COLLEGE OF GRADUATE STUDIES
Montana State University

Professional Paper Report

Date ______________________

The professional paper of ______________________, candidate for the degree of ______________ ________ in ________________, has been examined and read by the professional papers committee. It meets the standards of the ________________ Department and of the College of Graduate Studies. We recommend that it be accepted in partial fulfillment of the requirements for the degree.

Signed by the professional papers committee.

1. ______________________ 2. ______________________ 3. ______________________

4. ______________________, Department Head   Chairman

This form, signed by the members of the professional papers committee, must be delivered to the Library for approval with two copies of the finished professional paper.

- -

The professional paper of ______________________ has been examined and approved for binding.

Signed ______________________, Librarian

Do Not Write Below This Line

Date ______________________

To: ______________________

The professional paper of ______________________ has been approved by the professional papers committee, the Librarian, and the Dean of the College of Graduate Studies.

____
Dean, College of Graduate Studies

In presenting this professional paper in partial fulfillment of the requirements for an advanced degree at Montana State University, I agree that the Library shall make it freely available for inspection. I further agree that permission for extensive copying of this professional paper for scholarly purposes may be granted by my major professor, or, in his absence, by the Director of Libraries. It is understood that any copying or publication of this professional paper for financial gain shall not be allowed without my written permission.

Signature Russell Leon Sevik

Date 8-8-72

A COMPARISON OF STUDENT DICTATION SPEED IN FIRST YEAR SHORTHAND WHEN TAUGHT BY THE MICROMOLAR APPROACH AND THE EARLY NEW-MATTER APPROACH

by

RUSSELL LEON SEVIER

A professional paper submitted to the Graduate Faculty in partial fulfillment of the requirements for the degree

of

MASTER OF SCIENCE

in

Business Education

Approved:

Harvey A Larson

Head, Major Department

Chairman, Examining Committee

Graduate Dean

MONTANA STATE UNIVERSITY
Bozeman, Montana

August, 1972

ACKNOWLEDGEMENTS

Dr. Harvey A. Larson, Director, School of Commerce, Montana State University, Bozeman, Montana

Miss Leona F. Barnes, Professor of Business Education, Montana State University, Bozeman, Montana

Dr. Henry L. Parsons, Assistant Dean, College of Graduate Studies, Montana State University, Bozeman, Montana

Dr. Allien R. Russon, Professor of Management and Business Education, University of Utah, Salt Lake City, Utah

Mr. Clifford A. Harmala, Superintendent of Schools, Glendive, Montana

Mr. John H. Johnson, Principal, Dawson County High School, Glendive, Montana

Kathryn (Kay) T. Sevier, my wife

TABLE OF CONTENTS

Chapter		Page
I.	INTRODUCTION	1
	The problem	1
	Definition of Terms	5
II.	REVIEW OF LITERATURE	13
	Traditional Approaches	13
	Early New-Matter Approach	15
	Micromolar Approach	16
III.	THE EXPERIMENTAL DESIGN	21
	Grouping	21
	Group A	22
	Group B	23
	Method of Procedure	24
	General Procedure	28
	Summary	32
IV.	COMPARISON OF THE DATA	34
	General Procedure	34
	Preliminary Comparisons of Groups A and B	36
	Summary	70
V.	SUMMARY AND CONCLUSIONS	72
	Summary	72
	Conclusions	73
	Recommendations	74
	BIBLIOGRAPHY	75
	APPENDIX A - Tables I and II	76, 77
	APPENDIX B - Tracing Plates	78, 79

LIST OF TABLES

Table		Page
I.	Relative Data - Group A	76
II.	Relative Data - Group B	77
III.	Standard Deviation and Standard Error of the Mean Kuder Clerical Interest Ratings - Group A	41
IV.	Standard Deviation and Standard Error of the Mean Kuder Clerical Interest Ratings - Group B	42
V.	Standard Deviation and Standard Error of the Mean Average Previous Grades - Group A	46
VI.	Standard Deviation and Standard Error of the Mean Average Previous Grades - Group B	47
VII.	Standard Deviation and Standard Error of the Mean Average English Grades - Group A	52
VIII.	Standard Deviation and Standard Error of the Mean Average English Grades - Group B	53
IX.	Standard Deviation and Standard Error of the Mean Intelligence Quotient Scores - Group A	57
X.	Standard Deviation and Standard Error of the Mean Intelligence Quotient Scores - Group B	58
XI.	Standard Deviation and Standard Error of the Mean Dictation Speed Attempted - Group A	63
XII.	Standard Deviation and Standard Error of the Mean Dictation Speed Attempted - Group B	64
XIII.	Standard Deviation and Standard Error of the Mean Percent of Accuracy Attained - Group A	67
XIV.	Standard Deviation and Standard Error of the Mean Percent of Accuracy Attained - Group B	68

LIST OF FIGURES

Figure — Page

1. Standard Error of a Difference Between Two Means ($S.E.M._d$) Kuder Clerical Interest Ratings - Groups A and B 40
2. "t" Ratio for a Difference Between Two Means Kuder Clerical Interest Ratings - Groups A and B . . . 40
3. Standard Error of a Difference Between Two Means ($S.E.M._d$) Previous Grade Scores - Groups A and B 45
4. "t" Ratio for a Difference Between Two Means Previous Grade Scores - Groups A and B 45
5. Standard Error of a Difference Between Two Means ($S.E.M._d$) English Grades - Groups A and B 51
6. "t" Ratio for a Difference Between Two Means English Grades - Groups A and B 51
7. Standard Error of a Difference Between Two Means ($S.E.M._d$) Intelligence Quotient Scores - Groups A and B 56
8. "t" Ratio for a Difference Between Two Means Intelligence Quotient Scores - Groups A and B 56
9. Standard Error of a Difference Between Two Means ($S.E.M._d$) Dictation Speed Attempted - Groups A and B 62
10. "t" Ratio for a Difference Between Two Means Dictation Speed Attempted - Groups A and B 62
11. Standard Error of a Difference Between Two Means ($S.E.M._d$) Percent of Accuracy Attained - Groups A and B 69
12. "t" Ratio for a Difference Between Two Means Percent of Accuracy Attained - Groups A and B 70

A COMPARISON OF STUDENT DICTATION SPEED IN FIRST YEAR SHORTHAND WHEN TAUGHT BY THE MICROMOLAR APPROACH AND THE EARLY NEW-MATTER APPROACH

by

RUSSELL LEON SEVIER

ABSTRACT

Purpose

To determine the effectiveness of using the micromolar approach and the early new-matter approach to the teaching of beginning shorthand and if there would be a significant difference between the two.

Method and Sources

a. The study involved two shorthand classes at Dawson County High School. Thirty-six students and one teacher were randomly assigned to the two groups.

b. Students in Group A were taught using the early new-matter approach, and students in Group B were taught using the micromolar approach.

c. The clerical interest and academic ability of the students in both groups were compared prior to the beginning of shorthand instruction.

d. Practice dictation material was taken from the shorthand textbook, and from Shorthand Dictation A B C's, Third Edition, by Allien R. Russon. Test dictation material was taken from the latter.

e. All of the techniques outlined for the early new-matter approach were used in Group A.

f. A constant dictation rate of 100 words a minute, using tracing plates, was maintained by the students in Group B.

g. Dictation speed attempted and percent of accuracy attained by each student in Groups A and B were used for the final comparison.

h. A "t" test of 1.96 was used to test the significance of all data.

Summary of Findings

a. Both the early new-matter approach and the micromolar approach are effective in the teaching of beginning shorthand

b. There was no significant difference at the five percent level of confidence between the achievement of students taught by these two approaches, as measured by 3-minute new-matter dictation tests.

CHAPTER I

INTRODUCTION

A method is a procedure or process for attaining an objective: as a systematic plan followed in presenting materials for instruction.[1] In the teaching of shorthand, there are probably as many methods, modifications of methods, and combinations of methods as there are teachers. This statement seems to indicate to the researcher that shorthand teachers are continually trying to find the "right or best" method of teaching shorthand--one that will produce maximum learning in a minimum of time.

The Problem

It is the purpose of this study to (1) define two recently developed methods of teaching shorthand, along with the techniques and devices characteristic to each, and (2) compare the achievement of students taught by these two methods.

Statement of the Problem

Since the ability to record accurately unfamiliar material dicated at high speeds and also to transcribe the material accurately are the two major goals of a stenographer, the researcher reasoned that both the speed of recording and the adjustment to unfamiliar material are part of what is learned. It was also felt that the early introduction of these

---

[1] Webster's Seventh New Collegiate Dictionary (Springfield: G. & C. Merriam Company, 1965), p. 533.

two factors in a first-year shorthand class might affect the achievement of the learners in the class. It was the specific purpose of this study to seek answers to the following questions:

1. Would the use of a method which required dictation practice at a constant, high rate of speed from the beginning significantly affect the achievement of learners in first-year shorthand as measured by 3-minute, new-matter dictation takes?

2. Would the early introduction of new-matter dictation in first-year shorthand significantly affect the achievement (as measured by 3-minute, new-matter dictation takes) of the learners in the class?

3. Would there be a significant difference in the achievement attained by the students taught by these two methods?

Delimitations

This study was limited to 38 students, both juniors and seniors, enrolled in shorthand I for the school year 1971-1972 at Dawson County High School in Glendive, Montana.

The researcher, having five years' previous experience in teaching beginning shorthand, was the only teacher involved in the instructional process, and strict adherence to the techniques and devices set forth in the definitions of the two methods was maintained. The class period for the students consisted of one 55 or 60-minute period each day, five days a week, for the entire year; however, this study was concerned only with the first quarter.

The guidelines given in the definitions of the methods used in this study were controlled as much as possible, but deviations from these

guidelines (extra dictation practice, extra written homework, etc.) outside the classroom were basically uncontrollable. Deviations of this type may have had some effect on some of the students, but this effect would probably be insignificant because of the number of hours spent in formal instruction within the classroom.

Limitations

The results of this study may have been affected by the following factors:

Student absences. Because absence from school due to illness or other reasons was beyond the control of the investigator, it was felt that this may have had an effect on the achievement attained by some students.

Class interruptions. During the early part of the school year, interruptions in classroom instruction occurred frequently and irregularly. Such things as assemblies, class meetings, announcements, fire drills, etc., may have caused some emotional disturbance in the learners. However, the researcher tried to adjust his procedure so as to keep the presentation to the two groups equal. If the class period for one group was shortened or omitted due to an assembly, the researcher adjusted his presentation for the other group also.

Many activities such as field trips, club meetings, band and choir programs, etc., would cause various members of both groups to miss por-

tions of the shorthand instruction period. Therefore, these activities probably had a different effect on each student.

Number of students. The study involved all 38 students enrolled in shorthand I at Dawson County High School for the school year 1971-1972. Almost immediately after classes began, one student dropped from the class, and another student dropped some weeks later. Datta obtained for these students was not used in the comparison of the groups. Another student transferred from one group to the other, and this may have had some effect on the findings.

Time of day. Group A met the fourth class period of the day--a 55-minute period beginning at 12:30 p.m. Group B met the sixth class period of the day--a 60-minute period beginning at 2:30 p.m. It was felt by the investigator that the different hour of the day and the slight difference in class length may have had an effect on the achievement of the students in the two groups.

Miscellaneous factors. The influence of the teacher's personality on the personalities of the various students, the personal and the educational objectives of the students, and the personal and the educational interests of the students are additional factors that might have had an effect on the results obtained in this study. The Kuder Clerical Interest ratings were used to compare the interests of the two groups. Group A showed an average rating of 64.294, and Group B showed an average rating of 51.111.

Importance of the Study

Researchers in education are continually striving to find and/or develop better methods of instruction. If any method or procedure can be found to be better than others being used, then other teachers of the subject, as well as their students, will benefit by using the superior method or procedure. Anything that will contribute to this research program will be of value.

Definition of Terms

The definitions of some of the terms used in this study are given to assist the reader who is unfamiliar with shorthand terminology to better understand the data being presented.

Three-Minute Takes

A 3-minute take is the term used for the procedure used to test shorthand students. The instructor dictates material, usually in letter form, at a certain speed for three minutes. After the material has been dictated, the students are given a 20 to 30-minute period in which to transcribe the material. To provide for individual differences and student growth within the class, tests at two or three different speed levels are dictated on a given test day. Each student is encouraged to transcribe the highest take that he feels he has completed at a passing level. In order for a test to be considered passing, the student must transcribe it with 95 percent accuracy or better. Transcription is done at the type-

writer; and students must do their own work, using a dictionary for spelling, word-division, etc., when necessary.

Errors

On a 3-minute take, the following items are considered errors on the transcript:

1. Any word omitted.
2. Any word incorrectly transcribed.
3. Any word added.
4. Any transposition.
5. Any deviation from copy as dictated.
6. Any word used improperly (new, knew; no, know).
7. Any mishyphenated word.
8. Any word where possession is improperly used.

Percent of Accuracy

The percent of accuracy attained by a student on any given take can be determined by: (1) subtracting the number of errors made on the take from the total number of words in the take; and (2) dividing the number of words left after subtracting the errors by the total number of words in the take. The number of words in the take is dependent on the speed of dictation. The speed of a take indicates the number of words dictated in one minute. Therefore, by multiplying the speed by the number of minutes, the total number of words in the take will be determined.

Example: A 3-minute take, dictated at 90 words per minute, is transcribed with eight errors.

90 (speed) x 3 (number of minutes) = 270 total words

270 (total words) - 8 (errors) = 262

262 (number of words left after subtracting the errors) ÷ 270 (total words) = .97

Percent of accuracy: 97 percent

Brief Forms

Brief forms in shorthand are abbreviated shorthand symbols that represent words. This same principle is used in longhand. For example, in longhand the letters "Jr." represent the word "Junior"; the letters "St." represent the word "Saint"; and the same idea exists in shorthand. There are 129 brief forms in Gregg Shorthand, Diamond Jubilee Edition. These brief forms are committed to memory and automatized by the student.

New-Matter Material

Any material that is dictated to the students without prior knowledge of the context of the material by the students is new-matter material. This material can be dictated to the students by the teacher at any speed and for any length of time. For testing purposes in this study, new-matter material would be three minutes in length and previewed.

Preview

A preview is a teaching device used by shorthand teachers in which selected words from any given material to be dictated are written on the

board. Then prior to the dictation, the students practice these words in order to become thoroughly familiar with them and to reduce any hesitation they might incur in writing them during the dictation.

Early New-Matter Method

The following techniques and devices are used in the early new-matter approach to teaching shorthand:

Tracing. After the presentation of the first two lessons, students begin tracing the shorthand outlines from the textbook on onionskin paper. This tracing is continued for the first six weeks of the course and is turned in as a part of the students' homework assignment.

Automatization of brief forms. The method used to automatize the brief forms is the folded paper device, used and recommended by the late Charles Swem. The student writes the brief forms in a column, one below the other, on a sheet of paper. Then, with the textbook closed, he transcribes the brief forms in a second column. Now the first column of brief form outlines is folded back out of sight, and the student writes new outlines from the longhand in column two. The procedure is continued until eight columns have been filled. This paper is then turned in as a part of the homework.

Early new-matter dictation. New-matter dictation practice is introduced as soon as the students have learned the second list of brief forms. The material is very simple, consisting almost entirely of brief forms.

The dictation rate is slow enough that all students are able to get the dictation.

Early 3-minute takes. After the students have been practicing the easy new-matter dictation for a short time, they are ready for their first "chance to pass" a 3-minute, new-matter take. The teacher dictates two or three takes at slow speeds and demonstrates the transcription process. The students then transcribe one of the takes.

Formal review. As part of their homework, students are instructed to review Lesson 1 when Lesson 21 is assigned. This review is to be done in their notebooks, 20 lessons behind the new lesson, for the remainder of the first semester.

Reading and spelling. For the first two weeks, all homework and classwork is to be spelled and read. All words except brief forms are spelled prior to saying the word (D-e-r, Dear) when reading. Beginning with the third week, the class reads in the usual manner.

Use of the key. The key is used when doing homework assignments.

Rules. The rules are not stressed. A brief explanation is given when new principles are presented, but students are not asked to memorize the rules.

Writing. Brief periods of writing in the notebooks during class are provided as soon as the students begin tracing.

Reading for speed. Every sixth lesson is assigned for reading only. The students practice reading the lesson at home, and then in class they

read in pairs, one reading and one timing. This helps to automatize common words in the vocabulary.

Homework. Homework has been mentioned in the preceding techniques and devices. Specifically, homework consists of: tracing the lesson for the first six weeks, writing the lesson for the remainder of the course, the folded paper for brief forms, writing the review lessons three times, reading and spelling for the first two weeks, and reading for speed.[2]

Micromolar Approach

The following techniques and devices are characteristic of the micromolar approach to teaching shorthand:

Constant practice rate. A constant practice rate of 100 words per minute is maintained throughout the first semester. All material is dictated at this speed except test materials.[3]

Use of controlled reader. The controlled reader is used to further maintain the constant practice speed in reading and writing.[4]

Writing materials. In the micromolar appraoch, tracing is demon-

---

[2]Allien R. Russon, Methods of Teaching Shorthand, Monograph 119 (Cincinnati: South-Western Publishing Company, 1968), pp. 14-16.

[3]Shirley Eiken, "Consider the Micromolar Behavior Theory In Speed Development," The Delta Pi Epsilon Journal, 7:110, July, 1965.

[4]Rita A. Sloan, "An Application of the Micromolar Behavior Theory to the Instruction of Beginning Shorthand" (unpublished doctoral dissertation, University of Minnesota, Minneapolis, June, 1967).

strated after the completion of the second lesson, using writing materials prepared from the textbook lessons and other available sources. These writing materials are used for much of the material dictated in the class for the first six weeks. Writing materials are not used for testing.[5]

Reading for speed. As homework, the students are instructed to read each lesson over and over until it can be read rapidly and with ease.

Early introduction to writing. Writing in the notebooks is introduced when Lesson 4 is taught. On that day, material from Lesson 3 is dictated. The rate of dictation is 100 words per minute and the dictation times are extremely short (10 to 15 seconds).[6]

Other procedures used in the micromolar approach are similar to the traditional approaches.

Rules. The rules of theory are presented but not stressed.

Word lists. Word lists are used but little emphasis is placed on them. The major concern is in practicing continuous material.

Use of the key. The key to shorthand plate material is provided to assist the students in reading the homework assignments.

---

[5]Marion L. Boss, "A Micromolar Behavioristic Approach to Dictation Skill Building in Beginning Shorthand" (unpublished doctoral dissertation, Colorado State College, Greely, June, 1967).

[6]Eiken, op. cit., p. 111.

Automatization of brief forms. Students are encouraged to commit the brief forms to memory and to automatize them. Classroom drills and continual review and practice by the students as part of their homework are the methods used to accomplish this automatization.

Formal review. Formal reviews of theory are conducted at regular intervals.[7]

Homework. The homework for the first semester consists primarily of reading the assigned lesson to develop speed and proficiency.

---

[7] Lloyd V. Douglas, James T. Blanford, and Ruth I. Anderson, Teaching Business Subjects (Englewood Cliffs: Prentice-Hall, Inc., 1965), pp. 194-195

CHAPTER II

REVIEW OF LITERATURE

In 1965, Rahe compiled the Shorthand-Secretarial Research Index, consisting of a complete list of the research studies in the training of stenographers and secretaries from 1891 to 1965.[1] Many of the studies listed in the area of methodology were conducted in the 1930's and 1940's and it was found that they had little direct relationship to this study. The information obtained from all of this work was, however, beneficial to the researcher.

After a thorough search of Rahe's work, The Business Education Index, The Educational Resources Information Center Index (ERIC), Dissertation Abstracts, and various textbooks, it was found that there were no studies completed involving both the new-matter approach and the micromolar approach. The studies reviewed had been conducted in the following three areas:

1. Traditional methods of teaching shorthand--reading approach and writing approach.
2. Early new-matter approach.
3. Micromolar approach.

Traditional Approaches

Schloemer conducted an experiment in 1962-1963 to compare the results obtained from classes taught by contrasting methods. She used two classes

---

[1]Harves Rahe, Shorthand-Secretarial Research Index (New York: Gregg Division, McGraw-Hill Book Co., Inc., 1965).

with approximately equal grade point averages. The first class was taught using a reading or "functional" approach with little or no emphasis on rules of theory. The second class was taught using a writing approach with much emphasis on rules of theory.

At the end of the year, class achievement on 3-minute dictation of new material was compared and found to be almost equal. Schloemer concluded that: (1) when these two methods are taught by the same teacher, the results of the classes are comparable; and (2) the ability and interest of the students and the enthusiasm of the teacher for the method may have a more significant effect on the results than the method used.[2]

Settle conducted a similar study between 1957 and 1960 using matched pairs each year for three years. He found some difference in the final dictation ability in favor of the reading approach each year. This difference was not significant, however, unless the three years' replications were combined. He also found that knowledge of the rules and principles was the same.

Settle concluded that both methods have their own strengths and weaknesses and that there was no basis for a strong endorsement of either.[3]

---

[2]Carolyn Schloemer, "Approaches to Teaching Beginning Shorthand," The Balance Sheet, 46:299&332, March, 1965.

[3]Kenneth B. Settle, "The Relative Effectiveness of Two Methods of Teaching Gregg Shorthand" (unpublished doctoral dissertation, University of Cincinnati Teachers' College, Colorado, June, 1961).

Early New-Matter Approach

In reviewing the literature specific to the early new-matter approach, the researcher found disagreement in the theses and dissertations reviewed.

In a study conducted by Ward in 1966, the results obtained when using the reading approach and the early new-matter approach were compared. Students enrolled in four classes of beginning shorthand in the Salt Lake City schools as well as 21 college students enrolled in beginning shorthand for the school year 1962-1963 were used for this study. The reading approach was used for two of the high school classes, and the early new-matter approach was used for the other two. The college students were taught by the early new-matter approach.

No attempt was made to program students into particular classes. After programming was completed, intelligence quotient scores and English grades were used as points of comparison for the two high school groups.

The results, as measured by 5-minute dictation takes of new material, were compared statistically using the standard deviation and the standard error of the mean for both groups. These figures were then compared for significant differences by using the standard error of the difference between the two means and computing a "t" ratio for this difference.

After analyzing the data collected, Ward concluded that: (1) the use of the early new-matter approach in first-year shorthand seemed to have a significant effect on student achievement; and (2) the lower

achievers appeared to do better under the new-matter dictation approach than they did under the reading approach.[4]

In a similar study conducted by Persing, the findings were in disagreement with those of Ward. Using chi-square and Fisher exact probability testing, Persing matched two groups to the .05 level of equality on: (1) age; (2) collegiate grade point average; (3) ACT composite scores; and (4) English national percentile rankings. The study covered three semesters of instruction. The early new-matter approach was used for one group, and a traditional approach was used for the other.

Persing found no significant difference (.05 level) in: (1) knowledge of theory; (2) achievement in familiar-matter dictation; and (3) achievement in new-matter dictation. He recommended that teachers be aware of the values of both methods and turn their energy to other aspects of shorthand learning.[5]

Micromolar Approach

Some disagreement was also found in reviewing the literature specifically related to the micromolar approach to teaching shorthand.

---

[4]William C. Ward, Jr., "An Investigation Indicating the Effect of Early Use of New-Matter Dictation on the Achievement of First-Year Shorthand Students" (unpublished master's thesis, University of Utah, Salt Lake City, June, 1966).

[5]Bobbye Sorrels Persing, "A Classroom Investigation of When to Begin New-Matter Dictation in Gregg Shorthand" (unpublished doctoral dissertation, University of Oklahoma, Norman, June, 1966).

In his presentation of the micromolar behavior theory and its relation to performance speed in education, Logan poses the question of "What is learned?" He points out that:

> The critical feature of the approach being presented is the assumption that speed is part of what gets learned.
>
> This "micromolar approach" asserts that organisms not only learn what to do but also how fast to do it, that performance speed depends on how fast the organism has practiced as well as how long he has practiced.[6]

In presenting the micromolar behavior theory as a consideration for speed building development in shorthand, Eiken points out that it is the micromolar interpretation of the essential nature of a speed response that gives it its base as a part of what gets learned. In some methods of instruction, speed is dismissed as unimportant or fast and slow responses are considered to be the same response made at different speeds. If this is the case, then a student's learning a response better would result in an increase in speed.

The micromolar theory contends that a fast response is essentially different from a slow one. The speed element is considered to be a "micro" characteristic of a response. In writing shorthand, the responses made to each different speed of dictation are unique to that particular speed. Therefore, if a student is taught and learns to write at many various speeds, he "learns shorthand" many times.

---

[6]Frank a Logan, "Micromolar Behavior Theory and Performance Speed in Education," Harvard Educational Review, 33:179, Spring, 1963.

When learning a speed response, learning is considered to be optimal at the practice speed. Therefore, if teachers direct practice at speeds 10 to 30 words per minute faster than the test speed, as is often done, there should be some gain because the slower test speed will seem easier. The micromolar theory also contends, however, that there will be some loss because of the change in speeds. Practice dictation at higher speeds is beneficial, therefore, only if the gain realized from responding at a speed easier than the practice speed exceeds the loss resulting from this difference in learning required for the practice and response speeds.

Traditionally, the advancement from easy responses to more difficult responses in shorthand has been accomplished by advancing from slow speeds to fast speeds because slow speeds are generally considered to be easier than fast speeds. In view of the previous explanation, however, more emphasis might be placed on the difficulty of the dictated material and the length of the dictation time in controlling this advancement. Could students achive greater performance speed in the long run by practicing dictation initially at high speeds if the difficulty of this speed were compensated for by using extremely easy material and/or exceedingly short periods of dictation time?[7]

In 1967, Sloan conducted a study to compare the results obtained when

---

[7]Shirley Eiken, "Consider the Micromolar Behavior Theory in Speed Development," The Delta Pi Epsilon Journal, 7:108-111, July, 1965

using a traditional method with the results obtained when using a method based on the micromolar behavior theory. The study involved 252 students enrolled in 11 classes in 8 high schools in the Minneapolis-St.Paul area. In schools where tape laboratory equipment was available, students within the same class were randomly assigned to both methods. In those schools where tape laboratory equipment was not available, two classes were used. In all cases, textbook materials were revised and put on tape, with the experimental group (micromolar) using 100 words per minute as a constant practice speed, and the control group (traditional) using various speeds as their practice rate.

Interim tests were dictated four times in the course of the study. The control group received dictation at 50 words per minute on the first test, 60 words per minute on the second, 70 words per minute on the third, and 80 words per minute on the fourth. For the experimental group, all tests were dictated at 100 words per minute. At the conclusion of the 12-week period covered by the study, a battery of 3-minute dictation tests at speeds ranging from 60 words per minute to 110 words per minute was dictated to all students in both groups.

After analyzing the data, Sloan found the traditional method to be superior on the first three interim tests with no difference on the fourth test. On the basis of these findings, she recommended that: (1) the study be conducted for a full year; (2) a device similar to the Controlled Reader be used; and (3) a slower speed be used as the constant

rate.[8]

In a similar study involving 181 college students enrolled in beginning shorthand, Boss found that: (1) the experimental group was superior on the first two interim tests; (2) the control group was superior on the remainder; (3) the control group showed no growth during the last two weeks but the experimental group showed continued growth; (4) there was no significant difference in the achievement of the two groups; and (5) both groups generalized best at a speed of 90 words per minute.[9]

---

[8]Rita Sloan, "An Application of the Micromolar Behavior Theory to the Instruction of Beginning Shorthand" (unpublished doctoral dissertation, Univeristy of Minnesota, Minneapolis, June, 1967).

[9]Marion L. Boss, "A Micromolar Behavioristic Approach to Dictation Skill Building in Beginning Shorthand" (unpublished doctoral dissertation, Colorado State College, Greeley, June, 1967).

CHAPTER III

THE EXPERIMENTAL DESIGN

It was found when school began in August, 1971, that there were 38 students enrolled in beginning shorthand for the 1971-1972 school year. These students were scheduled into two classes meeting the fourth and sixth periods of the school day. The fourth period class was 55 minutes long, and the sixth period class was 60 minutes long. Both shorthand and transcription were to be covered in each class period.

Grouping

All students at Dawson County High School were assigned to the various classes by the principal and the vice principal. Those students desirous of taking beginning shorthand were assigned to the shorthand class which best fit the student's complete course of study. No attempt was made to program any particular student into any particular shorthand class on the basis of previous marks in other subjects, intelligence test scores, or any other reason. One shorthand class was slightly overcrowded, but shortly after the start of the school year two students in this class dropped shorthand, thus alleviating the problem. The researcher was the only teacher assigned to classes in beginning shorthand for the school year 1971-1972. One of the two classes was taught using the early new-matter approach and was designated Group A of the study. The other class was taught using the micromolar approach and was designated Group B of the study. Each group contained 18 students.

Teacher

The researcher, being the only teacher involved in this study, taught both groups. The teacher had five years' experience in teaching beginning and advanced shorthand and other business subjects on the high school level. However, the teacher had no previous experience with either approach to teaching shorthand used in this study, and relied heavily on published materials describing both approaches.

Equating the Groups

At the beginning of the school year 1971-1972, an alphabetical list was prepared for each of the two groups. An illustration of these lists can be found on Tables I and II, pages 76 and 77. Each list contained the group and number to which each student had been assigned, his class in school, either eleventh or twelfth, and columns for inserting the following information: intelligence quotient, average grade, average English grade, Kuder Clerical Interest rating, dictation speed attempted, and percent of accuracy attained on the sixth and final test administered during the course of the study.

Group A

Group A was assigned 18 students who were taught using the early new-matter approach to the teaching of shorthand. After the first two lessons had been presented, tracing of the letters and word lists in each lesson commenced. As soon as two sets of brief forms had been presented, the stu-

dents were drilled in class in writing the brief forms contained in these two sets. Drill on these brief forms was also assigned as a part of the students' homework. New-matter dictation was introduced the second week of instruction and consisted of brief forms with the exception of a few words. These words were previewed on the chalk board and practiced by the students prior to the dictation. The beginning new-matter dictation was at a rate of 20 words per minute. Each succeeding day brought another new-matter letter with words unfamiliar to the learners being previewed on the chalk board, and practiced by the learners prior to the daily new-matter dictation.

Group B

Eighteen students were also programmed into Group B. The researcher used the micromolar approach to the teaching of shorthand. A constant practice rate of 100 words per minute was used throughout the course of the study. After the completion of the second lesson, tracing was begun using writing materials prepared by making copies of letters from the text which had been assigned as reading practice. These writing materials were made by making a photo copy of a letter from the text and then duplicating it so that each learner had a good copy of the letter on which to trace the outlines. The students were asked not to write outside of class, so as to have better control of their practice rate. They were asked to read the lessons as many times as necessary until they could read them easily.

Writing in the notebooks commenced with the presentation of Lesson 4. Material from Lesson 3 was dictated at the rate of 100 words per minute for 10 to 15 seconds at a time.

Method of Procedure

Programming of Students

During the ninth grade year, the students were asked to prepare a tentative program for their four years of study at Dawson County High School. Then, in the spring of each year, the students were asked to prepare an up-dated program for the ensuing school year. After counseling with parents, teachers, and counselors, each student submitted a list of the classes he desired to take during the next school year. The guidance counselor reviewed each student's program with the student, and then sent the list to the principal for processing. The principal and the vice principal tabulated and sorted the class cards into a tentatvie schedule and sent all the information to Helena, Montana, for final processing with a computer. Each student was programmed into the classes he desired according to how it best fit his schedule. Some classes such as home economics, music, arts and crafts, etc., were scheduled only once or twice a day; therefore, students desirous of taking these specific courses were limited to certain class periods in which they could take other course selections on their programs.

In order to complete the programming of students for the next school

year, each teacher in each department was assigned a schedule of classes that would be taught by that teacher the next year. When all programming was completed for the school year 1971-1972, it was found that their would be two beginning shorthand classes, both taught by the researcher. Nothing more was done until the beginning of school in August, 1971.

At the beginning of school in August, 1971, a roll of students for each of the classes was made by the researcher. Each student was assigned both a number and an alphabetic letter, A or B, which designated the group and the alphabetic order for that student.

Intelligence Quotient Scores

After the students had been assigned to either Group A or B, each student's intelligence quotient score was obtained from the student's history file in the guidance office at Dawson County High School. The intelligence quotient score was determined by the Otis Quick-Scoring Mental Ability test, which had been administered to each student when he was in the ninth grade. A score of 90 to 110 on the Otis test was considered to be an average score. These scores were used as a basis for comparing the two groups.

Previous Grades

Each student's previous grades were obtained from the permanent record cards in the school office. Since all grades are recorded each semester, it was necessary to determine an average grade for each student. For each

student in the eleventh grade, each grade received during the ninth and tenth grades was assigned a numerical equivalent. For those students in the twelfth grade, each grade received in the ninth, tenth, and eleventh grades was assigned a numerical equivalent. By totaling these grades and dividing this total by the number of grades received, an average score was obtained.

For example, the following numerical values were assigned to each grade (plus and minus grades are not recorded as semester grades at Dawson County High School):

A - 1
B - 2
C - 3
D - 4
F - 5

If a student received the following semester grades, numerical equivalents were assigned according to the grade chart above as follows: during the ninth grade he received a B - 2, a B - 2, a C - 3, a C - 3, a B - 2, a D - 4, a B - 2, a C - 3, and a C - 3. During the tenth grade he received a B - 2, an A - 1, a C - 3, a B - 2, a B - 2, a C - 3, a C - 3, a C - 3, a D - 4, and a C - 3. These values were then totaled and divided by the number of grades. The one grade given for previous grades was based on this calculation:

2
2
3
3
2
4
2
3
3
2
1
3
2
2
3
3
3
4
3
50

$$19\overline{)50.000}\quad 2.6315$$

38
120
114
60
57
30
19
110
95
15

Averaged Previous Grade: 2.632

By referring to the grade chart on page 26, it is noted that a numerical score of 2.632 lies between a B and a C. Since it is closer to the C, it can be considered a C+.

English Grades

The English grades for each student were also obtained from the permanent record cards in the school office. These grades were also recorded for each semester of English taken in previous years, so an average English grade had to be determined for each student. This average English grade was computed in the same manner as the average previous grade.

Use of Intelligence Quotient Scores, Previous Grades, and English Grades

The intelligence quotient score, the previous grade, and the English

grade were factors used in comparing the two groups. It was hoped that the two groups would have somewhat equal ability based on these points. If the two groups did prove to be of equal ability, then some conclusions might be drawn regarding the effects of using the two methods of teaching beginning shorthand. Any differences between the two groups as determined by these points would have to be considered in drawing any conclusions concerning the levels of achievement reached by students taught under the two methods.

General Procedure

Shorthand Instruction

Although actual testing on 3-minute new-matter takes was done only one day a week, much time was spent on practice dictation the other days of the week to build a knowledge of shorthand and speed in the writing of shorthand from dictation. Some class time was also spent in working on the typing and transcribing speeds of the students. No further mention will be made of typing and transcribing speeds, as this study was not concerned with these areas of student progress.

Various devices or methods were used in an attempt to help increase the students' shorthand writing speeds. Some of these methods were the following:

1. The use of new-matter dictation drills daily in Group A. These drills were previewed, with the difficult words being practiced

by the students prior to the dictation. Other unfamiliar words were written on the chalk board by the teacher at the end of the dictation as the students called them out to the teacher.

2. The use of tracing plates during dictation in Group B. These tracing plates were of two types. In the beginning, each student was given a copy of material from the previous day's lesson and instructed to trace the outlines on the tracing plate provided as short passages of the material (10 to 15 seconds) were dictated repeatedly at 100 words a minute. Later, the tracing plates consisted of one sentence repeated five times. The first time the complete sentence was given. In the first repitition, 20 per cent of the words were omitted. In the second repetition, an additional 20 per cent of the words were omitted, and so on, for all four repetitions. Words were omitted on the basis of difficulty, with brief forms being the first words omitted. The students traced the entire sentence the first time it was dictated. On each succeeding dictation of the sentence, the students traced the words given on the tracing plate and were asked to fill in those words which were missing. Samples of these tracing plates can be found on pages 78 and 79.
3. Speed reading from shorthand plates in the text on practice material by both groups.
4. Dictation speeds at various rates for various intervals of time

on practice materials by the students in Group A.

5. The use of a Controlled Reader in both groups.
6. Dictation materials from tapes at various speeds on a multi-channel laboratory system and from phonograph records by Group A.
7. Various plans of dictation were used on familiar material in Group A. One plan would keep the rate of dictation the same and vary the length of dictation time. Another plan would vary the rate of dictation and keep the length of dictation time the same. Still another plan would vary both the rate of dictation and the length of dictation time. A fourth plan would follow the pyramid technique. Under this plan, the teacher dictates for one minute at 60 words a minute. He then begins at the beginning again, but dictates at a rate of 70 words a minute for one minute. This procedure is then repeated at a rate of 80 words a minute and finally back at 70 words a minute.

Administration of Tests

Beginning at the end of the fifth week, the students in both groups were given a 3-minute new-matter dictation test at least once a week. The same tests were given to both groups, and the material for the tests was taken from a text entitled Shorthand Dictation A B C's, Third Edition, 1969, by Allien R. Russon. This text also contained daily new-matter dictation drills which were used in Group A. These new-matter dictation

drills contained mostly brief forms, and the unfamiliar words were previewed on the chalk board and practiced by the students prior to the dictation.

The first test given to the two groups at the end of the fifth week consisted of three separate 3-minute dictation takes dictated at 20, 30, and 40 words a minute. The final test given to both groups consisted of five separate 3-minute dictation takes dictated at 40, 50, 60, 70, and 80 words a minute. For Group B which maintained a constant practice rate of 100 words a minute, these tests were the only deviation from this constant rate.

Correcting and Scoring of Tests

The tests for both groups were corrected in the same way. Errors were counted for any word omitted, any word incorrectly transcribed, any word added, any transposition, any deviation from copy as dictated, any word used improperly, any mishyphenated word, and any word where possession was improperly used. The errors were totaled and the percent of accuracy was figured and recorded along with the speed of the take. The percent of accuracy was figured by subtracting the number of errors made on the take from the total number of words in the take, and then dividing the number of words remaining after subtracting the errors by the total number of words in the take. This calculation is shown in the example on page seven.

Summary

For the purpose of comparing the effects of using two different methods of teaching beginning shorthand, it was decided to use all the students enrolled for this course at Dawson County High School for the school year 1971-1972. It was found that 38 students were enrolled in beginning shorthand; however, two of these students dropped this course a short time later. This left 36 students involved in this study.

Each student was assigned to one of two classes by the school administration according to which class period best fit the student's over-all schedule. The researcher then assigned each class a group letter based on the approach to teaching shorthand used in that class. Group A students were taught using the early new-matter appraoch, and Group B students were taught using the micromolar approach.

The Kuder Clerical Interest ratings were obtained for the students in both groups from the student history files in the guidance office at Dawson County High School, and were used in an effort to compare the students' interest in this type of course.

The intelligence quotient scores, previous grades, and English grades for students in both groups were also obtained from the student history files and the permanent record cards on file at Dawson County High School. These scores were used as points of comparison of ability for the two groups.

The students' achievement on 3-minute dictation tests were recorded.

These achievement records for the sixth and final test were used as the basis for comparing the effects of the two approaches to teaching beginning shorthand. These comparisons are discussed in Chapter IV of this professional paper.

CHAPTER IV

COMPARISON OF THE DATA

It was the purpose of this chapter to make various comparisons of the data which had been collected. These comparisons were to be developed to aid in proving or disapproving the hypothesis. The data for this study was collected and assembled in order that they might be used in making comparisons between Groups A and B.

Group A--This group consisted of 18 eleventh and twelfth grade students and was designated as the group taught by the early new-matter approach to the teaching of beginning shorthand.

Group B--This group also consisted of 18 eleventh and twelfth grade students. This group was taught by the micromolar approach to the teaching of beginning shorthand.

Students were arbitrarily assigned to Groups A and B by the principal and vice principal according to which class period best fit their class schedules. The researcher had nothing to do with the assignment of any student to either of the two groups.

General Procedure

Comparisons

To begin the comparisons of the two groups, the researcher felt that it was necessary to determine if Groups A and B had similar clerical interests. The Kuder Clerical Interest ratings were obtained from the student history files and were analyzed. It was hoped by the researcher that these ratings would be equal in both groups.

It was then necessary to determine if Groups A and B had similar academic ability. The first factor to be considered was the previous scholastic grades of the students. The permanent record card of each student was examined to obtain the previous grades for all courses taken by each student. The grades each student received in all semesters of courses taken during high school were analyzed. It was hoped by the researcher that these grades would also be equal in both groups.

A second factor to be considered in comparing the academic ability of the two groups was English grades, which were also obtained from the permanent records for all semesters of English taken during high school. These grades were also analyzed in the hope that they would be equal in both groups.

A third factor to be considered was the intelligence quotient score of each student in Groups A and B. The student history files were again examined. The intelligence quotient score, as determined by the Otis Quick-Scoring Mental Ability Test taken during the ninth grade of school, was obtained for each student. Again, it was hoped by the researcher that the intelligence quotient scores would reveal equal academic ability in Groups A and B.

A final comparison of the two groups was made at the completion of the first quarter of shorthand instruction. This comparison was made on the basis of the shorthand writing speed attempted and the percent of accuracy attained by each student, as measured by results on 3-minute new-

matter dictation tests taken at the end of this period.

After all the data had been collected, it was decided to construct tables to help in the making of these comparisons. The students in Groups A and B were arranged by number with the corresponding intelligence quotient score, average previous grade, average English grade, Kuder Clerical Interest rating, dictation speed attempted, and percent of accuracy attained listed immediately thereafter. The purpose of these tables was to indicate which group was superior academically or if the two groups had equal academic ability. The tables were also used to see which group reached higher goals or scores in beginning shorthand. An answer to the to the following question was sought: Was there a significant difference in the achievement of students taught by the two methods of shorthand instruction used in this study?

Preliminary Comparisons of Groups A and B

When the registration of students at Dawson County High School for the year 1971-1972 had been completed, it was known which students had selected to take beginning shorthand and to which classes they had been assigned. Information was then obtained from the student history file and permanent record card for each student enrolled in these beginning shorthand classes. All students were arranged in alphabetical order and assigned a code number. This number identified the group to which the student had been assigned and the method of shorthand by which he was taught.

The intelligence quotient score, average grade, average English grade, and Kuder Clerical Interest rating were recorded immediately after the student's code number. The null hypothesis and the "t" test were applied to this data to determine the equality or inequality of the interest and academic ability of Groups A and B. The null hypothesis assumed that the two groups of data were equal, and that any differences between the two groups were due to chance. For the difference to be significant, the "t" ratio or "t" test must be as large as 1.96. As a measure of comparison, the null hypothesis and "t" test required the mean scores and the standard error of the means of the two groups.

Kuder Clerical Interest Ratings

The researcher obtained the Kuder Clerical Interest ratings for the students from the history files in the guidance office at Dawson County High School. By totaling the ratings of the students in Group A and dividing by the number of students in Group A, it was found that the mean Kuder Clerical Interest rating for the students in Group A was 64.294 (rounded to three decimals). This calculation is shown on page 38.

The same procedure was used for the students in Group B. It was found that the mean Kuder Clerical Interest rating for the students in Group B was 51.111 (rounded to three decimals). This calculation is also shown on page 38.

Group A

Summation of Kuder Clerical Interest Ratings: 1093.00
Number of Students--Group A 17

```
   64.2941
17)1093.0000
   102
    73
    68
     50
     34
     160
     153
       70
       68
        20
        17
         3
```

Mean Kuder Clerical Interest Rating: 64.294

Group B

Summation of Kuder Clerical Interest Ratings: 920
Number of Students--Group B 18

```
   51.1111
18)920.0000
   90
    20
    18
     20
     18
      20
      18
       20
       18
        20
        18
         2
```

Mean Kuder Clerical Interest Rating: 51.111

To continue the analysis of the Kuder Clerical Interest ratings as outlined by the null hypothesis, it was necessary to compute the standard deviation and the standard error of the mean for both Groups A and B. These calculations are shown in Tables III and IV on pages 41 and 42.

It was determined from Tables III and IV that the standard error of of the mean for Kuder Clerical Interest ratings in Group A was 5.5362, and the standard error of the mean for Kuder Clerical Interest ratings in Group B was 6.8336. The standard error of the difference between the two means and a "t" ratio value were then computed to determine if the difference in the Kuder Clerical Interest ratings was actually a significant difference. The "t" ratio score was then applied to the "t" test to determine if the actual difference in Kuder Clerical Interest ratings was a significant difference at the five percent level of confidence. These calculations are shown in Figures 1 and 2 on page 40.

It is to be noted at this time that for purposes of computing a "t" ratio value, the positive and negative values of numbers are ignored. The "t" ratio for the difference between the two mean scores on Kuder Clerical Interest ratings for Groups A and B was computed to be 1.4990 (rounded to four decimals). To be significant at the five percent level, a "t" score must be 1.96 or greater. Since the data in Tables III and IV and Figures 1 and 2 indicate that the "t" score on Kuder Clerical Interest ratings for the students in Groups A and B was only 1.4990, it was concluded that this difference was not significant and that the two groups were of equal cler-

ial interest as measured by the Kuder Clerical Interest Test.

$$S.E.M._d = \sqrt{S.E.M._A^2 + S.E.M._B^2}$$

$$= \sqrt{5.5362^2 + 6.8336^2}$$

$$= \sqrt{30.6495 + 46.6981}$$

$$= 8.7947$$

FIGURE 1

STANDARD ERROR OF A DIFFERENCE BETWEEN TWO MEANS ($S.E.M._d$)
KUDER CLERICAL INTEREST RATINGS - GROUPS A AND B

$$\text{"t"} = \frac{M_A - M_B}{S.E.M._d}$$

$$= \frac{64.294 - 51.111}{8.7947}$$

$$= \frac{13.1830}{8.7947}$$

$$= 1.4990$$

FIGURE 2

"t" RATIO FOR A DIFFERENCE BETWEEN TWO MEANS
KUDER CLERICAL INTEREST RATINGS - GROUPS A AND B

Previous Grades

In the next comparison made by the researcher, the previous grades of

TABLE III

STANDARD DEVIATION AND STANDARD ERROR OF THE MEAN

KUDER CLERICAL INTEREST RATINGS - GROUP A

Student	Kuder Clerical Interest Rating	Deviation From M	Deviation Squared
A-1	68	3.7060	13.7344
A-2	33	- 31.2940	979.3144
A-3	27	- 37.2940	1390.8424
A-4	90	25.7060	660.7984
A-5	38	- 26.2940	691.3744
A-6	44	- 20.2940	411.8464
A-7	46	- 18.2940	334.6704
A-8	56	- 8.2940	68.7904
A-9	71	6.7060	44.9704
A-10	79	14.7060	216.2664
A-11	46	- 18.2940	334.6704
A-12	94	29.7060	882.4464
A-13	93	28.7060	824.0344
A-14			
A-15	92	27.7060	767.6224
A-16	95	30.7060	942.8584
A-17	49	- 15.2940	233.9064
A-18	72	7.7060	59.3824
T	1093	.0020	8857.5288

M = 64.294

Standard Deviation (S.D.)

$$S.D. = \sqrt{\frac{\Sigma x^2}{N}}$$

$$= \sqrt{\frac{8857.5288}{17}}$$

$$= \sqrt{521.0311}$$

$$= 22.8261$$

Standard Error Of The Mean (S.E.M.)

$$S.E.M. = \frac{S.D.}{\sqrt{N}}$$

$$= \frac{22.8261}{\sqrt{17}}$$

$$= \frac{22.8261}{4.1231}$$

$$= 5.5362$$

TABLE IV

STANDARD DEVIATION AND STANDARD ERROR OF THE MEAN

KUDER CLERICAL INTEREST RATINGS - GROUP B

Student	Kuder Clerical Interest Rating	Deviation From M	Deviation Squared
B-1	38	- 13.1110	171.8983
B-2	21	- 30.1110	906.6723
B-3	64	12.8890	166.1263
B-4	10	- 41.1110	1690.1143
B-5	76	24.8890	619.4623
B-6	67	15.8890	252.4603
B-7	87	35.8890	1288.0203
B-8	56	4.8890	23.9023
B-9	35	- 16.1110	259.5643
B-10	36	- 15.1110	228.3423
B-11	27	- 24.1110	581.3403
B-12	83	31.8890	1016.9083
B-13	20	- 31.1110	967.8943
B-14	14	- 37.1110	1377.2263
B-15	73	21.8890	479.1283
B-16	94	42.8890	1839.4663
B-17	99	47.8890	2293.3563
B-18	20	- 31.1110	967.8943
T	920	.0020	15129.7774

M = 51.111

Standard Deviation (S.D.)

$$S.D. = \sqrt{\frac{\Sigma x^2}{N}}$$

$$= \sqrt{\frac{15129.7774}{18}}$$

$$= \sqrt{840.5432}$$

$$= 28.9921$$

Standard Error Of The Mean (S.E.M.)

$$S.E.M. = \frac{S.D.}{\sqrt{N}}$$

$$= \frac{28.9921}{\sqrt{18}}$$

$$= \frac{28.9921}{4.2426}$$

$$= 6.8336$$

the students in Groups A and B were used to determine if the two groups had equal academic ability. The permanent record cards were examined and the previous semester grades for each student were obtained. These grades were averaged for each student as discussed in Chapter III, and were then listed opposite each student's code number (see Tables V and VI, pages 46 and 47). Again, by totaling the previous grades earned by the students in Group A and dividing by the number of students in Group A, a mean previous grade was obtained. This mean previous grade was found to be 2.299 (rounded to three decimals). This calculation is shown on page 44.

The same procedure was followed for the students in Group B. The mean previous grade for the students in Group B was found to be 2.457 (rounded to three decimals). This calculation is also shown on page 44.

It was again necessary to compute the standard deviation and the standard error of the mean for both Groups A and B in order to fulfill the steps outlined by the null hypothesis. These calculations are summarized in Tables V and VI on pages

From the data in Tables V and VI, it was determined that the standard error of the mean of the previous grades for the students in Group A was .1487. The standard error of the mean of the previous grades for the students in Group B was .1209. In order to determine if this difference in the mean previous grades of Groups A and B was actually a significant difference, it was necessary to compute the standard error of the difference between the two means and a "t" ratio value for this difference. The "t"

Group A

Summation of Previous Grades: 41.373
Number of Students--Group A 18

$$
\begin{array}{r}
2.2985 \\
18\overline{)41.3730} \\
\underline{36} \\
53 \\
\underline{36} \\
177 \\
\underline{162} \\
153 \\
\underline{144} \\
90 \\
\underline{90} \\
0
\end{array}
$$

Mean Previous Grade: 2.299

Group B

Summation of Previous Grades: 44.228
Number of Students--Group B 18

$$
\begin{array}{r}
2.4571 \\
18\overline{)44.2280} \\
\underline{36} \\
82 \\
\underline{72} \\
102 \\
\underline{90} \\
128 \\
\underline{126} \\
20 \\
\underline{18} \\
2
\end{array}
$$

Mean Previous Grade: 2.457

ratio score was then applied to the "t" test of 1.96 in order to determine the significance of this difference in scores at the five percent level.

These calculations are shown in Figures 3 and 4 below:

$$S.E.M._d = \sqrt{S.E.M._A^2 + S.E.M._B^2}$$

$$= \sqrt{.1487^2 + .1209^2}$$

$$= \sqrt{.0221 + .0146}$$

$$= .1916$$

FIGURE 3

STANDARD ERROR OF A DIFFERENCE BETWEEN TWO MEANS ($S.E.M._d$)
PREVIOUS GRADE SCORES - GROUPS A AND B

$$\text{"t"} = \frac{M_A - M_B}{S.E.M._d}$$

$$= \frac{2.299 - 2.457}{.1916}$$

$$= \frac{.1580}{.1916}$$

$$= .8246$$

FIGURE 4

"t" RATIO FOR A DIFFERENCE BETWEEN TWO MEANS
PREVIOUS GRADE SCORES - GROUPS A AND B

A "t" ratio of .8246 was found for the difference between the mean scores on previous grades for the students in Groups A and B. According

TABLE V

STANDARD DEVIATION AND STANDARD ERROR OF THE MEAN

AVERAGE PREVIOUS GRADES - GROUP A

Student	Average Previous Grade	Deviation From M	Deviation Squared
A-1	2.556	.257	.0661
A-2	2.824	.525	.2756
A-3	3.500	1.201	1.4424
A-4	2.389	.090	.0081
A-5	2.000	- .299	.0894
A-6	2.708	.409	.1673
A-7	2.944	.645	.4160
A-8	1.800	- .499	.2490
A-9	1.667	- .632	.3994
A-10	1.074	- 1.225	1.5006
A-11	2.692	.393	.1545
A-12	2.000	- .299	.0894
A-13	2.056	- .243	.0591
A-14	1.625	- .674	.4543
A-15	3.500	1.201	1.4424
A-16	1.765	- .534	.2852
A-17	2.059	- .240	.0576
A-18	2.214	- .085	.0072
T	41.373	- .009	7.1636

M = 2.299

Standard Deviation (S.D.)

$$S.D. = \sqrt{\frac{\Sigma x^2}{N}}$$

$$= \sqrt{\frac{7.1636}{18}}$$

$$= \sqrt{.3980}$$

$$= .6309$$

Standard Error Of The Mean (S.E.M.)

$$S.E.M. = \frac{S.D.}{\sqrt{N}}$$

$$= \frac{.6309}{\sqrt{18}}$$

$$= \frac{.6309}{4.2426}$$

$$= .1487$$

TABLE VI

STANDARD DEVIATION AND STANDARD ERROR OF THE MEAN

AVERAGE PREVIOUS GRADES - GROUP B

Student	Average Previous Grade	Deviation From M	Deviation Squared
B-1	2.000	- .4570	.2088
B-2	1.893	- .5640	.3181
B-3	1.538	- .9190	.8446
B-4	2.111	- .3460	.1197
B-5	2.941	.4840	.2343
B-6	3.444	.9870	.9742
B-7	2.882	.4250	.1806
B-8	2.529	.0720	.0052
B-9	2.091	- .3660	.1340
B-10	2.313	- .1440	.0207
B-11	2.556	.0990	.0098
B-12	2.650	.1930	.0372
B-13	3.250	.7930	.6288
B-14	2.267	- .1900	.0361
B-15	3.111	- .6540	.4277
B-16	2.333	- .1240	.0154
B-17	2.588	.1310	.0172
B-18	1.731	- .7260	.5271
T	44.228	.0020	4.7395

M = 2.457

Standard Deviation (S.D.)

$$S.D. = \sqrt{\frac{\Sigma x^2}{N}}$$

$$= \sqrt{\frac{4.7395}{18}}$$

$$= \sqrt{.2633}$$

$$= .5131$$

Standard Error Of The Mean (S.E.M.)

$$S.E.M. = \frac{S.D.}{\sqrt{N}}$$

$$= \frac{.5131}{\sqrt{18}}$$

$$= \frac{.5131}{4.2426}$$

$$= .1209$$

to the null hypothesis, a difference in scores in order to be significant at the five percent level must be of 1.96 or greater. As the "t" value for the previous grades was only .8246, it was concluded by the researcher that the difference in student ability, as measured by previous grades, was not a significant difference. Therefore, the students in Groups A and B were assumed to be equal in academic ability as measured by previous grades.

English Grades

The next comparison made by the researcher to determine the academic equality of the students in Groups A and B was the English grades of each student in these two groups. The permanent record cards were again examined, and the English grades earned by the students used in this study for each semester of English taken in high school were obtained. These grades were averaged as discussed in Chapter III and were listed in Tables VII and VIII on pages 52 and 53. By totaling the English grades for the students in Group A and dividing by the number of students in Group A, it was found that the mean English grade for the students in Group A was 2.177. This calculation is shown on page 49.

The same steps were followed for the students in Group B, and it was found that the mean English grade for the students in Group B was 2.306. This calculation is also shown on page 49.

In order to continue the analysis of the English grades of the students in both Groups A and B according to the steps outlined by the null

Group A

Summation of English Grades: 39.178
Number of Students--Group A 18

$$
\begin{array}{r}
2.1765 \\
18\overline{)39.1780} \\
\underline{36} \\
31 \\
\underline{18} \\
137 \\
\underline{126} \\
118 \\
\underline{108} \\
100 \\
\underline{90} \\
10
\end{array}
$$

Mean English Grade: 2.177

Group B

Summation of English Grades: 41.499
Number of Students--Group B 18

$$
\begin{array}{r}
2.3055 \\
18\overline{)41.4990} \\
\underline{36} \\
54 \\
\underline{54} \\
99 \\
\underline{90} \\
90 \\
\underline{90} \\
0
\end{array}
$$

Mean English Grade: 2.306

hypothesis, it was necessary to compute the standard deviation and the standard error of the mean for both Groups A and B. These calculations are summarized in Tables VII and VIII on pages 52 and 53.

From Tables VII and VIII, it was determined that the standard error of the mean of the English grades for the students in Group A was .1405. The standard error of the mean of the English grades for the students in Group B was determined to be .1271. In order to determine if the difference in the mean English grades of Groups A and B was actually a significant difference, it was necessary to compute the standard error of the difference between the two means and a "t" ratio value for this difference. The "t" test of 1.96 was then used with the "t" ratio score in order to find out the significance of this difference in scores at the five percent level. These calculations are shown in Figures 5 and 6.

The "t" ratio for the difference between the mean scores on English grades for the students in Groups A and B was found to be .6807. According to the null hypothesis, a difference in grades must be greater than 1.95 in order to be significant at the five percent level. It was concluded by the researcher, therefore, that the difference in student ability as measured by English grades was not significant. Therefore, the students in Groups A and B were assumed to be equal in academic ability as measured by English grades.

Intelligence Quotient Scores

The final comparison made by the researcher to determine the academic ability of the students in Groups A and B was the intelligence quotient

$$S.E.M._d = \sqrt{S.E.M._A^2 + S.E.M._B^2}$$

$$= \sqrt{.1405^2 + .1271^2}$$

$$= \sqrt{.0197 + .0162}$$

$$= .1895$$

FIGURE 5

STANDARD ERROR OF A DIFFERENCE BETWEEN TWO MEANS ($S.E.M._d$)
ENGLISH GRADES - GROUPS A AND B

$$\text{"t"} = \frac{M_A - M_B}{S.E.M._d}$$

$$= \frac{2.177 - 2.306}{.1895}$$

$$= \frac{.1290}{.1895}$$

$$= .6807$$

"t" RATIO FOR A DIFFERENCE BETWEEN TWO MEANS
ENGLISH GRADES - GROUPS A AND B

scores of each of the students in these two groups. The student history files were examined and the intelligence quotient score for each student in the study was obtained. These scores are shown in Tables IX and X on pages 57 and 58. Once again, the mean intelligence score for the students

TABLE VII

STANDARD DEVIATION AND STANDARD ERROR OF THE MEAN

AVERAGE ENGLISH GRADES - GROUP A

Student	Average English Grade	Deviation From M	Deviation Squared
A-1	2.250	.0730	.0053
A-2	2.750	.5730	.3283
A-3	3.250	1.0730	1.1513
A-4	2.750	.5730	.3283
A-5	1.750	- .4270	.1823
A-6	2.333	.1560	.0243
A-7	3.000	.8230	.6773
A-8	2.000	- .1770	.0313
A-9	1.500	- .6770	.4583
A-10	1.000	- 1.1770	1.3853
A-11	2.429	.2520	.0635
A-12	2.000	- .1770	.0313
A-13	2.250	.0730	.0053
A-14	1.330	- .8470	.7174
A-15	3.000	.8230	.6773
A-16	2.000	- .1770	.0313
A-17	1.750	- .4270	.1823
A-18	1.833	- .3440	.1183
T	39.178	- .0110	6.3987

M = 2.177

Standard Deviation (S.D.)

$$S.D. = \sqrt{\frac{\Sigma x^2}{N}}$$

$$= \sqrt{\frac{6.3987}{18}}$$

$$= \sqrt{.3555}$$

$$= .5962$$

Standard Error Of The Mean (S.E.M.)

$$S.E.M. = \frac{S.D.}{\sqrt{N}}$$

$$= \frac{.5962}{\sqrt{18}}$$

$$= \frac{.5962}{4.2426}$$

$$= .1405$$

TABLE VIII

STANDARD DEVIATION AND STANDARD ERROR OF THE MEAN

AVERAGE ENGLISH GRADES - GROUP B

Student	Average English Grade	Deviation From M	Deviation Squared
B-1	2.000	- .3060	.0936
B-2	1.833	- .4730	.2237
B-3	1.000	- 1.3060	1.7056
B-4	2.333	.0270	.0007
B-5	2.500	.1940	.0376
B-6	3.000	.6940	.4816
B-7	3.000	.6940	.4816
B-8	2.000	- .3060	.0936
B-9	2.250	- .0560	.0031
B-10	2.000	- .3060	.0936
B-11	2.000	- .3060	.0936
B-12	2.250	- .0560	.0031
B-13	3.000	.6940	.4816
B-14	2.000	- .3060	.0936
B-15	3.250	.9440	.8911
B-16	2.500	.1940	.0376
B-17	2.750	.4440	.1971
B-18	1.833	- .4730	.2237
T	41.499	- .0090	5.2361

M = 2.306

Standard Deviation (S.D.)

$$S.D. = \sqrt{\frac{\Sigma x^2}{N}}$$

$$= \sqrt{\frac{5.2361}{18}}$$

$$= \sqrt{.2909}$$

$$= .5394$$

Standard Error Of The Mean (S.E.M.)

$$S.E.M. = \frac{S.D.}{\sqrt{N}}$$

$$= \frac{.5394}{\sqrt{18}}$$

$$= \frac{.5394}{4.2426}$$

$$= .1271$$

in Group A was calculated by totaling the intelligence scores of the students in Group A and dividing by the number of students in Group A. This mean intelligence score for the students in Group A was found to be 110.529 (rounded to three decimals). This calculation is shown on page 55.

The same procedure was followed for the students in Group B. The mean intelligence quotient score for the students in Group B was found to be 107.4444 (rounded to three decimals). This calculation is shown on page 55.

In following the steps outlined by the null hypothesis for a continued analysis of the intelligence quotient scores of the students in Groups A and B, it was necessary to compute the standard deviation and the standard error of the mean for both Groups A and B. These calculations are shown in Tables IX and X on pages 57 and 58.

It was determined from Tables IX and X that the standard error of the mean of the intelligence quotient scores for the students in Group A was 2.2890. The standard error of the mean of the intelligence quotient scores for the students in Group B was determined to be 2.0597. In order to determine if the difference in the mean intelligence quotient scores of the two groups was actually a significant difference, it was necessary to compute the standard error of the difference between the two means and a "t" ratio value for this difference. The "t" ratio value was then applied to a "t" test of 1.96 in order to determine the significance of this difference at the five percent level. These calculations are shown in

Group A

Summation of Intelligence Quotient Scores: 1879.000
Number of Students--Group A 17

```
   110.5294
17)1879.0000
   17
   ---
    17
    --
     90
     85
     --
      50
      34
      --
      160
      153
      ---
       70
       68
       --
        2
```

Mean Intelligence Quotient Score: 110.529

Group B

Summation of Intelligence Quotient Scores: 1934
Number of Students--Group B 18

```
   107.4444
18)1934.0000
   18
   --
    134
    126
    ---
     80
     72
     --
      80
      72
      --
       80
       72
       --
        80
        72
        --
         8
```

Mean Intelligence Quotient Score: 107.444

Figures 7 and 8.

$$S.E.M._d = \sqrt{S.E.M._A^2 + S.E.M._B^2}$$

$$= \sqrt{2.2890^2 + 2.0597^2}$$

$$= \sqrt{5.2395 + 4.2424}$$

$$= 3.0793$$

FIGURE 7

STANDARD ERROR OF A DIFFERENCE BETWEEN TWO MEANS ($S.E.M._d$)
INTELLIGENCE QUOTIENT SCORES - GROUPS A AND B

$$"t" = \frac{M_A - M_B}{S.E.M._d}$$

$$= \frac{110.529 - 107.4444}{3.0793}$$

$$= \frac{3.085}{3.0793}$$

$$= 1.0019$$

FIGURE 8

"t" RATIO FOR A DIFFERENCE BETWEEN TWO MEANS
INTELLIGENCE QUOTIENT SCORES - GROUPS A AND B

The "t" ratio for the difference between the two mean scores on intelligence quotient scores for the students in the two groups was found to be

TABLE IX

STANDARD DEVIATION AND STANDARD ERROR OF THE MEAN

INTELLIGENCE QUOTIENT SCORES - GROUP A

Student	Intelligence Quotient Score	Deviation From M	Deviation Squared
A-1	118	- 7.4710	55.8158
A-2	91	-19.5290	381.3818
A-3			
A-4	118	7.4710	55.8158
A-5	114	3.4710	12.0478
A-6	105	- 5.5290	30.5698
A-7	96	- 14.5290	211.0918
A-8	118	7.4710	55.8158
A-9	122	11.4710	131.5838
A-10	119	8.4710	71.7578
A-11	105	- 5.5290	30.5698
A-12	112	1.4710	2.1638
A-13	115	4.4710	19.9898
A-14	98	- 12.5290	156.9758
A-15	103	- 7.5290	56.6858
A-16	121	10.4710	109.6418
A-17	104	- 6.5290	42.6278
A-18	120	9.4710	89.6998
T	1879	.0070	1514.2346

M = 110.529

Standard Deviation (S.D.)

$$S.D. = \sqrt{\frac{\Sigma x^2}{N}}$$

$$= \sqrt{\frac{1514.2346}{17}}$$

$$= \sqrt{89.0726}$$

$$= 9.4378$$

Standard Error Of the Mean (S.E.M.)

$$S.E.M. = \frac{S.D.}{\sqrt{N}}$$

$$= \frac{9.4378}{\sqrt{17}}$$

$$= \frac{9.4378}{4.1231}$$

$$= 2.2890$$

TABLE X

STANDARD DEVIATION AND STANDARD ERROR OF THE MEAN

INTELLIGENCE QUOTIENT SCORES - GROUP B

Student	Intelligence Quotient Score	Deviation From M	Deviation Squared
B-1	120	12.5560	157.6531
B-2	115	7.5560	57.0931
B-3	109	1.5560	2.4211
B-4	117	9.5560	91.3171
B-5	100	- 7.4440	55.4131
B-6	98	- 9.4440	89.1891
B-7	91	- 16.4440	270.4051
B-8	120	12.5560	157.6531
B-9	102	- 5.4440	29.6371
B-10	96	- 11.4440	130.9651
B-11	105	- 2.4440	5.9731
B-12	114	6.5560	42.9811
B-13	103	- 4.4440	19.7491
B-14	115	7.5560	57.0931
B-15	96	- 11.4440	130.9651
B-16	109	1.5560	2.4211
B-17	108	.5560	.3091
B-18	116	8.5560	73.2051
T	1934	.0080	1374.4438

M = 107.444

Standard Deviation (S.D.)

$$S.D. = \sqrt{\frac{\Sigma x^2}{N}}$$

$$= \sqrt{\frac{1374.4438}{18}}$$

$$= \sqrt{76.3580}$$

$$= 8.7383$$

Standard Error Of The Mean (S.E.M.)

$$S.E.M. = \frac{S.D.}{\sqrt{N}}$$

$$= \frac{8.7383}{\sqrt{18}}$$

$$= \frac{8.7383}{4.2426}$$

$$= 2.0597$$

1.0019. Since, according to the null hypothesis, a difference in socres must be greater than 1.95 in order to be significant, it was concluded by the researcher that the difference in student ability, as measured by their performance on the intelligence quotient tests, was not a significant difference; and the students in Groups A and B were assumed to be of equal academic ability as measured by intelligence quotient scores.

Comparison of Speed Attempted and Percent of Accuracy Attained on 3-Minute New-Matter Dictation At the Completion of One Quarter's Instruction

Dictation Speed Attempted

At the conclusion of the first quarter of beginning shorthand instruction for the school year 1971-1972, the shorthand achievement records on the final 3-minute new-matter dictation test given during this study were examined by the researcher. The dictation speed attempted by each student in Groups A and B was obtained and listed opposite the student's code number in Tables XI and XII on pages 63 and 64. It was now necessary to determine if a difference in speed attempted between Groups A and B was a significant difference or a difference related to chance factors. This was done by applying the null hypothesis analysis to these groups of data.

The mean speed attempted for the students in Group A was found by totaling the speeds attempted of the students in Group A and dividing by the number of students in Group A. This mean speed attempted for the students in Group A was 38.8889. This calculation is shown on page 61.

The same steps were followed for the students in Group B. It was found that the mean dictation speed attempted for the students in Group B was 37.7778. This calculation is shown on page 61.

In continuing the analysis of the shorthand dictation speed attempted as outlined by the null hypothesis, it was necessary to compute the standard deviation and the standard error of the mean for both Groups A and B. These calculations are shown in XI and XII on pages 63 and 64.

From Tables XI and XII, it was determined that the standard error of the mean for shorthand dictation speed attempted for Group A was 3.4147. and the standard error of the mean for shorthand dictation speed attempted for Group B was 2.1596. In order to determine if this difference was actually a significant difference, it was necessary to compute the standard error of the difference between the two means and a "t" ratio value for this difference. This "t" ratio value was then applied to the "t" test of of 1.96 to determine if the actual difference in dictation speed attempted was a significant difference at the five percent level of confidence. These calculations are shown in Figures 9 and 10.

It should once again be remembered that for purposes of computing a "t" ratio value, the positive and negative values of numbers are disregarded. The "t" ratio for the difference between the two mean scores on shorthand dictation speeds attempted for Groups A and B was found to be .2750. As this "t" ratio value was not greater than 1.95, it was concluded by the researcher that the difference in shorthand dictation speeds

Group A

Summation of Dictation Speeds Attempted: 700.0000
Number of Students--Group A 18

```
   38.88888
18)700.00000
   54
   160
   144
    160
    144
     160
     144
      160
      144
       160
       144
        160
        144
         16
```

Mean Dictation Speed Attempted: 38.8889

Group B

Summation of Dictation Speeds Attempted: 680
Number of Students--Group B 18

```
   37.77777
18)680.00000
   54
   140
   126
    140
    126
     140
     126
      140
      126
       140
       126
        140
        126
         14
```

Mean Dictation Speed Attempted: 37.7778

$$S.E.M._d = \sqrt{S.E.M._A^2 + S.E.M._B^2}$$

$$= \sqrt{3.4147^2 + 2.1596^2}$$

$$= \sqrt{11.6602 + 4.6639}$$

$$= 4.0403$$

FIGURE 9

STANDARD ERROR OF A DIFFERENCE BETWEEN TWO MEANS ($S.E.M._d$)
DICTATION SPEED ATTEMPTED - GROUPS A AND B

$$"t" = \frac{M_A - M_B}{}$$

$$= \frac{38.8889 - 37.7778}{4.0403}$$

$$= \frac{1.1111}{4.0403}$$

$$= .2750$$

FIGURE 10

"t" RATIO FOR A DIFFERENCE BETWEEN TWO MEANS
DICTATION SPEED ATTEMPTED - GROUPS A AND B

attempted for Groups A and B was not a significant difference and that this difference was caused by some factor or factors related to chance alone.

TABLE XI

STANDARD DEVIATION AND STANDARD ERROR OF THE MEAN

DICTATION SPEED ATTEMPTED - GROUP A

Student	Dictation Speed Attempted	Deviation From M	Deviation Squared
A-1	40	1.1111	1.2345
A-2	40	1.1111	1.2345
A-3	40	1.1111	1.2345
A-4	40	1.1111	1.2345
A-5	-	- 38.8889	1512.3465
A-6	50	11.1111	123.4565
A-7	40	1.1111	1.2345
A-8	50	11.1111	123.4565
A-9	40	1.1111	1.2345
A-10	50	11.1111	123.4565
A-11	-	- 38.8889	1512.3465
A-12	40	1.1111	1.2345
A-13	50	11.1111	123.4565
A-14	50	11.1111	123.4565
A-15	40	1.1111	1.2345
A-16	40	1.1111	1.2345
A-17	50	11.1111	123.4565
A-18	40	1.1111	1.2345
T	700	- .0002	3777.7770

M = 38.8889

Standard Deviation (S.D.)

$$S.D. = \sqrt{\frac{\Sigma x^2}{N}}$$

$$= \sqrt{\frac{3777.7770}{18}}$$

$$= \sqrt{209.8765}$$

$$= 14.4871$$

Standard Error Of The Mean (S.E.M.)

$$S.E.M. = \frac{S.D.}{\sqrt{N}}$$

$$= \frac{14.4871}{\sqrt{18}}$$

$$= \frac{14.4871}{4.2426}$$

$$= 3.4147$$

TABLE XII

STANDARD DEVIATION AND STANDARD ERROR OF THE MEAN

DICTATION SPEED ATTEMPTED - GROUP B

Student	Dictation Speed Attempted	Deviation From M	Deviation Squared
B-1	40	2.2222	4.9382
B-2	40	2.2222	4.9382
B-3	40	2.2222	4.9382
B-4	40	2.2222	4.9382
B-5	40	2.2222	4.9382
B-6	40	2.2222	4.9382
B-7	40	2.2222	4.9382
B-8	40	2.2222	4.9382
B-9	40	2.2222	4.9382
B-10	40	2.2222	4.9382
B-11	-	- 37.7778	1427.1622
B-12	40	2.2222	4.9382
B-13	40	2.2222	4.9382
B-14	40	2.2222	4.9382
B-15	40	2.2222	4.9382
B-16	40	2.2222	4.9382
B-17	40	2.2222	4.9382
B-18	40	2.2222	4.9382
T	680	- .0004	1511.1116

M = 37.7778

Standard Deviation (S.D.)

$$S.D. = \sqrt{\frac{\Sigma x^2}{N}}$$

$$= \sqrt{\frac{1511.1116}{18}}$$

$$= \sqrt{83.9506}$$

$$= 9.1625$$

Standard Error Of The Mean (S.E.M.)

$$S.E.M. = \frac{S.D.}{\sqrt{N}}$$

$$= \frac{9.1625}{\sqrt{18}}$$

$$= \frac{9.1625}{4.2426}$$

$$= 2.1596$$

Percent of Accuracy Attained

The final comparison of student achievement made by the researcher was the percent of accuracy attained by the students in Groups A and B on the final 3-minute new-matter dictation test given during the course of this study. The achievement records for this final test were again examined. The percent of accuracy attained by each student in Groups A and B was obtained and listed opposite the student's code number in Tables XIII and XIV.

The mean percent of accuracy attained for the students in Group A was then computed by totaling the percents of accuracy attained of the students in Group A and dividing by the number of students in Group A. The mean percent of accuracy attained for the students in Group A was 82.1667. This calculation is shown on page 66.

The same procedure was followed for the students in Group B. It was found that the mean percent of accuracy attained by the students in Group B was 75.2222. This calculation is also shown on page 66.

In continuing the analysis of the percent of accuracy attained as outlined by the null hypothesis, it was again necessary to compute the standard deviation and the standard error of the mean for Groups A and B. These calculations are shown in Tables XIII and XIV on pages 67 and 68.

From the data in Tables XIII and XIV, it was determined that the standard error of the mean for percent of accuracy attained for Group A was 7.4942, and the standard error of the mean for percent of accuracy

Group A

Summation of Percents of Accuracy Attained: 1479.0
Number of Students--Group A 18

```
      82.16666
   ------------
18)1479.00000
   144
   ---
     39
     36
     --
      30
      18
      --
      120
      108
      ---
       120
       108
       ---
        120
        108
        ---
         120
         108
         ---
          12
```

Mean Percent of Accuracy Attained: 82.1667

Group B

Summation of Percents of Accuracy Attained: 1354.0
Number of Students--Group B 18

```
   ------------
18)1354.00000
   126
   ---
     94
     90
     --
      40
      36
      --
       40
       36
       --
        40
        36
        --
         40
         36
         --
          4
```

Mean Percent of Accuracy Attained: 75.2222

TABLE XIII

STANDARD DEVIATION AND STANDARD ERROR OF THE MEAN

PERCENT OF ACCURACY ATTAINED - GROUP A

Student	Percent Of Accuracy Attained	Deviation From M	Deviation Squared
A-1	90	7.8333	61.3606
A-2	95	12.8333	164.6936
A-3	98	15.8333	250.6934
A-4	96	13.8333	191.3602
A-5	--	- 82.1667	6751.3666
A-6	98	15.8333	250.6934
A-7	88	5.8333	34.0274
A-8	99	16.8333	283.3600
A-9	100	17.8333	318.0266
A-10	100	17.8333	318.0266
A-11	--	- 82.1667	6751.3666
A-12	95	12.8333	164.6936
A-13	99	16.8333	283.3600
A-14	92	9.8333	96.6938
A-15	41	- 41.1667	1694.6972
A-16	94	11.8333	140.0270
A-17	96	13.8333	191.3602
A-18	98	15.8333	250.6934
T	1479	- .0006	18196.5002

M = 82.1667

Standard Deviation (S.D.)

$$S.D. = \sqrt{\frac{\Sigma x^2}{N}}$$

$$= \sqrt{\frac{18196.5002}{18}}$$

$$= \sqrt{1010.916}$$

$$= 31.7949$$

Standard Error Of The Mean (S.E.M.)

$$S.E.M. = \frac{S.D.}{\sqrt{N}}$$

$$= \frac{31.7949}{\sqrt{18}}$$

$$= \frac{31.7949}{4.2426}$$

$$= 7.4942$$

TABLE XIV

STANDARD DEVIATION AND STANDARD ERROR OF THE MEAN

PERCENT OF ACCURACY ATTAINED - GROUP B

Student	Percent Of Accuracy Attained	Deviation From M	Deviation Squared
B-1	60	- 15.2222	231.7154
B-2	98	22.7778	518.8282
B-3	97	21.7778	474.2726
B-4	73	- 2.2222	4.9382
B-5	73	- 2.2222	4.9382
B-6	60	- 15.2222	231.7154
B-7	34	- 41.2222	1699.2698
B-8	92	16.7778	281.4946
B-9	93	17.7778	316.0502
B-10	91	15.7778	248.9390
B-11	--	- 75.2222	5658.3794
B-12	91	15.7778	248.9390
B-13	96	20.7778	431.7170
B-14	78	2.7778	7.7162
B-15	76	.7778	.6050
B-16	68	- 7.2222	52.1602
B-17	78	2.7778	7.7162
B-18	96	20.7778	431.7170
T	1354	.0004	10851.1116

M = 75.2222

Standard Deviation (S.D.)

$$S.D. = \sqrt{\frac{\Sigma x^2}{N}}$$

$$= \sqrt{\frac{10851.1116}{18}}$$

$$= \sqrt{602.8395}$$

$$= 24.5528$$

Standard Error Of The Mean (S.E.M.)

$$S.E.M. = \frac{S.D.}{\sqrt{N}}$$

$$= \frac{24.5528}{\sqrt{18}}$$

$$= \frac{24.5528}{4.2426}$$

$$= 5.7872$$

attained for Group B was 5.7872. To determine if this difference in percents of accuracy attained was actually a significant difference, it was again necessary to compute the standard error of the difference between the two means and a "t" ratio value for this difference. This "t" ratio value was then applied to the "t" test to determine if the actual difference in percent of accuracy attained was a significant difference. These calculations are shown in Figures 11 and 12.

$$S.E.M._d = \sqrt{S.E.M._A^2 + S.E.M._B^2}$$

$$= \sqrt{7.4942^2 + 5.7872^2}$$

$$= \sqrt{56.1630 + 33.4917}$$

$$= 9.4686$$

FIGURE 11

STANDARD ERROR OF A DIFFERENCE BETWEEN TWO MEANS ($S.E.M._d$)
PERCENT OF ACCURACY ATTAINED - GROUPS A AND B

A "t" score to be significant at the five percent level of confidence must be greater than 1.95. The "t" ratio for the difference between the two mean scores on percents of accuracy attained for Groups A and B was found to be .7334. Therefore, it was concluded by the researcher that the difference in percents of accuracy attained for Groups A and B was not a

significant difference. It was also concluded by the researcher that some factor or factors related to chance alone were responsible for this difference.

$$\text{"t"} = \frac{M_A - M_B}{S.E.M._d}$$

$$= \frac{82.1667 - 75.2222}{9.4686}$$

$$= \frac{6.9445}{9.4686}$$

$$= .7334$$

FIGURE 12

"t" RATIO FOR A DIFFERENCE BETWEEN TWO MEANS
PERCENT OF ACCURACY ATTAINED - GROUPS A AND B

Summary

It was the purpose of this chapter to make various comparisons of the data which had been collected for Groups A and B, and these comparisons were made between Groups A and B. The Kuder Clerical Interest ratings of the students in Groups A and B were compared to determine if these two groups had similar clerical interest.

The previous grades, English grades, and intelligence quotient scores of the students in the two groups were then compared to determine if these two groups were of equal academic ability.

Final comparisons were made at the end of the first quarter of short-

hand instruction. The shorthand dictation speed attempted and the percent of accuracy attained by each student, as measured by 3-minute new-matter dictation tests, were the basis for these comparisons of Groups A and B. Statistical procedures outlined by the null hypothesis were utilized to facilitate all comparisons made in this study.

Conclusions drawn from the data compiled for this study are summarized in Chapter V.

CHAPTER V

SUMMARY AND CONCLUSIONS

This study attempted to compare the effects of using two different methods of teaching beginning shorthand. The achievement records, as measured by 3-minute new-matter dictation tests, of all students enrolled in beginning shorthand at Dawson County High School in Glendive, Montana, during the 1971-1972 school year were analyzed to facilitate this comparison. Answeres to the following questions were sought:

1. Would the use of a teaching method requiring the dictation practice at a constant, high rate of speed affect the achievement of learners in beginning shorthand?

2. Would the use of a teaching method involving the early introduction of new-matter dictation affect the achievement of learners in beginning shorthand?

3. Would there be a significant difference in the achievement of students taught by these two methods?

Summary

Prior to the beginning of school, the students were assigned to one of the two beginning shorthand classes offered. Each of these classes was then assigned a group letter--A or B. Group A was taught using the early new-matter approach. In this approach, new-matter dictation is presented very early in the year. Tracing of the outlines in the text is used to facilitate learning, and the brief forms are practiced to a point of automatization.

Group B was taught using the micromolar approach to the beginning of shorthand. In this approach, a constant practice dictation rate of 100 words a minute, using tracing plates, is employed from the beginning of instruction.

The two groups were compared to determine if they were equal in clerical interest and academic ability. The Kuder Clerical Interest ratings previous grades, English grades, and intelligence quotient scores were used to facilitate these comparisons.

At the completion of the first quarter's instruction, the achievement of the students in Groups A and B, as measured by 3-minute new-matter dictation takes, were compared. The dictation speed attempted and the percent of accuracy attained by the students were used for these comparisons.

Conclusions

Based on the findings given in Chapter IV, the following conclusions are made:

1. The early new-matter approach to the teaching of beginning shorthand is an effective method.

2. The micromolar approach to the teaching of beginning shorthand is an effective method.

3. There is no significant difference in the achievement of students at the end of one quarter of instruction when taught by these two methods.

Recommendations

If further investigation using the early new-matter approach and the micromolar approach to the teaching of beginning shorthand were to be conducted, the following recommendations for research might be considered:

1. A study for one complete year of shorthand instruction applying the two methods might find more evidence to support one of the two methods.

2. A larger sample should be used.

3. The final comparison might be made between the percents of accuracy attained on 3-minute new-matter dictation tests, rather than on both speed of dictation attempted and percent of accuracy attained as was done in this study. This could be done by dictating the tests at various speeds and requiring each student to attempt each speed, and then comparing the percents of accuracy attained by each student at each speed.

BIBLIOGRAPHY

Marion L. Boss, "A Micromolar Behavioristic Approach to Dictation Skill Building in Beginning Shorthand" (unpublished doctoral dissertation, Colorado State College, Greeley, June, 1967).

Lloyd V. Douglas, James T. Blanford, and Ruth I Anderson, Teaching Business Subjects (Englewood Cliffs: Prentice-Hall, Inc., 1965), pp. 194-195.

Shirley Eiken, "Consider the Micromolar Behavior Theory in Speed Development," The Delta Pi Epsilon Journal, 7:110, July, 1965.

Frank A. Logan, "Micromolar Behavior Theory and Performance Speed in Education," Harvard Educational Review, 33:179, Spring, 1963.

Harves Rahe, Shorthand-Secretarial Research Index (New York: Gregg Division, McGraw-Hill Book Co., Inc., 1965).

Allien R. Russon, Methods of Teaching Shorthand, Monograph 119 (Cincinnati: South-Western Publishing Comapny, 1968), pp 14-16.

Carolyn Schloemer, "Approaches to Teaching Beginning Shorthand," The Balance Sheet, 46:299&332, March, 1965.

Kenneth B. Settle, "The Relative Effectiveness of Two Methods of Teaching Gregg Shorthand" (unpublished doctoral dissertation, University of Cincinnati Teachers' College, Colorado, June, 1961).

Rita A. Sloan, "An Application of the Micromolar Behavior Theory to the Instruction of Beginning Shorthand" (unpublished doctoral dissertation, University of Minnesota, Minneapolis, June, 1967).

Bobbye Sorrels Persing, "A Classroom Investigation of When to Begin New-Matter Dictation in Gregg Shorthand" (unpublished doctoral dissertation, University of Oklahoma, Norman, June, 1966).

William C. Ward, Jr., "An Investigation Indicating the Effect of Early Use of New-Matter Dictation on the Achievement of First-Year Shorthand Students" (unpublished master's thesis, University of Utah, Salt Lake City, June, 1966).

Webster's Seventh New Collegiate Dictionary (Springfield: G. & C. Merriam Company, 1965) p. 533.

APPENDIX A

TABLES

TABLE I

RELATIVE DATA - GROUP A

Group And Number	Class	Intelligence Quotient	Average Grade	Average English Grade	Kuder Clerical Interest Rating	Dictation Speed Attempted	Percent Of Accuracy Attained
A-1	11	118	2.556	2.250	68	40	90
A-2	11	91	2.824	2.750	33	40	95
A-3	12	---	3.500	3.250	27	40	98
A-4	11	118	2.389	2.750	90	40	96
A-5	11	114	2.000	1.750	38	0	0
A-6	12	105	2.708	2.333	44	50	98
A-7	11	96	2.944	3.000	46	40	88
A-8	11	118	1.800	2.000	56	50	99
A-9	11	122	1.667	1.500	71	40	100
A-10	12	119	1.074	1.000	79	50	100
A-11	12	105	2.692	2.429	46	0	0
A-12	11	112	2.000	2.000	94	40	95
A-13	11	115	2.056	2.250	93	50	99
A-14	11	98	1.625	1.333	--	50	92
A-15	11	103	3.500	3.000	92	40	41
A-16	11	121	1.765	2.000	95	40	94
A-17	11	104	2.059	1.750	49	50	96
A-18	12	120	2.214	1.833	72	40	98

TABLE II

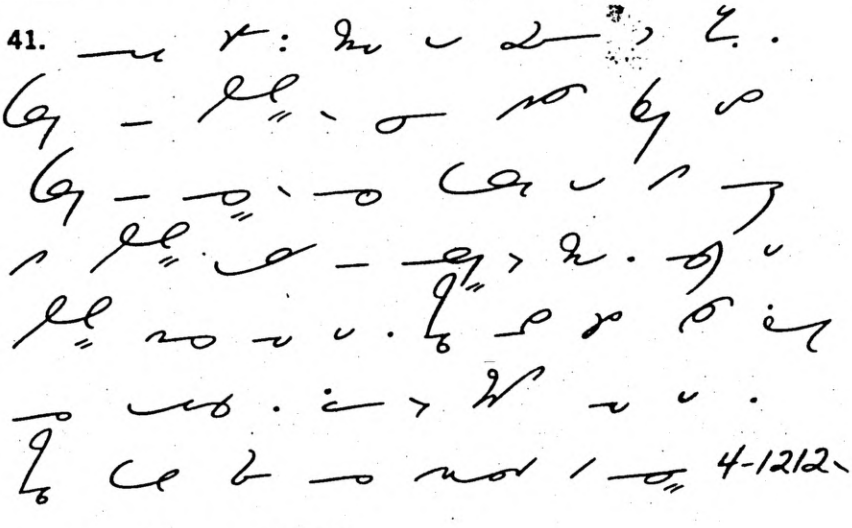
RELATIVE DATA - GROUP B

Group And Number	Class	Intelligence Quotient	Average Grade	Average English Grade	Kuder Clerical Interest Rating	Dictation Speed Attempted	Percent Of Accuracy Attained
B-1	11	120	2.000	2.000	38	40	60
B-2	12	115	1.893	1.833	21	40	98
B-3	12	109	1.538	1.000	64	40	97
B-4	12	117	2.111	2.333	10	40	73
B-5	11	100	2.941	2.500	76	40	73
B-6	12	98	3.444	3.000	67	40	60
B-7	11	91	2.882	3.000	87	40	34
B-8	11	120	2.529	2.000	56	40	92
B-9	11	102	2.091	2.250	35	40	93
B-10	11	96	2.313	2.000	36	40	91
B-11	11	105	2.556	2.000	27	0	0
B-12	11	114	2.650	2.250	83	40	91
B-13	11	103	3.250	3.000	20	40	96
B-14	12	115	2.267	2.000	14	40	78
B-15	11	96	3.111	3.250	73	40	76
B-16	11	109	2.333	2.500	94	40	68
B-17	11	108	2.588	2.750	99	40	78
B-18	12	116	1.731	1.833	20	40	96

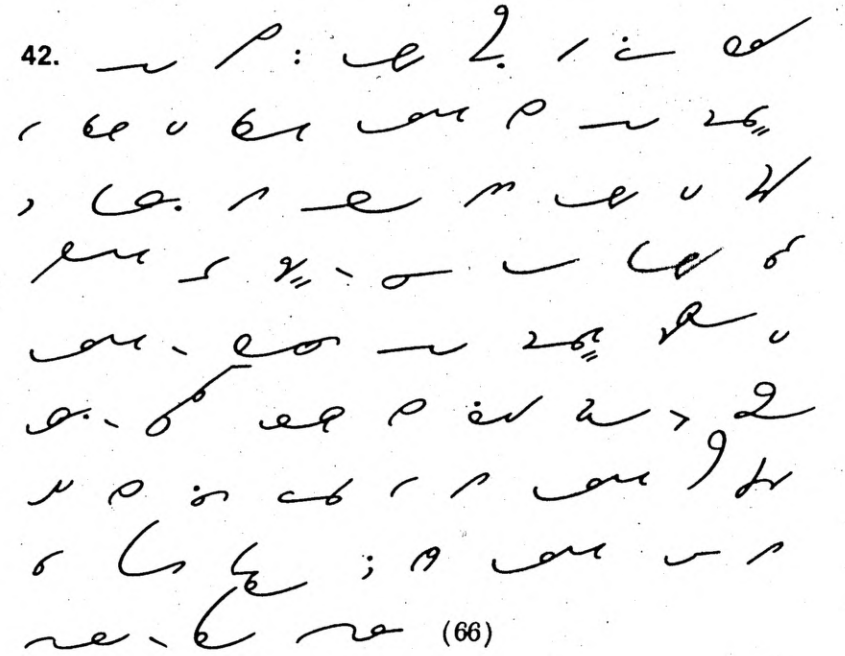
APPENDIX B

TRACING PLATES

40 GREGG SHORTHAND · *Lesson 6*

41. 

(66)

42. 

(66)