AN EXPERIMENT TO DETERMINE WHETHER THREE-MINUTE TIMED WRITINGS ARE AS EFFECTIVE AS FIVE-MINUTE TIMED WRITINGS IN THE DEVELOPMENT OF BASIC TYPEWRITING SKILL

by

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

MASTER OF SCIENCE

in

Business Education

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May 17, 1957

Blacksburg, Virginia

ACKNOWLEDGMENTS

The author wishes to express her sincere appreciation and gratitude for the able assistance and guidance she received in the planning and preparation of this study.

, typewriting editor, Gregg Publishing Company, deserves thanks for suggesting research areas in which there is an existing need; also for his evaluation of the experimental pattern used, and for furnishing the timed writings for test purposes.

To the Typewriting I students of Willis High School, the author expresses gratitude for their enthusiastic participation and interest in this study.

Special thanks goes to Dr. Harry Huffman, faculty advisor, for his guidance and encouragement; also to Dr. J. Curtis Hall for his constructive criticism and generous contributions.

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CHAPTER I

THE PROBLEM

Introduction

In discussing the right kind of practice to develop typewriting power, Lessenberry said:

> . . . "We learn to do by doing" is an accepted educational truism; but it is only a half-truth, and the missing half is as significant as that quoted. One learns to type by the right kind of practice, not merely through any kind of practice.[1]

There is little conclusive evidence as to the most effective practice and rest intervals for learning typewriting. Such evidence can be determined only through careful experimentation and testing.

In this study, the procedure used in finding this evidence centered around four psychological principles that are applicable in the early part of the skill-building stage. The authority for the formulation of these principles was given in the following pages of this chapter. These principles were:

1. Although the most effective length of timed writing has not been determined, it is established that short periods of practice are better than longer ones. They provide for

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[1] D. D. Lessenberry, Methods of Teaching Typewriting, (New York: South-Western Publishing Company, 1949), Monograph 71, p. 23.

repetition and remedial work; whereas longer ones tend to test rather than teach. Stressing speed from the beginning enables students to typewrite problems rapidly and thus obtain the same results; yet shortens the time necessary to develop the skill.

2. Interest, which is fundamental to skill building, is maintained effectively through the use of shorter tests than have been used in the past.

3. Students are more relaxed when typewriting for short periods of time.

4. Short drills control the factor of fatigue when the student is exercising new combinations of muscles.

The Need for the Study

The chief concern about typewriting instruction today is in the time required to perfect the skill. Many studies have been made of the time necessary for skill acquisition, and these have shown rather conclusively that the time required for the development of a usable skill in typewriting has been too long due to inefficient teaching procedures and lack of psychological basis.

Odell and Stuart recognized the need for research in this area when they said:

> . . . One of the major difficulties with typewriting instruction at the present time lies in the extensive amount of time needed to perfect the skill.

> Any study will be most welcome which reveals means whereby the amount of learning time may be reduced.[1]

In a publication as recent as our Virginia Course of Study in Typewriting, this statement was made:

> There is considerable evidence to justify the contention that much time is wasted in teaching typewriting. Results of time and motion studies support this claim. Inefficient teaching procedures and classroom organization appear to be the main causes of prolonged typewriting courses.[2]

Typewriting instruction is divided into distinct stages according to the results to be obtained. Odell and Stuart[3] termed them (1) key-board learning stage, (2) continuity copy-writing stage, and (3) advanced skills stage.

The greatest need for reducing time seems to be in the continuity copy-writing stage, because this is the stage during which the student progresses from letter recognition to word and phrase recognition and builds speed through automatizing the mental process.

There are at least two reasons why there exists a definite need for forming the exact habits, reproducing the

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[1]William R. Odell and Esta Ross Stuart, Principles and Techniques for Directing the Learning of Typewriting, (Boston: D. D. Heath and Company, 1945), p. 238.

[2]State Department of Education, Suggested Content, Instructional Procedures and Achievement Goals for Virginia High Schools (Richmond, Virginia: Business Education Service of the Division of Vocational Education, 1950), p. 11.

[3]Odell and Stuart, op. cit., p. 26.

skill, and insuring that necessary habits are formed in the most direct and economical way during this continuity copy-writing stage.

1. By using the psychological approach, it is possible that the four semesters commonly devoted to typewriting may be cut to three semesters, or even two semesters, without eliminating any of the essential elements of training now being taught or that the typist should be taught.

2. This automatic word habit stage should be developed as soon as possible for much of the thinking about typewriting form cannot be done while the student is still so conscious of his writing.

Once the deficiency in typewriting instruction has been cited, it is then necessary to determine what conditions are necessary for effective, repetitive practice in order that a student may develop his best typewriting power with a minimum of waste motion and loss of time. After passing through many stages, typewriting instruction has come to rest on how to learn to do the best typewriting, rather than just learning to typewrite as was formerly the case.

Clem substantiated the necessity for basing all instruction on the laws of learning when she said:

> The only way to obtain such an economical and efficient method of directing learners in any case of learning is to obtain and utilize the facts revealed by a complete scientific analysis of the task of learning. This would shift the emphasis from methods of teaching, classroom management,

> and methods of instruction to methods of learning, a change that is needed to develop the most efficient methods of instruction for all types of learning.[1]

Psychologists agree that this shift of instruction to methods of learning must include not only drill but also a purpose that is understood. Lessenberry quoted Gray as saying the following:

> All learning, regardless of type, takes place through exercise and is facilitated by understanding. To do and to understand why, are fundamental in all forms of effective learning. The amount of exercise and the amount of understanding both vary with the nature of the learning situation (which includes the learner). Also, they are interdependent. The amount of exercise necessary is reduced by increasing the amount of understanding and vice versa. Exercise and understanding may truly be considered the laws of learning.[2]

In discussing the type of practice which will render the best results, Morgan[3] gave three factors that must be considered: (1) the length of the practice, (2) the length of the rest period, and (3) the location of the rest period in the course of learning.

Book was one of the first to concentrate on the how of skill building. As far back as 1925, in his book,

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[1]Jane E. Clem, The Technique of Teaching Typewriting, (New York: The Gregg Publishing Company, 1929), p. 39.

[2]Lessenberry, op. cit., p. 23.

[3]Clifford T. Morgan, Introduction to Psychology (New York: McGraw-Hill Book Company, 1956), p. 123.

Learning to Typewrite, he gave the following information regarding the lengths of practice and rest periods:

> . . . One of the most important problems in any case of learning is, therefore, to determine the exact amount of practice that will produce the greatest amount of effect, and to determine the length of the time interval between practices that will yield the most permanent results for strengthening the neural bonds to be formed.[1]

Although there is a need to ascertain the exact kind and amount of special practice which will yield the best results, broad factors on which to base a study are fairly well established. Dealing with the rate at which a person practices a task, Morgan said:

> . . . For an amazingly wide variety of situations, short periods of practice interspersed with brief periods of rest permit more efficient learning than continuous practice. This is true for single instrumental conditioning, and it is true for such complex skills as learning to type.[2]
>
> Practice periods should, in general, be short, for, within certain limits, the longer they are the more they tend toward continuous practice and thus the slower the rate of learning.[3]

Ten- and fifteen-minute timed writings, now thought to be unnecessary, have been replaced by the five-minute timed writings which are generally accepted. Despite this

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[1]William F. Book, Learning to Typewrite (New York: The Gregg Publishing Co., 1925), pp. 42-43.

[2]Morgan, op. cit., p. 122.

[3]Ibid., p. 123.

progress, typewriting experts agree that there is still little conclusive evidence as to the most effective practice and rest periods for learning typewriting.

In addition to the need for more experimental evidence regarding the length of the practice period, more should be learned regarding the proper alternations of periods of work and rest.

In discussing the Laws of Exercise and Effect, Book recognized this need:

> . . . How much practice should be required at different levels of skill, and how much time should be allowed between practices to obtain the greatest fixing effect for the habits to be formed? No conclusive answer can be given to this question for typewriting, but experiments in other types of learning have shown that it is advantageous to distribute the practice in certain definite ways.[1]

The need to discover means of creating and maintaining interest is essential in all subjects, but particularly in typewriting. Few teachers of other subjects can boast the interest and enthusiasm of a beginning typewriting class. The element of attitude and understanding is important for any stage of skill building, but the following quotation illustrates why it was so essential in these early stages of typewriting:

> Teachers of typewriting have found there comes a slackening of the student's enthusiasm toward the end of the first term. Perhaps this is due to

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[1]Book, op. cit., p. 218.

> several factors, including the loss of novelty, the realization of the difficulty of the course, and a slowing up of progress.
>
> At this point the teacher has his greatest problem in stimulating his students and helping them through this discouraging plateau of development.[1]

In addition to being recommended for speed building, short timed writings are also recommended for maintaining interest. After reviewing research from various sources, Odell and Stuart formulated a principle regarding length of writing as it effects interest:

> Principle eleven--The learning period should be broken up into short units, since shorter learning periods are more effective than longer ones.
>
> . . . It seems clear from the incomplete evidence available that extremely long practice periods should be avoided because they are apt to prove uninteresting and monotonous. Certainly experience with typewriting students confirms these findings.[2]

Another need is to determine the length of practice which will best relieve tension within the student. It has been conclusively established that the tense, uneasy student makes little progress.

At the very outset, the acquisition of typewriting skill requires control of the nerves. The first thing a typewriting teacher should encourage is a feeling of

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[1]Ralph E. Bruno, "Developing Typewriting Confidence," UBEA Forum, X, (October, 1955), p. 23.

[2]Odell and Stuart, op. cit., p. 23.

relaxation in the class by developing the right attitude toward the work and furnishing a sufficient amount of easy, comfortable practice.

Fatigue is another factor worthy of consideration in the skill building stage. This applies when the students try to exercise new combinations of muscles in the beginning stages. The teacher needs to determine the length of writing which will keep this element of fatigue to a minimum.

Purposes of the Study

The purposes of this study were established after a review of the psychological factors which affect skill development. There are four purposes:

1. To compare the results of writings three minutes in length with five-minute timed writings in the beginning stages of skill development. This is based on the assumption that too much of the typewriting instruction given in classrooms today is, because of its length, of test nature rather than drill nature. The experiment was to determine if the point of differentiation between timings for drill purposes and timings for measurement was not to be found between the three- and five-minute efforts. The three-minute drills used for the experiment represent the maximum length drill exercises should be.

2. To determine if interest and understanding, also essential to speed development, can be developed and maintained more effectively through three-minute timed writings than through five-minute timed writings.

3. To determine if students feel they are less tense when taking three-minute timed writings than when taking five-minute timed writings.

4. To determine if students feel they tire less on three-minute timed writings than on five-minute timed writings in the initial stages of skill development when they are exercising new combinations of muscles.

Definitions

1. Timed writing.--The typewriting of connected paragraph material for a specified length of time.

2. Continuity copy-writing stage.--The stage which immediately follows the keyboard learning stage and consists of writing continuity copy that contains some new words.

3. Letter recognition level of practice.--The stage in which the typist sees, thinks, and types letter by letter.

4. Word and phrase recognition level of practice.--The stage in which the typist thinks the word as a unit and types without thinking the letters of the word.

5. Automatizing.--An unconscious process when a student no longer has to think of a letter reach, but

strikes the letter automatically in response to sight, sound, or thought of letter.

6. Rotation.--A definite period of time in this study at the end of which the experimental group became the control group, and the control group became the experimental group.

7. Cycle.--An exact number of lessons in this study which consisted of two rotations when one group of students had been through both a three-minute and five-minute rotation.

CHAPTER II

REVIEW OF LITERATURE

Introduction

The review of literature in the area of typewriting instruction revealed many facts the investigator felt were necessary as a setting and background for the study. This included not only references to how typewriting is learned, but a brief history of typewriting, the stages through which it has evolved, and the type of instruction it requires as compared with other courses.

The laws of learning referred to in Chapter I included only those areas in which there is an existing need; whereas Chapter II includes those psychological principles necessary for the acquisition of typewriting skill, with which this study is concerned.

Status of Typewriting in the Business Curriculum

Enrollments in typewriting now exceed the enrollment in bookkeeping, which was originally believed to be the foundation of all business training. Blackstone and Smith had this to say about the importance, popularity, and future of typewriting:

> Typewriting has been playing an increasingly important role in the commercial curriculum for the past decade or more. Today its enrollment is greater than for any other business subject and

> the tendency seems to be that it will increase still more. . . . It is even conceivable that the movement will continue until every secondary school student will be expected to take some typewriting, even as today each elementary school pupil is expected to take penmanship.[1]

They used the foregoing facts about the growth of typewriting as a setting for their further discussion of inadequate instruction:

> A movement of such proportions should justify great effort to determine the best possible means of providing instruction in a subject having such widespread appeal. Yet today a great deal of dispute and debate exist concerning teaching procedures in this field.[2]

History of Typewriting Instruction

Typewriting instruction has not been based on psychological principles since the course was introduced into the schools as early as 1880. The following summary by Blackstone and Smith indicates how emphasis in this field has shifted:

> Early instruction. Growing as it did out of the demands of the century, out of the industrial revolution, and out of the invention of the typewriter, instruction in typewriting had little time for development of theory or philosophical consideration of comparative methods of teaching. The thing to do was to write, to use the machine, and for this purpose, one or two fingers of each hand were considered amply sufficient for everybody.

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[1] E. G. Blackstone and Sofrona L. Smith, Improvement of Instruction in Typewriting (New York: Prentice-Hall, Inc., 1949), p. v.

[2] Ibid.

> As commercial usage became more general, however, There came an awareness of the need for better operational methods.[1]

Typewriting instruction, however, has finally come to rest upon terms of the psychological principle rather than materials used. The review of literature pertaining to the evolution of typewriting instruction revealed other changes which were significant to the study.

The principle of self supervision first gave way to the principle of teacher supervision as a basis of instructional methods in typewriting. Then, after World War I, individual practice, under teacher supervision, was replaced by the adoption of the group method. Likewise, typewriter-company speed departments discarded the special aptitude explanation for success in typewriting and replaced it with enthusiasm, intelligent striving, and confident determined ambition.

The success brought about by added effort, enthusiasm, and ambition was ample proof of how unimportant were some of the traditions about teaching typewriting. Not only has tradition existed in this area, but in few subjects has the force of tradition extended itself so strongly as it has in typewriting. Most teachers advocate their own individual teaching procedures without experimental evidence. Teachers,

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[1] Ibid., p. 7.

in general, have not been critical enough and have been satisfied to accept the procedures used when they were students. Also, in many cases the teacher of typewriting has not been well trained in psychology.

Despite the force of tradition and lack of teacher training, typewriting instruction has shown some significant improvement. Book recognized this improvement as early as 1925 when he said:

> One of the most remarkable achievements in the acquisition of human skills is the phenomenal increase in speed and accuracy that has been made in typewriting during the past 20 years. The fact that the number of words written per minute and hour has practically doubled and that the quality of the copy written has been correspondingly improved does not begin to tell the story. . . . Nothing short of a detailed analysis of the entire process of acquiring such feats of skill can reveal what a learner must do to attain it.[1]

Typewriting Instruction Classified

The teacher should be aware of the type of instruction typewriting requires as compared with other subjects. Odell and Stuart[2] classified subjects as (1) knowledge type, (2) appreciation type, and (3) skill type. Naturally, typewriting is of the skill type. In discussing the type of instruction a skill subject requires, Odell and Stuart said:

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[1]Book, op. cit., p. 166.

[2]Odell and Stuart, op. cit., p. 24.

> In terms of choice of subject matter, the most exacting type of learning is that of skill. Here the teacher must lead all students along the one path. All learners must take each step in the process in the same sequence. . . . The learning process must proceed carefully along the one way, each step following the one before it in a prescribed order. Deviations from the plan or omission of any step throws the whole learning process into a chaotic state.[1]

If instruction for a skill subject is so exacting, the use of the known psychological principles of learning become essential.

Psychological Principles Necessary for Acquisition of Typewriting Skill

For the purpose of understanding how to type takes place, a study of how to acquire skill is the first learning problem. Right practice and full understanding of the purpose of the practice controls the development of skill in typewriting. Right practice cannot always be standardized. For this reason, skill must be thought of as plastic, flexible, and ever-changing with different individuals. Lessenberry formulated seven factors that condition learning which, however, do not vary greatly with individual students:

1. The learner must know the goal toward which he is working.
2. The learner must understand the purpose of each practice project and the expected

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[1] Ibid., p. 25.

outcomes of the use of a particular practice procedure. This means that he must not only know how he should practice, but also why.

3. The learner must like the work. "Enjoyable learning is essential to efficient learning."

4. Knowledge of progress in learning is essential to efficient learning.

5. Repetitive practice is essential to the development of skill.

6. Practice makes perfect only if there is a definite drive toward perfection.

7. "Mere practice will not develop habit. The repetitions must be regular and frequent, rather than numerous, and made with all the attention at the individual's command."[1]

Automatizing the mental process.--After a study of how typewriting is learned, Book formulated five steps necessary for the writing of each letter on the typewriter. Clem[2] quoted these five steps from Book: (1) getting the copy, (2) mentally locating the corresponding key, (4) movement required for reaching the key, (5) initiation of the letter-making movements.

This process illustrates how the use of the thought center diminishes as the steps are blended together. In the beginning, the student must use all five steps, and this requires the use of the thought center to the highest degree.

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[1]Lessenberry, op. cit., p. 24.

[2]Clem, op. cit., pp. 43-44.

This is known as the letter-recognition level of typewriting. As soon as the keyboard is mastered, a blending of the steps begins. Steps 1 and 2 are first joined together. Then the process is reduced by blending steps 4 and 5. All five steps are joined into one when enough skill is acquired to make the steps automatic.

It is in this stage of automatizing the mental process that the factors of proper length of drill, maintenance of interest, and elimination of fatigue and tension, mentioned in Chapter I, are so important.

Increasing typewriting speed is a matter of increasing the speed of the mental reactions rather than the physical act of striking the keys. Clem summarized the process of speed building as follows:

> The Psychology of Speed in Typing. Every voluntary muscular reaction in typing has a certain accompanying mental process, including not only the mental process that stimulates the action, but also certain additional mental processes that may accompany or follow the execution of the action. . . . The speed of writing at this stage is governed largely by the sum total of the time required for all of these processes. Increasing speed is a matter of decreasing the time required for any or all of these processes. Usually the finger movement itself requires but very little time; so, for the average pupil, the problem of how to increase speed is usually the problem of how to increase the speed of the mental reactions.[1]

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[1]Clem, op. cit., pp. 51-52.

The length of typewriting effort.--What practice procedure, then, is considered best for promoting this increase in speed? Speed drills are designed primarily to automatize responses and to increase stroking speed. The exact amount of practice that will yield the best results and the intervals of time that should be allowed between these practices has not been determined, as was pointed out in Chapter I.

Many attempts have been made to determine the most effective length of timed writings on the skill-building level. Formerly, the length of time allotted to timed writings and the length of the paragraph copy provided for them got longer and longer as one leafed the pages of a typewriting text.

At the present time, ten- and fifteen-minute timed writings during the skill-building stage are considered unnecessary. Writings of this length reflect a tendency on the part of the teacher to test rather than teach. Rowe said:

> . . . There is little place for any ten- or fifteen-minute timed writings (tests) in typewriting classes; instead, the emphasis throughout the course should be placed upon improvement rather than absolute achievement. As a result, timed writings should be a skill-building device rather than an excuse for the teacher to sit at his desk for periods of ten to fifteen minutes.[1]

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[1]John L. Rowe, The Bulletin of the National Association of Secondary-School Principals, XXXIII (November, 1949), p. 144.

Although the exact amount of practice required for typewriting is not known, experiments in other types of learning have shown certain definite principles which apply. Lamb gave the following information in defense of short speed efforts:

> Drills should be short, intensive and precise in objective. Progress in typing is achieved through short spurts of intense effort aimed at a specific goal. . . . In the short timed writing, the student proves to himself that he can type at such-and-such a rate, and this success--followed by plenty of practice--enables him to convert his gains into sustained writing power at the advanced level.[1]

Also dealing with the length of writings which best promotes speed building, Blackstone and Smith recommended short efforts as a building process toward longer periods:

> . . . Most gains in typing are secured at first in short, intensive efforts, and these gains may later be consolidated and developed so that they may be maintained for longer periods. Repeated, short, intense periods of activity are better than long periods of activity.[2]

Book gave the psychology behind short periods of practice as opposed to long ones when discussing the secondary laws under The Law of Practice or Habit:

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[1]Marion M. Lamb, Your First Year of Teaching Typewriting (New York: South-Western Publishing Company, 1947), p. 41.

[2]Blackstone and Smith, op. cit., p. 91.

> Frequency. The first, and foremost of these secondary laws is the cumulative effect produced by the repetition of any stimulus-response process. This depends upon the frequency with which the performance is repeated and upon the time interval between the practices. If short or of the proper length, we get a cumulative effect. If long, the organism makes a negative adaptation to the stimulus so repeated. . . . One of the most important problems in any case of learning is, therefore, to determine the exact amount of practice that will produce the exact amount of effect, and to determine the length of the time interval between practices that will yield the most permanent results for strengthening the neural bonds to be formed.[1]

Distribution of Practice.--Another point which must be considered in speed building is distribution of the practice with periods of rest. Book discussed this under Laws of Exercise and Effect dealing with the way in which all habits acquired in learning to typewrite are permanently attached to the appropriate stimulus:

> Proper Alternation of Periods of Work and Rest. Another important factor which influences the fixing of typewriting habits is the distribution of practice. To obtain the best results for permanently fixing any set of habits the most economical periods of work and rest must be determined and used.[2]

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[1]Book, op. cit., pp. 41-43.

[2]Ibid., p. 218.

The Importance of Understanding in Learning Typewriting.--Psychologists insist that learning does not depend upon repetition and drill alone. Without a purpose that is understood, there cannot be effective learning.

In discussing the three laws of learning under The Law of Practice and Habit, which determines the amount of effect which a given stimulus-response activity will produce, Book mentioned one of the laws as being:

> Intensity of Stimulus. A second factor which affects helpfully or hurtfully the fixing of the neural bonds to be formed in any instance of learnind is the intensity of stimulus, which simply means that vigorous exercise accompanied by concentrated attention strengthens such a connection more than repeating the response more often in a less vigorous or more inattentive manner.[1]

Blackstone and Smith also recognized that the attitude the learner takes is a fundamental factor in the efficiency of the habit-forming process:

> It is well known that a student learns better and faster if he is interested in his work, if he enjoys it, and if he knows what degree of progress he is making. Lessenberry shrewdly says that it is not so important what the student does to the practice material as what the practice material does to the student.[2]

Odell and Stuart indicated why typewriting, particularly, requires constant attention to motivation:

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[1] Ibid., p. 43.

[2] Blackstone and Smith, op. cit., p. 90.

> . . . Here all learners must master all the knowledge. It is due to this set and rigid sequence in the skill subject that motivation looms so large. Rigid conformity always is apt to be uninteresting.[1]

Further proof of the importance of proper attitude is given in connection with plateaus in learning. If the proper exercise and attitude toward practice work are not present, progress is likely to halt or become non-existent.

Lamb[2] said if plateaus are to be decreased, motivation seems to be the only means of doing so. She recommended as much practice as would not involve monotony but concluded that success would probably depend on motivation.

How can this motivation and attitude be developed? The teacher can play a major role in this respect through her confidence in her students and by supplying material which presents a challenge, yet is not too difficult.

In discussing the methods of teaching typewriting, Lessenberry recognized the influence of the teacher in developing attitude:

> . . . Students must believe they can learn to type--and so must the teacher. We now know enough about the effect of a confident attitude to know that it removes barriers to skill development. . . . Students must be made to succeed.[3]

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[1]Odell and Stuart, op. cit., p. 25.

[2]Lamb, op. cit., p. 191.

[3]Lessenberry, op. cit., p. 6.

The Importance of Relaxation.--Lessenberry listed relaxation as one of the seven basic techniques for typewriting and followed it with this discussion:

> . . . Relaxation is mental first, then it becomes physical. Relaxation usually comes from the feeling of certainty that the work to be done can be done without difficulty. . . . So, real typing power comes when the typist is poised and free to work without the interference of taut muscles.[1]

The Element of Fatigue.--In the principles compiled by Odell and Stuart, they mentioned another factor in addition to exercise, understanding, and relaxation:

> In addition to the interest factor, the element of fatigue also must be considered. This applies especially in the beginning stages of learning when the student tries very hard and exercises new combinations of muscles.[2]

In discussing how habits are established under The Law of Exercise and Effect, Book mentioned how fatigue should be considered in determining the length of the practice period:

> Habits Cannot be Fixed When the Learners are Fatigued. Another factor which influences the fixing of habits in learning to typewrite is fatigue. . . . Making a wrong response on the machine not only weakens the habit to be established, but fixes a wrong response. It also displeases the learner and tends to develop a wrong attitude towards the practice. Such tendencies to error increase with fatigue; and since incorrect practice is worse than no

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[1] Ibid.

[2] Odell and Stuart, op. cit., p. 23.

> practice at all, the matter of determining how long a profitable type of practice can be sustained by different learners and at different levels of skill, is an important problem that every teacher of typewriting must solve if he is to obtain the best results for fixing the specific habits that must be established.[1]

Summary

Today the enrollment in typewriting is greater than for any other business subject. Typewriting instruction was not based on psychological principles when it was introduced into the school as early as 1880. As commercial usage became more general, however, there came an awareness of the need for better operational methods. After passing through many stages, the emphasis in typewriting instruction has come to rest upon terms of the psychological principle rather than materials used.

The following statement by Book serves as a good summary of what these psychological principles involve and the need for special investigation to determine the most desirable practice and rest periods for obtaining them:

> The best results are obtained when the periods of practice or study are of such a length as will give the greatest amount of exercise to the habits to be formed with the least opportunity for fatigue . . . and when the interval between practice and periods of study is of such a length,

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[1]Book, op. cit., p. 219.

> on the other hand, as will insure the most complete dropping out of the interfering tendencies to respond inevitably formed in the course of learning, with the least possible fading of the habits to be established. Special investigation must determine what these most desirable periods of work and rest for any case of learning are.[1]

This study dealt with the length of the drill exercises which were best for promoting the laws of learning involved in skill building. The review of literature, therefore, included discussions of how exercise, motivation, relaxation, and elimination of fatigue relate to the acquisition of typewriting skill.

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[1] Ibid., p. 434.

CHAPTER III

PROCEDURE

Selection of Problem

The investigator selected typewriting instruction for research because of her desire to contribute to a field in which there was a definite need. The need for such a study was defined in Chapter I.

Also, the investigator wished to select a research topic which could be investigated in a rural school situation. The experiment was conducted in a rural school which limited the opportunity for the type of research requiring cooperation with industry such as is found in an urban area. Moreover, it was felt that this experiment would be just as effective in this rural area as it would be in an urban one.

Selection of Students

Because the major part of this study was experimental in nature, it was first necessary to design a pattern to include experimental and control groups. Huffman, in a letter to Lloyd, made the following statement regarding such a selection:

> Of course the problem of setting up a control group and an experimental group is a knotty one. It is a problem that statisticians grapple with every day especially when they deal with elusive

> subjects. One technique is to set up a careful experimental design that may measure the factor under consideration carefully. In thinking about the matter for some length of time, an obvious solution occurred to me and that is the following:
>
> Let the same group of students be both the experimental and controlling groups. In such a way whatever factors influence typewriting will have their same influence on the three-minute timings as they do on the five-minute timings.[1]

In his reply, Lloyd said, "Sounds fine, . . . This may be the answer for which I was seeking."[2]

Through this suggestion, the following plan was adopted:

TABLE 1

ROTATION SCHEDULE TO PROVIDE FOR EXPERIMENTAL AND CONTROL FACTORS

Frequency of Rotation	Classes	
	A	B
First 20 lessons	3 min.	5 min.
Second 20 lessons	5 "	3 "
Third 20 lessons	3 "	5 "
Fourth 20 lessons	5 "	3 "
Fifth 10 lessons	3 "	5 "
Sixth 10 lessons	5 "	3 "

[1] Letter from Harry Huffman, Head, Department of Business Education, Virginia Polytechnic Institute, Blacksburg, Virginia, to Alan C. Lloyd, Typewriting Editor, McGraw-Hill Book Company, Inc., New York, New York, July 21, 1956. (See Appendix A).

[2] Reply from Alan C. Lloyd to Harry Huffman July 23, 1956. (See Appendix A).

By using this rotation plan, it was thought that all factors which influence typewriting would be present for both three- and five-minute timed writings.

The experiment included two Typewriting I classes in Willis High School, Floyd County, Virginia. The number of students could be equalized or interchanged in any way necessary for the study. Although random arrangement was not essential, each student being both in the experimental and control groups, the classes were divided at random, placing eighteen students in each section.

The thirty-six students available for study provided 252 measurements which were analyzed in this study. Furthermore, secondary measurements included 4,320 facts. The questionnaire used provided fifteen student preferences for three- and five-minute timed writings with relation to skill-building factors other than exercise.

The Experiment

The stage of skill development which immediately follows mastery of the keyboard is termed the continuity, copy-writing stage by Odell and Stuart, Chapter I. The purpose of drill work during this stage is to build speed by automatizing the mental processes of the students. This increase in speed comes when the student progresses from the letter to the word and phrase recognition of response.

This experiment pertained to the time element of the drill work given during the continuity copy-writing period of skill development. The trend is toward shorter speed efforts. Ten- and fifteen-minute writings are no longer used extensively for skill development but have been replaced by five-minute writings. Considering the elements of rest periods, interest, relaxation, and fatigue, this study was to determine if three-minute timed writings would not be just as effective as five-minute timed writings in the development of basic typewriting skill.

As the experiment was to test the effectiveness of three-minute timed writings as compared with five-minute timed writings, the students were given identical instruction, the only difference being in the length of timed writings given. During the same rotation period, the writings for one section were three minutes in length; while the other section was given the traditional five-minute writings.

To assure that the only variable would be the length of timed writings given, it was decided that the experimental group would receive one three-minute writing per day; and the control group would be given a five-minute writing on the same material. These timed writings were given the first part of the class period after five minutes of warm up and preview. After two students had checked the results of the tests for accuracy, they were recorded on a daily check sheet.

Measurement of Results

The experimental pattern provided for exact measurements of gains or losses for both groups. After the students had mastered the keyboard but before the experiment started, both groups were given two five-minute timed writings. The better test was scored and served as the basis on which to figure all succeeding gains or losses. In order to report all significant findings of the study, the investigator decided to use three types of measurements:

1. One measurement consisted of two five-minute tests given at the end of each rotation period. The students submitted only the better of the two writings for measurement. The investigator checked all of these writings for accuracy. Regardless of the length of the timed writing the class might be using for a particular rotation period, the same five-minute timed writing was given to both groups to make the measurement consistent. The material used was new to the students and had the same syllable intensity as the daily timed writings which preceded the test. These five-minute tests were designed to show the difference in degree of progress of students who had taken three-minute as compared with those who had taken five-minute timed writings. Because the rotation periods were continuous, the test at the end of one period served as the beginning test of the succeeding one.

2. The second measurement was obtained by scoring the last regular daily timed writing in each rotation period. The students reacted to this timed writing in just the same manner as to all daily timed writings, which probably means they were less tense than on scheduled tests in measurement No. 1. The purpose of this score was to show the students' progress on material of the same difficulty and length as the writings used within the rotation period. Being taken from the textbook, this was not necessarily new material to the students.

3. To show a more complete picture of the entire rotation period, the third measurement consisted of the average of all writings for a rotation period. To obtain this average, it was necessary for each student to keep a daily record of his writings. Two students checked the writings for accuracy before they were recorded. At the end of the rotation period, the scores for each student were obtained. The total of these individual scores, divided first by the number of days in the rotation period and then by the time in minutes gave the average used in determining the gain or loss reported in the tables (Chapter IV--Tables 4, 7, and 10). As in measurement No. 2, these writings were taken from the textbook and did not always represent new material.

For the purpose of comparing the results of measurements taken from different lengths of timed writings, all three measurements are given in Chapter IV on the basis of gain or loss per student per minute.

As the data were to be reported on progress for each rotation period, the investigator felt that speed, control, and a combination of both speed and control should be considered in constituting this gain.

The measurement of speed was based on the increase in the gross strokes written per minute during the rotation period.

To measure the control factor, a corresponding record was maintained to show increase or decrease in number of errors per minute as the speed increased.

For the third factor, which would combine both speed and control, a point system was designed. Each line written without error constituted one point. Therefore, a student's number of points would increase simultaneously with an increase in strokes, provided he maintained the corresponding control.

Determining the Preferences of the Students

The laws of learning given in Chapter I indicated that interest, relaxation, and elimination of fatigue are essential to skill building. The investigator decided to

obtain the reactions of the students to the lengths of timed writings by administering a questionnaire (See Appendix B) after all students had completed the final rotation. Through the use of both the experiment and the questionnaire it was felt that all factors mentioned in Chapter I would have been included in the study.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The experiment included 100 class periods, starting with the 21st lesson of instruction. The students mastered the keyboard in the first 20 lessons. These 100 class periods constituted two complete rotations of 20 lessons each and one rotation of 10 lessons. Although the last rotation was shortened to 10 lessons because of lack of time, in the end both groups of students had spent exactly the same amount of time in the experiment. The student subjects of this experiment were divided into two groups, which alternately were experimental and control. Thus, every student had 50 days of instruction in both the experimental and control groups.

During the experiment, which included one timed writing per day, the regular class work was performed. The instruction was the same for the two groups with the exception of the length of the daily timed writings.

Because of the variety afforded by the rotation design, three measurements were reported, not for the purpose of comparing the results but to include as many findings as possible. Although all three measurements covered the same period of time, each was unique in what it measured. Therefore, different measurements rendered different results.

groups at the end of each rotation period. This material was a five-minute test for both groups and measured the students' typewriting ability on new material.

In Table 2 the 127.2 strokes, the increase per minute per student in the three-minute group, represents the average gain for the 21st to the 121st lesson. The 143.3 strokes for the five-minute group can be interpreted in a similar fashion. For the first two complete rotation cycles, the difference in the increase for the five-minute group over the three-minute group was relatively the same; whereas, during the last cycle of 20 lessons, the increase switched from the five-minute to the three-minute group.

Table 3 covered the same period of time as Table 2, but the results were obtained by scoring the last timed writing in each rotation period. Thus, the writings for the experimental group were three minutes in length, while those for the control group were five-minutes in length. However, the results were given in increase or decrease per student per minute.

Table 3 shows that the total increase was 47.7 words per minute per student more for the experimental group than for the control group during the 100 days of the experiment. Not only was the total gain more for the three-minute group, but this increase was continuous throughout each complete rotation cycle. Also, the amount of increase was more for

CHAPTER IV

ANALYSIS OF DATA

Measurement of Strokes

Tables showing increases or decreases in strokes written are presented for individual analysis in this chapter. The data used in these tables were obtained from the three types of measurements mentioned in Chapter III.

The results reported in Table 2 were obtained from the tests administered to both the three- and five-minute

TABLE 2

AVERAGE INCREASE OR DECREASE IN STROKES PER MINUTE PER STUDENT AT THE END OF VARIOUS CYCLES AS MEASURED BY A FIVE-MINUTE TEST

Rotation Period	Length of Writings Given During the Rotation Period			
	3 min.		5 min.	
First 20 lessons	56.8		59.8	
Second 20 lessons	10.7		22.2	
Total--First 40 lessons	67.5		82.0	
Total--40 lessons		67.5		82.0
Third 20 lessons	30.5		36.2	
Fourth 20 lessons	15.9		16.9	
Total--Second 40 lessons	46.4		53.1	
Total--80 lessons		113.9		135.1
Fifth 10 lessons	1.1		.6	
Sixth 10 lessons	12.2		7.6	
Total--Third 20 lessons	13.3		8.2	
Total--100 lessons		127.2		143.3

the experimental group at the end of each rotation period. Likewise, the total gains for the same group was more uniform being 67.7, 61.0, and 41.8 as compared with 63.1, 36.6, and 23.1 for the five-minute group.

TABLE 3

AVERAGE INCREASE OR DECREASE IN STROKES PER MINUTE PER STUDENT AT THE END OF VARIOUS CYCLES AS MEASURED BY THE LAST WRITING IN EACH ROTATION PERIOD

Rotation Period	Length of Writings Given During the Rotation Period			
	3 min.		5 min.	
First 20 lessons	68.5		65.7	
Second 20 lessons	- .8		2.6	
Total--First 40 lessons	67.7		63.1	
Total--40 lessons		67.7		63.1
Third 20 lessons	49.2		35.4	
Fourth 20 lessons	11.8		1.2	
Total--Second 40 lessons	61.0		36.6	
Total--80 lessons		128.7		99.7
Fifth 10 lessons	23.7		12.1	
Sixth 10 lessons	18.1		11.0	
Total--Third 20 lessons	41.8		23.1	
Total--100 lessons		170.5		122.8

The averages for all writings taken during the various rotation periods were obtained as the source for Table 4. Because these data included the average of all the timed writings for a particular rotation period, it was felt that this measurement would give a complete picture of an entire cycle.

TABLE 4

AVERAGE INCREASE OR DECREASE IN STROKES PER MINUTE PER STUDENT AT THE END OF VARIOUS CYCLES AS MEASURED BY THE AVERAGE OF DAILY TIMED WRITINGS

Rotation Period	Length of Writings Given During the Rotation Period			
	3 min.		5 min.	
First 20 lessons	48.2		37.3	
Second 20 lessons	29.8		17.4	
Total--First 40 lessons	78.0		54.7	
Total--40 lessons		78.0		54.7
Third 20 lessons	34.1		19.8	
Fourth 20 lessons	26.2		18.1	
Total--Second 40 lessons	60.3		37.9	
Total--80 lessons		138.3		92.6
Fifth 10 lessons	20.2		7.4	
Sixth 10 lessons	39.4		3.2	
Total--Third 20 lessons	59.6		10.6	
Total--100 lessons		197.9		103.2

Table 4 shows an even more substantial increase for the experimental group than did Table 3. The content of the table may be enumerated as follows: (1) Without exception, the amount of increase was more for the three-minute group. (2) Considering the lessons collectively, the difference in increase for the experimental group over the control group doubled during each rotation cycle--40 lessons, 23.3; 80 lessons, 45.7; 100 lessons, 94.7. (3) The experimental group showing 78.0, 60.3, and 59.6, maintained a more consistent

increase during each cycle; whereas, the increase for the control group, 54.7, 37.9, and 10.6 dropped approximately half during the three intervals.

Tables 2, 3, and 4, all dealing with increases and decreases in strokes, have been presented and explained. Table 2 shows that five-minute writings produces the greater increase; whereas, Tables 3 and 4 show a greater increase for three-minute writings. In this respect, there could be some connection between the type of measurement used and the results obtained. As far as the students were concerned, the measurements for Tables 3 and 4 were class work rather than a formal test. When the test reported in Table 2 was given, the class routine had to be changed considerably. Two tests were given instead of one. For the students taking three-minute writings, the test was two minutes longer than the daily timed writings. The fact that Table 2 was based on new material and Tables 3 and 4 were based on familiar material also should be noted.

The uniformity of the cycle increases of the experimental group as compared with the constant lack of increase of the control group for the same period also seems significant.

Measurement of Errors

To show the corresponding control factor in skill development as measured by this experiment, three tables are presented. Although all three tables cover the same period of time, each illustrates a different type measurement.

Table 5 shows the error increase or decrease measured by the tests given to both groups at the end of each rotation period. The content of this test was new material to the students.

TABLE 5

AVERAGE INCREASE OR DECREASE IN ERRORS PER MINUTE PER STUDENT AT THE END OF VARIOUS CYCLES AS MEASURED BY A FIVE-MINUTE TEST

Rotation Period	Length of Writings Given During the Rotation Period			
	3 min.		5 min.	
First 20 lessons	.58		.54	
Second 20 lessons	.42		.92	
Total--First 20 lessons	1.00		1.46	
Total--20 lessons		1.00		1.46
Third 20 lessons	-.60		-.28	
Fourth 20 lessons	.24		-.40	
Total--Second 20 lessons	-.36		-.68	
Total--40 lessons		.64		.78
Fifth 10 lessons	.30		.56	
Sixth 10 lessons	-.30		.26	
Total--Third 20 lessons	0		.82	
Total--100 lessons		.64		1.60

The average increases and decreases for the various rotation periods in Table 5 show no consistent pattern for both groups. On a comparative basis, five-minute tests, given at the end of the rotation, produced more errors per minute than did the three-minute tests for the same period. This was true for every cycle throughout the 100 lessons of the experiment.

The measurement for Table 6 contained two lengths of writings. When the last writing in each rotation was scored,

TABLE 6

AVERAGE INCREASE OR DECREASE IN ERRORS PER MINUTE PER STUDENT AT THE END OF VARIOUS CYCLES AS MEASURED BY THE LAST WRITING IN EACH ROTATION PERIOD

Rotation Period	Length of Writings Given During the Rotation Period			
	3 min.		5 min.	
First 20 lessons	1.19		.88	
Second 20 lessons	-.31		.43	
Total--First 40 lessons	.88		1.31	
Total--40 lessons		.88		1.31
Third 20 lessons	-.29		.43	
Fourth 20 lessons	.53		-.25	
Total--Second 40 lessons	.24		.18	
Total--80 lessons		1.12		1.49
Fifth 10 lessons	.41		-.25	
Sixth 10 lessons	.49		-.23	
Total--Third 20 lessons	.90		-.48	
Total--100 lessons		2.02		1.01

the experimental group was engaged in three-minute writings while the control group was taking five-minute writings. The material used for the timing came from the textbook.

As in Table 5, no systematic increases or decreases in errors are evident in Table 6. Neither does the type of class work in which the students were engaged seem to have any affect on the scores. One group shows an increase in errors while the other group shows a decided decrease for the same period.

The first 80 lessons were in agreement with the results shown in Table 5; the control group showing the larger increase. During the last 20 lessons, however, the error rate for the two groups show two extremes, with the experimental group showing the larger total increase.

Table 7 shows the average for all writings during the various rotation periods.

When all writings are considered, as in Table 7, a more uniform pattern is shown than when measurement is based on only one writing. The significant point to be concluded from Table 7 is that the control group shows a .36 increase over the experimental group.

The timed writings, which were the basis for the measurements for Tables 6 and 7, were similar in length and were taken from the textbook; yet the two tables show opposite results. This might be explained by the fact that

Table 6 was based on only one writing, while Table 7 covered the entire rotation period.

TABLE 7

AVERAGE INCREASE OR DECREASE IN ERRORS PER MINUTE PER STUDENT AT THE END OF VARIOUS CYCLES AS MEASURED BY THE AVERAGE OF DAILY TIMED WRITINGS

Rotation Period	Length of Writings Given During the Rotation Period			
	3 min.		5 min.	
First 20 lessons	.99		.66	
Second 20 lessons	.17		.11	
Total--First 40 lessons	1.16		.77	
Total--40 lessons		1.16		.77
Third 20 lessons	-.04		.09	
Fourth 20 lessons	-.25		-.30	
Total--Second 40 lessons	-.29		-.21	
Total--80 lessons		.87		.56
Fifth 10 lessons	-.03		.69	
Sixth 10 lessons	.22		.17	
Total--Third 20 lessons	.19		.86	
Total--100 lessons		1.06		1.42

Because of the lack of consistency in any of the three tables dealing with errors, no conclusions can be drawn in this study.

Measurement of Points

Both speed and control are combined in the following three tables. The data for the tables were based on a point system. A point represents a line of copy, approximately 13 words, written without error.

The source for Table 8 was the test that was given to the students at the end of each rotation period.

TABLE 8

AVERAGE INCREASE OR DECREASE IN POINTS PER MINUTE PER STUDENT AT THE END OF VARIOUS CYCLES AS MEASURED BY A FIVE-MINUTE TEST

Rotation Period	Length of Writings Given During the Rotation Period			
	3 min.		5 min.	
First 20 lessons	.56		.52	
Second 20 lessons	-.24		-.26	
Total--First 40 lessons	.32		.26	
Total--40 lessons		.32		.26
Third 20 lessons	.48		.42	
Fourth 20 lessons	.14		.36	
Total--Second 40 lessons	.62		.78	
Total--80 lessons		.94		1.04
Fifth 10 lessons	-.14		-.12	
Sixth 10 lessons	.10		-.12	
Total--Third 20 lessons	-.04		-.24	
Total--100 lessons		.90		.80

As measured by a test containing new material, Table 8 shows that over a period of 100 lessons, students accumulated .10 more points per minute per student when taking three-minute writings than when taking five-minute ones. Even between Lessons 80 and 100 when the average number of points decreased for both groups, the experimental group's points decreased less.

Unlike Table 8, the material for Table 9 was obtained by scoring the last regular timed writing in each rotation.

TABLE 9

AVERAGE INCREASE OR DECREASE IN POINTS PER MINUTE PER STUDENT AT THE END OF VARIOUS CYCLES AS MEASURED BY THE LAST WRITING IN EACH ROTATION PERIOD

Rotation Period	Length of Writings Given During the Rotation Period			
	3 min.		5 min.	
First 20 lessons	.55		.60	
Second 20 lessons	-.05		-.38	
Total--First 40 lessons	.50		.22	
Total--40 lessons		.50		.22
Third 20 lessons	.74		.15	
Fourth 20 lessons	.21		.06	
Total--Second 40 lessons	.95		.21	
Total--80 lessons		1.45		.43
Fifth 10 lessons	.14		-.05	
Sixth 10 lessons	.12		-.12	
Total--Third 20 lessons	.26		-.17	
Total--100 lessons		1.71		.26

The measurements given in Table 9 at the end of the three cycles show no deviation from the substantial increase in points of the experimental group over the control group.

The elimination of the fatigue factor in Table 9 should be noted when comparing the increased difference in points for the three-minute time group in Table 9 over Table 8. For Table 8 both groups took five-minute tests.

Table 10 shows gain or loss of the two groups based on all writings in each rotation. The increases and

TABLE 10

AVERAGE INCREASE OR DECREASE IN POINTS PER MINUTE PER STUDENT AT THE END OF VARIOUS CYCLES AS MEASURED BY THE AVERAGE OF DAILY TIMED WRITINGS

Rotation Period	Length of Writings Given During the Rotation Period			
	3 min.		5 min.	
First 20 lessons	.35		.32	
Second 20 lessons	.16		-.03	
Total--First 40 lessons	.51		.29	
Total--40 lessons		.51		.29
Third 20 lessons	.37		.18	
Fourth 20 lessons	.35		.27	
Total--Second 40 lessons	.72		.45	
Total--80 lessons		1.23		.74
Fifth 10 lessons	.26		-.19	
Sixth 10 lessons	.56		-.08	
Total--Third 20 lessons	.82		-.27	
Total--100 lessons		2.05		.47

decreases reported in Table 10 were derived from the averages for all the writings in the rotation from each student.

The total point gain for three-minute writings is even larger when all writings in the rotation period are considered than when measurement is based only on the last writing for the period. Table 10 is in conformity with Table 9, both showing increases and decreases for the same group during the same period of time. The experimental group showed a constant increase in points for the 100 lessons while the control group dropped from .74 points at the end of the 80th lesson to .47 points at the end of the 100th lesson.

With one exception, all three measurements show that, on the per minute basis, three-minute timed writings produce more correct lines of typewritten copy than five-minute timed writings. As is true of a typical progress curve in typewriting, both groups show the greatest gain in points in the early stages of skill development on all three measurements. The type of measurement seemed to have no affect on this pattern. After the 80th lesson, with one exception, the experimental group maintained a slight increase while the control group showed a decrease for the 20 lessons as determined by all three measurements.

Because points combine both speed and control, this increase can either be the result of the students typewriting more copy, maintaining better control, or a combination of both.

Determining the Students' Preferences for Writings

The data for this part of the study were obtained from the questionnaire in Appendix B.

The review of literature, Chapter II, revealed that the attitude of the student is a major factor in skill development. This questionnaire was administered to the students who had participated in this study in an attempt to determine if there is any relation between their attitude and the results obtained. This instrument included questions on concentration, interest, fatigue, relaxation--all known to affect the acquisition of typewriting skill.

These reactions are shown in Table 11.

TABLE 11

STUDENT PREFERENCES FOR THREE- AND FIVE-MINUTE TIMED WRITINGS IN RELATION TO SKILL BUILDING FACTORS OTHER THAN EXERCISE

Factor	Per Cent of Student Preference		
	3 min.	5 min.	Either 3 or 5 min.
Easier Progress	69	31	
Better Concentration	54	40	6
More Interesting	71	26	3
Least Tiring	80	17	3
Easier Relaxation	74	26	

Pursuing further the element of fatigue, the questionnaire contained the question, "Did the five-minute test at the end of a three-minute rotation tire you more than the daily writings for that rotation? Why?" The responses were as follows:

Eighty-three per cent of the students answered "yes" to this question and gave the following reasons:

1. They were more tiring.
2. The thought of a five-minute test made me tense.
3. I got nervous at the last.
4. It was harder for me to concentrate.
5. Longer writings upset my typing techniques.

The remaining seventeen per cent gave the following reasons for their "no" answers:

1. When I have more time, I can relax and do my best.
2. When I have more time, I don't seem so rushed.
3. I have time to get settled down and can steadily increase my speed in the latter part of the writing.

By comparing the student preferences with the general findings of this study, a definite relation can be observed. Preference for three-minute or five-minute writings in order to make easy progress was determined by referring to an individual check sheet kept by each student. The investigator observed similar reactions when the students transferred according to the rotation schedule.

Conclusions

The following general conclusions were drawn from the results of this study which included (1) measurement of speed, control, and a combination of both speed and control, and (2) preferences of the students regarding the two lengths of writings. The five-minute tests were the primary measurements in this study. The last writing in each rotation period and the averages of the daily timed writings served as secondary measurements.

1. When measured by five-minute tests, over a period of 100 lessons, students increased their stroking rates by 16.1 more strokes per minute per student when taking five-minute writings than when taking three-minute writings. The experimental group showed a total increase of 127.2 strokes. The control group showed a total increase of 143.3 strokes. (See Table 2).

2. When measured by the last writing in each rotation period, over a period of 100 lessons, students increased their stroking rates by 47.7 more strokes per minute per student when taking three-minute writings than when taking five-minute timings. The experimental group showed a total increase of 170.5 strokes. The control group showed a total increase of 122.8 strokes. (See Table 3).

3. When measured by the average of daily timed writings, over a period of 100 lessons, students increased their stroking rates by 94.7 more strokes per minute per student when taking three-minute writings than when taking five-minute timed writings. The experimental group showed a total increase of 197.9 strokes. The control group showed a total increase of 103.2 strokes. (See Table 4).

4. Even though the primary measurement favored the five-minute daily writings, the two secondary measurements favored the three-minute writings. Therefore, it is the opinion of the author that students will increase their stroking rate (with no consideration for control) faster when given five-minute daily writings.

5. When measured by five-minute tests, over a period of 100 lessons, students increased their errors by .96 more errors per minute per student when taking five-minute writings than when taking three-minute writings. The experimental group showed a total increase of .64. The control group showed a total increase of 1.60 errors. (See Table 5).

6. When measured by the last writing in each rotation period, over a period of 100 lessons, students increased their errors by 1.01 more errors per minute per student when taking three-minute writings than when taking

five-minute writings. The experimental group showed a total increase of 2.02. The control group showed a total increase of 1.01 errors. (See Table 6).

7. When measured by the average of the daily timed writings, over a period of 100 lessons, students increased their errors by .36 more errors per minute per student when taking five-minute writings than when taking three-minute writings. The experimental group showed a total increase of 1.06. The control group showed a total increase of 1.42. (See Table 7).

8. On two of the three-measurements, students increased their errors more when taking five-minute timed writings than when taking three-minute timed writings. On the five-minute test, which served as the primary testing device for this study, the five-minute group showed a greater increase in errors than the three-minute group. The two secondary measurements, although similar in time and content, showed opposite results. Because of this differentiation, no definite conclusions are drawn in this study regarding errors.

9. When measured by five-minute tests, over a period of 100 lessons, students increased their points by .10 more points per minute per student when taking three-minute writings than when taking five-minute writings. The experimental group showed a total increase of .90 points. The

control group showed a total increase of .80 points. (See Table 8).

10. When measured by the last writing in each rotation period, over a period of 100 lessons, students increased their points by 1.45 more points per minute per student when taking three-minute writings than when taking five-minute writings. The experimental group showed a total increase of 1.71 points. The control group showed a total increase of .26 points. (See Table 9).

11. When measured by the average of the daily timed writings, over a period of 100 lessons, students increased their points by 1.58 more points per minute per student when taking three-minute writings than when taking five-minute ones. The experimental group showed a total increase of 2.05. The control group showed a total increase of .47. (See Table 10).

12. On all three measurements, students increased their points more when taking three-minute writings than when taking five-minute writings. Therefore, on a point basis, which combines both speed and control, three-minute timings were superior to five-minute timings.

13. The student preferences disclosed that they highly prefer three-minute writings. Although the percentages deviated somewhat, the majority indicated they preferred the shorter timings for easier progress, better

concentration, more interest, least tiring, and easier relaxation. (See Table 11).

14. Because the attitude and interest of the student is essential in skill building, the author concluded that three-minute writings are better than five-minute writings for creating and maintaining student interest.

Recommendations

The following recommendations are made as a result of the findings and the experience of the investigator in conducting this study. It is recommended:

1. That three minutes be the maximum length of drill exercises in the early stages of skill development when the students are exercising new combinations of muscles.

2. That extensive use be made of student progress sheets for promoting the understanding and interest elements of skill development.

3. That a similar study be made using the same rotation schedule but equalize the number of minutes spent in actual typewriting by giving more three-minute timed writings than five-minute ones.

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APPENDICES

A. Correspondence with:

Dr. Alan C. Lloyd
Typewriting Editor
Gregg Publishing Division
McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York 36, New York

B. Questionnaire

APPENDIX A

Correspondence with Dr. Lloyd

July 21, 1956

Dr. Alan C. Lloyd
Typewriting Editor
Gregg Publishing Division
McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York 36, New York

Dear Alan:

I have been thinking about the study in typewriting to determine whether three-minute timings produce the same or different results from five-minute timings. Of course the problem of setting up a control group and an experimental group is a knotty one. It is a problem that statisticians grapple with every day especially when they deal with elusive subjects. One technique is to set up a careful experimental design that may measure the factor under consideration carefully. In thinking about the matter for some length of time, an obvious solution occurred to me and that is the following:

Let the same group of students be both the experimental and the controlling groups. In such a way whatever factors influence typewriting will have their same influence on the three-minute timings as they do on the five-minute timings. As a proposal, I am showing below a possible experimental design:

TYPEWRITING EXPERIMENT

Month	Classes 1	2
Dec.	3	5
Jan.	5	3
Feb.	3	5
March	5	3
April	3	5
May	5	3

The design shows the classifications of months in which the experiment is to take place as well as how two particular classes would be used. The reason for this design is that the teacher who is considering the experiment has two classes. Obviously it could be done with any number of classes.

If we assume that the differentiation began in December being the first time that five-minute timings were given then we could begin the experiment. In effect the students would alternate from three-minute timings to five-minute timings. The growth during each of these periods would be carefully measured. In order that every possible factor be considered, I am suggesting that the two classes alternate in their efforts.

It is quite possible that the experiment could run in five months instead of six or maybe more months. At any rate, I have suggested that the teacher follow the textbooks strictly until December, at which time she would then begin giving the timings as indicated.

Should this research be started by the teacher, we would need six carefully constructed tests to be used as the criterion. Actually, there would be a test given before and after each month with reference to its specific timings. Perhaps we would need 12 instead of 6 tests. That is a matter that needs further consideration.

Should we establish such an experiment, perhaps you would care to permit us to use some of your material which has both been standardized empirically and by other measures. At any rate, Miss Shelor is interested in your reaction to the experiment. I hope that I have explained it well enough for you to follow.

Very sincerely yours,

Harry Huffman, Professor
Business Education

Response from Lloyd in the Form of Notation on this letter:

Sounds fine. This may be the answer for which I was seeking.

Floyd, Virginia
August 18, 1956

Dr. Alan C. Lloyd
Typewriting Editor
Gregg Publishing Division
McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York 36, New York

Dear Dr. Lloyd:

On July 21, you received a letter from Dr. Harry Huffman regarding an experiment to determine whether three-minute timings are as effective as five-minute timings in the development of basic typewriting skill.

I am a graduate student at Virginia Polytechnic Institute and an seeking a thesis topic. Dr. Huffman also mentioned in his letter that I am contemplating this experiment with two sections of my first year typewriting students during the school session 1955-56.

As I understand it, this topic was discussed by you and Dr. Huffman as one for which there is a definite need. I am very interested in doing my research on a topic which will contribute directly to the business education field.

As I did not have an opportunity to talk with you personally on this topic, there are some phases on which I would like clarification and will greatly appreciate any information which will make my study more meaningful to the greatest number in the field.

I have obtained two of the latest textbooks in the field of psychology which have excellent chapters on the laws of learning pertaining to skill development. This I will include in my chapter on related reading.

On a separate sheet, I am listing some of my interpretations and questions as I review the topic. Any comments will be greatly appreciated.

Sincerely yours,

(Miss) Nola Shelor

Enclosure

Setting for the Study:

This experiment is to be done with first year typewriting students. They are taught in two sections--one in the morning; the other in the afternoon. The students can be interchanged in any way necessary for the study.

The principal of the school has been notified and is very anxious to cooperate as to keeping class interruptions to a minimum.

The teacher has had eight years teaching experience.

Interpretations and Questions:

1. Is the suggested pattern of alternation of classes suitable for a study of this type? Is the month time interval too short?

	Classes	
Month	1	2
Dec.	3 min.	5 min.
Jan.	5 "	3 "
Feb.	3 "	5 "
March	5 "	3 "
April	3 "	5 "
May	5 "	3 "

This is the exact pattern suggested by Dr. Huffman. My school starts August 31 and the first five-minute writing occurs in the first month. I will probably need to alter this to start in October, but it seems that the only essential thing is to have an even number of rotations.

2. Should measurements be taken on GWPM, CWPM, both, or by a point system (possibly a certain number of points for each correct line typed).

3. It seems to me that the study is divided into two distinct parts:
   A. The two different techniques or procedures used within the month.
   B. The measurement of results of both groups at the beginning and ending of each month.

   I would like some pointers on the differentiation of techniques to use within the month.

Even if the timings used within the month are different for each group (three minute and five minute) wouldn't the test material for both groups need to be identical in both content and time to make an accurate measurement?

On the same subject, should the tests remain the same in syllable intensity and difficulty throughout the experiment or should it gradually become more difficult as their skill develops?

4. In a real school situation, absences and class interruptions are certain to occur. For this reason it seems logical that measurement should be stated in per pupil gain rather than on total for the class; or, in processing the data, would it not be well to have two groups of figures:
   A. Include only those present for the entire month.
   B. Include all students.

   In this way it would be possible to determine the difference absences make.

5. Will a random division, say every other one alphabetically, make a satisfactory division?

I realize that possibly this is only a mere beginning of the questions which I will encounter and that there will be many more as the experiment progresses, but I am very anxious to design as complete a pattern as possible before the experiment starts.

I will be very grateful for any criticism or comments you, as a typewriting expert, will make; because I realize that the validity of the experiment will depend upon the procedure used.

Responses from Lloyd in the Form of Notations on Investigator's Letter to Him August 18, 1956

Response to:

Question 1.--Not if you make certain that there is a timed writing every period. I suggest checking your school schedule so that you switch every 15 or 20 periods rather than by the irregular calendar month. Yes, even number of rotations.

Question 2.--Why not have students keep GWPM records, but you keep the others, too; that's what I'd do.

Question 3.--Ending of one is beginning of other, of course. Yes, use a five-minute selection for the test. I'd use our T.A.T. leaflet (I'll provide) and give youngsters two attempts, each on new copy. Tests should be standard difficulty.

Question 4.--I'd bet on class averages (or medians might be better). Or, if you know one class won't get its timed writing, don't give it to the other class either. You'll probably have to keep complete records, then use those data that seem significant.

Question 5.--I'd not divide any class. Switch timed writings by whole class.

Miss Shelor,

I think, myself, that you ought to keep the study as simple as possible, not so much to relieve yourself of work as to eliminate distracting factors whose discussion would encumber the study. You have two classes. You teach them exactly alike except that, whenever the experiment begins, one class takes 5-minute writings instead of 2-, 3-, or 4-minute writings; and the other class takes 3-minute writings instead of 2-, 4-, or 5-minute writings. Every 15 (or 20) class periods you reverse the two groups--the 5-minuters switch to 3's and the 3-minuters switch to 5's. On the 15th period (or 20th) you give a 5-minute writing to both groups, using the same copy; then you study the results to see, switch after switch, whether practicing daily 3-minute

writings helps students (a) more, (b) less, or (c) the same in preparation for a test that is for 5 minutes.

You should use the same preliminary routine on the daily writings--preview the same way, give the same number of attempts. I'd suggest two writings daily, using the same copy for both. For the test copy, I'd use a leaflet like the one I am enclosing; it has two selections each long enough for a 5-minute writing, each on the same vocabulary, and each with equivalent difficulty. I shall be happy to provide you with 10 sets of these, 35 or so to a set, if you wish to have them for this purpose.

In a nutshell, you're trying to find out whether the best way to get a high skill, as measured on a 5-minute timed writing of standard difficulty, is to take a slew of 3-minute practice writings or 5-minute practice writings.

Next question!

(Signed) Alan Lloyd

APPENDIX B

Questionnaire

STUDENT QUESTIONNAIRE

TO THE STUDENT: Now that you have completed rotations on both three- and five-minute writings, will you please give your reactions to the following questions:

A. From your daily record, on which length writing did you find it easier to show progress:

☐ Three-minute ☐ Five-minute

B. On which length writing:

1. Could you concentrate better?

☐ Three-minute ☐ Five-minute

2. Could you show the most interest?

☐ Three-minute ☐ Five-minute

3. Did you tire the least?

☐ Three-minute ☐ Five-minute

4. Did you find it easier to relax?

☐ Three-minute ☐ Five-minute

C. Did the five-minute test at the end of a three-minute rotation tire you more than the daily writings for that rotation?

☐ Yes ☐ No

Why?