and industry depend on typewritten material; therefore, the ability to type is most important.

Since business and industry depend on typewritten material as a supportive communication tool, the typewriting teachers have the responsibility for selecting the most effective method of teaching beginning typewriting students. Many methods of presenting the typewriter keyboard have been advocated. Douglas, Blanford, and Anderson refer to the following methods: (1) The Homerow Approach in which the teacher teaches the locations of the fingers on the homerow and then presents extensive drills using these keys; (2) The Vertical Approach in which all keys struck by one finger are presented at one time; (3) The Skip-Around or Word-Pattern Approach in which key locations presented first are those that are needed to prepare meaningful copy; (4) The Whole Keyboard Approach in which the entire alphabetic keyboard is presented during the first day of typing with additional drill provided on succeeding days to enable the students to learn the key locations.[2] The electronic keychart instructional teaching aid can be adapted to most of these methods.

Typewriting teachers are constantly striving for methods that will provide more efficient use of both student and teacher time. These methods

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[1]Marie M. Stewart, Frank W. Lanham, and Kenneth Zimmer, College English and Communication (New York: Gregg Division, McGraw-Hill Book Company, 1965), p. 4.

[2]Lloyd V. Douglas, James T. Blanford, and Ruth I. Anderson, Teaching Business Subjects, 2d ed. (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1965), pp. 127-28.

are under constant revision and study. Therefore, teachers of typewriting, as well as manufacturers of equipment used in the teaching of typewriting, seek new ways to present the keyboard to students in a most effective way.

Statement of Purpose

The purpose of this study was to investigate the effect of the use of teaching methods of instruction upon the achievement of beginning typewriting students who learn to typewrite under two different methods of instruction: (1) the electronic keychart instructional method, and (2) the traditional method. The two methods of instruction were the electronic keychart instructional teaching method and the traditional teaching method. This investigation was designed to determine whether specific instructional methods contribute more effectively to students achievement in beginning typewriting when used in conjunction with the electronic keychart or the traditional method of teaching beginning typewriting.

Statement of Problem

The primary problem of this study was to analyze the differences, if any, in (1) the rate of speed and (2) the degree of accuracy of beginning typewriting students who learned beginning typewriting under controlled conditions. These two criteria constitute the level of keyboard mastery. One group of students was taught utilizing the Kee Electronic Keychart teaching aid and the other group was taught utilizing the traditional keyboard instructional method. Measurements were taken at six predetermined stages of the keyboard instruction of

the rate of speed and the degree of accuracy of those beginning typewriting students.

Specifically, the problems investigated in this study were:

1. Do students who have had a course in beginning typewriting with the instructor using the Kee Electronic Keychart instructional method master the keyboard better than students who have had beginning typewriting taught with the instructor using the traditional method of teaching?

2. Is gender related to performance of students who have been taught beginning typewriting with the instructor using the Kee Electronic Keychart instructional method of teaching?

3. Is gender related to performance of students who have been taught beginning typewriting with the instructor using the traditional method of teaching?

4. Is general scholastic ability related to performance of students who have been taught beginning typewriting with the instructor using the Kee Electronic Keychart instructional method of teaching?

5. Is general scholastic ability related to performance of students who have been taught beginning typewriting with the instructor using the traditional method of teaching?

6. Is age related to performance of students who have been taught beginning typewriting with the instructor using the Kee Electronic Keychart instructional method of teaching?

7. Is age related to performance of students who have been taught beginning typewriting with the instructor using the traditional method of teaching?

8. Is the number of cumulative college credit hours related to performance of students who have been taught beginning typewriting with the instructor using the Kee Electronic Keychart instructional method of teaching?

9. Is the number of cumulative college credit hours related to performance of students who have been taught beginning typewriting with the instructor using the traditional method of teaching?

10. Is college grade-point average related to performance of students who have been taught beginning typewriting with the instructor using the Kee Electronic Keychart instructional method of teaching?

11. Is college grade-point average related to performance of students who have been taught beginning typewriting with the instructor using the traditional method of teaching?

Hypotheses Tested

The following hypotheses were tested:

Hypothesis 1: The keyboard mastery mean for students who had beginning typewriting with the instructor using the Kee Electronic Keychart method of teaching is greater than the keyboard mastery mean for students who had beginning typewriting with the instructor using the traditional method of teaching.

Hypothesis 2: The keyboard mastery mean for female students who had beginning typewriting with the instructor using the Kee Electronic Keychart instructional method of teaching is greater than the keyboard mastery mean for female students who had beginning typewriting with the instructor using the traditional method of teaching.

Hypothesis 3: The keyboard mastery mean for male students who had beginning typewriting with the instructor using the Kee Electronic Keychart instructional method of teaching is greater than the keyboard mastery mean for male students who had beginning typewriting with the instructor using the traditional method of teaching.

Hypothesis 4: The keyboard mastery mean of students with higher general scholastic ability who had beginning typewriting with the instructor using the Kee Electronic Keychart instructional method of teaching is greater than the keyboard mastery mean of students with higher general scholastic ability who had beginning typewriting with the instructor using the traditional method of teaching.

Hypothesis 5: The keyboard mastery mean of students with lower general scholastic ability who had beginning typewriting with the instructor using the Kee Electronic Keychart instructional method of teaching is greater than the keyboard mastery mean of students with lower general scholastic ability who had beginning typewriting with the instructor using the traditional method of teaching.

Hypothesis 6: The keyboard mastery mean of older students who had beginning typewriting with the instructor using the Kee Electronic Keychart instructional method of teaching is greater than the keyboard mastery mean of older students who had beginning typewriting with the instructor using the traditional method of teaching.

Hypothesis 7: The keyboard mastery mean of younger students who had beginning typewriting with the instructor using the Kee Electronic Keychart instructional method of teaching is greater than the keyboard

mastery mean of younger students who had beginning typewriting with the instructor using the traditional method of teaching.

Hypothesis 8: The keyboard mastery mean of students at the junior level who had beginning typewriting with the instructor using the Kee Electronic Keychart instructional method of teaching is greater than the keyboard mastery mean of students at the junior level who had beginning typewriting with the instructor using the traditional method of teaching.

Hypothesis 9: The keyboard mastery mean of students below the junior level who had beginning typewriting with the instructor using the Kee Electronic Keychart instructional method of teaching is greater than the keyboard mastery mean of students below the junior level who had beginning typewriting with the instructor using the traditional method of teaching.

Hypothesis 10: The keyboard mastery mean of students with a higher college grade-point average who had beginning typewriting with the instructor using the Kee Electronic Keychart instructional method of teaching is greater than the keyboard mastery mean of students with a higher college grade-point average who had beginning typewriting with the instructor using the traditional method of teaching.

Hypothesis 11: The keyboard mastery mean of students with a lower college grade-point average who had beginning typewriting with the instructor using the Kee Electronic Keychart instructional method of teaching is greater than the keyboard mastery mean of students with a lower college grade-point average who had beginning typewriting with the instructor using the traditional method of teaching.

Significance of Problem

This study was an attempt to measure the effect of the Kee Electronic Keychart instructional method of teaching on the keyboard mastery level of beginning typewriting students. The study was an attempt to provide data that could be used in curriculum planning for the teaching of beginning typewriting. The results of this study could influence the instructor's choice of methodology and teaching aids for presenting the keyboard to beginning typewriting students.

Definition of Terms

Terminology used in this study is defined as follows:

Traditional Teaching Method: Traditional teaching method is defined as the traditional textbook method of teaching typewriting used by the majority of teachers without the electronic keychart aid.

Electronic Keychart Instructional Method: Electronic Keychart instructional method is defined as the method of teaching typewriting used by teachers who utilize the Electronic Keychart aid. The electronic keychart is a large-group classroom aid to instruction that provides visual stimulus for students learning keyboard skills. A letter, a number, or a symbol is illuminated independently and the students are instructed to type this particular letter, number, or symbol on their typewriters. The Kee Electronic Keychart consists of a large, colorful keyboard display, a tape reader, and a control panel. (See Appendix C.) The programmed lesson tapes that are fed through the tape reader determine which letter, number, or symbol will light up on the display board. The words-per-minute dial is used to regulate automatically the rate at which characters are presented.

Tape Reader: Tape reader is a small piece of equipment attached to the side of the large keyboard display that reads the prepunched programmed tapes through electrical impulses. The sequence of the letter, number, or symbol displayed on the keychart is determined by the prepunched tape.

Control Panel: A teacher's remote keyboard similar in design to a typewriter keyboard is connected to the right-hand side of the visual display by a 25-foot remote cable. After the remote keyboard is plugged into the visual display board, any key depressed on the teacher's control panel will light up the corresponding character on the visual display keychart.

Letter Keys: The alphabetic letter keys are the keys on the typewriter keyboard used to type words.

Number Keys: The number keys are the keys on the typewriter keyboard displaying the numbers. The numbers are 1, 2, 3, 4, 5, 6, 7, 8, 9, and 0.

Symbols Keys: The symbol keys are the keys on a typewriter keyboard that display the commonly used symbols in the business and consumer world of communications. The symbols are /, ", ', !, °, [,], @, #, $, %, ¢, &, *, (,), _, -, +, and =.

Accuracy: Every deviation in any manner from the printed copy of the material being typed is considered an error. The student's typing performance is measured in terms of both speed and errors. All measurements are one minute in length.

GWPM: GWPM is defined as the gross words per minute. The gross number of strokes is counted from the printed copy of the matter being

typed, and is divided by five, the results are the number of gross words from which all deductions for errors are made.

EPM: EPM is defined as the errors per minute. An error is any deviation from the material being copied.

NWPM: NWPM is defined as the net words per minute. Ten words are deducted from the gross words typed for every error typed to give net words per minute. (Ten words are deducted on a one-minute timed writing for each error to give the net words per minute.) Only one error per word is counted as penalty in case there are two or more errors in a word.

General Scholastic Ability: General scholastic ability is defined as the composite score on the American College Test (ACT).

Limitations of Study

1. This investigation was limited to two (2) sections of beginning typewriting scheduled at the University of Oklahoma, Norman, Oklahoma during the spring semester of 1976. These two sections were taught by the researcher.

2. Students in the beginning typewriting courses at the University of Oklahoma are not necessarily representative of other university populations.

Nature and Sources of Data

Information pertaining to the design of this study was gathered from a variety of sources. Books, periodicals, doctoral dissertations, and abstracts pertaining to instructional methodology in beginning

typewriting were perused. Also, books pertaining to educational research and statistics were examined.

Analysis of Data

After the data were collected, they were coded and given to the programmer for processing at the Merrick Computer Center. The statistical tool used for this study was the T-Test.

Procedures of Study

The procedures used in this study consisted of the following steps:

1. Pertinent literature was reviewed to develop an adequate background for the study.

2. Permission was obtained from the University of Oklahoma to do this study. The University of Oklahoma administration granted permission to involve students, classes, and the writer in this research study.

3. An appropriate research design was selected. Taking the experiment into the real world of the classroom makes it difficult to exercise sufficient control over the experiment to make it fit the requirements of a true experiment. Campbell and Stanley coined the term "quasi-experimental design" to describe the situation in which the researcher has control over the scheduling of data collection procedures but must accept accidental sampling rather than follow random sampling procedures.[1]

---

[1]Donald T. Campbell and Julian C. Stanley, "Experimental and Quasi-Experimental Designs for Research on Teaching," Handbook of Research on Teaching, ed. by N. L. Gage (Chicago, IL: Rand McNally and Company, 1963), p. 34.

4. The student permission forms and the student information sheets were designed. The designed forms and information sheets were completed by the students at the beginning and at the end of the 1976 spring semester.

5. The experimental and the control groups were designated. The students taught by the Kee Electronic Keyboard instructional method were designated as the experimental group. The students taught by the traditional method were designated as the control group.

6. Tests were given and performance data were collected at various intervals during the 1976 spring semester. The six different measurements were taken at predetermined intervals.

7. The data collected at the six predetermined intervals were coded, analyzed, and interpreted.

8. The written report of the research was prepared.

Assumptions of Study

The following statements were assumed to be valid for the purposes of this study.

1. Size of Group: Group sizes of 10 to 15 subjects would provide sufficient basis for reliability.

2. Time of Day: Because the control group met at 9:30 a.m. and the experimental group met at 11:30 a.m., the time of day would provide no significant difference in the performance results of the two classes.

Organization of Study

The report of this research problem consists of five chapters, the bibliography, and the appendices. Chapter I includes the Introduction, Statement of Purpose, Statement of Problem, Hypotheses Tested,

Significance of Problem, Definiton of Terms, Limitations of Study, Nature and Sources of Data, Analysis of Data, Procedures of Study, Assumptions of Study, and Organization of Study. Chapter II reviews relevant literature. Chapter III contains a detailed description of the procedures employed in this experiment. Chapter IV presents the results of the study. Chapter V presents the summary, conclusions, and recommendations of this research.

CHAPTER II

REVIEW OF LITERATURE

There is voluminous literature in the area of method of presenting the typewriter keyboard to beginning typewriting students. The literature includes research studies, surveys, articles, brochures, and books related to the methods used in presenting the typewriter keyboard to students at various levels of education--elementary, secondary, and post-secondary.

The literature was selected for review on the basis of its relevance to this study. The related literature is categorized under the following headings: Methods of Teaching the Keyboard; Teaching Aids in Presenting the Keyboard; and Research Directly Related to the Design of the Present Study.

Methods of Teaching the Keyboard

"The phrase 'learning to type' as it is now used, means learning to type by touch using all eight fingers . . . , although many nonprofessionals manage to operate the machine successfully with inferior techniques."[1] Mrs. L. V. Longley, Cincinnati, Ohio, proprietor of Longley's Shorthand and Typewriter Institute, published a pamphlet in 1882 describing her technique of using all the fingers of both hands to typewrite.

---

[1]Bruce Bliven, Jr., The Wonderful Writing Machine (New York: Random House, 1954), p. 111.

Her proposed methods were critized by the trade magazine Cosmopolitian Shorthander as being hare-brained.[1] However, her method was given a boost by the appearance of another "fast typist"--Frank E. McGurrin.

Frank E. McGurrin of Salt Lake City, Utah, was an official stenographer for the Federal Court in Salt Lake City and was an exceptionally good typist. He had memorized the keyboard and was able to typewrite without looking at his hands and relied solely on his sense of touch to typewrite. After several years had passed, Bates Torrey of Portland, Maine, in a pamphlet, "A Manual of Practical Typewriting" used the word 'touch' to describe the system McGurrin used. At that time, the word "touch" was coined in typewriting.[2] On July 25, 1888, Frank E. McGurrin and Louis Taub engaged in a typewriter race for a cash prize of $500. The race was in two parts: forty-five minutes of direct dictation and forty-five minutes of copying from an unfamiliar script. The man with the largest combined total number of words would be declared the winner. McGurrin was the winner and the idea of "touch" typewriting was conceded to be the way to type.[3]

The research studies reviewed in this section are pertinent to methods of teaching the keyboard. These research studies are presented in chronological order beginning with the year 1961.

In 1961, Cary[4] conducted an experimental study using high school students to determine the effectiveness of the wall-chart method as compared with the sight method of teaching the typewriter keyboard.

---

[1]Ibid., p. 112. [2]Ibid., p. 115. [3]Ibid.

[4]Paul Russell Cary, "Wall-Chart Method Versus Sight Method of Teaching the Typewriter Keyboard" (unpublished Master's thesis, Illinois State Normal University, 1961).

Specifically, Cary attempted to answer the following questions:

1. What is the effect of speed and accuracy on twelve-second straight-copy material throughout the course of one semester.
2. What is the effect on speed and accuracy on one-minute straight-copy material throughout the course of one semester when the two methods of introducing the keyboard are used?
3. What is the effect on speed and accuracy on five-minute straight-copy material throughout the course of one semester when the two methods of introducing the keyboard are used?
4. What relationships exist between the variables of speed and accuracy under the two methods?[1]

Cary's study was limited to speed and accuracy of stroking in straight-copy timed writings. The study did not include mathematical manipulations, structural techniques in the use of English, or the ability to organize and set up problems for typing.[2]

Cary's investigation was restricted to thirty-eight students--thirty sophomores and eight seniors--who had enrolled in a one-semester personal typewriting course at Riverside, Illinois, during the period from September 1960 to January 1961.[3]

The following non-experimental variables might have influenced Cary's study: (1) intensity of motivation; (2) zeal, enthusiasm and personality of the teacher; (3) attitudes of the students toward the subject and the methods employed in the study; (4) kind of equipment used; (5) the hour of the day during which each class was held; and (6) climatic conditions in each room.[4]

Cary applied the wall-chart method to the control group. The students were instructed to look at a wall chart to find the location of the keys as they learned the keyboard. After they once had their fingers on the home row keys, they were not to look at the keys.

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[1]Ibid., p. 3. [2]Ibid. [3]Ibid., p. 4. [4]Ibid.

Five fifty-five minute class periods per week were used for the introduction of the keyboard during the first two weeks of the semester. The students used no text during this initial learning of the keyboard. Both the control group and the experimental group took the same dictation and typed the same material throughout the entire semester.[1]

Cary applied the sight method to the experimental group. The experimental group was instructed to look at their keyboards to find the location of each key as they learned the keyboard. The students had to look at the keys until they had learned the location of each key because no wall chart or text was used. The introduction of the keyboard was presented during the first two weeks of the course.[2]

Starting with the third week and continuing through the eighteenth week, twelve-second timings and one-minute timings were given on straight-copy material during at least three class sessions each week to both the experimental and the control group. Both groups were given three twelve-second timings for speed and three twelve-second timings for accuracy. The timing with the highest number of gross words per minute with the least number of errors was recorded for each student in both groups. Every fourth class meeting, scores from the twelve-second timings were recorded.[3]

During the twelfth class meeting, both groups were given three one-minute timings for speed and three one-minute timings for accuracy and these scores were recorded. The timing with the highest number of gross words per minute and the timing with the least number of errors were recorded for each student in both groups. Scores of the one-minute timings were recorded for both groups every fourth class session after the initial timing.[4]

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[1]Ibid., p. 5. [2]Ibid., p. 6. [3]Ibid., p. 5. [4]Ibid.

Each week, a number of five-minute, straight-copy timings were given. Two five-minute, straight-copy timings were given and recorded during every third class session. The gross words per minute and the total number of errors on the better timing were recorded for each student in both groups. Because many typewriting educators use the net-words-per-minute formula to measure a typist's speed and accuracy, net words per minute were recorded for each student in both groups.[1]

Cary concluded the following:

1. The use of the experimental method appears not to hinder or improve the development of speed and accuracy at the typewriter.
2. The higher rate of speed attained by the sight group in the first four weeks of the learning period may have been due to the greater ease of learning made possible by the lettered keyboard as compared with the wall chart.
3. After the first few timings, the fluctuation in daily scores apparently has little or no relation to the difference in the teaching approach between the experimental and control groups.
4. The slightly greater number of errors made by the experimental group may have been due to the stimulus being the dictated letters and words rather than the printed letters and words.[2]

In 1967, Price[3] conducted a study to determine whether the chalkboard approach to teaching typewriting is more effective than the traditional approach in introducing and teaching the keyboard in beginning typewriting. The subjects in Price's study included an experimental group and a control group. The control group was taught by the traditional textbook method, and the experimental group was taught with the chalkboard approach.

Price selected thirteen matched pairs based on Lorge Thorndike I. Q. scores, grade level, sex, and make of manual typewriter.

---

[1]Ibid., p. 6. [2]Ibid., p. 37.

[3]Shirley M. Price, "Chalkboard Approach versus the Traditional Textbook Method in Teaching in Beginning Typewriting" (unpublished Master's thesis, Northern Illinois University, 1967).

The experimental group met the sixth period in the day, and the control group met the first period in the morning.

The data in Price's study consisted of scores on separate tests as follows:

1. Written test of filling in a blank keyboard chart.
2. Three one-minute timed writings were given for speed and accuracy after the first ten days, after twenty days, after seven weeks, after eight weeks, and after nine weeks of instruction. These scores were totaled and averaged.[1]

A statistical analysis was applied to the data to determine whether differences in achievement of the mean gross speed scores and the mean number of errors for the thirteen matched pairs were significant. The "t-test" was used to determine the significance of difference between the means of the two groups.[2]

Price concluded that, although in five out of eleven instances the differences were significant at the .05 level of confidence, the results seemed to indicate that the chalkboard approach to learning the keyboard produced higher gross typing speeds, with no lesser degree of accuracy, than the traditional textbook method.[3]

In 1968, Akridge[4] conducted a study to compare the relative effectiveness of two methods of teaching numbers in elementary typewriting classes--the conventional teacher administered instruction versus the educational developmental laboratory materials and instrument training as a supplementary teaching aid.

---

[1]Ibid., pp. 35-37. [2]Ibid. [3]Ibid., pp. 37-40.

[4]Mary Jane Akridge, "A Comparison of Relative Effectiveness of Two Methods of Teaching Numbers in Elementary Typewriting Classes: Conventional Teacher Instruction vs. Educational Developmental Laboratory Materials and Instrument Training as a Supplementary Teaching Aid" (unpublished Master's thesis, University of Georgia, 1968).

Akridge used two adult evening classes in beginning typewriting in the study. The experimental group was a randomly chosen class. The other class was maintained as the control group. The same teacher taught both groups. Both groups received the same instruction except that the Skill Builder Controlled Reader was used with the experimental group for supplementary instruction in the typing of numbers.[1]

A comparison of the two groups was made on mean gain in stroking rate and mean reduction of errors from the pretest to the post-test. The study extended over a period of 24 class hours.[2]

The differences between the experimental group and the control group on the four pretests were not statistically significant at the .05 level, though the means for the experimental group were higher on the four tests.[3]

Akridge concluded that:

1. Supplementary instruction and drill on numbers appear to result in improved proficiency in the typing of numbers.
2. The superiority of the experimental group was sufficiently demonstrated to warrant continued experimentation with the Skill Builder Controlled Reader as a supplementary aid in the teaching of numbers.[4]

In 1968, Peterson[5] conducted a study to compare the relative effectiveness of three teaching approaches to personal typewriting instruction at the eighth-grade level. The three teaching approaches investigated were speed, accuracy, and a combination of speed and accuracy.[6]

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[1]Ibid., p. 4. [2]Ibid., p. 17. [3]Ibid., p. 18. [4]Ibid.

[5]Lelia M. Peterson, "Comparison of the Relative Effectiveness of Three Approaches to Personal Typewriting Instruction at the Eighth Grade Level" (unpublished Master's thesis, Wisconsin State University, 1968).

[6]Ibid., p. 43.

The population for Peterson's study consisted of 276 eighth-grade students who had no previous typewriting training. Nine different personal typewriting classes were involved. The nine classes were divided into three groups of 92 students. Each group consisted of three classes of personal typewriting students.[1]

Preliminary material was taught in the same manner in all typewriting classes. Students were given timed writings after the keyboard had been presented. A different teaching approach was used with each group. While one group worked on speed, another group worked on accuracy, and another group worked on both speed and accuracy.[2]

Three points were used for comparison purposes--a point for individual and class progress at the end of six weeks; a point, at the end of twelve weeks; and a point, at the end of eighteen weeks of measurement. The mean and the median were then recorded for each measurement of total words typed and number of errors made. Peterson utilized the "t-test" for the comparison of the means.[3]

Peterson concluded the following:

1. The mean speed scores when comparing the scores achieved by students using the accuracy approach and the scores achieved by students taught by the speed approach were not significantly different.
2. The mean speed scores when comparing the scores achieved by students taught using the speed approach and the scores achieved by students taught by the speed and accuracy approach were not significantly different.
3. The mean speed scores when comparing the scores achieved by students taught using the accuracy approach and the scores achieved by students taught by the speed and accuracy approach were not significantly different.
4. Classes taught using the accuracy approach consistently made fewer errors than classes taught either by the speed approach or by the speed and accuracy approach.

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[1]Ibid., p. 18. [2]Ibid., p. 44. [3]Ibid.

5. The classes taught by the speed approach consistently typed faster than classes taught by either the accuracy approach or by the speed and accuracy approach.
6. The terminal speed for classes taught using the accuracy approach differed by only 1.7 words per minute from the terminal speed of the classes taught by the speed approach.
7. There was a significant difference in errors made by students in classes taught using the speed approach and the errors made by students in classes taught using the accuracy approach.
8. In all groups, no matter what teaching approach was used, a gradual increase in speed was evidenced throughout the study.
9. In all groups, no matter what teaching approach was used, the greatest gain in speed occurred between the sixth and twelfth week of measurement.[1]

In 1973, Varnon[2] did a comparative study on the effectiveness of two methods of teaching problem typewriting in the secondary school beginning typewriting course. The two methods compared were the self-paced programmed approach and the teacher-directed, non-programmed approach.[3]

The major purposes of Varnon's study were the following:

1. To compare the production performance of students taught through self-paced, programmed instruction with the production performance of students taught through teacher-directed, non-programmed instruction. Achievement was compared on three selected factors of production performance: (a) form score, (b) production speed score, and (c) production accuracy score.
2. To determine whether one method of instruction is more effective than the other method in teaching problem typewriting to students at the same scholastic achievement level when students are categorized into upper, middle, and lower levels.[4]

Another purpose of Varnon's study was to determine whether the self-paced approach and the teacher-directed approach to problem

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[1] Ibid., pp. 45-46.

[2] Mary Sue Varnon, "A Comparison of Self-Paced, Programmed Instruction and Teacher-Directed, Non-Programmed Instruction in Problem Typewriting in the Beginning Secondary School Course" (unpublished Ph.D. dissertation, Georgia State University, 1973).

[3] Ibid., p. 1. [4] Ibid.

typewriting result in equal gains in straight-copy speed and equal gains in straight-copy accuracy.[1]

Varnon's study was limited to the performance of students in six beginning typewriting classes at the high school level in Missouri and four beginning typewriting classes at the high school level in Tennessee, during the 1972-1973 academic year. The subjects were chosen on the basis of their enrollment in the classes of the three teachers conducting the experiment. Groups were compared for equality only on the bases of previous scholastic achievement, straight-copy speed, and straight-copy accuracy. Only sixty class periods (fifty-five minutes each), including testing periods, were used. During the sixty class periods, only three units of problem typewriting were presented: letters and envelopes, tabulation, and footnotes and unbound manuscripts.[2]

To compare the production performance of the two groups, Varnon computed t-tests to determine the statistical significance of the difference between the means of the two groups on each of the following selected factors of production performance: form scores, production speed scores, and production accuracy scores.[3]

To compare the effectiveness of the contrasting methods of instruction in teaching problem typewriting to students of comparable levels of scholastic achievement, Varnon divided the subjects into upper, middle, and lower levels on the basis of cumulative grade-point average on the secondary school level and conducted an analysis of variance for unweighted mean scores of students within each level for each of the following selected

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[1]Ibid., p. 1. [2]Ibid., p. 5. [3]Ibid., p. 78.

factors of production performance: form scores, production speed scores, and production accuracy scores.[1]

To compare the gains made by the two groups in straight-copy speed and the gains made by the two groups in straight-copy accuracy, Varnon calculated the difference between the initial straight-copy scores and final straight-copy and computed *t*-tests to determine whether the differences in the mean gains of the two groups were statistically significant.[2]

Varnon concluded that:

1. The self-paced, programmed approach using printed programmed materials as the basic instructional source is an effective method of teaching problem typewriting in the secondary school beginning typewriting course.
2. Self-paced, programmed instruction using printed programmed materials as the basic instructional source is as effective as teacher-directed instruction in teaching problem typewriting to students of all scholastic achievement levels in the secondary school beginning typewriting course.
3. Permitting students to work at their own pace in completing self-instructional problem typewriting units does not inhibit their development of straight-copy skills.[3]

Several methods of teaching the keyboard to beginning typewriting students have been reviewed, and there was no consensus among the researchers as to a superior method of presenting the keyboard. The reviewed research included elementary, secondary, and adult students.

Teaching Aids in Presenting the Keyboard

The following is a review, in chronological order, of studies that were considered relevant to the present study.

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[1]Ibid., p. 78. [2]Ibid., p. 79. [3]Ibid., p. vi.

In 1951, Winger[1] conducted a study to test scientifically the value of the tachistoscope as a basic aid to learning in beginning typewriting. Fundamentally, the Winger study involved the use of mechanical means for the exposure of materials in a manner somewhat similar to the flash-card method of presentation used for many years in such subjects as spelling, reading, arithmetic, shorthand, and typewriting. The experiment was designed to measure the value of intensive training in the perception of words, digits, phrases, and typewriting.[2]

Winger used one control and one experimental class each time the experiment was conducted. The first experiment was conducted during the fall quarter and the second experiment was conducted during the winter quarter at Oregon State College during 1949-1950 school year. Participating members of the groups were equated, as nearly as possible, by group means and standard deviations on the factors of mental ability, reading skill, and manual dexterity. Participants in the experiments had no previous typewriting instruction.

The control class received the instruction and used the materials normally given to beginning typewriting students for the development of typewriting skills. The experimental class was given the same type of training, plus tachistoscopic training for about ten minutes of each class period. During this short period of tachistoscopic training, the experimental class typed from exposure material that was controlled as to amount and duration of exposure and was projected on a screen in front of the group.

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[1]Fred E. Winger, "The Determination of the Significance of Tachistoscopic Training in Word Perception as Applied to Beginning Typewriting Instruction" (unpublished Ed.D. dissertation, University of Oregon, 1951).

[2]Ibid., pp. 4-5.

The tachistoscopic training provided in the experiment was designed to serve as a visual aid of instruction and not as a substitute for any of the generally accepted teaching procedures for typewriting skill development.[1]

The analysis of variance was used to provide a final statistical test of the significance of the differences between the control and the experimental classes based on five-minute timed writings.[2]

Winger sought the answers to the following questions:

1. Will practice in rapid perception of words or word-recognition units and transfer of this image to the typewritten copy be conducive to the development of rapid stroking from the beginning?
2. Will practice in rapid perception of words or word-recognition units and transfer of this image to the typewritten copy be conducive to the development of accuracy in typewriting?
3. Will the use of a darkened room in the beginning typewriting instruction be conducive to improved operational techniques?
4. Will the use of tachistoscopic training lead to an increased ability to concentrate on the copy and to relax while attaining typewriting skills?
5. Will the use of tachistoscopic training be a valuable motivating force and lead to increased interest on the part of the student and the teacher?
6. Will the constant practice in quick perception develop habits of reading which will not only be of benefit in typewriting but will carry over into other areas of the student's program?
7. Will tachistoscopic training tend to develop a natural rhythm of writing rather than a regulated rhythm that is so characteristic of letter-by-letter stroking habits?[3]

The results of Winger's experiment resulted in the following conclusions:

1. Rapid Stroking: Tachistoscopic training develops a more rapid stroking ability in the early stages of skill development. This early superiority in stroking rate is then retained while a relatively normal growth follows as judged by the growth patterns of the traditionally instructed groups.
2. Accurate Stroking. As faster stroking rates were developed, more accurate strokings were being made by those trained on the flash material. Those receiving the tachistoscopic training were able

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[1]Ibid., p. 8. [2]Ibid., p. 78. [3]Ibid., pp. 4-7.

to obtain better accuracy scores from the very beginning in spite of the fact that they were stroking more rapidly than those receiving traditional instruction.

3. Improved Operational Techniques: The use of the darkened room as a part of the tachistoscopic training is conducive to improved operational techniques.
4. Increased Concentration and Relaxation: The use of the darkened room as a part of the tachistoscopic training is conducive to increased concentration of the copy and a relaxed atmosphere and less tension in the classroom.
5. Motivating Force and Increased Interest: Tachistoscopic training is definitely a motivating factor in typewriting skill development. The students, as well as the teacher, agreed that this functional visual aid developed a more interesting classroom atmosphere than the traditional procedures.
6. Reading for Typewriting: The experimenter contends that the tachistoscopic training contributes toward the development of reading skills for typewriting. The benefits to be derived from this training so far as reading for other subjects was not confirmed by this study.
7. Development of a Natural Typewriting Rhythm: The flash procedures do tend to develop a more natural rhythm (metronomic) of writing as contrasted with the regulated rhythm so characteristic of letter-by-letter stroking habits.[1]

In 1966, Dorn[2] conducted a study to determine whether there was a difference in pupil achievement in the typewriting of numbers when special daily drills on numbers were presented with the aid of the overhead projector and chalkboard as compared with drilling on numbers using the textbook exclusively.[3]

Specifically, Dorn attempted to answer the following two questions:

1. What is the effect of the two instructional approaches on developing speed on mixed copy and straight-number copy material?
2. What is the effect of the two instructional approaches on developing accuracy on mixed copy and straight-number copy materials?[4]

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[1] Ibid., pp. 135-139.

[2] Brock Edward Dorn, "An Experiment to Determine if Special Drills Presented with the Aid of the Overhead Projector and the Chalkboard Improve Number Typing Speed and Accuracy" (unpublished Master's thesis, Northern Illinois University, 1966).

[3] Ibid., p. 2. [4] Ibid.

Dorn worked with two typewriting classes--one control class and one experimental class. Manual typewriters were used in both classes. The control class was drilled on numbers using only one of the standard junior high school typewriting textbooks. The emphasis was on developing number typewriting proficiency using the overhead projector, chalkboard, and other supplementary drills as teaching aids in the experimental class.[1]

As a criterion for measuring speed and accuracy achievement, one-minute timed writings were used. "Tests were reported in terms of mean gross speed and mean gross errors on mixed copy and straight-number copy within the groups and between the groups."[2]

> Test results were subjected to statistical analysis to determine the significance of the mean gains or losses within groups and the difference between means of the two groups. A critical ratio, "t" score, was used to test significance at the .05 level of confidence.[3]

Dorn concluded that the overhead projector, chalkboard, and supplementary drills improved accuracy to a greater extent for the experimental group than did the regular textbook material for the control group on both mixed copy and straight-number copy. The experimental group showed greater improvement than did the control group on straight-number copy speed. Dorn found that the overhead projector, chalkboard, and supplementary drills were superior to just regular textbook materials in developing straight-number copy speed.[4]

In 1969, Smith[5] conducted a study to determine whether closed-circuit television could be used to improve basic skill performance by

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[1]Ibid., p. 48. [2]Ibid., p. 49. [3]Ibid. [4]Ibid., pp. 51-52.

[5]Sherrilyn B. Smith, "An Experiment to Determine Whether Closed Circuit Television Can Improve Beginning Typewriting Performance" (unpublished Master's thesis, University of Colorado, 1969).

improving techniques and to determine the cost of using the closed circuit circuit television equipment in beginning typewriting classes.

Smith used the following equipment: a television camera, a video tape recorder, and a monitor set. Typing techniques of the students were filmed periodically in the experimental class. Students in the control class were not exposed to the television equipment.

Smith employed the following controls to assure that both classes were handled alike: (1) all students were told that they were a part of an experimental study, (2) the same instructor taught both classes, (3) detailed lesson plans were followed, (4) the classroom, desks, chairs, stands, and textbooks were the same for both groups, (5) each class period was 55 minutes in length, and (6) identical visual aids were used in both classes.

Evaluation of the experiment was based upon a series of timed writings given approximately every two weeks. For each typist, records were kept for gross words and errors per minute.

Smith gathered data on the cost of using the closed circuit television equipment. "The cost of the equipment was prorated according to the amount of time the equipment was in use."[1]

The following conclusions were drawn by Smith:

1. The experimental group which used the closed circuit television equipment to improve techniques, was significantly better in both speed and accuracy performance on the final two of the thirteen tests given.
2. From the first test given to the last test given, the experimental group where the television equipment was used gained significantly more total words per minute typed and gained in accuracy (fewer errors per minute) than the control group.
3. Therefore, on the basis of the findings in this study, typewriting performance, as measured by speed and accuracy, was

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[1]Ibid., p. 36.

improved by using television equipment to show students how they could improve typewriting techniques.[1]

In 1970, Serlo[2] conducted a study to determine whether there is a statistically significant difference between the achievement of students taught to type on electric typewriters as compared with the achievement of students taught to type on manual typewriters.

Serlo attempted to answer the following questions:

1. Is there a significant difference in the straight-copy speeds achieved by students taught to type on an electric typewriter as compared with the speeds achieved by students taught to type on a manual typewriter?
2. Is there a significant difference in the number of errors made by students taught to type on an electric typewriter as compared with the students taught to type on a manual typewriter?
3. Is there a significant difference in the production rates achieved by students taught to type on an electric typewriter as compared with the students taught to type on a manual typewriter?[3]

Serlo compared the student's t ratio to a t distribution table to determine the significance between the two groups at the .01 level.[4]

Serlo also sought student opinions of the manual and the electric typewriter so as to provide an added dimension to the study.

In the Serlo study, two classes of Typing I students were involved. One class used electric machines and the other used manual machines. The students involved had no previous training in typewriting.[5]

Serlo concluded the following:

1. Neither the electric or the manual typewriter offers an advantage to the beginning typist.

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[1]Ibid., p. 38.

[2]David J. Serlo, "A Comparison of the Achievement Attained by Beginning Typewriting Students on Electric and Manual Typewriters" (unpublished Master's thesis, Indiana University of Pennsylvania, 1970).

[3]Ibid., p. 4. [4]Ibid., p. 9. [5]Ibid., pp. 3-4.

2. Both groups progress at relatively the same pace with the same quality of work in terms of speed, errors, and production work.
3. The students do not find the service keys difficult to adjust to and manipulate on either typewriter.
4. The manual typing students although, as comfortable at their typewriters as the electric typing students, find that errors tend to increase more noticeably after a prolonged period of time.
5. All students prefer to learn on the electric typewriter.[1]

In summary, four graduate research studies were reviewed pertaining to teaching aids in beginning typewriting classes. Winger's [2] experimental class, which used the tachistoscopic training device, developed a more rapid stroking rate and a higher accuracy rate than that of the control class. Dorn[3] used the overhead projector and chalkboard in his experimental class as a teaching aid. This experimental class had a better performance rate on both speed and accuracy on straight copy and number copy. The use of closed-circuit televison by Smith's [4] experimental class had a better performance rate on both speed and accuracy than the control class. Serlo[5] did not use a teaching aid as such but compared the performance of students using electric typewriters with those using manual typewriters. Serlo did not find a difference at the .01 level of significance. The raw data revealed, however, that the performance of the experimental class was higher than that of the control class on both gross words per minute and errors per minute.

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[1] Ibid., pp. 27-28.

[2] Winger, "The Significance of Tachistoscopic Training."

[3] Dorn, "Aid of Overhead Projector and Chalkboard."

[4] Smith, "Closed Circuit Television"

[5] Serlo, "Electric &/or Manual Typewriters."

Research Directly Related to the Design of the Present Study

In 1973, Cook[1] conducted a study to determine the difference in student achievement in the rates of speed and degrees of accuracy between two groups of learners with one group (control) receiving conventional keyboard instruction and the other (experimental) receiving keyboard instruction utilizing the electronic keychart teaching aid.

Secondary pruposes were (1) to determine whether the difference in instructors had a significant effect on the skill achievement and (2) to determine whether the difference in the kind of typewriter had a significant effect on the skill achievement.[2]

The population for Cook's study was composed of students enrolled in two classes of beginning typewriting at Central Michigan University. Each class was randomly divided into an experimental and a control group. Each of the experimental and control groups was further subdivided into three sections, which were randomly selected to learn the typewriter keyboard on the IBM Selectric, IBM Model D, or Royal manual typewriters.[3] Each of the experienced typewriting teachers taught an experimental and a control group. Identical course outlines, time schedules, basic textbooks, and homework assignments were utilized for each group.[4]

The students were compared for equality of groups in terms of the American College Test scores, number of hours of credit accumulated,

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[1]Wells Franklin Cook, "A Comparison of Two Methods of Presenting the Keyboard: The Electronic Keychart Versus the Traditional Method of Keyboard Presentation" (unpublished Ph.D. dissertation, Michigan State University, 1973).

[2]Ibid., p. 6. [3]Ibid., p. 77. [4]Ibid.

grade-point average (cumulative), number of absences from class, number of times tardy to class, age, and sex. The experimental and control groups were much more alike than they were different.[1]

The statistical treatment of the data utilized the multivariate analysis of variance to test the significance of differences between the control and the experimental groups concerning student achievement in the rates of speed and the degrees of accuracy between the two groups of learners--control and experimental. Secondary problems were (1) to determine whether the difference in instructor had a significant effect on the skill achievement and (2) to determine whether the difference in the kind of typewriter had a significant effect on the skill development.[2]

Cook concluded that:

1. Students using the KEE-type-trainer in this experimental study of learning the typewriter keyboard were more accurate than were the students taught by conventional teaching methods.
2. Students using the KEE-type-trainer in this experimental study of learning the typewriter keyboard typed at slower speeds than did students taught by conventional teaching methods.
3. Students in this experimental study typed equally well regardless of the kind of typewriter used.
4. No significant differences were found between the instructors in the study.[3]

The Cook[4] study was similar to this study in that the "Kee-type-trainer" was used. This study is a replica of the Cook study. However, the hypotheses and the statistical treatment of the data in this study are different from those of the Cook study. The Cook study is compared with this study in Chapter V.

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[1]Ibid., p. 78. [2]Ibid., p. 6. [3]Ibid., p. 86.

[4]Cook, "Electronic Keychart versus the Traditional Method Keyboard Presentation."

Summary

Chapter II consists of a comprehensive review of research and professional literature relating to the teaching of beginning typewriting classes at the elementary, secondary, and adult levels. The amount of material in each category is quite extensive. Therefore, items selected for mention in this review of professional literature and research were limited to those most closely related to the present study.

The review of literature was classified into three major categories: (1) Methods of Teaching the Keyboard, (2) Teaching Aids in Presenting the Keyboard, and (3) Research Directly Related to the Design of the Present Study.

CHAPTER III

METHODS

The methodology for this study is discussed under the following headings: Subjects, Materials, Pre-Experimental Procedure, Course Procedure, and Statistical Procedures.

Subjects

The subjects for this experimental study were students enrolled in two beginning typewriting classes during the Spring of 1976 at the University of Oklahoma, Norman, Oklahoma. The total number of subjects was 46. The subjects for the two groups (experimental and control) did not constitute a random sample inasmuch as intact classroom groups were used.

The experimental group, which met at 11:30 a.m. on Mondays, Wednesdays, and Fridays, had a total of 21 students. Of the 21 students, 12 students had no prior typewriting experience. The control group, which met at 9:30 a.m. on Mondays, Wednesdays, and Fridays, had a total of 25 students. Of the 25 students in the control group, 14 students had no prior typewriting experience.

Materials

Materials and equipment used in this study were furnished by Mr. John Ward, Executive Vice President of Kee, Incorporated.

The only material used by the control group was the textbook, College Typewriting by Lessenberry, Wanous, Duncan, and Warner.[1] The experimental group used the same textbook as the control group. In addition to the textbook, the experimental group used the Kee Electronic Wall Chart with its pre-punched tapes and the control panel that was manually operated by the Instructor. (See Appendix C.)

IBM Selectric typewriters were used in this study. The same classroom was used for both the experimental and the control groups.

The independent measures in this study were beginning typewriting course enrollment, gender, scholastic ability, age, cumulative college credit hours, and grade-point average. The dependent measure was the performance that was measured at six predetermined intervals during the semester.

Pre-Experimental Procedure

A course outline based on the textbook and correlated with the Kee pre-punched tapes was developed before the beginning of the semester. (See Appendix A.) The course outline was developed so that the instructor would make the same presentation to each class. The course outline provided for absences of students in that individual measurements were to be given on the first day the student returned to class. The course outline was predicated on the fact that the classes were to meet only on Mondays, Wednesdays, and Fridays during the semester.

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[1] D. D. Lessenbery, S. J. Wanous, C. H. Duncan, and S. E. Warner, College Typewriting, 9th ed. (Cincinnati: South-Western Publishing Co., 1975).

The subjects for the two groups (experimental and control) were assigned to the instructor by regular scheduling techniques. Permission was obtained from the University of Oklahoma Administration and the Chairman of the Business Education Department in the College of Education to involve the students, the classes, and this instructor in this research study. Permission was also obtained from the Office of Admissions and Records, University of Oklahoma, to secure American College Test scores (ACT), the grade-point averages, and the cumulative college credit hours for each student who would be enrolled in the beginning typewriting courses.

Course Procedure

At the beginning of the semester, each student was asked to fill out a student information sheet. (See Appendix A.) This sheet provided information as to whether or not the student had previously taken typewriting. The students' transcripts (high school and college) were checked to verify this information. The transcripts provided the final determination as to which group the student would be assigned--those who had typewriting or those who did not have typewriting.

Students who had typewriting before and had been advised to repeat the course were given the same assignments in the typewriting classes as those who had no previous typewriting. These students were not segregated in any way until after the data had been gathered and coded for the statistical analysis. Each group was subdivided into those who had typewriting and those who did not have typewriting. This procedure was followed in both the experimental group and the control group so as not to bias the statistical treatment of the data.

The experimental group and the control group were taught by the same instructor. The Kee Electronic Keychart was controlled by the teacher and was operated from pre-punched tapes and/or the control panel. The Kee Electronic Keychart was used to introduce the letters, symbols, and numbers to the experimental group. The control group was introduced to the letters, symbols, and numbers via the traditional method. The classes were allowed a five minute warm-up period during the first five minutes of each class while the instructor performed the necessary administrative duties and gave individual help if needed or requested.

Next, the letters of the keyboard for the day were introduced. In the experimental group, the instructor told the students which characters were to be introduced for the day and asked the students to locate the key(s) on the keychart and then to locate the key(s) on their machines. They were told to make several motions from the homerow keys to the particular key that was being introduced while keeping their eyes on the Kee Electronic wall chart.

The Kee Electronic wall chart was then turned on so the students could type as they followed the flashing of the keys as they lit up on the chart. The initial speed on the flashing of the keys during the first week of the semester was at five words per minute. The students complained that five words per minute was too slow and seven words per minute was a better speed. After the students had typed through the key presentation for the day, they were asked to type once again from the same material from their textbooks. Students then switched back to the Kee Electronic wall chart and the speed was increased to the next higher speed by at least two words per minute.

The remainder of the class period was devoted to the exercises in the textbook that reinforced the keys, numbers, or symbols that had been presented that day. Students were requested to type from previously presented materials that would reinforce their learning. All students were asked to work on the same material at the same time. This procedure allowed the instructor time to move about the room and to give individual assistance where needed and to observe the reaches being made by each student. Any student who was observed making improper reaches was given immediate assistance and corrections were made before the wrong habit had been formed.

Six different measurements for each student in the experimental and the control group were given during the semester. These measurements were taken from unfamiliar materials so that the students did not have the opportunity to prejudice the statistical results through practice over the typewriting materials. The measurement copy difficulty was correlated at each point in time with the textbook copy difficulty being used by the students so that they would not be taking tests from higher syllable intensity, stroke intensity, or incidence of high-frequency words than they were working on in class at each particular point of measurement.[1]

The first measurement was taken after all letters of the alphabet had been presented. This measurement was taken from the textbook, College Typewriting, page 26, Exercise 12E.[2] (See Appendix A.)

Measurement number two was taken on the fourth class meeting after the first measurement had been taken. This procedure allowed the students

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[1]Lessenberry, Wanous, Duncan, and Warner, College Typewriting, p. 18.

[2]Ibid., p. 26.

three in-class days for drill and review over the letters of the alphabet. (See page 30, 15D, College Typewriting.)[1] (See Appendix A.)

The third measurement was taken over the numbers after they had been presented to the class. This measurement was from Gregg's Typing 300, page 64.[2] The symbols were then presented and, after the final symbol had been presented, a fourth measurement was taken. This material came from the material prepared by Well Cook.[3] (See Appendix A.)

After the letters, numbers, and symbols had been presented to the classes, the students in both groups continued to follow the format of the textbook and both groups were given identical homework assignments.

During the last two weeks of the semester, the fifth and the sixth measurements were taken. These six measurements were for speed and accuracy. Each test was scored as to gross words per minute as well as total errors per minute. (See Appendix B.)

The words per minute were determined and counted according to acceptable typewriting standards--that is, five strokes equal one standard typewritten word.[4]

Errors were counted when any deviation was made from the material being used in the administered test.

An attitudinal questionnaire was given to the students at the last class meeting and they were asked to given their opinions as to the

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[1]Ibid., p. 30.

[2]John L. Rowe, Allan C. Lloyd, and Fred E. Winger, Typing 300, Volume 1: General Course (5th ed.; Dallas, TX: Gregg Division, McGraw-Hill Book Co., 1972), p. 64.

[3]Cook, "Electronic Keychart versus the Traditional Method Keyboard Presentation."

[4]Lessenberry, Wanous, Duncan, and Warner, College Typewriting, p. 14.

classroom procedure(s). (See Appendix A.) The students were told that their signature was optional and that they could complete the form using their typewriter.

Statistical Procedures

After the data had been collected and coded, frequencies were run to determine whether the groups were proportionately divided. The data on each of the six measurements were then subjected to the following analyses:

1. A T-Test using two treatment groups--the experimental class who had no prior typewriting experience and the control class who had no prior typewriting experience--with the keyboard mastery mean analyzed.

2. A T-Test using two treatment groups--the female students in the experimental class who had no prior typewriting experience and the female students in the control class who had no prior typewriting experience--with the keyboard mastery mean analyzed.

3. A T-Test using two treatment groups--the male students in the experimental class who had no prior typewriting experience and the male students in the control class who had no prior typewriting experience--with the keyboard mastery mean analyzed.

4. A T-Test using two treatment groups--the students with general scholastic ability higher than 20.7 in the experimental class who had no prior typewriting experience and the students with general scholastic ability higher than 20.7 in the control class who had no prior typewriting experience--with the keyboard mastery mean analyzed.

5. A T-Test using two treatment groups--the students with general scholastic ability less than 20.7 in the experimental class who had no prior typewriting experience and the students with general scholastic ability less than 20.7 in the control class who had no prior typewriting experience--with the keyboard mastery mean analyzed.

6. A T-Test using two treatment groups--the students with ages higher than 20.467 years in the experimental class who had no prior typewriting experience and the students with ages higher than 20.467 years in the control class who had no prior typewriting experience--with the keyboard mastery mean analyzed.

7. A T-Test using two treatment groups--the students with ages lower than 20.467 in the experimental class who had no prior typewriting experience and the students with ages lower than 20.467 in the control who had no prior typewriting experience--with the keyboard mastery mean analyzed.

8. A T-Test using two treatment groups--the students with cumulative college credit hours above 71.935 in the experimental class who had no prior typewriting experience and the students with cumulative college credit hours above 71.935 in the control class who had no prior typewriting experience--with the keyboard mastery mean analyzed.

9. A T-Test using two treatment groups--the students with cumulative college credit hours less than 71.935 in the experimental class who had no prior typewriting experience and the students with cumulative college credit hours less than 71.935 in the control class who had no prior typewriting experience--with the keyboard mastery mean analyzed.

10. A T-Test using two treatment groups--the students with college grade-point average above 2.677 in the experimental class who had no prior typewriting experience and the students with college grade-point average above 2.677 in the control class who had no prior typewriting experience--with the keyboard mastery mean analyzed.

11. A T-Test using two treatment groups--the students with college grade-point average less than 2.677 in the experiemental class who had no prior typewriting experience and the students with college grade-point average less than 2.677 in the control class who had no prior typewriting experience--with the keyboard mastery mean analyzed.

Scattergrams were run to check for linear relationships and then tests were run for non-zero intercepts.

Two basic assumptions underlying the use of the T-Test are (1) the population from which each sample is drawn is normally distributed; and (2) the sample data have been drawn randomly from the population.[1]

These two basic assumptions were not completely met; however the failure to meet the two assumption should not invalidate the internal validity of the study.[2] According to Popham, the classroom teacher can check with precision the difference between two groups.[3] "One can depart quite markedly from them and still obtain a *t* value which can be correctly interpreted."[4] These typewriting classes were assigned to the instructor through the normal scheduling procedures at the University and were followed by random assignment of each class to an experimental or control category.

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[1] W. James Popham, Educational Statistics: Use and Interpretation (New York: Harper & Row, Publishers, 1967), p. 141.

[2] Ibid., p. 139. [3] Ibid. [4] Ibid.

CHAPTER IV

RESULTS

Analysis of Data

The dependent measures used in this study were the scores obtained by each student on the six different one-minute timed writings. The independent measures were beginning typewriting class enrollment, gender, general scholastic ability, age, cumulative credit hours, and college grade-point average.

The six dependent measures were subjected to T-Tests. Prior to T-Tests, frequency statistics were run on the independent measures to determine whether the groups were proportionate.

The two groups (the experimental and the control) were deemed satisfactory. (See Appendix B, Table 1.) There were 21 students in the experimental group and 25 students in the control group. Appendix B, Table 2, shows that the gender is almost equally divided--22 females and 24 males. The ages are shown in Appendix B, Table 3 and indicate a group division of those who are 18 through 20 and then 20 and older. The mean age was 20.467; the median age was 20.27. The ages cluster around 19, 20, and 21. The general scholastic ability frequency statistics of interest are (1) minimum score, (2) maximum score, and (3) median score. The mean is 20.7; the median is 20.83. (See Appendix B, Table 4.) The cumulative college credit hours present nothing in the

frequency distribution but the statistics at the bottom of Table 5, Appendix B, are noteworthy. The mean of 71.935 hours and the median of 67.50 hours indicate that the students are either second-semester sophomores or perhaps first-semester juniors. The statistics for the cumulative grade-point average indicate a mean of 2.677, which is near a B- or C+. The students in this study, therefore, are of average ability on the basis of the 0-4 grade-point system used at the University of Oklahoma.

After the frequency statistics were run, the next step was to subject the dependent measures (the six one-minute timed writings) to T-Tests; the independent measures being class enrollment, gender, general scholastic ability, age, cumulative credit hours, and college grade-point average. (See Appendix B, Table 6 for these data.)

Table 1 presents T-Test results for differences between the keyboard mastery means (based on the measure of net words per minute for tests one through six) of the experimental and the control group. The analysis revealed no statistically significant difference at the .05 level of confidence between the two groups on tests 1, 2, 3, 4, 5, and 6.

Table 2 presents T-Test results for differences between the keyboard mastery means (based on the measure of net words per minute for tests one through six) for the experimental and the control group females. The analysis revealed no statistically significant differences at the .05 level of confidence between the two groups on tests 1, 2, 3, 4, 5, and 6.

TABLE 1

T-TESTS FOR DIFFERENCE BETWEEN THE KEYBOARD MASTERY MEANS (BASED ON THE MEASURE OF NET WORDS PER MINUTE) OF THE EXPERIMENTAL AND THE CONTROL GROUPS FOR TESTS ONE THROUGH SIX

VARIABLE	NUMBER	STANDARD DEVIATION	MEAN	T VALUE
Test 1				
Group 1	14	18.726	-0.2857	-1.21[a]
Group 2	12	14.850	7.8333	
Test 2				
Group 1	14	20.265	-4.7143	-0.39[b]
Group 2	12	21.309	-1.5000	
Test 3				
Group 1	14	17.496	0.3571	0.34[c]
Group 2	12	28.184	-2.8333	
Test 4				
Group 1	14	10.628	6.7857	-0.04[d]
Group 2	12	7.561	6.9167	
Test 5				
Group 1	14	14.678	18.7143	-0.63[e]
Group 2	12	15.751	22.5000	
Test 6				
Group 1	14	15.741	21.9286	-1.06[f]
Group 2	12	18.151	29.0000	

[a]Not significant at the .05 level

[b]Not significant at the .05 level

[c]Not significant at the .05 level

[d]Not significant at the .05 level

[e]Not significant at the .05 level

[f]Not significant at the .05 level

TABLE 2

T-TESTS FOR DIFFERENCE BETWEEN THE KEYBOARD MASTERY MEANS (BASED ON THE MEASURE OF NET WORDS PER MINUTE) OF THE EXPERIMENTAL AND THE CONTROL GROUP FEMALES FOR TESTS ONE THROUGH SIX

VARIABLE	NUMBER	STANDARD DEVIATION	MEAN	T VALUE
Test 1				
Group 1	3	22.679	11.6667	1.11[a]
Group 2	6	25.010	-7.5000	
Test 2				
Group 1	3	13.868	7.6667	1.54[b]
Group 2	6	17.941	-10.6667	
Test 3				
Group 1	3	10.017	2.6667	-0.26[c]
Group 2	6	19.488	5.8333	
Test 4				
Group 1	3	8.185	8.0000	-0.38[d]
Group 2	6	8.914	10.3333	
Test 5				
Group 1	3	10.786	24.3333	1.18[e]
Group 2	6	13.795	13.5000	
Test 6				
Group 1	3	13.204	38.6667	1.78[f]
Group 2	6	18.623	17.0000	

[a]Not significant at the .05 level

[b]Not significant at the .05 level

[c]Not significant at the .05 level

[d]Not significant at the .05 level

[e]Not significant at the .05 level

[f]Not significant at the .05 level

Table 3 presents T-Test results for differences between the keyboard mastery means (based on the measure of net words per minute for tests one through six) for the experimental and the control group males. The analysis revealed no statistically significant differences at the .05 level of confidence between the two groups on tests 1, 2, 3, 4, 5, and 6.

Table 4 presents T-Test results for differences between the keyboard mastery means (based on the measure of net words per minute for tests one through six) for the experimental and the control group who have a general scholastic ability score higher than 20.7. The analysis revealed no statistically significant differences at the .05 level of confidence between the two groups on tests 1, 2, 3, 4, 5, and 6.

Table 5 presents T-Test results for differences between the keyboard mastery means (based on the measure of net words per minute for tests one through six) for the experimental and the control group who have a general scholastic ability score lower than 20.7. The analysis revealed no statistically significant differences at the .05 level of confidence between the two groups on tests 1, 2, 3, 4, 5, and 6.

Table 6 presents T-Test results for differences between the keyboard mastery means (based on the measure of net words per minute for tests one through six) for the experimental and the control group who have an age higher than 20.467. The analysis revealed no statistically significant differences at the .05 level of confidence between the two groups on tests 1, 2, 3, 4, 5, and 6.

Table 7 presents T-Test results for differences between the keyboard mastery means (based on the measure of net words per minute for tests one through six) for the experimental and the control group who

TABLE 3

T-TESTS FOR DIFFERENCE BETWEEN THE KEYBOARD MASTERY MEANS (BASED ON THE MEASURE OF NET WORDS PER MINUTE) OF THE EXPERIMENTAL AND THE CONTROL GROUP MALES FOR TESTS ONE THROUGH SIX

VARIABLE	NUMBER	STANDARD DEVIATION	MEAN	T VALUE
Test 1				
Group 1	9	12.934	6.5556	0.24[a]
Group 2	8	11.243	5.1250	
Test 2				
Group 1	9	23.114	-4.5556	-0.39[b]
Group 2	8	21.901	-0.2500	
Test 3				
Group 1	9	32.435	-4.6667	-0.08[c]
Group 2	8	15.881	-3.7500	
Test 4				
Group 1	9	7.828	6.5556	0.51[d]
Group 2	8	11.581	4.1250	
Test 5				
Group 1	9	17.617	21.8889	-0.09[e]
Group 2	8	14.947	22.6250	
Test 6				
Group 1	9	19.045	25.7778	0.11[f]
Group	8	12.755	24.8750	

[a]Not significant at the .05 level

[b]Not significant at the .05 level

[c]Not significant at the .05 level

[d]Not significant at the .05 level

[e]Not significant at the .05 level

[f]Not significant at the .05 level

TABLE 4

T-TESTS FOR DIFFERENCE BETWEEN THE KEYBOARD MASTERY MEANS (BASED ON THE MEASURE OF NET WORDS PER MINUTE) OF THE EXPERIMENTAL AND THE CONTROL GROUP WITH GENERAL SCHOLASTIC ABILITY HIGHER THAN 20.7 FOR TESTS ONE THROUGH SIX

VARIABLE	NUMBER	STANDARD DEVIATION	MEAN	T VALUE
Test 1				
Group 1	8	17.415	9.8750	0.88[a]
Group 2	8	23.463	0.7500	
Test 2				
Group 1	8	15.560	-0.1250	0.43[b]
Group 2	8	19.253	-3.8750	
Test 3				
Group 1	8	11.650	6.5000	0.17[c]
Group 2	8	19.097	5.1250	
Test 4				
Group 1	8	7.653	7.5000	-0.26[d]
Group 2	8	11.298	8.7500	
Test 5				
Group 1	8	14.772	27.2500	0.90[e]
Group 2	8	11.865	21.2500	
Test 6				
Group 1	8	16.600	30.8750	1.25[f]
Group 2	8	16.579	20.5000	

[a]Not significant at the .05 level

[b]Not significant at the .05 level

[c]Not significant at the .05 level

[d]Not significant at the .05 level

[e]Not significant at the .05 level

[f]Not significant at the .05 level

TABLE 5

T-TESTS FOR DIFFERENCE BETWEEN THE KEYBOARD MASTERY MEANS (BASED ON THE MEASURE OF NET WORDS PER MINUTE) OF THE EXPERIMENTAL AND THE CONTROL GROUP WITH GENERAL SCHOLASTIC ABILITY LESS THAN 20.7 FOR TESTS ONE THROUGH SIX

VARIABLE	NUMBER	STANDARD DEVIATION	MEAN	T VALUE
Test 1				
Group 1	4	8.221	3.7500	0.80[a]
Group 2	6	11.708	-1.6667	
Test 2				
Group 1	4	32.938	-4.2500	0.09[b]
Group 2	6	23.370	-5.8333	
Test 3				
Group 1	4	43.578	-21.5000	-0.69[c]
Group 2	6	14.156	-6.0000	
Test 4				
Group 1	4	8.382	5.7500	0.26[d]
Group 2	6	10.028	4.1667	
Test 5				
Group 1	4	14.832	13.0000	-0.21[e]
Group 2	6	18.414	15.3333	
Test 6				
Group 1	4	23.071	25.2500	0.20[f]
Group 2	6	15.118	22.8333	

[a]Not significant at the .05 level

[b]Not significant at the .05 level

[c]Not significant at the .05 level

[d]Not significant at the .05 level

[e]Not significant at the .05 level

[f]Not significant at the .05 level

TABLE 6

T-TESTS FOR DIFFERENCE BETWEEN THE KEYBOARD MASTERY MEANS (BASED ON THE MEASURE OF NET WORDS PER MINUTE) OF THE EXPERIMENTAL AND THE CONTROL GROUP WITH AGES HIGHER THAN 20.467 FOR TESTS ONE THROUGH SIX

VARIABLE	NUMBER	STANDARD DEVIATION	MEAN	T VALUE
Test 1				
Group 1	6	15.453	6.0000	1.25[a]
Group 2	7	20.897	-7.0000	
Test 2				
Group 1	6	13.891	-0.1667	0.75[b]
Group 2	7	21.404	-7.8571	
Test 3				
Group 1	6	13.491	7.0000	0.93[c]
Group 2	7	17.960	-1.2857	
Test 4				
Group 1	6	8.710	8.3333	1.13[d]
Group 2	7	7.477	3.2857	
Test 5				
Group 1	6	11.725	23.3333	0.69[e]
Group 2	7	15.460	18.0000	
Test 6				
Group 1	6	10.948	24.3333	0.90[f]
Group 2	7	18.981	16.4286	

[a]Not significant at the .05 level

[b]Not significant at the .05 level

[c]Not significant at the .05 level

[d]Not significant at the .05 level

[e]Not significant at the .05 level

[f]Not significant at the .05 level

TABLE 7

T-TESTS FOR DIFFERENCE BETWEEN THE KEYBOARD MASTERY MEANS (BASED ON THE MEASURE OF NET WORDS PER MINUTE) OF THE EXPERIMENTAL AND THE CONTROL GROUP WITH AGES LOWER THAN 20.467 FOR TESTS ONE THROUGH SIX

VARIABLE	NUMBER	STANDARD DEVIATION	MEAN	T VALUE
Test 1				
Group 1	6	15.436	9.6667	0.39[a]
Group 2	7	14.763	6.4286	
Test 2				
Group 1	6	28.315	-2.8333	-0.09[b]
Group 2	7	20.214	-1.5714	
Test 3				
Group 1	6	36.517	-12.6667	-0.89[c]
Group 2	7	18.285	2.0000	
Test 4				
Group 1	6	6.716	5.5000	-0.87[d]
Group 2	7	12.659	10.2857	
Test 5				
Group 1	6	20.166	21.6667	0.23[e]
Group 2	7	15.054	19.4286	
Test 6				
Group 1	6	23.509	33.6667	0.69[f]
Group 2	7	9.693	26.5714	

[a]Not significant at the .05 level

[b]Not significant at the .05 level

[c]Not significant at the .05 level

[d]Not significant at the .05 level

[e]Not significant at the .05 level

[f]Not significant at the .05 level

have an age lower than 20.467. The analysis revealed no statistically significant differences at the .05 level of confidence between the two groups on tests 1, 2, 3, 4, 5, and 6.

Table 8 presents T-Test results for difference between the keyboard mastery means (based on the measure of net words per minute for tests one through six) for the experimental and the control group who have cumulative college credit hours higher than 71.935. The analysis revealed no statistically significant differences at the .05 level of confidence between the two groups on tests 1, 2, 3, 4, 5, and 6.

Table 9 presents T-Test results for difference between the keyboard mastery means (based on the measure of net words per minute for tests one through six) for the experimental and the control group who have cumulative college credit hours lower than 71.935. The analysis revealed no statistically significant differences at the .05 level of confidence between the two groups on tests 1, 2, 3, 4, 5, and 6.

Table 10 presents T-Test results for difference between the keyboard mastery means (based on the measure of net words per minute for tests one through six) for the experimental and the control group who have a grade-point average above 2.677. The analysis revealed no significant difference at the .05 level of confidence between the two groups on tests 1, 2, 3, 4, and 6; however, there was a significant difference at the .05 level of confidence on test five.

Table 11 presents T-Test results for difference between the keyboard mastery means (based on the measure of net words per minute for tests one through six) for the experimental and the control group who have a grade-point average less than 2.677. The analysis revealed no

TABLE 8

T-TESTS FOR DIFFERENCE BETWEEN THE KEYBOARD MASTERY MEANS (BASED ON THE MEASURE OF NET WORDS PER MINUTE) OF THE EXPERIMENTAL AND THE CONTROL GROUP WITH CUMULATIVE COLLEGE CREDIT HOURS ABOVE 71.935 FOR TESTS ONE THROUGH SIX

VARIABLE	NUMBER	STANDARD DEVIATION	MEAN	T VALUE
Test 1				
Group 1	6	16.018	11.1667	1.17[a]
Group 2	9	22.387	-1.2222	
Test 2				
Group 1	6	17.233	-2.5000	-0.17[b]
Group 2	9	21.382	-0.7778	
Test 3				
Group 1	6	13.136	6.8333	0.93[c]
Group 2	9	18.507	-1.3333	
Test 4				
Group 1	6	7.711	9.6667	1.02[d]
Group 2	9	9.821	4.7778	
Test 5				
Group 1	6	13.852	23.3333	0.69[e]
Group 2	9	16.029	17.7778	
Test 6				
Group 1	6	15.629	27.3333	0.91[f]
Group 2	9	18.520	19.0000	

[a]Not significant at the .05 level

[b]Not significant at the .05 level

[c]Not significant at the .05 level

[d]Not significant at the .05 level

[e]Not significant at the .05 level

[f]Not significant at the .05 level

TABLE 9

T-TESTS FOR DIFFERENCE BETWEEN THE KEYBOARD MASTERY MEANS (BASED ON THE MEASURE OF NET WORDS PER MINUTE) OF THE EXPERIMENTAL AND THE CONTROL GROUP WITH CUMULATIVE COLLEGE CREDIT HOURS LESS THAN 71.935 FOR TESTS ONE THROUGH SIX

VARIABLE	NUMBER	STANDARD DEVIATION	MEAN	T VALUE
Test 1				
Group 1	6	14.209	4.5000	0.39[a]
Group 2	5	11.480	1.4000	
Test 2				
Group 1	6	27.076	-0.5000	0.80[b]
Group 2	5	17.964	-11.8000	
Test 3				
Group 1	6	36.752	-12.5000	-0.54[c]
Group 2	5	17.082	3.4000	
Test 4				
Group 1	6	6.940	4.1667	-1.07[d]
Group 2	5	12.198	10.4000	
Test 5				
Group 1	6	18.769	21.6667	0.13[e]
Group 2	5	13.446	20.4000	
Test 6				
Group 1	6	21.768	30.6667	0.50[f]
Group 2	5	6.782	26.0000	

[a]Not significant at the .05 level

[b]Not significant at the .05 level

[c]Not significant at the .05 level

[d]Not significant at the .05 level

[e]Not significant at the .05 level

[f]Not significant at the .05 level

TABLE 10

T-TESTS FOR DIFFERENCE BETWEEN THE KEYBOARD MASTERY MEANS (BASED ON THE MEASURE OF NET WORDS PER MINUTE) OF THE EXPERIMENTAL AND THE CONTROL GROUP WITH COLLEGE GRADE-POINT AVERAGE ABOVE 2.677 FOR TESTS ONE THROUGH SIX

VARIABLE	NUMBER	STANDARD DEVIATION	MEAN	T VALUE
Test 1				
Group 1	7	17.116	12.4286	1.62[a]
Group 2	5	25.193	-7.2000	
Test 2				
Group 1	7	16.051	1.4286	0.67[b]
Group 2	5	24.633	-6.4000	
Test 3				
Group 1	7	19.523	0.1429	-0.08[c]
Group 2	5	17.930	1.0000	
Test 4				
Group 1	7	7.183	7.4286	1.24[d]
Group 2	5	2.775	3.2000	
Test 5				
Group 1	7	12.972	29.5714	3.57[e]
Group 2	5	5.167	10.2000	
Test 6				
Group 1	7	16.051	33.4286	2.17[f]
Group 2	5	18.322	11.8000	

[a]Not significant at the .05 level

[b]Not significant at the .05 level

[c]Not significant at the .05 level

[d]Not significant at the .05 level

[e]Significant at the .05 level

[f]Not significant at the .05 level

TABLE 11

T-TESTS FOR DIFFERENCE BETWEEN THE KEYBOARD MASTERY MEANS (BASED ON THE MEASURE OF NET WORDS PER MINUTE) OF THE EXPERIMENTAL AND THE CONTROL GROUP WITH COLLEGE GRADE-POINT AVERAGE LESS THAN 2.677 FOR TESTS ONE THROUGH SIX

VARIABLE	NUMBER	STANDARD DEVIATION	MEAN	T VALUE
Test 1				
Group 1	5	8.849	1.4000	-0.30[a]
Group 2	9	14.354	3.5556	
Test 2				
Group 1	5	28.745	-5.6000	-0.14[b]
Group 2	9	19.005	-3.7778	
Test 3				
Group 1	5	39.693	-7.0000	-0.37[c]
Group 2	9	18.337	0.0000	
Test 4				
Group 1	5	8.871	6.2000	-0.39[d]
Group 2	9	12.930	8.7778	
Test 5				
Group 1	5	14.826	12.6000	-1.23[e]
Group 2	9	16.318	23.4444	
Test 6				
Group 1	5	20.909	22.8000	-0.41[f]
Group 2	9	11.241	26.8889	

[a]Not significant at the .05 level

[b]Not significant at the .05 level

[c]Not significant at the .05 level

[d]Not significant at the .05 level

[e]Not significant at the .05 level

[f]Not significant at the .05 level

statistically significant differences at the .05 level of confidence between the two groups on tests 1, 2, 3, 4, 5, and 6.

Testing of Hypotheses

In this study it was hypothesized that:

Hypothesis 1. The keyboard mastery mean (based on the measure of net words per minute for tests one through six) for students who have had beginning typewriting with the instructor using the Kee Electronic Keychart method of teaching is greater than the keyboard mastery mean for students who have had beginning typewriting with the instructor using the traditional method of teaching. Since this difference was not significant on test 1, test 2, test 3, test 4, test 5, and test 6, this hypothesis was not supported. (See Table 1.)

Hypothesis 2. The keyboard mastery mean (based on the measure of net words per minute for tests one through six) for female students who have had beginning typewriting with the instructor using the Kee Electronic Keychart instructional method of teaching is greater than the keyboard mastery mean for female students who have had beginning typewriting with the instructor using the traditional method of teaching. Since this difference was not significant on test 1, test 2, test 3, test 4, test 5, and test 6, this hypothesis was not supported. (See Table 2.)

Hypothesis 3. The keyboard mastery mean (based on the measure of net words per minute for tests one through six) for male students who have had beginning typewriting with the instructor using the Kee Electronic Keychart Instructional method of teaching is greater than the keyboard mastery mean for male students who have had beginning typewriting with the instructor using the traditional method of teaching.

Since this difference was not significant on test 1, test 2, test 3, test 4, test 5, and test 6, this hypothesis was not supported. (See Table 3.)

Hypothesis 4. The keyboard mastery mean of students with higher general scholastic ability who had beginning typewriting with the instructor using the Kee Electronic Keychart instructional method of teaching is greater than the keyboard mastery mean of students with higher general scholastic ability who had beginning typewriting with the instructor using the traditional method of teaching. Since this difference was not significant on test 1, test 2, test 3, test 4, test 5, and test 6, this hypothesis was not supported. (See Table 4.)

Hypothesis 5. The keyboard mastery mean of students with lower general scholastic ability who had beginning typewriting with the instructor using the Kee Electronic Keychart instructional method of teaching is greater than the keyboard mastery mean of students with lower general scholastic ability who had beginning typewriting with the instructor using the traditional method of teaching. Since this difference was not significant on test 1, test 2, test 3, test 4, test 5, and test 6, this hypothesis was not supported. (See Table 5.)

Hypothesis 6. The keyboard mastery mean of older students who had beginning typewriting with the instructor using the Kee Electronic Keychart instructional method of teaching is greater than the keyboard mastery mean of older students who had beginning typewriting with the instructor using the traditional method of teaching. Since this difference was not significant on test 1, test 2, test 3, test 4, test 5, and test 6, this hypothesis was not supported. (See Table 6.)

Hypothesis 7. The keyboard mastery mean of younger students who had beginning typewriting with the instructor using the Kee Electronic Keychart instructional method of teaching is greater than the keyboard mastery mean of younger students who had beginning typewriting with the instructor using the traditional method of teaching. Since this difference was not significant on test 1, test 2, test 3, test 4, test 5, and test 6, this hypothesis was not supported. (See Table 7.)

Hypothesis 8. The keyboard mastery mean of students at the junior level who had beginning typewriting with the instructor using the Kee Electronic Keychart instructional method of teaching is greater than the keyboard mastery mean of students at the junior level who had beginning typewriting with the instructor using the traditional method of teaching. Since this difference was not significant on test 1, test 2, test 3, test 4, test 5, and test 6, this hypothesis was not supported. (See Table 8.)

Hypothesis 9. The keyboard mastery mean of students below the junior level who had beginning typewriting with the instructor using the Kee Electronic Keychart instructional method of teaching is greater than the keyboard mastery mean of students below the junior level who had beginning typewriting with the instructor using the traditional method of teaching. Since this difference was not significant on test 1, test 2, test 3, test 4, test 5, and test 6, this hypothesis was not supported. (See Table 9.)

Hypothesis 10. The keyboard mastery mean of students with a higher college grade-point average who had beginning typewriting with the instructor using the Kee Electronic Keychart instructional method

of teaching is greater than the keyboard mastery mean of students with a higher college grade-point average who had beginning typewriting with the instructor using the traditional method of teaching. Since this difference was not significant on test 1, test 2, test 3, test 4, and test 6, this hypothesis was not supported; however, there was a significant difference at the .05 level on test 5. This hypothesis was supported on test 5. (See Table 10.)

Hypothesis 11. The keyboard mastery mean of students with a lower college grade-point average who had beginning typewriting with the instructor using the Kee Electronic Keychart instructional method of teaching is greater than the keyboard mastery mean of students with a lower college grade-point average who had beginning typewriting with the instructor using the traditional method of teaching. Since this difference was not significant on test 1, test 2, test 3, test 4, test 5, and test 6, this hypothesis was not supported. (See Table 11.)

Comparison of Present Study with Cook Study

The results of this study were presented in Chapter IV; however, because the present study is similar to the Cook study, this Chapter discusses factors that might have resulted in the failure of this study to corroborate the findings of the Cook study.

In comparing the present study to the Cook study, the dependent measures were the same--six one-minute timed writings taken at predetermined intervals. However, the independent measures in this study were beginning typewriting enrollment, gender, general scholastic ability, (American College Test score), age, cumulative college credit hours, and college grade-point average whereas Cook used treatment, machine (model of typewriters), instructor, American College Test scores, number of college credit hours accumulated, college grade-point average accumulated, number of absences from class, number of times tardy to class, age, and sex.

In an attempt to eliminate any preconceived bias from the present study, the same instructor taught both sections of beginning typewriting to provide uniformity of teacher influence. Also, the same classroom and the same typewriters (IBM Selectric) were used for both beginning typewriting classes in an attempt to eliminate as much outside influence as possible.

This study had nine males and three females in the experimental group and the control group consisted of six females and eight males. The Cook study had ten males and seven females in the experimental group while the control group had eight males and ten females.

The American College Test mean for the students in the experimental group in this study was higher (23 as compared to 20.5) than the American College Test score mean for the experimental group in the Cook study. The American College Test Scores for the control groups were nearly the same (22.18 as compared to 22.28) for both studies.

The cumulative college credit hours mean for the experimental group in this study was 74.58 whereas the number of cumulative college credit hours for those in the Cook study was 37.27. The cumulative credit hours mean for the control group in this study was 78.14 while the Cook study reported 46.97. Thus, the number of cumulative college credit hours indicated that the present study consisted of primarily juniors while Cook had mostly sophomores.

The age mean for the experimental group in this study was 20.33; whereas the age mean for the experimental group in the Cook study was 19.08. The age mean for the control group in this study was 23.64; whereas the age mean for the control group in the Cook study was 18.78.

The college grade-point average mean for the students in the experimental group in the present study was 2.98 while the grade-point mean for the Cook study was 2.7. The college grade-point mean for students in the control group in this study was 2.64 while the grade-point mean in the Cook study was 2.5.

A comparison of this study with the Cook study produced the following results. The students in the present study on the whole were older and had a higher American College Test score mean, more college credit hours, and a higher grade-point average.

In the present study, a T-Test was performed on each of the dependent measures--the six one-minute timed writings. The independent

measures were class enrollment, gender, general scholastic ability, age, cumulative college credit hours, and college grade-point average. In the Cook study, the multivariate analysis of variance was employed. The independent measures in the Cook study were treatment, machine (model of typewriters), instructor, American College Test scores, number of college credit hours accumulated, college grade-point average accumulated, number of absences from class, number of times tardy to class, age, and sex.

Cook used gross words per minute and errors per minute to measure speed and accuracy while this researcher used net words per minute to measure speed and accuracy. The net words per minute are deemed by this researcher to be a more reasonable measure in that net words per minute reflect the measure used by most typewriting textbooks.

The Cook study concluded that the experimental groups were more accurate than the control group. However, the Cook study reported that the control group had typed at a higher rate of speed than did the experimental group. The present study found that only on test five was there a significant difference in favor of the experimental group.

In responding to the questionnaire given on the last day of class, the experimental and the control groups indicated that the method used in their class had been acceptable and that they had enjoyed being in the typewriting classes. (See Appendix A.) However, the students in this study differed from those in the Cook study in their opinions of the typewriters. Students in this study responded more favorably toward the machine that they had used but this reaction could have resulted from the fact all students had used the same model of machine while the Cook group had used three different models.

The average number of hours spent outside class on homework for the experimental class averaged 2.33 hours while the control class had an average of 2.46 hours. The range for outside work was from zero hours to seven hours per week.

In summary, the inconsistencies of these findings with Cook's findings might be attributable to several factors. In analyzing the data, Cook used the interaction of machine, instructor, and treatment for both the experimental group and the control group. The present study used the same machines, classroom, and instructor for the experimental and the control group.

CHAPTER V

SUMMARY

Restatement of the Problem

The problem of this study was to analyze the difference in the rate of speed and the degree of accuracy achieved by beginning typewriting students who had learned beginning typewriting under controlled condition. These two criteria constitute the level of keyboard mastery.

The subjects of this study were students enrolled in two beginning typewriting classes. One class was identified as the experimental group and the other class was identified as the control group. The experimental group was taught with the use of the Kee Electronic Keychart teaching aid and the control group was taught with the use of the traditional keyboard instructional method. Measurements of the rate of speed and the degree of accuracy of these beginning typewriting students were taken at six predetermined stages of the keyboard instruction.

Specifically, this study sought answers to the following questions:

1. Do students who have had a course in beginning typewriting with the instructor using the Kee Electronic Keychart instructional method master the keyboard (based on the measure of net words per minute) better than students who have had beginning typewriting taught with the instructor using the traditional method of teaching?

2. Is gender related to performance of students who have been taught beginning typewriting with the instructor using the Kee Electronic Keychart instructional method of teaching?

3. Is gender related to performance of students who have been taught beginning typewriting with the instructor using the traditional method of teaching?

4. Is general scholastic ability related to performance of students who have been taught beginning typewriting with the instructor using the Kee Electronic Keychart instructional method of teaching?

5. Is general scholastic ability related to performance of students who have been taught beginning typewriting with the instructor using the traditional method of teaching?

6. Is age related to performance of students who have been taught beginning typewriting with the instructor using the Kee Electronic Keychart instructional method of teaching?

7. Is age related to performance of students who have been taught beginning typewriting with the instructor using the traditional method of teaching?

8. Is the number of cumulative college credit hours related to performance of students who have been taught beginning typewriting with the instructor using the Kee Electronic Keychart instructional method of teaching?

9. Is the number of cumulative college credit hours related to performance of students who have been taught beginning typewriting with the instructor using the traditional method of teaching?

10. Is college grade-point average related to performance of students who have been taught beginning typewriting with the instructor using the Kee Electronic Keychart instructional method of teaching?

11. Is college grade-point average related to performance of students who have been taught beginning typewriting with the instructor using the traditional method of teaching?

Procedures

The procedure followed in this study consisted of the following steps: (1) a review of the research and the literature in the methods of teaching typewriting, (2) the selection of a research design that could evaluate the data gathered in this experiment, (3) the analysis and the interpretation of the data used in solving the problem of the study, and (4) the writing of this research report.

This study was conducted at the University of Oklahoma, Norman, Oklahoma, during the spring semester of 1976. The subjects of this study were students enrolled in two beginning typewriting classes. One class was identified as the experimental group and the other class was identified as the control group. The experimental group met at 11:30 a.m. on Mondays, Wednesdays, and Fridays and was taught beginning typewriting with the aid of the Kee Electronic Keychart. The control group met on Mondays, Wednesdays, and Fridays at 9:30 a.m. and was taught beginning typewriting by the traditional method of teaching. Both groups used the same textbooks, classroom, and typewriters. Only the method of instruction was different.

Measurements were taken at six predetermined points during the semester and these data were then subjected to statistical analysis.

The T-Test was the statistical measure used. Hypotheses were developed and tested statistically.

Findings

Based on an analysis of the test data presented in Chapter IV, the major findings were:

1. The keyboard mastery mean for students who had beginning typewriting with the instructor using the Kee Electronic Keychart method of teaching was not significantly greater than the keyboard mastery mean for students who had beginning typewriting with the instructor using the traditional method of teaching.

2. The findings indicated no relationship between gender and keyboard mastery mean.

3. Likewise, the findings indicated no relationship between keyboard mastery mean and general scholastic ability.

4. There was no relationship between keyboard mastery and age.

5. The findings indicated no relationship between cumulative college credit hours and keyboard mastery.

6. The findings indicated a relationship between keyboard mastery mean and college grade-point average on only one of the six measurements given.

7. Those students using the Kee Electronic Keychart performed better at almost every level when compared to those taught by the traditional approach to typewriting but not significantly so at the .05 level of confidence.

Conclusions

This investigator failed to corroborate the conclusions of the Cook study that (1) students taught using the Kee Electronic Keychart method of teaching beginning typewriting were more accurate than were the students taught by the traditional method and (2) students taught by the traditional method of teaching beginning typewriting typed at a faster rate of speed than did the students taught using the Kee Electronic Keychart method of teaching.

Because the results of this study failed to corroborate the findings of the Cook study, the dissimilarity is possibly attributable to the differences in the use of the statistical test applied to the data.

Recommendations

In view of the findings and the conclusions of this study, the researcher recommends that (1) a replicate of this study should be made using another college setting in which a larger group of students could be engaged in the experiment; and (2) inasmuch as the higher grade-point seems to be related to keyboard mastery, this Electronic Keychart equipment should provide an excellent means for teaching gifted children in an enrichment program.

BIBLIOGRAPHY

Books

Best, John W. Research in Education. 2d ed. Englewood Cliffs, New Jersey: Prentice Hall, Inc., 1970.

Bliven, Bruce, Jr. The Wonderful Writing Machine. New York: Random House, 1954.

Borg, Walter R. Educational Research: An Introduction. New York: David McKay Company, Inc., 1963.

Campbell, Donald T., and Stanley, Julian C. "Experimental and Quasi-Experimental Designs for Research on Teaching." Handbook of Research on Teaching. Edited by N. L. Gage. Chicago: Rand McNally and Company, 1963.

Cook, Fred S., and Wiper, Robert E. "New Media for Teaching Typewriting." New Media in Teaching the Business Subjects. Edited by Edwin A. Swanson. National Business Education Yearbook, No. 3, 1965. Washington: National Business Education Association, 1965.

Culbertson, Jack A., and Hencley, Stephen A. Educational Research: New Perspectives. Danville, Illinois: The Interstate Printers & Publishers, Inc., 1963.

Douglas, Lloyd V.; Blanford, James T.; and Anderson, Ruth I. Teaching Business Subjects. 2d ed. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1965.

Downie, N. M., and Heath, R. W. Basic Statistical Methods. 2d ed. New York: Harper & Row, Publishers, 1965.

Edwards, Allen L. Experimental Design in Psychological Research. New York: Holt, Rinehart and Winston, 1966.

Erickson, Lawrence W. Contributions of Research to Business Education. Edited by Calfrey C. Calhoun and Mildred Hillestad. National Business Education Yearbook, No. 9, 1971. Washington: National Business Education Association, 1965.

Featheringham, Richard D., and Mitchell, William M. "Methods of Teaching Numbers and Symbols." Methods of Teaching Typewriting. Edited by John L. Rowe. Somerville, New Jersey: The Eastern Business Teachers Association, Somerset Press, 1965.

Ferguson, George A. Statistical Analysis in Psychology and Education. 2d ed. New York: McGraw-Hill Book Company, 1966.

Harms, Harm, and Stehr, B. W. Methods in Vocational Business Education. Cincinnati, Ohio: South-Western Publishing Company, 1963.

Hays, William L. Statistics. New York: Holt, Rinehart and Winston, 1963.

Hosler, Russell J. "Methods of Teaching the Alphabetic Keyboard." Methods of Teaching Typewriting. Somerville, New Jersey: The Eastern Business Teachers Association, Somerset Press, 1965.

Klecka, William, R.; Nie, Norman H.; and Hull, C. Hadlai. SPSS Primer: Statistical Package for the Social Sciences Primer. New York: McGraw-Hill Book Company, 1975.

Kerlinger, Fred N. Foundations of Behavioral Research. New York: Holt, Rinehart and Winston, Inc., 1964.

Lamb, Marion M. Your First Year of Teaching Typewriting. 2d ed. Cincinnati, Ohio: South-Western Publishing Company, 1959.

Lessenberry, D. D. "The Rationale for a Widely Used Sequence of Introducing the Letter Keyboard." Practices and Preferences in Teaching Typewriting. Edited by Jerry W. Robinson. Cincinnati, Ohio: South-Western Publishing Company, Monograph 117, 1967.

_____. "Teaching the Letter Keyboard." Practices and Preferences in Teaching Typewriting. Edited by Jerry W. Robinson. Cincinnati, Ohio: South-Western Publishing Company, Monograph 117, 1967.

Lessenberry, D. D.; Wanous, S. J.; and Duncan, C. H. College Typewriting. 8th ed. Cincinnati, Ohio: South-Western Publishing Company, 1969.

Lessenberry, D. D.; Wanous, S. J.; Duncan, C. H.; and Warner, S.E. College Typewriting.. 9th ed. Cincinnati, Ohio: South-Western Publishing Company, 1975.

Lloyd, Alan C.; Rowe, John L.; and Winger, Fred E. Typing 75, Basic. 3d ed. New York: Gregg Division, McGraw-Hill Book Company, 1970.

Lloyd, Alan C.; Roland, Robert P.; Rowe, John L.; and Winger, Fred E. Keyboard Presentation (Teacher's Script). New York: Gregg Division, McGraw-Hill Book Company, 1971.

_____.; Poland, Robert P.; Rowe, John L.; Winger, Fred E.; and Griffith, William D. Selective Practice; Typing Drills. New York: Gregg and Community College Division/McGraw-Hill Book Company, 1974.

Nanassy, Louis C. "Visual Aids in Teaching Typewriting" Methods of Teaching Typewriting. Edited by John Rowe. Somerville, New Jersey: The Eastern Business Teachers Association, Somerset Press, 1965.

Nie, Norman H.; Hull, C. Hadlai; Jenkins, Jean G.; Steinbrenner, Karin; and Bent, Dale H. SPSS: Statistical Package for the Social Sciences. 2d ed. New York: McGraw-Hill Book Company, 1975.

Popham, W. James. Educational Statistics: Use and Interpretation. New York: Harper & Row, Publishers, 1967.

Rowe, John L.; Lloyd, Alan C.; and Winger, Fred E. Gregg General Typing I. Teacher's Edition. New York: Gregg Division, McGraw-Hill Book Company, 1967.

Russon, Allien R., and Wanous, S. J. Philosophy and Psychology of Teaching Typewriting. Cincinnati, Ohio: South-Western Publishing Company, 1960.

Stewart, Marie M.; Lanham, Frank W.; and Zimmer, Kenneth. College English and Communication. New York: Gregg Division, McGraw-Hill Book Company, 1965.

Tonne, Herbert; Popham, Estelle L.; and Freeman, M. Herbert. Methods of Teaching Business Subjects. 3d ed. New York: Gregg Division, McGraw-Hill Book Company, 1969.

West, Leonard J. Acquisition of Typewriting Skills. New York: Pitman Publishing Corporation, 1969.

_____. "Experimental and Quasi-Experimental Research." Contributions of Research to Business Education. Edited by Calfrey C. Calhoun and Mildred Hillestad. National Business Education Yearbook, No. 9, 1971. Washington: National Business Education Association, 1971.

Winger, Fred E. "Typewriting" Changing Methods of Teaching Business Subjects. Edited by LeRoy Brendel and Herbert Yengel. National Business Education Yearbook, No. 10, 1972. Washington: National Business Education Association, 1972.

Periodicals

Beaumont, Lee R. "Give Beginning Typists a Head Start." Business Education Form, 25:1 (October, 1970).

Featheringham, Richard D. "Focus on Typewriting." Business Education Forum, 26:2 (November, 1971).

_____. "A Successful Approach to Keyboard Mastery." Journal of Business Education, 39:8 (May, 1964).

Fields, Marlin H. "The Whole Word Method Teaching the Keyboard." Journal of Business Education, 40:7 (April, 1965).

Grubbs, Robert., and Gasking, Frederick J. "The Individualizers in Typewriting Instruction." Business Education Forum, 25:8 (May, 1971).

Hirsch, Richard S. "Effects of Standard Versus Alphabetic Keyboard Formats on Typing Performance." Journal of Applied Psychology, 54:6.

Johnston, Chester. "Teaching Typewriting Via Television." Business Education Forum, 17:2 (November, 1962).

Liguori, Frank E. "Presenting the Keyboard." Business Education Forum, 17:8 (May, 1963).

Myran, Gunder A. "Introducing Typewriting: The Chalkboard Approach." Business Education World, 46:1 (October, 1971).

Poland, Robert P. "Instructional Hardware in the Typewriting Classroom." Business Education World, 52:3 (January-February, 1972).

_____. "The Use of Televised Instruction in Typewriting." National Business Education Quarterly, 34:3 (March, 1966).

Shaffer, Richard G. "You Can Build an Electric Keyboard for Typing Instruction." Business Education World, 44:1 (September, 1963).

West, Leonard J. "Trends in Teaching Typewriting." Business Education Forum, 26:8 (May, 1972).

Research Documents

Akridge, Mary Jane. "A Comparison of Relative Effectiveness of Two Methods of Teaching Numbers in Elementary Typewriting Classes: Conventional Teacher Instruction vs. Educational Developmental Laboratory Materials and Instrument Training as a Supplementary Teaching Aid." Master's thesis, University of Georgia, 1968.

Cook, Wells Franklin. "A Comparison of Two Methods of Presenting the Keyboard: The Electronic Keychart Versus the Traditional Method of Keyboard Presentation." Ph.D. dissertation, Michigan State University, 1973.

Cary, Paul Russell. "Wall-Chart Method Versus Sight Method of Teaching the Typewriter Keyboard." Master's thesis, Illinois State Normal University, 1961.

Dorn, Brock Edward. "An Experiment to Determine if Special Drills Presented with the Aid of the Overhead Projector and the Chalkboard Improve Number Typing Speed and Accuracy." Master's thesis, Northern Illinois University, 1966.

Hanson, Robert D. "Machine Use in Teaching Data Processing Concepts." Ph.D. dissertation, Colorado State University, 1968.

Lindsay, Vaughnie J. "Psychological Concepts Germane to Efficient Motor Skill Development in Typewriting." Ed.D. dissertation, Indiana University, 1966.

Peterson, Leila M. "Comparison of Relative Effectiveness of Three Approaches to Personal Typewriting Instruction at the Eighth Grade Level." Master's thesis, Wisconsin State University, 1968.

Price, Shirley M. "The Chalkboard Approach Versus the Traditional Textbook Method in Teaching Beginning Typewriting." Master's thesis, Northern Illinois University, 1967.

Serlo, David J. "A Comparison of the Achievement Attained by Beginning Typewriting Students on Electric and Manual Typewriters." Master's thesis, Indiana University of Pennsylvania, 1970.

Smith, Sherrilyn B. "An Experiment to Determine Whether Closed Circuit Television Can Improve Beginning Typewriting Performance." Master's thesis, University of Colorado, 1969.

Stephens, Daryl D. "The Illuminated Typewriter Keyboard Chart: Its Construction and Uses." Master's thesis, Kansas State College of Pittsburg, 1966.

Varnon, Mary Sue. "A Comparison of Self-Paced, Programmed Instruction and Teacher-Directed, Non-Programmed Instruction in Problem Typewriting in the Beginning Secondary School Course." Ph.D. dissertation, Georgia State University, 1973.

Weaver, David H. "An Experimental Study of the Relative Impact of Controllable Factors of Difficulty in Typewriting Practice Materials." Ph.D. dissertation, Syracuse University, 1966.

Winger, Fred E. "The Determination of the Significance of Tachistoscopic Training in Word Perception as Applied to Beginning Typewriting Instruction." Ed.D. dissertation, University of Oregon, 1951.

APPENDIX A

DATA COLLECTION MATERIAL

Exhibit 1

STUDENT INFORMATION SHEET

Name_____ Social Security #_____
Last First Middle Initial

Local Address_____

Local Phone Number_____

Home Address_____

Home Phone Number_____

Date of Birth_____ Age_____ Male or Female (Circle One)

Year at the University: (Circle one of the following.)

Freshman Sophomore Junior Senior Graduate Unclassified

Previous typing instruction:

_____ Weeks self taught

_____ Weeks taught in Elementary School

_____ Weeks taught in Junior High School

_____ Weeks taught in Senior High School

_____ Weeks taught in Business College

_____ None

This typewriting class meets at: 9:30 a.m. MWF. 11:30 a.m. MWF (Circl

Major_____ Minor if applicable _____

Certification sought if any_____

Exhibit 2

Date	Lesson	Material Covered
Jan 14	1	Course introduction. Explain machine parts, Letters a, s, d, f, j, k, l, ; (home row)
16	1, 2	Letters e, h, carriage return, paper center point, space bar
19	3, 4	Letters i, t, c, ., shift keys, spacing rules
21	5, 6	Letters o, r, z, n, ribbon control lever
23	7, 8	Letters u, w, b, ,, stroking techniques
26	9, 11	Letters v, p, q, m, tabulation
28	11	Letters g, ?, x, y, back spacing
30		Measurement number one. Student information sheet, review
Feb 2	12, 13	Explain textbook procedures, skill drills, review of stroking techniques, horizontal centering, shift lock
4	14	Skill drills, vertical centering, pacing using remote panel
6	15, 16	Skill drills, spread headings
9	17, 18	Measurement number two. Numbers 5, 8, 1, 2, 0
11	19, 20	Numbers 3, 6, 1, 4, 9, Review centering
13	21	Numbers 7, -, --, ½, ¼, construct fractions
16	22C	Measurement number three. Symbols $, &, (,), block style business letters
18	24D	Symbols ", ', __, personal letters
20	23C	Symbols #, %, erasing
23	22C, 25C	Symbols $, ¢, @, special characters, bell cue, centering on special size paper
25		Symbols +, !, °, *, plus other constructed symbols
27		Drills
Mar 1		Measurement number four.
	(Continued to follow textbook outline for remainder of semester)	
Apr 21		Measurement number five.
26		Measurement number six.

Exhibit 3

Timed Writings

Measurement Number One:	Words
You will learn to type what you now write by	9
hand. This is one of the prized end goals of the	19
course. This change will not be quick, but it is	28
sure to come. Just give it time, trust, and help.	39
The hope is that you can type as fast as you	9
can think. This goal may not be reached, but you	19
should type at least three times the rate you can	28
write by hand. This is a sound claim, not a hoax.	39

Measurement Number Two:	Words
Believe it or not, some things in life are still free:	11
the respect of close friends, the luxury of a day or two in	23
the quiet country, or the practice of free choice. Perhaps	35
you now know how much value these things do add to a life.	47
You can also extend a helping hand or a kind word to a	11
fellow who needs it, enjoy a clear breeze, or visit with an	23
old friend. These things, and many more, cost nothing. As	35
you may know, a happy condition comes from a state of mind.	47

Measurement Number Three:	Words
The total of 10, 28, 39, 47, and 56 is about 180.	10
Now, please total 10 and 28 and 39 and 47 and 56.	20
The sum of 10, 28, 39, 47, and 56 is exactly 180.	30
Do problems 10, 28, and 39; and review 47 and 56.	40

Measurement Number Four:	Words
"Write 15% to Dodd & Co. on #10 @ 866 and $1."	11
Don't vote for Jones! a + b = 25. Use and asterisk (*).	24

Timed Writings continued

Measurement Number Five: Words

All through the lunch hour, we sat there and played an old quiz game that Mike had found in a box of junk that his dad had thrown out. The game was a lot of fun, too; but we got tired of that, of course. The rain kept on. Dave came up with a game he had found in some old book; we tried this one for a while, too. We were glad to see the sun at last. 12 24 36 48 60 72

Once in a blue moon, it is good to get up at the crack of dawn and watch the world wake up. You see the sun break through the shades and mist of night and gleam on the drops of dew that weigh down the leaves and the grass; and as you look, the leaves lift up and the grass turns straight while the dew fades and dries in the first soft breath of breeze. 12 24 36 48 60 72

Measurement Number Six: Words

You have learned a great deal about typing in only a few months. You may not yet be strking all keys as rapidly or as precisely as you desire, but you have started a firm foundation upon which you can build even more skill. Like any other skill, typing requires continued effort to be maintained or improved; so set aside a daily practice time. 13 27 42 56 69

If you proceed with the typing program in college, your practice time will be scheduled for you. Even so, you will learn that a bit of extra practice each day may be just enough to permit your new skill to enter a prized category. Even if you do not continue with formal typing instruction, you can add greatly to your skill all by yourself. 13 27 41 56 69

A timed writing effort is superior to an untimed one. Timing can supply a little desirable pressure; it also can show you just how well you are doing. In school your teacher times you; if you decide to practice on your own you should work under time pressure then, too. A timing record or tape is especially good to use for this fine purpose. 13 27 42 55 69

Exhibit 4

SUMMARY OF STUDENTS' Opinion

Typewriting Questionnaire Name (Experimental Group)

This scale has been prepared so that you can indicate how you feel about this typewriting class. PLEASE RESPOND TO EVERY ITEM. In each case, draw a circle around the letter which represents your own reactions as follows:

SA if you strongly agree with the statement
A if you agree but not strongly so
N if you are neutral or undecided
D if you disagree but not strongly so
SD if you strongly disagree with the statement

Remember, the only correct answer is the one which actually represents how you feel about this class.

Statement	SA	A	N	D	SD
1. The methods used in teaching this typewriting class can be described as satisfying.	6	4	1	1	-
2. My attitude toward this typewriting class has become less favorable than it was.	-	1	2	6	3
3. More contact between teacher and students would improve this typewriting class.	1	3	3	3	2
4. I find that the method used in this typewriting class is satisfying to me.	6	4	1	1	-
5. Unimportant topics have taken too much of my time in this typewriting class.	1	4	-	4	3
6. I cannot see that this teaching method has any advantage over any other methods.	-	-	6	5	1
7. This typewriting class exceeds every expectation I had for it.	1	5	3	3	-
8. The method of teaching this typewriting class is not equally good for all students.	1	3	7	1	-
9. I have only neutral feelings about the subject matter in this typewriting class.	-	6	2	4	-
10. The presentation of this typewriting class is paced too fast.	-	5	3	4	-

11.	I am glad that this method of teaching was used for this typewriting class.	4	2	6	-	-
12.	This has been a disappointing typewriting class.	-	1	1	6	4
13.	I find myself enthusiastic when I study typewriting.	1	6	2	3	-
14.	I am forced by the method used in this typewriting class to spend too much time on material I already know.	1	-	-	7	4
15.	I feel that all typewriting classes should be taught by the method used in this class.	2	3	7	-	-
16.	This typewriting class lacks student participation.	-	1	4	5	2
17.	The method used to teach this typewriting class holds students back too much.	-	-	3	5	3
18.	My high retention of the material in this typewriting class is due to the method used to present it.	2	-	6	1	3
19.	The amount I have learned in this typewriting class exceeds my expectation.	1	5	1	5	-
20.	I want to do more on my own in this typewriting class, but I can't because of the teaching method.	1	-	4	5	2
21.	I am enthusiastic about the way this typewriting class is taught.	1	6	3	2	-
22.	The method of instruction used in this typewriting class has many shortcomings.	-	1	6	5	-
23.	I would describe this typewriting class as well organized.	6	6	-	-	-
24.	Not all my hopes about this typewriting class have been fulfilled.	3	2	3	4	-
25.	I have not had a chance to look back over the material when I wanted to in this typewriting class.	1	2	1	6	4
26.	The content of this typewriting class is interesting.	1	5	6	-	-
27.	I enjoyed being in this typewriting class.	4	7	-	1	-

28.	I thought the instructor was a good teacher.	10	1	1	-	-
29.	Of all hours possible, I thought this hour was the best one possible for taking typewriting.	1	5	5	1	-
30.	I like the typewriter I used.	4	5	3	-	-

31. About how much time per week did you spend on typewriting outside class each week? 2.33 hours weekly

32. Did you generally eat breakfast before coming to class? 6 yes; 6 no

33. Did you generally eat lunch before coming to class? 11 no; 1 yes

34. Generally where were you and what were you doing before coming to the typewriting class? 10 in class; whatever I could think of in the dorm; sleeping; running errands between classes.

35. Generally how would you describe your mood toward coming to class? 4 good; agreeable; not much willingness; enthusiastic; lab time did not match material expected; hungry; sleepy; one class in many that was fruitful.

Exhibit 5

SUMMARY OF STUDENTS' Opinion

Typewriting Questionnaire Name (Control Group)

This scale has been prepared so that you can indicate how you feel about this typewriting class. PLEASE RESPOND TO EVERY ITEM. In each case, draw a circle around the letter which represents your own reactions as follows:

SA if you strongly agree with the statement
A if you agree but not strongly so
N if you are neutral or undecided
D if you disagree but not strongly so
SD if you strongly disagree with the statement

Remember, the only correct answer is the one which actually represents how you feel about this class.

Statement	SA	A	N	D	SD
1. The methods used in teaching this typewriting class can be described as satisfying.	3	6	4	-	-
2. My attitude toward this typewriting class has become less favorable than it was.	1	3	4	2	3
3. More contact between teacher and students would improve this typewriting class.	1	2	4	5	1
4. I find that the method used in this typewriting class is satisfying to me.	4	7	1	1	-
5. Unimportant topics have taken too much of my time in this typewriting class.	2	-	1	6	4
6. I cannot see that this teaching method has any advantage over any other methods.	-	2	9	2	-
7. This typewriting class exceeds every expectation I had for it.	-	6	6	1	-
8. The method of teaching this typewriting class is not equally good for all students.	-	4	6	2	-
9. I have only neutral feelings about the subject matter in this typewriting class.	-	2	3	8	-
10. The presentation of this typewriting class is paced too fast.	1	4	2	5	1

11.	I am glad that this method of teaching was used for this typewriting class.	3	6	3	1	-
12.	This has been a disappointing typewriting class.	1	1	2	7	2
13.	I find myself enthusiastic when I study typewriting.	2	5	3	3	-
14.	I am forced by the method used in this typewriting class to spend too much time on material I already know.	-	-	-	9	4
15.	I feel that all typewriting classes should be taught by the method used in this class.	1	1	11	-	-
16.	This typewriting class lacks student participation.	-	1	4	7	1
17.	The method used to teach this typewriting class holds students back too much.	-	1	1	6	5
18.	My high retention of the material in this typewriting class is due to the method used to present it.	1	4	8	-	-
19.	The amount I have learned in this typewriting class exceeds my expectation.	1	6	2	1	-
20.	I want to do more on my own in this typewriting class, but I can't because of the teaching method.	-	1	2	9	1
21.	I am enthusiastic about the way this typewriting class is taught.	2	6	5	-	-
22.	The method of instruction used in this typewriting class has many shortcomings.	-	4	4	5	-
23.	I would describe this typewriting class as well organized.	4	9	-	-	-
24.	Not all my hopes about this typewriting class have been fulfilled.	-	7	3	3	-
25.	I have not had a chance to look back over the material when I wanted to in this typewriting class.	-	5	2	4	2
26.	The content of this typewriting class is interesting.	1	8	1	3	-
27.	I enjoyed being in this typewriting class.	4	6	1	1	-

28.	I thought the instructor was a good teacher.	7 6 - - -
29.	Of all hours possible, I thought this hour was the best one possible for taking typewriting.	2 6 4 1 -
30.	I like the typewriter I used.	5 8 - - -
31.	About how much time per week did you spend on typewriting outside of class each week?	2.46 hours weekly
32.	Did you generally eat breakfast before coming to class?	5 yes; 6 no
33.	Did you generally eat lunch before coming to class?	7 no; 1 yes; 2 NA

34. Generally where were you and what were you doing before coming to the typewriting class? Home & class; 1 running; 3 sleeping; 2 in bed; 4 in class.

35. Generally how would you describe your mood toward coming to class: 2 average; real good; too far to walk; positive; good; scared wouldn't pass; looked forward to it; favorable; prefer sack time; tired.

APPENDIX B

DATA

TABLE B-1

EDUCATIONAL METHOD COMPARISON STUDY FOR TYPING
FREQUENCY FOR GROUP STATISTIC

Category Label	Absolute Freq	Relative Freq	Adjusted Freq	Cum Freq
Kee--No Exper.	12	26.1	26.1	26.1
Kee--Prev Exper.	9	19.6	19.6	45.7
Control--No Exper.	14	30.4	30.4	76.1
Control--Prev Exper.	11	23.9	23.9	100.0
Total	46	100.0	100.0	

TABLE B-2

EDUCATIONAL METHOD COMPARISON STUDY FOR TYPING
FREQUENCY FOR GENDER STATISTIC

Category Label	Absolute Freq	Relative Freq	Adjusted Freq	Cum Freq
Female	22	47.8	47.8	47.8
Male	24	52.2	52.2	100.0
Total	46	100.0	100.0	

TABLE B-3

EDUCATIONAL METHOD COMPARISON STUDY FOR TYPING
FREQUENCY FOR AGE STATISTIC

Category Label	Absolute Freq	Relative Freq	Adjusted Freq	Cum Freq
18	3	6.5	6.7	6.7
19	11	23.9	24.4	31.1
20	11	23.9	24.4	55.6
21	12	26.1	26.7	82.2
22	3	6.5	6.7	88.9
23	3	6.5	6.7	95.6
24	1	2.2	2.2	97.8
27	1	2.2	2.2	100.0
56	1	2.2	Missing	100.0

Mean 20.467 Median 20.273

TABLE B-4

EDUCATIONAL METHOD COMPARISON STUDY FOR TYPING
FREQUENCY FOR ACT STATISTIC

Category Label	Absolute Freq	Relative Freq	Adjusted Freq	Cum Freq
10	2	4.3	4.8	4.8
12	3	6.5	7.1	11.9
13	1	2.2	2.4	14.3
14	1	2.2	2.4	16.7
15	1	2.2	2.4	19.0
16	1	2.2	2.4	21.4
17	4	8.7	9.5	31.0
18	3	6.5	7.1	38.1
19	3	6.5	7.1	45.2
20	1	2.2	2.4	47.6
21	3	6.5	7.1	54.8
22	2	4.3	4.8	59.5
23	2	4.3	4.8	64.3
24	1	2.2	2.4	66.7
25	3	6.5	7.1	73.8
26	1	2.2	2.4	76.2
27	6	13.0	14.3	90.5
28	2	4.3	4.8	95.2
30	2	4.3	4.8	100.0
0	4	8.7	Missing	100.0
Total	46	100.0	100.0	

Mean 20.7 Median 20.833

TABLE B-5

EDUCATIONAL METHOD COMPARISON STUDY FOR TYPING
FREQUENCY FOR CUMULATIVE COLLEGE CREDIT HOURS STATISTIC

Category Label	Absolute Freq	Relative Freq	Adjusted Freq	Cum Freq
21	1	2.2	2.2	2.2
26	1	2.2	2.2	4.3
29	2	4.3	4.3	8.7
30	2	4.3	4.3	13.0
32	1	2.2	2.2	15.2
42	2	4.3	4.3	19.6
44	1	2.2	2.2	21.7
45	1	2.2	2.2	23.9
47	3	6.5	6.5	30.4
49	1	2.2	2.2	32.6
50	1	2.2	2.2	34.8
51	1	2.2	2.2	37.0
53	1	2.2	2.2	39.1
55	1	2.2	2.2	41.3
56	1	2.2	2.2	43.5
57	1	2.2	2.2	45.7
66	1	2.2	2.2	47.8
67	1	2.2	2.2	50.0
73	1	2.2	2.2	52.2
75	2	4.3	4.3	56.5
82	1	2.2	2.2	58.7
84	1	2.2	2.2	60.9
86	1	2.2	2.2	63.0
88	1	2.2	2.2	65.2
89	1	2.2	2.2	67.4
91	1	2.2	2.2	69.6
92	2	4.3	4.3	73.9
98	1	2.2	2.2	76.1
101	1	2.2	2.2	78.3
104	1	2.2	2.2	80.4
107	1	2.2	2.2	82.6
109	1	2.2	2.2	84.8
111	1	2.2	2.2	87.0
115	1	2.2	2.2	89.1
119	2	4.3	4.3	93.5
122	1	2.2	2.2	95.7
129	1	2.2	2.2	97.8
133	1	2.2	2.2	100.0
Total	46	100.0	100.0	

Mean 71.935 hrs. Median 67.500

TABLE B-6

RAW DATA

GP[a]	ID	SEX[b]	AGE	ACT	CCH	GPA	TEST 1 GWPM	TEST 1 EPM	TEST 2 GWPM	TEST 2 EPM	TEST 3 GWPM	TEST 3 EPM	TEST 4 GWPM	TEST 4 EPM	TEST 5 GWPM	TEST 5 EPM	TEST 6 GWPM	TEST 6 EPM
Experimental Class																		
1	01	1	19	25	029	3.34	26	0	28	1	32	2	21	2	59	1	56	0
1	02	0	20	27	119	3.73	29	0	33	1	34	2	26	2	42	3	53	0
1	03	1	21	30	111	3.75	26	0	25	2	20	0	18	0	34	0	34	2
1	04	1	19	00	021	2.43	21	1	23	0	22	1	18	0	46	2	49	0
1	05	0	22	27	122	3.38	20	0	24	2	15	2	17	0	32	0	36	0
1	06	0	21	28	050	3.02	16	3	16	2	19	2	21	2	39	1	37	1
1	07	1	21	10	057	2.58	27	2	22	0	26	1	23	2	30	1	37	0
1	08	1	21	25	109	2.28	12	2	12	3	11	2	13	0	33	1	31	1
1	09	1	20	10	056	2.11	12	2	15	6	15	9	19	2	22	3	26	3
1	10	1	21	27	084	2.44	15	1	20	3	21	0	18	2	22	3	31	2
1	11	1	19	18	051	2.98	15	1	13	3	11	5	13	1	24	1	29	1
1	12	1	20	26	086	3.67	15	2	21	4	20	2	16	1	37	0	29	0
2	13	1	20	19	082	1.72	35	1	47	1	26	0	23	2	47	0	55	2
2	14	0	22	20	115	2.28	43	1	47	3	33	1	28	1	45	0	58	1
2	15	1	21	19	092	2.25	52	2	57	4	42	2	19	4	56	0	60	0
2	16	0	19	17	066	2.55	35	1	36	0	29	0	21	2	43	0	45	0
2	17	0	18	30	030	4.00	46	0	47	2	36	4	25	1	58	0	63	0
2	18	0	10	16	047	1.68	29	0	22	3	16	1	19	4	34	0	37	0
2	19	1	20	17	075	1.97	28	1	33	1	25	2	18	0	39	0	37	0
2	20	1	23	12	026	2.23	44	6	44	3	31	0	18	2	42	1	56	1
2	21	0	19	19	029	3.59	40	0	46	0	28	1	20	1	54	0	55	0
Control Class																		
3	01	0	21	13	104	2.14	14	3	13	2	10	4	19	2	18	2	24	2
3	02	1	56	00	091	1.97	37	2	36	1	20	2	10	2	46	0	46	1
3	03	1	20	27	092	3.64	12	2	17	1	10	3	12	1	22	2	23	1
3	04	1	20	25	030	2.50	17	1	21	1	14	4	10	2	28	0	30	1
3	05	1	19	24	088	2.44	26	0	25	1	22	0	25	0	37	0	41	0
3	06	1	22	27	067	2.34	28	3	31	4	20	1	18	1	20	0	22	0
3	07	0	20	28	073	3.74	18	0	17	0	15	1	21	2	35	2	34	1
3	08	0	27	23	101	3.28	31	8	27	4	27	0	18	1	34	2	36	5
3	09	0	19	21	032	2.16	26	3	26	6	15	1	18	0	36	0	36	0
3	10	1	24	00	129	2.38	18	2	21	3	11	2	13	0	28	0	31	0
3	11	0	19	17	042	2.29	18	3	18	2	20	1	18	0	30	3	30	0
3	12	1	23	00	107	2.91	10	1	14	6	09	2	12	1	31	2	13	1
3	13	0	20	27	049	2.35	18	0	15	4	18	0	18	0	28	1	22	0
3	14	1	21	12	089	2.80	13	1	13	1	14	1	13	1	39	3	33	0
4	15	0	19	18	055	3.04	25	1	23	2	19	0	18	0	31	0	34	0
4	16	0	18	21	045	3.38	38	2	38	3	30	1	36	3	56	3	56	2
4	17	0	20	23	047	3.66	40	1	34	2	35	2	29	2	60	0	60	1
4	18	0	21	22	075	2.29	44	3	40	1	20	1	19	0	40	1	49	1
4	19	0	19	12	042	1.69	41	4	39	3	29	1	26	3	40	1	45	1
4	20	0	19	22	053	2.51	23	0	23	2	22	0	21	1	42	2	46	0
4	21	0	23	15	133	2.44	39	1	40	0	30	1	22	0	58	2	55	5
4	22	1	21	17	047	2.15	28	1	29	0	20	1	18	0	39	0	36	1
4	23	1	21	21	119	2.75	20	9	17	4	12	5	26	0	38	1	33	0
4	24	1	21	19	098	2.22	27	1	27	1	18	1	19	1	40	3	46	1
4	25	0	20	14	044	2.11	44	5	40	1	24	6	26	3	45	3	60	2

[a] GP 1 indicates students in the experimental class who had not had previous typewriting experience
GP 2 indicates students in the experimental class who have had previous typewriting experience

[b] 0 indicates female students
1 indicates male students

APPENDIX C

KEE ELECTRONIC WALLCHART

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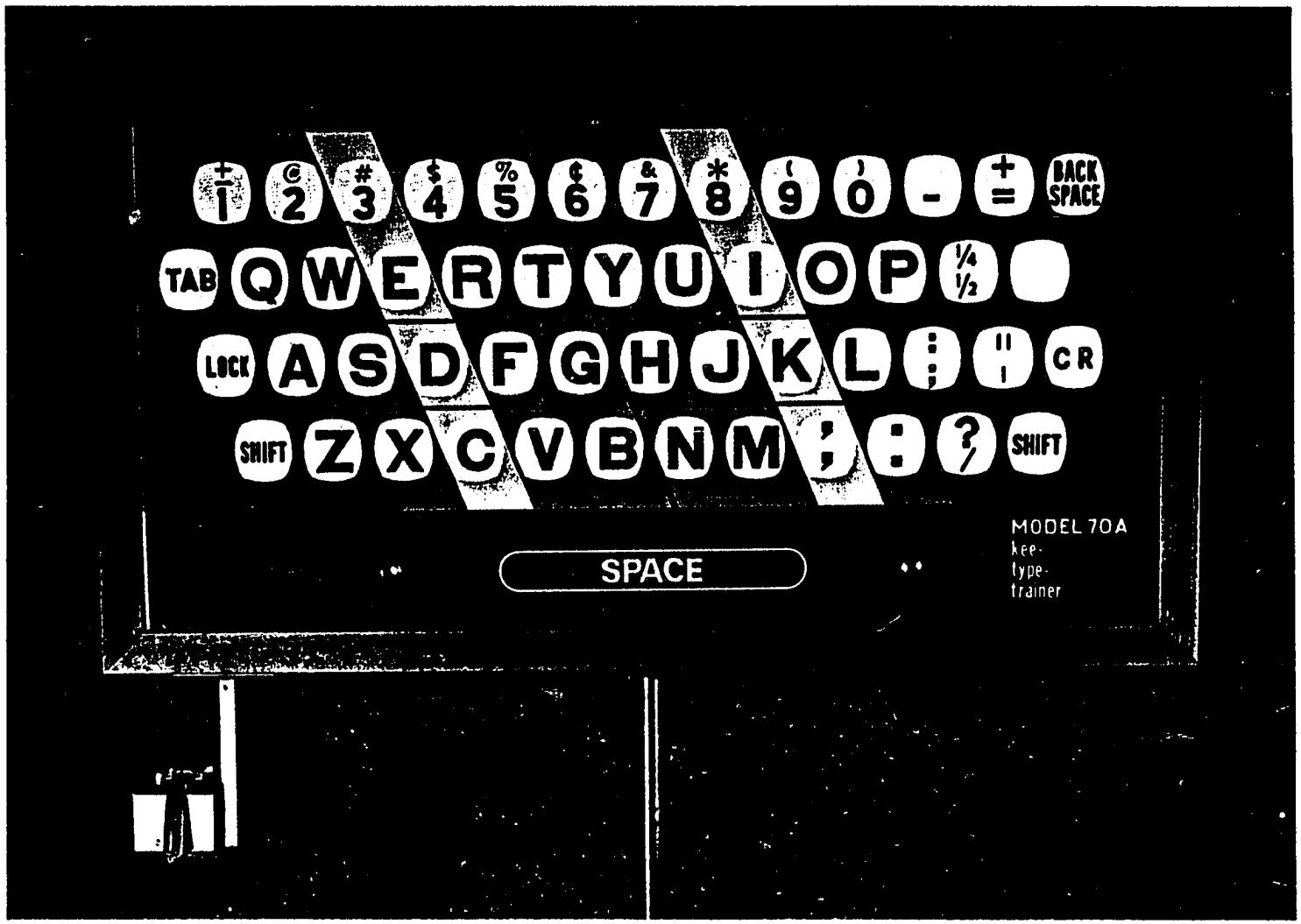

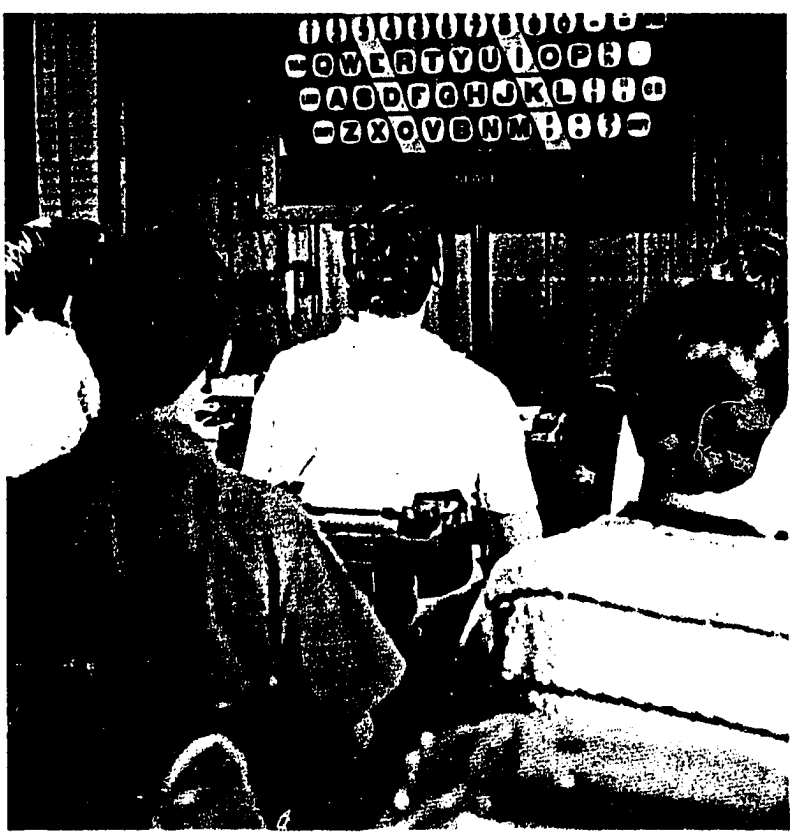

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