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AN EXPLORATORY STUDY ASSESSING THE EFFECTS OF USING THE WORKBOOK DURING HOMEWORK PRACTICE ON STUDENTS' SHORTHAND THEORY KNOWLEDGE

by

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ABSTRACT

In this paper, the researcher has sought to determine if the use of the workbook during shorthand homework practice would result in a significant difference in achievement levels on two intermediate shorthand classes at Montana State University during the 1979 winter quarter.

The subjects of this study were 40 students enrolled in two sections of BUOA 111, Intermediate Shorthand. The two sections were randomly designated as Section I (control) and Section II (experimental). Students in Section I completed their homework using the conventional homework method. Students in Section II completed their homework using the conventional method plus they completed a workbook lesson.

A pre- and posttest consisting of 100 dictated theory words was administered to students in each section. The two-tailed Student "t" test of significant difference at the .05 confidence level was used to analyze data obtained from pre- and posttest mean scores.

It was concluded that regardless of whether the students used the workbook or not during shorthand homework practice, the end result was that both groups were approximately equal in their shorthand theory and transcription knowledge at the end of the study.
CHAPTER I

INTRODUCTION

The importance of practice in skill development cannot be overemphasized. Practice is essential in the acquisition of any perceptual motor skill such as shorthand. Homework as a method of practice has for years been a controversial question in the teaching of shorthand. The kind of homework, amount of homework, and the attitude of the student while doing the homework are some of the factors which determine the effectiveness of the student's homework practice. (Toulouse, 1971:1)

Flood (1951:143,144) states that there are three basic questions in connection with the problem of assigning shorthand homework:

1. To give or not to give homework? Some school administrators do not permit homework assignments in any subject. They feel that unsupervised practice does not always improve skills. On the other hand, it is sometimes difficult to build skill when less than an hour a day is spent at it.

2. How much homework to give? Quantity is also a debatable problem. Homework assignments vary from five to ten pages a day to a specified number of copies of each word, sentence, or page. The student does not benefit from writing a shorthand outline any more than two or three times because after this amount of repetitions his attention shifts, and he goes through the mechanical motions of writing.

3. What kind of homework to give? What to include in the homework assignment is a problem affecting the next day's lesson. An assignment requiring reading of shorthand plates would probably be the most effective and the least detrimental if the student is properly motivated. Students are more apt, however, to prepare the assignments requiring written work to be handed in, and they will do that written requirement first if the assignment consists of both reading and writing.

This study was basically concerned with question three: What kind of homework to give? Specifically, would the use of a workbook in daily
homework assignments result in a significant difference in achievement levels in the students' shorthand theory knowledge.

**Statement of the Problem**

The problem of this study was to determine if using the workbook during shorthand homework practice would result in a statistically significant difference in achievement levels in shorthand theory knowledge on two intermediate shorthand classes at Montana State University during the 1979 winter quarter.

**Need for the Study**

Madsen (1961:392) states that effective homework is the key to a successful shorthand program. He states ten characteristics of a good homework system that he has found to be effective:

1. That it builds upon one's knowledge of shorthand.
2. That it makes an allowance for individual differences.
3. That it provides an opportunity for thought and problem solving.
4. That it directly develops the ability to construct new words and phrases.
5. That it should assist in the development of skills applicable to vocational employment.
6. That it furnishes knowledge of results—the student should discover and correct his own errors.
7. That it provides a basis for additional skill development in the classroom.
8. That it provides a check against forgetting, through constant review of all previous learning.
9. That it provides a means of self-motivation. The student is able to feel that he is working for his self-satisfaction,
not for the teacher's satisfaction.

10. The time necessary for completion of the assignment is within reason—its completion is felt as desirable by the student, not as a daily burden.

It would seem that these ten characteristics should formulate the basis for one standardized homework assignment that could be applied to all shorthand classes to produce the best results from shorthand homework practice on student performance. Experts in the field do not recommend one particular standardized assignment. Toulouse (1971:3) states that "the general lack of research in the area of shorthand homework would seem to dictate that additional research in this area be conducted."

In addition, Zoubek (1961:21) found that during seminars, etc., the topic which was always of interest to shorthand teachers was the subject of shorthand homework: "Teachers wanted to know how much homework to give, what kind of homework to give, what to do with it after students completed it, how could they make homework more interesting, etc."

The workbook accompanying *Gregg Shorthand for Colleges*, the text used by the students in this study, seems to be an excellent study aid for improving shorthand theory knowledge. Perhaps if it could be determined that the workbook is a valuable tool in developing a student's shorthand theory knowledge, it would greatly aid the instructor in determining what kind of homework to assign.

**General Questions to be Answered**

1. Does the use of the workbook exercises significantly improve students' shorthand theory knowledge over conventional homework methods?
2. Does the method of doing homework result in a significant difference in the level of achievement in students' theory knowledge?

General Procedures

The following procedures were used to investigate the problem:

1. The population tested consisted of two intermediate collegiate shorthand classes at Montana State University during the 1979 winter quarter.

2. Each group was taught by the same instructor.

3. A pretest developed by the authors of Gregg Shorthand, Series 90 was given to students in each group. The test consisted of 100 dictated words and covered all theory principles of Gregg Shorthand.

4. Each test was given two scores indicating correctly written shorthand outlines and correctly transcribed words from shorthand outlines.

5. Students in each group were asked to spend at least one hour on homework each night. In-class activities for students in both groups were identical.

6. Students in the experimental group were instructed to read the lesson and make one copy of the shorthand plates. They were also instructed to complete the workbook lesson that corresponds to each textbook lesson. The students were then asked to read the lesson until the completion of the hour.

7. The students in the control group were instructed to read each lesson and make two copies of each shorthand letter. They were then asked to read the lesson until the completion of the hour.

8. At the end of the quarter students in each group were administered a posttest consisting of the same 100 dictated theory words given as the pretest.

Delimitations

1. The population for this study was limited to two winter quarter intermediate level shorthand classes at Montana State University.
2. This study was concerned only with the effect of homework and did not attempt to assess the effects of other variables on performance.

3. The study was concerned with the measurement of students' shorthand theory achievement only. It was not concerned with any other aspect of shorthand skill development.

**Definition of Terms**

The following terms are defined by the researcher for the purposes of clarity and understanding. They are not necessarily standard definitions in the field.

- **Intermediate Shorthand Class**: Students in an intermediate shorthand class have had one quarter of beginning shorthand and are now at the next level.
- **Shorthand Theory**: The principles governing the formation of shorthand outlines.
- **Shorthand Workbook**: Exercises correlating with the shorthand textbook requiring students to form shorthand outlines, transcribe shorthand sentences, and apply proper rules of punctuation and spelling.
- **Dictate**: To say or read aloud for recording or transcription.
- **Transcribe**: To produce a typewritten copy of material that has been dictated.

**Conventional Homework Method**: Shorthand homework usually consisting of some or all of the following activities: reading the shorthand word lists containing examples of new principles, reading the shorthand letters, copying the words in the word lists, and copying the shorthand letters.
CHAPTER II
REVIEW OF LITERATURE

Introduction

The purpose of this chapter is to present a current review of literature on the subject of homework practice and its relationship to shorthand skill development.

The chapter is organized as follows:

1. A History of Shorthand
2. Reasons for Acquiring a Shorthand Skill
3. The Necessity for Practice in Skill Development
4. Homework as Practice
5. Types of Homework in Shorthand

A History of Shorthand

Shorthand is defined as "the art of writing words and sentences in brief symbols." (Russon, 1968:1) It had its origins in ancient Greece with Zenophon, who used a shorthand system to record Socrates' memoirs. Shorthand did not become generally used, however, until the days of the Roman Empire. The first Latin shorthand system was invented by Marcus Tiro, who was Cicero's secretary. Tiro's system was "cursive" (a shortened longhand) and he also wrote a shorthand dictionary.

Tiro's shorthand lasted about a thousand years and influenced Tomothe Bright, who designed an English system in 1588. The father of modern shorthand is considered to be John Willis. He invented a geometrical system and designed a complete shorthand alphabet. In 1600 he published a book, Art of Stenography.

Samuel Taylor then invented a system which lasted almost a century and formed the backbone of many present methods. His system was called the
"Universal System of Stenography or Short Hand Writing." (Russon, 1968:1) His shorthand was a great improvement over any other system up to that time and was adapted to many languages.

Up to this point the shorthand systems in use had a geometrical basis, which required a high standard of education and long training to learn. Franz Gabelsberger, a German, invented a simpler system which went back to the cursive method. He is believed to be the "greatest inventor of shorthand." (Russon, 1968:2)

In 1837 Englishman Isaac Pitman invented a system of shorthand that until the 1920's was taught in most American schools. It is still used by more people in English-speaking countries than any other system. At the present time, Pitman is the only system taught in Philadelphia and is very prominent in New York. (Forkner, 1976:95) It is based on the circle and uses light and dark lines to represent certain phonetic sounds.

An Irishman in his late teens, John Robert Gregg, invented a shorthand system that was ultimately going to be one of the most popular and widely-used systems ever developed. The Gregg system is a cursive system of curve-motion shorthand with circles, hooks, and loops. Gregg introduced it to the United States in 1893 and it immediately began to spread and experience great expansion. (Forkner, 1976:96) This was due in part to the establishment of the Gregg school in Chicago, continuous speed-test winnings by Gregg writers, and the publication of Business Education World. The success of Gregg Shorthand can also be traced to its willingness to revise its system based on research and demand. (Forkner, 1976:98)

Between 1900 and 1920 machine shorthand or Stenotype was developed.
This system has recently grown tremendously due in part to its success in the courtroom and is presently being taught in many high schools, colleges, and business schools.

After 1925 such shorthand systems as Thomas, Dewey, and Speedwriting were developed. However, these systems failed to gain any significant acceptance.

Many shorthand systems have been developed since 1950. Among them—Stenoscript, Forkner, Briefhand, Gregg Notetand, Landmark, Quickhand, and most recently, Century 21.

Students in this study will be using Gregg Shorthand as this system is currently being taught at Montana State University.

Reasons for Acquiring a Shorthand Skill

In the 1950's machines for recording dictation began to gain in popularity, and with this development came manufacturers' predictions that dictating machines would bring about the demise of shorthand as a skill and job requirement. However, these predictions did not come about, and "once these same manufacturers recognized that shorthand was still very much with us and in fact provided a very lucrative, untapped market for hardware, they began to develop and promote electronic laboratories for teaching shorthand." (Hess, 1976:10)

During the 1970's the concept of word processing, an approach which combines the use of dictation equipment and magnetic typewriters, began to emerge on the office scene. Word processing is a means of increasing office production in the area of written communications, and once again
manufacturers are predicting that word processing will bring about an end to the shorthand skill job requirement.

Currently, 10 percent of all companies in the United States use word processing equipment. (Anderson, 1976:18) Small business and service organizations will not install word processing equipment due to the fact that the equipment is expensive and these firms do not generate a heavy volume of written communication. However, their communications must be handled in some way and, "the secretary in the environment who can take dictation is therefore a valuable asset." (Anderson, 1976:18)

Within the large corporations today that do utilize word processing equipment many top executives still insist on having a private secretary who can take dictation in shorthand. (Anderson, 1976:18) For secretaries in the word processing center, where shorthand is not a job requirement, shorthand would definitely be an asset enabling the secretary to save time and to be more productive. For example, recording important phone calls where the exact wording is essential, and recording directions quickly and accurately are possible if the secretary utilizes a shorthand skill.

Shorthand lends itself to a variety of other applications in the office situation. For example, the recording of minutes at important meetings and conferences can be accomplished more effectively with shorthand than if the secretary were to listen to a tape recording of the meeting. As Hess (1976:11) points out, executive secretaries are responsible for gathering and organizing data to be used by executives in preparing reports
Shorthand is invaluable in speeding up this data collection process. The secretary who desires a promotion or wishes to change jobs might find doors closed to her if she does not possess a shorthand skill. In an independent study of office requirements in Portland in 1975, Robertson found that over 50 percent of the large companies in the area offered more opportunities for advancement to employees with shorthand skills. He also concluded that beginning secretarial and clerical employees with these skills earn higher salaries. (1975:19)

Conley, in a 1972 survey intended as a guidance aid for curriculum planning for training programs in the San Francisco Bay area, interviewed 8,128 employees. Conley found that 64.2 percent of the jobs required shorthand and 10.5 percent required both shorthand and machine transcription for a total of 74.7 percent requiring shorthand. (21) He concluded that the "use of shorthand as a dictation recording medium is still overwhelmingly favored over mechanical devices, and there is no real indication that shorthand is on the decline. (1972:22)

Mitchell and Olson compared the utilization of shorthand and machine transcription in 339 selected firms in the Minneapolis-St. Paul area in 1969. They found that 73 percent of the firms responding employed shorthand writers, while 10 percent employed dictation machine operators only. Of those firms employing 500 or more individuals, 95 percent employed shorthand writers and 5 percent employed dictation machine operators only. (6)

In a 1971 survey of employment agencies in Missouri, Bryce asked, "Do good secretarial/stenographic positions require shorthand?"
Seventy percent of the agencies responded "Yes, usually." and 30 percent responded "Yes, always." (178)

These studies clearly indicate that shorthand is a skill currently in demand by employers in a wide variety of geographical areas. It would seem that more opportunities in the form of jobs and earning power are available to persons with a shorthand skill. It also seems evident that the use of shorthand as a dictation recording medium is favored over mechanical devices. In reality then "the trend is not away from shorthand, but rather toward the use of both shorthand and machine transcription skills." (Hess, 1976:11)

The Necessity for Practice in Skill Development

Any objective study of the problems and issues involved in the teaching of a skill subject such as shorthand requires a review of the related psychological principles which deal with motor learning.

Oxendine defines learning as "the process by which behavior is developed or altered through practice and experience." (1968:7)

Motor learning, which is within the overall definition of learning, refers to types of behavioral change which involve bodily movement. The acquisition of motor skills is dependent upon practice and exposure to the activity and the coordination of muscular responses. (Oxendine, 1968:8)

In 1976, Reese and Smith (1) in their study, "Shorthand A Textbook Analysis," had the following to say about learning shorthand:

The study of shorthand consists of a complex mix of learning behaviors including cognitive, affective, and psychomotor.
As a verbal or language skill, shorthand has many of the same properties and problems that are inherent in the learning of any language. As a motor skill, shorthand shares many of the features of learning cursive writing; mental and physical coordination are necessary for success in each.

In some respects the study of shorthand is even more complex than the study of language or cursive writing, however, because the written responses (signs) are made to oral stimuli; and the speed of response to discriminated sound perceptions is a critical element in the efficient performance of the shorthand writer. (1976:1)

Flood specifies that the processes involved in taking one sentence such as, "I will go to town" from dictation includes such learning activities as:

. . . the memorization of symbols for sounds, visual acuity in noticing fine details in the outlines for individual words, audio alertness and automatic reaction in reproducing the symbols in different combinations upon hearing the sounds, kinesthetic control so that the symbols will assume correct proportions and so that there will be rapid and fluent movement of the pen in reproducing the symbols, application of phrasing combinations and knowledge of the shorthand principles. (1951:5)

As a result of this complex mix of learning characteristics involved in the skill of taking dictation, shorthand teachers are constantly looking for ways to simplify and make more efficient the shorthand learning activities.

One learning activity that is vital to the development of a motor skill is practice. Oxendine (1968:23) states that, "the old adage 'Practice makes perfect' accurately emphasizes the need for practice in learning . . . most learning theorists give considerable attention to the matters of desirable practice schedules, the organization and conduct of practices, and, in general, the role of practice in learning."
There are two types of practice in skill development—massed and spaced (distributed) practice.

Massed practices are those which have little or no rest (or alternate activity) between the beginning and the completion of practice on the activity. Distributed practices are those in which work periods are spread out or separated by either rest or some activity which is different from the one being practiced. (Oxendine, 1968:206)

Oxendine further states that distributed practices are generally more efficient for learning than massed practices. (1968:213)

Reese and Smith regard practice as vitally important in the development of a shorthand skill. They identify eight conditions that have been recognized by experimental and educational psychologists as vital conditions for effective learning to occur. Two of the eight deal with practice in shorthand skill development:

1. Practice materials and procedures should be goal-centered and success oriented.

2. Repetition is an essential condition for learning a skill that is semiautomatic and to be long retained. (1976:8)

In conclusion, Reese and Smith state that "a shorthand learner does not learn what he/she does not practice." (1976:8)

**Homework as Practice**

Practice, therefore, is necessary if a student is to progress in building shorthand skill. In-class practice is regarded as the best type of practice for the shorthand student because the teacher is present to supervise it. However, additional practice time is required if the student is to progress in skill development. This additional practice
time most often takes the form of a required homework assignment for the shorthand student.

"Homework plays a vital part in the ultimate shorthand skill that the student will acquire." (Leslie, 1973:13) During homework practice the student is unsupervised and "it is not unusual for a student to do his shorthand homework without deriving much benefit from the time devoted to this practice." (Anderson, 1972:105) Leslie (1973:13) further states:

It is important, therefore, that the student be provided with the proper material on which to practice and that he be taught how to practice efficiently so as to derive the maximum benefit from the time he invests in practice.

Flood (1951:144) states the following regarding shorthand homework practice:

The assignment for homework should make a direct contribution to the class work for the following day.

. . . (The teacher must) be specific in making homework assignments. Give definite instructions regarding the type of practice. . . Let the students know why you wish them to practice in a certain way; they will practice more intelligently, and knowing how that part of the assignment will affect the next day's class work will help to motivate their study.

Types of Homework in Shorthand

There are a variety of homework assignments that can be given to shorthand students. The introduction of shorthand laboratory equipment, tapes, and records has further added to the number of ways a student can practice his/her shorthand skill.

The traditional homework plan, as stated in the Instructor's Manual for Gregg Shorthand for Colleges, consists of reading the shorthand
outlines in the word lists at the beginning of each lesson and then making two copies of each shorthand word in the shorthand notebook. The student would then be instructed to read the Reading and Writing Practice in the lesson and make one copy of it in the shorthand notebook. The authors also recommend assigning the corresponding lesson in the workbook.

The student might also be required to write the shorthand outlines from the student's transcript instead of copying the shorthand from the textbook shorthand plates.

Most publishers of shorthand instructional materials include a workbook that can be used to supplement homework practice. The workbook usually consists of exercises correlated with the textbook requiring the students to form shorthand outlines, transcribe shorthand sentences, and apply proper rules of punctuation and spelling.

Another method of shorthand homework achieving some degree of popularity now is requiring the student to do his homework by writing from sound. Thus students complete their homework assignments by taking dictation from tapes or records.

Programmed materials are also available for homework practice. These materials allow the student to progress at his/her individual speed.

There are also many variations and combinations of the above methods which could be utilized when assigning shorthand homework.
CHAPTER III
PROCEDURES

The primary purpose of this study was to determine if using the workbook during shorthand homework practice would result in a statistically significant difference in achievement levels in students' shorthand theory knowledge.

The purposes of this chapter are: (a) to describe the population, (b) to describe the procedure, (c) to explain the method of collecting the data, (d) to explain the method of organizing the data, (e) to state the statistical hypotheses, and (f) to describe the method of analyzing the data.

Population

The subjects of this study were 40 students enrolled in BUOA 111, Intermediate Shorthand, at Montana State University during the 1979 winter quarter. The students in each class were those students who registered for the class during the registration period. No attempt was made to rearrange the students in any way.

Procedure

Section I and Section II of BUOA 111 were used for the study. Students in Section I were designated the control group. Students in Section II were designated the experimental group. The students were not told that they were participating in a research study.

In an effort to control an error that could be made due to certain variables, both sections were scheduled in the morning, in the same
shorthand classroom, and taught by one instructor, Mrs. Betty Taylor, a member of the Business, Office, and Distributive Education Department at Montana State University.

Students in both groups were given a pretest. All students were asked to spend one hour each night on homework. In addition, the students in Section I (control) were instructed to do the following homework assignment each night:

1. Read the lesson.
2. Copy the words in the word lists at the beginning of each lesson once.
3. Copy the letters in each lesson twice.
4. Re-read the lesson until the completion of the hour.

The students in Section II (experimental) were given the following homework assignment:

1. Read the lesson.
2. Copy the words in the word lists at the beginning of each lesson once.
3. Copy the letters in each lesson once.
4. Complete the workbook corresponding to each lesson.
5. Re-read the lesson until the completion of the hour.

At the end of the quarter students in each group were administered a posttest.

Method of Collecting The Data

The students in each section were administered a pretest and posttest consisting of 100 dictated theory words. The tests were given by
the instructor of the classes, an experienced shorthand teacher.

The pretest and posttest consisted of the same 100 dictated theory words. The test was developed by the authors of *Gregg Short-hand, Series 90*. The test was used extensively by the authors in research studies throughout the United States.

Each theory word on the test was dictated twice with a six-second pause between each item. The students were instructed to write the shorthand for each word and after the test was completely dictated, to transcribe each shorthand outline.

Each test was given two scores. One score indicated the number of correctly written shorthand outlines; the other score indicated the number of outlines correctly transcribed.

**Method of Organizing the Data**

Data gathered in this study was organized on tables: (1) the mean scores of the shorthand outlines and transcription accuracy on the pretest and posttest, and (2) the "t" calculated and table values of "t". The tables were designed in consultation with Dr. Edward Ray Ladd of the Marketing and Management Department at Montana State University.

**Mean Scores**

<table>
<thead>
<tr>
<th></th>
<th>Pretest</th>
<th>Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section I</td>
<td>Mean Score</td>
<td>Mean Score</td>
</tr>
</tbody>
</table>
"t" Analysis

Statistical Hypotheses

The specific hypotheses to be tested follow. If:

- \( H_0 \) = Null Hypothesis
- \( H_A \) = Alternate Hypothesis
- \( M \) = Mean
- \( A \) = After Treatment
- \( B \) = Before Treatment
- \( S \) = Shorthand Theory Part
- \( T \) = Transcription Part

1. There is no significant difference between the mean scores on the shorthand theory part of the pretest given to students in Section I and the mean scores on the shorthand theory part of the posttest given to students in Section I.
   \[ H_0 : M_{ISA} = M_{ISB} \quad H_A : M_{ISA} \neq M_{ISB} \]

2. There is no significant difference between the mean scores on the shorthand theory part of the pretest given to students in Section II and the mean scores on the shorthand theory part of the posttest given to students in Section II.
   \[ H_0 : M_{IISA} = M_{IISB} \quad H_A : M_{IISA} \neq M_{IISB} \]

3. There is no significant difference between the mean scores on the shorthand theory part of the pretest given to students in Section I and the mean scores on the shorthand theory part of the pretest given to students in Section II.
   \[ H_0 : M_{ISB} = M_{IISB} \quad H_A : M_{ISB} \neq M_{IISB} \]

4. There is no significant difference between the mean scores on the shorthand theory part of the posttest given to students in Section I and the mean scores on the shorthand theory part of the posttest given to students in Section II.
   \[ H_0 : M_{ISA} = M_{IISA} \quad H_A : M_{ISA} \neq M_{IISA} \]
given to students in Section II.

$$H_0: \mu_{ISA} = \mu_{IISA} \quad H_A: \mu_{ISA} \neq \mu_{IISA}$$

5. There is no significant difference between the mean scores on the transcription part of the pretest given to students in Section I and the mean scores on the transcription part of the posttest given to students in Section I.

$$H_0: \mu_{ITB} = \mu_{ITA} \quad H_A: \mu_{ITB} \neq \mu_{ITA}$$

6. There is no significant difference between the mean scores on the transcription part of the pretest given to students in Section II and the mean scores on the transcription part of the posttest given to students in Section II.

$$H_0: \mu_{IITB} = \mu_{IITA} \quad H_A: \mu_{IITB} \neq \mu_{IITA}$$

7. There is no significant difference between the mean scores on the transcription part of the pretest given to students in Section I and the mean scores on the transcription part of the pretest given to students in Section II.

$$H_0: \mu_{ITB} = \mu_{IITB} \quad H_A: \mu_{ITB} \neq \mu_{IITB}$$

8. There is no significant difference between the mean scores on the transcription part of the posttest given to students in Section I and the mean scores on the transcription part of the posttest given to students in Section II.

$$H_0: \mu_{ITA} = \mu_{IITA} \quad H_A: \mu_{ITA} \neq \mu_{IITA}$$

**Method of Analyzing the Data**

The primary purpose of this study was to determine if using the workbook during shorthand homework practice resulted in a statistically significant difference in achievement levels on students' shorthand theory knowledge. The most appropriate statistical method for an analysis of data obtained from pretest and posttest scores was the two-tailed Student "t" test of significant difference.
The Student "t" test has many characteristics including the following which apply to this study:

1. In a simple randomized experiment involving only two treatments, the "t" test can be employed to test the null hypothesis concerning the treatment population means. (Lindquist, 1953:48)

2. The "t" test is a standard score for distributions of differences between means for small samples. (Peatman, 1947:397)

3. The "t" test is an assumption that the distribution of the populations from which the samples were drawn are normal and that the standard deviations are equal. (Turney, 1968:98)

The Student "t" test is a test of significance. For the "t" value to be significant, the computed value of "t" must be greater than the tabulated value of "t" to reject the null hypothesis. If the computed value of "t" is less than or equal to the tabulated value of "t," the null hypothesis would be accepted and the difference between the groups would not be significant.

In this study scores obtained on the pretests and posttests of both groups were compared using the Student "t" test of significant difference at the .05 confidence level. All calculations were performed on a calculator using a pre-programmed method. The following method of calculating the value of "t" was used:

\[
t = \frac{\bar{X}_A - \bar{X}_B}{\sqrt{\frac{(n_A - 1) S_A^2 + (n_B - 1) S_B^2}{n_A + n_B - 2} \cdot \frac{1}{n_A} + \frac{1}{n_B}}}
\]
where:

\( \bar{X}_A \) = Mean of Section I before the treatment

\( \bar{X}_B \) = Mean of Section II after the treatment

\( S \) = Sample standard deviation

\( n \) = Sample size

\( n_A \) = Section I before the treatment

\( n_B \) = Section II after the treatment
CHAPTER IV
RESEARCH FINDINGS

This chapter was prepared to present and analyze the results of the pretest and posttest scores of the students who participated in this study.

It is the purpose of this chapter to illustrate the data collected in such a manner as to allow for the arrival of conclusions to confirm or reject the null hypotheses proposed in Chapter III.

The purpose of this study was to determine if using the workbook during shorthand homework practice resulted in a statistically significant difference in achievement levels in students' shorthand theory knowledge.

Scores obtained on the pretests and posttests of both groups were compared using the Student "t" test of significant difference at the .05 confidence level. For the "t" value to have been significant, the computed value of "t" would have to have been greater than the tabulated value of "t" to reject the null hypothesis.

The results indicated that the mean posttest scores of the students in Section II who used the workbook during homework practice were higher than the mean scores of the Students in Section I who did not use the workbook. However, the differences in the mean scores were so small, that they were not statistically significant.
Statistical Hypotheses

Following are the results of the calculations for each hypothesis stated in Chapter III.

Hypothesis: There is no significant difference between the mean scores on the shorthand theory part of the pretest given to students in Section I and the mean scores on the shorthand theory part of the posttest given to students in Section I.

<table>
<thead>
<tr>
<th>TABLE I</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Scores</td>
</tr>
<tr>
<td>Pretest</td>
</tr>
<tr>
<td>Section I Shorthand Theory</td>
</tr>
<tr>
<td>N = 16</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TABLE II</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;t&quot; Analysis</td>
</tr>
<tr>
<td>df = 30</td>
</tr>
<tr>
<td>L = .05</td>
</tr>
<tr>
<td>Table &quot;t&quot;</td>
</tr>
<tr>
<td>Section I Shorthand Theory</td>
</tr>
</tbody>
</table>

Analysis: There was a statistically significant difference between the mean scores on the shorthand theory part of the pretest given to students in Section I and the mean scores on the shorthand theory part of the posttest given to students in Section I.

The mean scores on the shorthand theory part of the posttest given to students in Section I were significantly higher than the mean scores.
on the shorthand theory part of the pretest given to students in Section I resulting in a rejection of the null hypothesis. Therefore, as indicated by the posttest scores of this test, at the end of the quarter the shorthand theory knowledge of the students in Section I had significantly improved.
Hypothesis: There is no significant difference between the mean scores on the shorthand theory part of the pretest given to students in Section II and the mean scores on the shorthand theory part of the posttest given to students in Section II.

TABLE III

<table>
<thead>
<tr>
<th></th>
<th>Pretest</th>
<th>Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Section II</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Shorthand</strong></td>
<td>44.17</td>
<td>85.17</td>
</tr>
<tr>
<td><strong>Theory</strong></td>
<td>N = 24</td>
<td>N = 24</td>
</tr>
</tbody>
</table>

TABLE IV

<table>
<thead>
<tr>
<th></th>
<th>Table &quot;t&quot;</th>
<th>Calculated &quot;t&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Section II</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Shorthand</strong></td>
<td>1.68</td>
<td>9.05</td>
</tr>
<tr>
<td><strong>Theory</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Analysis: There was a statistically significant difference between the mean scores on the shorthand theory part of the pretest given to students in Section II and the mean scores on the shorthand theory part of the posttest given to students in Section II.

The mean scores on the shorthand theory part of the posttest given to students in Section II were significantly higher than the mean scores on the shorthand theory part of the pretest given to students in Section II resulting in a rejection of the null hypothesis.

Therefore, the shorthand theory knowledge of the students in Section II significantly improved since the beginning of the quarter as indicated by the higher posttest scores.
Hypothesis: There is no significant difference between the mean scores on the shorthand theory part of the pretest given to students in Section I and the mean scores on the shorthand theory part of the pretest given to students in Section II.

<table>
<thead>
<tr>
<th>TABLE V</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mean Scores</strong></td>
</tr>
<tr>
<td><strong>Section I</strong></td>
</tr>
<tr>
<td>Pretest Shorthand Theory</td>
</tr>
<tr>
<td>( N = 16 )</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TABLE VI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>&quot;t&quot; Analysis</strong></td>
</tr>
<tr>
<td>( \frac{\text{df}}{df} = 38 )</td>
</tr>
<tr>
<td>( \alpha = .05 )</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Table &quot;t&quot;</strong></th>
<th><strong>Calculated &quot;t&quot;</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest Shorthand Theory</td>
<td>1.68</td>
</tr>
</tbody>
</table>

Analysis: There was not a significant difference between the mean scores on the shorthand theory part of the pretest given to students in Section I and the mean scores on the shorthand theory part of the pretest given to students in Section II.

The mean scores on the shorthand theory part of the pretest given to students in Section I were slightly higher than the mean scores of the pretest given to students in Section II. The difference was so small, however, that it was not statistically significant and resulted in an acceptance of the null hypothesis.

Students in both groups, therefore, were approximately equal in their shorthand theory knowledge at the beginning of this study.
Hypothesis: There is no significant difference between the mean scores on the shorthand theory part of the posttest given to students in Section I and the mean scores on the shorthand theory part of the posttest given to students in Section II.

TABLE VII

Mean Scores

<table>
<thead>
<tr>
<th></th>
<th>Section I</th>
<th>Section II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Posttest</td>
<td>81.31</td>
<td>85.17</td>
</tr>
<tr>
<td>Shorthand</td>
<td>N = 16</td>
<td>N = 24</td>
</tr>
<tr>
<td>Theory</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TABLE VIII

"t" Analysis

<table>
<thead>
<tr>
<th></th>
<th>Table &quot;t&quot;</th>
<th>Calculated &quot;t&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Posttest</td>
<td>1.68</td>
<td>0.98</td>
</tr>
<tr>
<td>Shorthand</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Theory</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Analysis: There was not a significant difference in the mean scores on the shorthand theory part of the posttest given to students in Section I and the mean scores on the shorthand theory part of the posttest given to students in Section II.

The mean scores on the shorthand theory part of the posttest given to the Section II students, who used the workbook during homework practice, were higher than the mean scores on the shorthand theory part of the posttest given to students in Section I who did not use the workbook. However, the difference was not large enough to be statistically significant. This resulted in an acceptance of the null hypothesis.
It is interesting to note that at the beginning of the quarter the students in Section I had higher mean scores on the shorthand theory part of the pretest (as indicated in Table V). However, at the end of the quarter the students who used the workbook in Section II had higher scores on the shorthand theory part of the posttest (Table VIII).

It would seem, therefore, that the students who used the workbook during homework practice had a greater improvement in their shorthand theory knowledge than the students in Section I who did not use the workbook.
Hypothesis: There is no significant difference between the mean scores on the transcription part of the pretest given to students in Section I and the mean scores on the transcription part of the posttest given to students in Section I.

TABLE IX
Mean Scores

<table>
<thead>
<tr>
<th>Pretest</th>
<th>Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section I Transcription</td>
<td>69.75</td>
</tr>
<tr>
<td>N = 16</td>
<td>N = 16</td>
</tr>
</tbody>
</table>

TABLE X
"t" Analysis

| Analysis: There was a significant difference between the mean scores on the transcription part of the pretest given to students in Section I and the mean scores on the transcription part of the posttest given to students in Section I.  
The mean scores on the transcription part of the posttest given to students in Section I were significantly higher than the mean scores on the transcription part of the pretest given to the students in Section I. This resulted in a rejection of the null hypothesis. Thus, Section I students' transcription ability on a theory test of this type significantly improved over the quarter as indicated by the higher posttest scores. |

"t" Calculated "t"

| Section I Transcription | 1.70  | 4.34  |
| df = 30  | L = .05 |
| Table "t" Calculated "t" |   |   |
Hypothesis: There is no significant difference between the mean scores on the transcription part of the pretest given to students in Section II and the mean scores on the transcription part of the posttest given to students in Section II.

<table>
<thead>
<tr>
<th>Table XI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Scores</td>
</tr>
<tr>
<td>Pretest</td>
</tr>
<tr>
<td>Section II</td>
</tr>
<tr>
<td>Transcription</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table XII</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;t&quot; Analysis</td>
</tr>
<tr>
<td>df = 46</td>
</tr>
<tr>
<td>( \alpha = .05 )</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table &quot;t&quot; Calculated &quot;t&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section II Transcription</td>
</tr>
</tbody>
</table>

Analysis: There was a significant difference between the mean scores on the transcription part of the pretest given to students in Section II and the mean scores on the transcription part of the posttest given to students in Section II.

The mean scores on the transcription part of the posttest given to students in Section II were significantly higher than the mean scores on the transcription part of the pretest given to students in Section II, resulting in a rejection of the null hypothesis. The Section II students' transcription ability on a theory test of this type significantly improved since the beginning of the quarter as indicated by the significantly higher posttest scores.
Hypothesis: There is no significant difference between the mean scores on the transcription part of the pretest given to students in Section I and the mean scores on the transcription part of the pretest given to students in Section II.

TABLE XIII
Mean Scores

<table>
<thead>
<tr>
<th></th>
<th>Section I</th>
<th>Section II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prestest</td>
<td>69.75</td>
<td>71.75</td>
</tr>
<tr>
<td>Trancription</td>
<td>N = 16</td>
<td>N = 24</td>
</tr>
</tbody>
</table>

TABLE IVX
"t" Analysis

<table>
<thead>
<tr>
<th></th>
<th>df = 38</th>
<th>( \alpha = .05 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table &quot;t&quot;</td>
<td>Calculated &quot;t&quot;</td>
<td></td>
</tr>
<tr>
<td>Pretest</td>
<td>1.68</td>
<td>0.33</td>
</tr>
</tbody>
</table>

Analysis: There was no significant difference between the mean scores on the transcription part of the pretest given to students in Section I and the mean scores on the transcription part of the pretest given to students in Section II.

The mean scores on the transcription part of the pretest given to students in Section II were higher than the mean scores on the transcription part of the pretest given to students in Section I. However, there was not enough of a difference to be statistically significant. Students in both groups, therefore, were approximately equal in their transcription ability on a theory test of this type at the beginning of this study.
Hypothesis: There is no significant difference between the mean scores on the transcription part of the posttest given to students in Section I and the mean scores on the transcription part of the posttest given to students in Section II.

TABLE XV

<table>
<thead>
<tr>
<th></th>
<th>Section I</th>
<th>Section II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Posttest Tran-</td>
<td>93.56</td>
<td>96.33</td>
</tr>
<tr>
<td>scription</td>
<td>N = 16</td>
<td>N = 24</td>
</tr>
</tbody>
</table>

TABLE XVI

<table>
<thead>
<tr>
<th></th>
<th>Table &quot;t&quot;</th>
<th>Calculated &quot;t&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Posttest Tran-</td>
<td>1.68</td>
<td>1.13</td>
</tr>
<tr>
<td>scription</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Analysis: There was no significant difference between the mean scores on the transcription part of the posttest given to students in Section I and the mean scores on the transcription part of the posttest given to students in Section II.

The mean scores on the transcription part of the posttest given to students who used the workbook in Section II were higher than the mean scores on the transcription part of the posttest given to the students in Section I. This would indicate that the use of the workbook might have aided the students' transcription ability on a test of this type. However, the difference was not great enough to be statistically significant. This resulted in an acceptance of the null hypothesis.
Other Findings

The instructor of the classes reported several other significant findings regarding the use of the workbook during homework practice. The students preferred using the workbook during homework over the traditional method. It would seem that the workbook provided a variety of activity during homework. Students in Section II preferred this variety over the repetitive copying of shorthand plates, which they found monotonous. It seems that a combination of using the workbook and copying the letters from the shorthand plates would be a more beneficial homework assignment.

The instructor also reported that the students in Section II showed a significant improvement in their punctuation ability. She found that the students in Section II were better able to apply the proper rules of punctuation than the students in Section I. The Section II students themselves also reported to the instructor that they felt the use of the workbook helped them to understand and apply the proper punctuation rules.

And, finally, the students in Section II seemed to have better spelling ability than the Section I students. The workbook stresses the spelling of commonly used business words, and the students in Section II apparently benefited from this daily drill.

Summary

Regardless of whether the students used the workbook or not during homework practice the end result was that both groups were approximately equal in their shorthand theory and transcription knowledge at the end
of this study. The posttest mean scores of the students who used the workbook in Section II were higher, however, than the posttest mean scores of the students in Section I who did not use the workbook during homework practice. However, the differences were not statistically significant at the .05 confidence level. Thus, the null hypotheses were accepted for this particular aspect of the study.

Students in both groups were approximately equal in their shorthand theory knowledge at the beginning of this study as indicated by their mean scores on the pretest given at the beginning of the quarter. It is interesting to note that at the beginning of the quarter the students in Section I (control) had higher mean scores on the shorthand theory part of the pretest than the students in Section II (experimental). However, at the end of the quarter it was the students in Section II, who used the workbook, who had higher scores on the shorthand theory part of the posttest.

The students within each group did show statistically significant improvement at the end of the quarter in both their shorthand theory and transcription knowledge as indicated by their much higher posttest scores.

Conclusion

It can be concluded from this analysis of data that using the workbook during shorthand homework practice, as compared to the traditional method of doing homework, does not result in a significant improvement in achievement levels on students' shorthand theory knowledge or their
transcription ability on a test of this type. Although the posttest mean scores of the students using the workbook were higher than the posttest mean scores of the students who did not use the workbook, the difference in scores was not great enough to be statistically significant.
CHAPTER V
SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Homework has been an extremely controversial question in the teaching of shorthand. Should homework be assigned? How much homework should be assigned? What kind of homework should be assigned? These are all questions that have concerned shorthand teachers for years.

At this time there is no standardized homework assignment that is recognized as being most beneficial to students' shorthand development. Perhaps this is due to the general lack of research done on the subject.

The problem of this study was to determine if using the workbook during homework practice would result in a significant difference in achievement levels on two intermediate shorthand classes at Montana State University during the 1979 winter quarter.

Both groups, the control and the experimental, were each instructed to spend one hour each night on shorthand homework. The control group read the lesson, copied the shorthand plates, and read the lesson again. The experimental group read the lesson, copied the shorthand plates, and completed the workbook that accompanies each lesson. Both groups were administered a pretest and posttest developed by the Research Department of the Gregg Division of the McGraw-Hill Book Company, publishers of the shorthand text used by the students in this study. The test consisted of 100 dictated shorthand theory words covering all the principles of
Gregg Shorthand.

This study was concerned with the measurement of students' shorthand theory achievement and transcription ability on a theory test only and was not concerned with the measurement of any other aspect of shorthand skill development.

Some type of shorthand system has been in use since ancient Greece. In recent history many systems have been developed with some achieving more success and acceptance than others. Students in this study used the shorthand system developed by John Robert Gregg and known as Gregg Shorthand. It is the most popular and widely used shorthand system in the United States today and is currently the only shorthand system taught at Montana State University.

Recently studies have been conducted and surveys taken to determine if shorthand is still in demand and sought after by business firms. Results from studies conducted over a wide geographical area indicate that employers seeking qualified stenographers and secretaries still require that applicants have good shorthand skills for most job openings. Secretaries with shorthand skills find more opportunity for advancement and, in addition, there seems to be definite values to a beginning worker in knowing shorthand. In today's automated office a person possessing a combination of good shorthand and machine transcription skills is very much in demand. (Hess, 1976:11) (Robertson, 1975:19)

Shorthand is a motor skill, and one of the most beneficial ways of acquiring expertise in motor skills is practice. Distributed practice,
where the practice periods are separated by periods of rest or alternate activity, is generally regarded as more beneficial than massed practice. A teacher of a skill subject such as shorthand must be familiar with the various psychological principles that relate to learning a motor skill so that these principles can be adapted to his/her shorthand instruction.

In-class practice alone is not sufficient for the development of a shorthand skill. Some form of out-of-class practice must be utilized. Therefore, most shorthand teachers assign some form of shorthand homework to their students. This homework should make a direct contribution to the class work for the following day.

Homework assignments vary but generally consist of one, or a combination of, the following: reading and copying the shorthand from the shorthand textbook; writing shorthand from the student's transcript; utilizing multiple channel equipment, tapes or records; utilizing programmed materials; and completing the workbook that accompanies the shorthand textbook lesson.

The subjects of this study were 40 students enrolled in two sections of BUOA 111, Intermediate Shorthand, at Montana State University during the 1979 winter quarter. The primary purpose of this study was to determine if using the workbook during shorthand homework practice would result in a statistically significant difference in achievement levels on the BUOA 111 students' shorthand theory knowledge.

The two sections were randomly designated as Section I (control) and
Section II (experimental). Students in Section I completed their homework using the conventional homework method. Students in Section II completed their homework using the conventional method plus they completed a workbook lesson.

Students in each section were administered a pre- and posttest consisting of 100 dictated theory words. Data gathered from the pretests and posttests were organized on tables. The two-tailed Student "t" test of significant difference at the .05 confidence level was used to analyze data obtained from pretest and posttest scores. Calculations were performed on a calculator using a pre-programmed method.

Regardless of whether the students used the workbook or not during shorthand homework practice, the end result was that both groups were approximately equal in their shorthand theory and transcription knowledge at the end of this study. The posttest mean scores of the students who used the workbook in Section II were higher, however, than the posttest mean scores of the students in Section I who did not use the workbook during homework practice. However, the differences were not statistically significant at the .05 confidence level. Thus, the null hypotheses were accepted for this particular aspect of the study.

Students in both groups were approximately equal in their shorthand theory knowledge at the beginning of this study as indicated by their mean scores on the pretest given at the beginning of the quarter. It is interesting to note that at the beginning of the quarter the students in Section I (control) had higher mean scores on the shorthand theory part
of the pretest than the students in Section II (experimental). However, at the end of the quarter it was the students in Section II, who used the workbook, who had higher scores on the shorthand theory part of the posttest.

The students within each group did show statistically significant improvement at the end of the quarter in both their shorthand theory and transcription of this theory as indicated by their scores.

CONCLUSIONS

The results of this study, as detailed in Chapter IV, lead this researcher to the following conclusions:

1. According to this study, the researcher found that varying the homework methods had no impact on shorthand theory achievement.

2. There is no particular advantage in using the workbook during shorthand homework practice over the traditional method of doing shorthand homework. Students in both groups achieved approximately equal results.

3. Using the workbook during shorthand homework practice in addition to the traditional homework method does not significantly improve students' shorthand theory knowledge.

4. Using the workbook during shorthand homework practice in addition to the traditional homework method does not significantly improve students' transcription knowledge as measured in this study.

IMPLICATIONS

The results of this study imply the following, even though the data does not provide conclusive support:
1. The posttest mean scores of the students who used the workbook during shorthand homework practice were higher than the Section I students' posttest mean scores. This fact would seem to imply that the use of the workbook during homework practice did result in an improvement in students' shorthand theory knowledge and transcription ability on a test of the type given in this study.

2. At the beginning of the quarter, the students in Section I had higher mean scores on the shorthand theory part of the pretest. However, at the end of the quarter the students in Section II, who used the workbook, had higher mean scores on the shorthand theory part of the posttest. This would indicate that the students who used the workbook had a greater improvement in their shorthand theory knowledge than the students who did not use the workbook during homework practice.

Even though these variables were not tested, the following findings seem important:

1. The instructor of the two classes reported that the punctuation ability of the students in Section II, who used the workbook, greatly improved over the quarter. She reported that their ability to punctuate correctly was greater than the students in Section I. This would imply that the workbook does provide much needed instruction and drill on the punctuation rules, which is a vital knowledge for shorthand students to acquire.

2. The instructor of the classes reported that the students preferred using the workbook during homework practice rather than just copying the shorthand plates. This would seem to indicate that a variety in shorthand homework practice is preferred by students and results in more benefit being derived from homework practice.

3. And, finally, the instructor felt that the students who used the workbook improved their spelling ability as a result of the spelling drills emphasized in the workbook. Therefore, through the use of the workbook it would seem that students' knowledge in spelling improved, another important skill for a shorthand student to acquire.
RECOMMENDATIONS

The following recommendations have been derived from the findings, implications, and conclusions of this study:

1. Even though the study did not demonstrate that the workbook method was superior to other homework methods, shorthand teachers should consider requiring that the workbook accompanying the text be completed by their shorthand students during shorthand homework practice because of the benefits that might be derived; i.e., punctuation, spelling, etc.

   A recommended assignment would be for the students to copy the letters in the textbook once and then complete the corresponding workbook lesson. It is further recommended that the teacher be prepared to answer any questions the students might have on the workbook lesson.

2. As there is evidence of little research in the area of shorthand homework, it is recommended that other studies be conducted to test the variables of tape recorded dictation, classroom environment versus home environment for doing homework, programmed instruction, etc., and the effect of these variables on shorthand achievement. Practice is vital to skill development, and the time students spend in doing homework should be devoted to intensive, meaningful practice.

3. The use of the workbook on students' transcription ability in the actual transcribing of letters should be further tested. It is possible that the drills in the workbook do improve students' transcription ability, especially in the areas of punctuation and spelling, and this would further indicate the importance of students completing the workbook assignment each night.

4. The effects of using the workbook on students' dictation rate should also be studied. This researcher found that students' shorthand theory knowledge improved slightly as a result of using the workbook. Therefore, it is possible that there would be an improvement in the ability of the students in taking dictation as a result of using the workbook during homework practice.
5. The researcher recommends that this study be replicated to determine if the results would be consistent with or vary from the findings of this study.
APPENDIX
PRETEST-POSTTEST *

Directions: Dictate each word twice allowing a six-second pause between each word. For example, WHILE (PAUSE) WHILE (6 SECOND PAUSE)

1. while 23. between 45. end 67. also
2. senses 24. those 46. regard 68. decide
3. area 25. glad 47. with 69. album
4. speculation 26. initial 48. acknowledge 70. supervise
5. brotherhood 27. year 49. opinion 71. general
6. describe 28. nature 50. situation 72. when
7. basement 29. fix 51. deny 73. very
8. medical 30. transpose 52. because 74. several
9. myself 31. regulate 53. bring 75. responsible
10. receive 32. empty 54. annual 76. meanings
11. explain 33. heard 55. furnish 77. oil
12. engage 34. swim 56. facility 78. divide
13. found 35. consume 57. interest 79. friendship
14. inviting 36. until 58. gather 80. circumstance
15. willingly 37. careful 59. lately 81. permit
16. complete 38. self-made 60. quick 82. station
17. nation 39. electrical 61. blank 83. modification
18. readily 40. mistake 62. old 84. improper
19. program 41. modern 63. cultivate 85. yellow
20. period 42. unite 64. security 86. postpone
21. advertise 43. mental 65. attempt 87. member
22. success 44. needed 66. possible 88. combination
89. report
90. summer
91. contribute
92. consequent
93. require
94. institute
95. privilege
96. should
97. thank
98. during
99. experience
100. and

*This test was developed by the Research Department of the Gregg Division of the McGraw-Hill Book Company, publishers of the shorthand text used by the students in the study. This test was used extensively in research studies throughout the United States.
LITERATURE CITED
LITERATURE CITED


