THE UNIVERSITY OF OKLAHOMA

GRADUATE COLLEGE

A STUDY OF ACHIEVEMENT IN SECOND-YEAR TYPEWRITING

A DISSERTATION

SUBMITTED TO THE GRADUATE FACULTY

in partial fulfillment of the requirements for the degree of

DOCTOR OF EDUCATION

BY

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Norman, Oklahoma

1959

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A STUDY OF ACHIEVEMENT IN

SECOND-YEAR TYPEWRITING

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ACKNOWLEDGMENT

The writer wishes to express his [redacted]
to the chairman of his doctoral committee [redacted]
this investigation, Dr. Gerald A. Porter, [redacted]
ously of his time, and whose interest, [redacted]
ance were so essential in the development [redacted]
also wishes to acknowledge the assistance [redacted]
received from the other members of his [redacted]
Dr. Arthur W. Heilman, Dr. John E. Mertes, [redacted]
James C. Powell, and Dr. Gail Shannon.

Appreciation is extended to Dr. [redacted]
tiger, and Dr. O. J. Rupiper, for their [redacted]
statistical procedures used in this study; [redacted]
E. Shearer, Dean James D. Morrison, and [redacted]
Southeastern State College who gave [redacted]
the period of graduate study; and to the [redacted]
istrators of the participating high schools [redacted]
ance and cooperation.

To my wife, Lucretia Mathies McCoy,

and my sons,

John Wharton, and Joe David

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A STUDY OF ACHIEVEMENT IN SECOND-YEAR TYPEWRITING

CHAPTER I

THE PROBLEM

Introduction

Education is currently being subjected to more criticism than in perhaps any period to date. It appears that there is evidence to substantiate claims that at least some parts of our educational system are less effective than they might be. Political and educational leaders, as well as the "man on the street" are showing concern about education and some attempts are being made to improve those phases of education which may be inferior to those of other nations.

Unfortunately, the great nation-wide interest currently shown in regard to education has developed primarily in terms of instruction in science and mathematics. If not properly channeled, the current criticisms and proposals for federal subsidization of education may eventually result in over-emphasis of some areas coupled with neglect of other equally important areas.

The special interest in the scientific areas evidenced at this time has been the result of a general concern for our national defense. Since no specific crisis is likely to occur to focus attention on other phases of education, increased interest in, and support for, these phases must be the result of spontaneous efforts on the part of educators with direct responsibility for such phases.

Business education is comparatively new. It did not assume importance in any of our secondary schools until sometime after 1900, as was indicated by Tonne, Popham, and Freeman[1] when they said, "Little effort was made to introduce extensive business training courses into the public high schools until 1910." However, business education has matured rapidly, and currently is a significant element in secondary-school and college programs.

Typewriting has been playing an increasingly important role in the business education curriculum for the past two decades. The earliest year in which the United States Office of Education[2] lists figures for enrollment in typewriting is 1922, when 281,524 students were enrolled. Since 1922 enrollments in typewriting in the public high schools of this country have exceeded the enrollments in bookkeeping,

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[1] Herbert A. Tonne, Estelle L. Popham, and M. Herbert Freeman, Methods of Teaching Business Subjects (New York: Gregg Publishing Company, 1949), p. 4.

[2] Statistics of Public High Schools, 1927-28 (Washington: U. S. Office of Education, Bulletin 35, 1929), p. 102.

the subject originally believed to be the foundation of all business education. Strong[1] states that the enrollment in secondary-school typewriting increased steadily from 281,524 in 1922 to 1,118,538 in 1940.

The latest comprehensive data[2] which have been published relative to business subject enrollments, in the secondary schools for the United States, show that the enrollment in typewriting climbed to 1,216,142 students in 1949. In that year, approximately 34 per cent of the total enrollment in business subjects was in typewriting. Approximately one-fourth, 312,110, of the typewriting students were enrolled in advanced courses of instruction in 1950.

Since no accurate data relative to typewriting enrollments for the country as a whole are available beyond the year 1949, only rough approximations of the current enrollments can be made. However, most business educators agree with Enterline that:

> It is safe to assume that departments of business education will continue to enroll in business courses at least the same proportionate number of students. With the increased holding power of schools, with increased need for workers on the skilled and technical levels, there is good reason to believe that a

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[1]Earl P. Strong, The Organization, Administration, and Supervision of Business Education (New York: Gregg Publishing Co., 1944), p. 44.

[2]J. Dan Hull, et al., "Offerings and Enrollments in High School Subjects," Chapter 5, Biennial Survey of Education in the U. S., 1948-50 (Washington 25, D. C.: U. S. Government Printing Office, 1951).

> larger proportion of students entering the secondary school will enroll in business subjects.[1]

If one assumes that enrollment in secondary-school typewriting has continued to be the same percentage of the total student enrollment as in 1949, the current enrollment in high school typewriting is at least 1,739,745 students.

An indication of the importance of typewriting in our schools is the following statement by Clements:

> Because typewriting is a basic communication skill in our culture and because of its extreme popularity as a secondary-school subject in both urban and rural communities, it may be concluded that typewriting today is a basic element in the program of general education rather than merely one phase of the vocational preparation of an office worker.[2]

Today, typewriting has assumed a position of such importance in the secondary-schools of Oklahoma that 34 of every 100 students are enrolled in typewriting, with 8 of every 100 enrolled in second-year typewriting.[3] It is probable that whenever enrollment in any course of instruction becomes so prevalent, research which might improve instructional practices should be undertaken.

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[1] H. G. Enterline, "The Characteristics of a Changing School Population," Curriculum Patterns in Business Education, The American Business Education Yearbook, Volume XIII (Somerville, N. J.: Somerset Press, 1956), p. 17-18.

[2] Joseph Hardin Clements, "Business Education in the Secondary Schools of Oklahoma" (unpublished Ed. D. dissertation, University of Oklahoma, 1954), p. 188.

[3] Ibid., p. 182.

The Southwest Conference on Business Education[1] in June, 1951, asked two panels of speakers to discuss the merits of including typewriting II in the high school curriculum. The discussion was in the form of a debate with one group taking the affirmative and another the negative side of the question. Of course, no decision was reached but the debate made clear the fact that some business teachers are seriously questioning the value of second-year typewriting in the high-school curriculum.

Writing in regard to factors to consider in curriculum construction, Selden says:

> A sound education calls for more than bookkeeping, shorthand, and typewriting. The students require a sound economic education . . .[2]

Davis likewise recognized the need for a broader business curriculum when he wrote:

> The business curriculum should provide vocational education for the majority as well as the minority--the continuation of many programs, such as typewriting I, typewriting II, shorthand I, and shorthand II, often eliminates business education for the majority of the pupils in many small high schools. Courses in clerical practice, general business, salesmanship, and record keeping would probably satisfy the demands of many more pupils.[3]

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[1]Becky Sharp, "The Typing II Case," The New Mexico Business Educator (Las Vegas, New Mexico: New Mexico Highlands University, March, 1952), p. 17.

[2]William Selden, "Curriculum Levels in Business Education Formal and Terminal Levels: In-Service and Continuing Levels," Curriculum Patterns in Business Education, The American Business Education Yearbook, Volume XIII (Somerville, N. J.: Somerset Press, 1956), p. 159.

[3]Reed Davis, "The Elective-Sequence Curriculum Pattern," Curriculum Patterns in Business Education, The American Business Education Yearbook, Volume XIII (Somerville, N. J.: Somerset Press, 1956), p. 168.

A study of current research and literature will reveal that American businessmen, and foreign educators who visit America, are also inclined to question the relative values of the business courses included in the average high-school curriculum. Studies have indicated that businessmen place less emphasis than most business teachers on the building of a battery of specific business skills, such as typewriting, to a high level of proficiency. Instead, they attach more importance to correct grammar, spelling, personality and general background subjects.[1]

Takaharu Ono, the Supervisor of Business Education, Ministry of Education, Tokyo, Japan, visited the United States so that he might gain knowledge with which he could establish an effective program of business training in the schools of Japan. After his visit, he wrote a report of "Impressions of American Business Education" in which he indicated the aspects of the American high school business education program with which he was favorably, or unfavorably, impressed. The first of Ono's unfavorable impressions of American business education was:

> Too much emphasis on skill training. I found a great portion of the business curriculum was occupied by such skill training as typewriting and shorthand. On the contrary, those courses which are called general, basic or social-business, . . . were found in comparatively few schools.[2]

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[1]Tonne, Popham, and Freeman, op. cit., p. 15.

[2]Takaharu Ono, "Impressions of American Business Education," American Business Education, November, 1955, p. 111.

Ono commented further to the effect that business education authorities talk a lot about basic courses, but aren't doing much about them. It is apparent to many educators that business education is not mere training in specific narrow skills and should involve a broad background knowledge and understanding of business and economics. Such background knowledge and understanding is indispensable for business workers.

In many secondary schools all of the attention of the business department is directed toward instruction in the three traditional business subjects of typewriting, bookkeeping, and shorthand, to the extent of four semesters or more of each, and the need for background courses in business is largely ignored. The need for a broad business curriculum, with limited vertical extension of any one subject, is most frequently encountered in the high school which has only one or two business teachers. There it is virtually impossible to offer more than one year of instruction in any one area and continue to make available a well-rounded program of business subjects.

The preceding pages of this study have indicated that our entire educational system is currently undergoing close scrutiny and revision. Specific areas of specialization are endeavoring to meet the challenge of the need for better training, in every conceivable way. The relatively new, and rapidly expanding, departments of business education like

many other subject matter areas, have recognized that they must continually seek out and use the most effective curricula, methods, and materials available if they are to meet the needs of their students. Earlier in this chapter it was indicated that serious questions have arisen concerning the wisdom of including advanced courses of instruction in skill subjects, like typewriting, in our high school curricula. It is possible that business teachers have over-estimated the value of the second year of typewriting in many of our public high schools. Research which indicates the amount of learning during the course of instruction in second-year typewriting is needed to indicate the advisability of retaining second-year typewriting, in our high-school courses of study.

Statement of the Problem

This study constitutes an attempt to discover the extent of learning of students during the course of instruction in the second year of typewriting in selected public high schools in Oklahoma.

In completing the investigation an attempt was made to determine the extent of the achievement of students during the second year of typewriting in terms of: (1) changes of students' ability to typewrite straight-copy material; (2) changes in number and kinds of typewriting errors; and (3) changes in ability to perform typewriting production work.

From the outset, this study was designed to determine the degree to which basic typewriting skills are extended as

a result of instruction provided in the second year of typewriting in secondary schools.

Delimitation

The data in this study are limited primarily to those obtained through testing 221 students enrolled in 15 classes of second-year typewriting, taught by 10 different teachers in four secondary schools in Oklahoma City. The data are not necessarily representative of instruction in other schools in Oklahoma City or in any other part of the United States.

Only those students who had completed the first year of typewriting in Oklahoma City were included in this study.

Source of Data

The data for this study were obtained through the process of administering "The Students Typewriting Tests," Volume XIII, Test 3, to 542 students and from records in the administrative offices of the schools involved in the investigation. The intelligence quotients of students as well as information concerning age, sex, grade placement, and grades in first-year typewriting were obtained from the permanent record files of the students, and from questionnaires filled out by the participants.

Procedure

"The Students Typewriting Tests," Volume XIII, Test 3, was administered to 542 students enrolled in the second year

of typewriting in selected schools in Oklahoma City. The test was administered to this group on three different occasions: (1) during the second week of classes in September, 1956; (2) again during the eighteenth week of instruction; and (3) finally during the thirty-fifth week of instruction.

The tests were scored in accordance with the grading scale furnished by the authors. The data were then treated statistically to determine the amount of learning that had taken place during the year of instruction.

The extent of change in the net words per minute, number of errors committed, score on the timed-writing portion of the test, score on the production portion of the test, and over-all score were determined for each student each semester. The number and types of errors committed were analyzed, and the errors were classified according to type. An effort was made to learn if there was any consistency in the number and types of errors made by typists.

Specifically, the steps in the procedure were as follows: (1) an extensive review of current literature and research; (2) study of all available tests and the selection of the one which best measures the elements with which this study is concerned; (3) the selection of an adequate sample; (4) the administration of the tests; (5) the analysis and statistical treatment of the test results; (6) preparation of the report summarizing the entire investigation.

It should be noted that step 5 of the procedure for this study consisted of several specific parts as indicated by the following outline.

I. Determination of scores, central tendencies, variability, and analysis of errors.

   A. The score for each part of the test, the production section, and entire test was determined for each student in accordance with the weighted scale furnished by the sponsors of the test.

   B. The timed writings were graded according to the International Typewriting Contest Rules. The score was stated in terms of net words per minute, gross words per minute, and number of errors committed.

   C. The mean was calculated for the group to determine the central tendency of the calculated scores.

   D. The standard error of the mean was computed to determine the extent to which these statistics might diverge from the parameter. The critical ratio was used to determine the degrees of freedom of the calculated mean.

   E. To determine the variability and reliability of the scores obtained, the range, the standard deviation, and the standard error of the standard deviation were computed.

   F. The errors committed were analyzed and classified into the following types: (1) letter substitution, manipulation errors, mental errors, and miscellaneous errors on the timed writings, and (2) stroking, manipulation, and mental association errors on each of the other three parts.

II. The difference, and the standard error of the difference, of the means of each previous calculation were computed.

III. The coefficient of correlation was computed between the change in the test scores and the age, grade placement, intelligence and prior grades in typewriting.

IV. The differences between the means were calculated to determine if there were significant differences in the scores achieved by different sexes.

V. The group was broken into quartiles based upon the scores made on the first test. The progress made by each quartile was compared with the progress made by each of the other quartiles to determine if students in one quartile made more progress during the period of instruction than the students in another quartile.

VI. Prior research was studied in an effort to determine if, and at what stage of the period of instruction, the subjects in this study reached a level of efficiency which was acceptable for employment.

The remainder of this research report presents in detail each of the significant phases of the investigation of the extent of achievement in second-year typewriting. A review of research and literature related to the problem is presented in Chapter II. Chapter III is a discussion of background information helpful to the reader in better understanding and interpreting the data presented. A presentation and analysis of data to reveal the extent of achievement of students is included in Chapter IV. Chapter V consists of a discussion of the timed writing results; and production typewriting is dealt with in Chapter VI. Information relating to the control factor in typewriting is presented in Chapter VII. Chapter VIII contains a summary of the data, statement of findings and the conclusions reached.

CHAPTER II

RELATED LITERATURE

To date there have been relatively few studies which are directly related to the problem of this investigation; however, numerous significant studies have been made which relate to certain limited phases of the total problem. Most prior related research studies have been status studies which have been reported in master's theses or doctoral dissertations.

The following reviews of related research are not meant to be a comprehensive summary of all studies involving areas covered by this research project. Instead, the material reviewed here is intended to be a representative sample of the prior research most closely related to this study.

In 1951, Browning[1] analyzed the progress made by students on production tests in the first-quarter typewriting classes at the University of Tennessee. Progress was measured in terms of gross rates of typewriting business letters, envelopes, reports, tabulations, and centering problems. An

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[1]Bette Eilene Browning, "Progress of University Typewriting Students as Measured by a Series of Production Tests" (unpublished Master's thesis, University of Tennessee, 1951).

analysis of errors on the series of production tests was also made.

Progress was calculated from the fifth through the twelfth week of instruction. The findings most closely related to this study are:

> 1. The gross words a minute on business letters increased from 14.00 words a minute on the first test to 16.83 words a minute on the last test.
> 2. The tabulation rates decreased from 6.83 gross words a minute at the end of the eighth week when tabulation was introduced, to 6.65 gross words a minute on the final test.
> 3. Centering was tested only during the sixth and twelfth weeks. The gross words per minute decreased from 5.77 on the first test to 5.33 on the final examination.
> 4. The actual number of errors classified as form on the business letters decreased throughout the test series, but increased when stated as a percentage of the total number of errors. The actual number of errors classified as placement remained constant, but increased on a percentage basis.
> 5. On actual and percentage bases the vertical and horizontal spacing errors increased during the semester on tabulated material. The total errors on tabulation decreased during the semester.[1]

It should be pointed out that in the Browning study erasing was not permitted on the first series of tests; but was required on the last tests. This may account for some of the failure of the students to improve their scores; however, Browning states as one of her findings that, "Erasing may be taught after students have had some experience in typing business letters, and gross production rates are not reduced if erasures are made efficiently."[2]

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[1] Ibid., p. 87.

[2] Ibid.

Rahe's[1] review of research in typewriting covered all research studies in the field of typewriting instruction that were made in the United States prior to January 1, 1949.

Rahe found that speed requirements on straight-copy material were reported as 35-40, and 50-60 net words a minute for the second and fourth semesters, respectively, of high school typewriting. He also found that other research studies indicated that office typists were found to type straight-copy material at 54 net words a minute.

Rahe's study listed several findings and conclusions relating to errors in typewriting. Those most closely related to this study were:

> 1. Advanced typewriting pupils make fewer errors a page than do beginning typewriting pupils.
> 2. Bright pupils, as determined by intelligence tests, make fewer errors in typewriting than dull pupils, and the two groups tend to make different kinds of errors.[2]

Sharp[3] states that minimum achievement standards for first-year typewriting students range from 30 to 36 net words per minute; but at the conclusion of the second year, the standard range is from 35 to 60 net words per minute.

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[1]Harves Christian Rahe, "Review of Research in Typewriting" (unpublished Ed. D. dissertation, School of Education, Indiana University, 1950), p. 853.

[2]Ibid., p. 444.

[3]Becky Sharp, "The Typing II Case," The New Mexico Business Educator (Las Vegas, New Mexico: New Mexico Highlands University, March, 1952), p. 17.

A survey was conducted in 1956-57 by personnel associated with The Business Teacher.[1] The survey was designed to determine the speed and accuracy of typewriting students at the end of the first year of instruction. The figures are based on 6,185 scores achieved by students in 191 schools, in 35 states, on 5-minute timed writings. The results pertain to a fairly representative sampling of small and large high schools and appear to present a fair, incidental sample of scores made by students at the end of the first year of instruction in high schools across the nation.

The results of the survey indicate that the average stroking speed of high-school students on 5-minute tests at the end of the first year of instruction in typewriting is 41 gross words a minute with 6 errors. This constitutes a score of 29 net words per minute if the score is calculated in accordance with the International Typewriting Contest rules.

According to the Business Teacher survey almost three-fifths (59.3 per cent) of the students typed at speeds within the relatively narrow spread of 35 to 50 gross words a minute; but, there was a significant spread in the number of errors made. The errors were distributed fairly evenly from 1 to more than 10 errors per paper.

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[1] Joan Savinski, "41 and 6," The Business Teacher, XXXV (March, 1958), p. 10.

The coefficient of correlation between the gross words per minute and the number of errors committed on the papers in the survey was so low that it indicated no distinct relationship between stroking rates and numbers of errors committed.

A year earlier the staff of The Business Teacher made a survey of achievement during the first semester of typewriting which indicated that the average accomplishment on a 5-minute timed writing at the end of the first semester was 30 gross words a minute with 5 errors. This is the equivalent of 20 net words a minute.

Another study was carried on by Hawkins[1] who made an analysis of errors committed in first, second, and third semester classes in typewriting at Schenley High School, Pittsburgh, Pennsylvania. The persistency and kinds of errors common to the work and the classes were studied.

Errors made by 117 pupils during the time of this study, (except errors on class drill), were recorded on individual charts, and were tabulated under the following four major classifications: "Imperfect Location of Keys," "Manipulation," "Mental," and "Miscellaneous."

More than fifty per cent of the errors found by Hawkins were made in the "Imperfect Location of Keys." The

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[1]Helen I. Hawkins, "An Analysis of Errors Made in First, Second, and Third Semester Typewriting Classes in a High School" (unpublished Master's thesis, University of Pittsburgh, 1932).

percentage of the "Manipulation" errors indicated a decrease from semester to semester, but the "Miscellaneous" errors increased from semester to semester. The average number of daily errors per pupil made by different groups within each class varied from 2 to 10 errors. The types of errors which persisted in the work of all three semesters were imperfect location of letters E, I, and S, and the omission and the addition of letters. Certain types of errors were peculiar to the work of each semester. For the first semester these were imperfect location of the letters O, R, and T, and spacing between words and letters; for the second semester, imperfect location of the letters M, O, R, and T, spacing between letters, and placement; and for the third semester, imperfect location of the letters A and M, spacing between words, omission of words, placement, business procedure, omissions, and wrong word.

Hawkins found that there was no consistent reduction of errors made from week to week; however, the general tendency was toward the reduction of the total number and percentage of errors made. Hawkins concluded that, as typing power increased, errors decreased.

An analysis of the errors contained in straight-copy test papers of eighth and ninth-grade pupils in the California schools was made by Pille[1] in 1933. The test papers of

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[1]Elsa Pille, "An Analysis of First Semester Typewriting Errors" (unpublished Master's thesis, University of Southern California, 1933).

pupils who averaged less than ten net words per minute were checked according to International Typewriting Contest Rules.

In Pille's study, errors were grouped under four major headings; namely, "letter errors," "word errors," "punctuation errors," and "machine manipulation errors." In the eighth grade the number of errors were divided as follows: 67 per cent letter errors, 22 per cent machine manipulation errors, 6 per cent word errors, and 5 per cent punctuation errors. In the ninth grade the errors were 69 per cent letter errors, 18 per cent machine manipulation errors, 8 per cent word errors, and 5 per cent punctuation errors.

Wilson[1] analyzed the errors made by first-year high-school students on straight-copy tests which were administered at 5-week intervals during the school year 1940-41.

Wilson found that the following seven types of errors made up 77 per cent of the total revealed in her study: (1) wrong character, (2) omission of character, (3) strike-over, (4) transposition of character, (5) insertion of character, (6) character anticipation, and (7) space omitted between words, in the order listed. These seven types of errors persisted on all of the tests administered by Wilson. In essence, the findings presented by Wilson were:

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[1]Hattie Will Wilson, "An Analysis of Errors Made on Straight-Copy Tests by First Year Typewriting Students in Selected Oklahoma High Schools, during the year 1940-41" (unpublished Master's thesis, Oklahoma Agricultural and Mechanical College, 1941).

1. There is no apparent relationship between the number of errors made on a test paper and the speed with which the student writes in terms of gross words.
2. There is only slight difference in the average number of errors made by boys and girls; the girls make slightly fewer.
3. The apparent difference between the kinds of errors made by boys and girls is insignificant.
4. Seven kinds of errors are most frequent. These are wrong character, omission of character, strikeover, transposition of character, insertion of character, anticipation of character, and space omitted between words.[1]

In 1944 Porter[2] made a study of the typewriting errors made by 150 U. S. Navy Trainees in the hope that common errors of the group would indicate the remedial instruction needed to reduce the number of errors made by succeeding groups. His investigation of errors has significance in relation to the error analysis portion of this investigation.

Some of the findings which Porter reached after studying the errors on 301 ten-minute timed writings follow:

1. Of the total errors, 43.8 per cent were due to single-letter substitution.
2. The letter making movements accounted for 41.5 per cent of the 1,275 typewriting errors. Of these errors, 34.7 per cent may be attributed directly to faulty reading; in the following order: (a) anticipation of letters 12.5 per cent; (b) transposition of letters 9.6 per cent; (c) omission of letters 8.7 per cent; and (d) addition of letters 3.9 per cent.
3. Non-keyboard errors, resulting more or less directly from incorrect manipulation of the machine, accounted for 10.2 per cent of all errors. Incorrect spacing within the lines was responsible for the majority of these errors.

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[1] Ibid., p. 86.

[2] Gerald A. Porter, "What Are the Typewriting Errors Being Made by Navy Trainees in the Storekeeping Course at Indiana University?" (unpublished research study, Indiana University, 1944).

4. The number of strikeovers was unusually low. An average of one strikeover to every six papers indicates that the special effort of teachers to cut down this error has been quite successful.

5. Errors in syllabication were few. Only seven errors appeared on 301 papers.

6. The number of shadow letters, strikeovers, and crowding and piling errors was unusually low in comparison with those indicated by other research studies. Only 5 per cent of the total errors were of this nature, while the studies investigated by the author indicated 12 per cent or more of these errors.

7. The same kinds of errors appeared on the papers of the fast typists as on the papers of the slower typists. Only the number of each was different in proportion to amount typed.

8. Increased rates of typewriting were accompanied by a decreased number of all types of errors.

9. In analyzing the common words mistyped, it was found that 8.9 per cent of the 1,275 errors were made with the 15 most common words of the English language.

10. Proofreading and checking by trainees was very good. Few of the errors were found and marked by instructors after the papers had been checked by the typists.[1]

Pasewark's[2] study of the effectiveness of television instruction in typewriting reveals that the errors students make follow no consistent pattern. Pasewark's study indicates that throughout the first semester of typewriting by means of television instruction the percentage of errors to words per minute remains almost the same. The types of errors change; but the percentage of errors remains constant.

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[1] Ibid., pp. 8-20.

[2] William Robert Pasewark, "The Effectiveness of Television as a Medium of Learning Typewriting" (unpublished Ph. D. dissertation, New York University, 1956).

Cook[1] found that all students in his study who could typewrite at a rate of 40 words a minute or better at the time of their initial employment satisfactorily met the performance standards required by their employers. Only 45 per cent of those who possessed ability to typewrite at a rate of less than 40 words a minute succeeded in their intial job.

In 1950 the members and staff of the National Office Management Association conducted a survey[2] of the vocational requirements for three types of beginning office employees. NOMA members in 971 companies in the United States, and 88 in Canada reported their requirements for beginning stenographers, file clerks and key-driven calculating machine operators. Each of the NOMA members participating in this survey employs from 25 to 5,000 persons, and the combined payroll is over 255,000 people.

The following proficiency standards for beginning stenographers were established by the NOMA survey, and are especially significant in this study:

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[1]D. W. Cook, "Some Practical Results from Tests," Personnel Selection Clinic Proceedings. Kansas City: Greater Kansas City Committee for Economic Development, 1945, as quoted by C. H. Lawshe, Jr., Principles of Personnel Testing (New York: McGraw-Hill Book Company, 1948), p. 154.

[2]Vera V. Green, D. L. Brennen, and H. A. Warner, A Survey of Vocational Requirements for Certain Beginning Jobs in Offices, Survey Summary No. 10 (Philadelphia: National Office Management Association, 1950).

Typing from "straight copy" words per minute[1]

40 WPM	50 WPM	60 WPM	Other
12%	60%	26%	2%

The authors of the NOMA report appear to be somewhat skeptical of the proficiency standards reported by their members, as evidenced by the following excerpt from their report:

> While in several of the jobs beginning requirements were nearly the same as those reported by school authorities for the aptitudes and abilities of school graduates, office executives in some cases reported proficiency standards for beginning jobs somewhat higher than the reported abilities of school graduates. This disparity was most marked in the stenographic section for proficiency, where the reports of office executives indicated that beginning requirements in offices were in some cases 60 per cent higher than reported abilities of school graduates. As the earlier comment above indicated, it may very well be that the beginning requirements reported by office executives reflect not actually the product of the schools, but rather the abilities of those persons going into jobs on a first tenancy basis in a given company; that is, because of a rather heavy preponderance numerically of small companies, which may hire more or less experienced first tenants, stated beginning requirements may be rather higher than the abilities of school graduates.[2]

The authors of this NOMA report have developed the following standards, which they believe to be more realistic than some of the standards reported by members of the National Office Management Association.

Suggested typewriting proficiency standards for beginning stenographers are[3]:

The Standard Now (1950).....45 words per minute

The Standard in 1953.....55 words per minute

The Standard in 1960.....70 words per minute

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[1] Ibid., p. 8. [2] Ibid., p. 9. [3] Ibid., p. 12.

These suggested standards are based on ten-minute timed writings, with five errors or less.

Nelson[1] reported that 26 of 41 stenographers stated that approximately 50 to 60 "words a minute" in typewriting would be satisfactory for the performance of their jobs; 7 indicated that a speed of less than 50 "words a minute" would be sufficient for their positions; and 8 indicated a need of ability to typewrite at a speed in excess of 60 words a minute. Only one stenographer reported that a typewriting speed of 40 words a minute would be sufficient to perform her work satisfactorily. Nelson concludes that ". . . a typewriting speed of 50 to 60 words a minute for both stenographers and typists would be sufficient for satisfactory performance."[2]

A recent study by Wright[3] involved an attempt to ascertain the standards of performance required of office employees in various types of business in Topeka, Kansas, and the duties of beginning office workers in that city.

She found that 60 per cent of the firms had no minimum standards for typewriting speed; while 8 required 40 words a minute; 5 required 50 words a minute; 4 required 60

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[1]John Howard Nelson, "A Study of Relationships Between Achievement of Stenographers and Typists on the National Business Entrance Tests and Their Performance in Beginning Positions" (unpublished Ph. D. dissertation, New York University, 1951).

[2]Ibid., p. 112.

[3]Dorothy Marie Wright, "An Occupational Survey of Job Requirements and Standards in 50 Topeka, Kansas, Firms Which Hire High School Graduates" (unpublished Master of Arts thesis, State University of Iowa, 1951).

words a minute; 1 required 65 words a minute; 1 required 75 words a minute; and 1 required 90 words a minute.

Wright recommended that:

> Since the trend seems to be toward a generalization of duties more and more emphasis should be placed on general knowledge and fundamental procedures, and less upon specialization and skill development. Since there are more than four times as many general office clerk jobs available in Topeka as any other, it is recommended that a more intensive program in general clerical training be developed at Lydon High School to supplement the present stenographic and bookkeeping courses.[1]

Potter[2] gathered information from office managers of various types of business in regard to requirements for office employees, as a basis for recommendations for high school curriculum revisions. One of her findings was that a majority of office managers require a typewriting speed of 40 words a minute.

The research reviewed in this study establishes the minimum typewriting standard as around 40 net words a minute at the end of the fourth semester of instruction. The minimum performance standards for beginning typists appear to be approximately the same as the minimum standards for satisfactory completion of the second year of high-school typewriting.

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[1] Ibid., p. 82.

[2] Thelma Maude Potter, "An Analysis of the Work of General Clerical Employees" (unpublished Ph. D. dissertation, Teachers College, Columbia University, 1954).

The findings and conclusions of the investigators who analyzed typewriting errors covered such a wide area that generalizations here are deemed to be unwise.

CHAPTER III

BACKGROUND INFORMATION ESSENTIAL TO THIS STUDY

The background information essential to this study pertains primarily to the sources of the data on which the conclusions are ultimately based. This chapter contains a detailed description of the conditions surrounding the source and collection of the data used in this study.

The information presented in this chapter was gathered from several sources. Interviews with administrative officials of the Oklahoma City Public Schools, administrators and faculty of the selected schools, and other business teachers in the Oklahoma City area provided much of the material. Some data were gathered from student records in the offices of the selected schools, and from central records kept in the administrative offices of the Oklahoma City Public Schools. Most of the personal information was gathered by means of a questionnaire filled in by the student participants. Information pertaining to physical facilities was obtained by an inspection of the classrooms and equipment involved in this study.

A copy of the guide used to collect uniform data concerning the schools, teachers, physical equipment, textbooks, and some instructional practices is included as Appendix E.

Other pieces of information were gathered from various publications and interviews with leaders in the field of business education.

Schools

The schools included in this investigation were selected because several factors needed for adequate research were present. The four senior high schools offered a sufficiently large number of classes of second-year typewriting to make a reliable study. The administrative officials and faculty members employed in the selected schools appeared to be well qualified for their positions and were respected by other members of their profession. The physical facilities were similar to those found in many high schools. It was assumed that the instructional program was representative of that found in Oklahoma, and that the sample selected would provide a basis for sound conclusions. Fortunately, these selected high schools offered the spirit of cooperation and assistance necessary to insure the successful execution of a research project.

The selected schools have quite different backgrounds. One of the schools was established near the down-town business district as one of the first public high schools in Oklahoma City. Another of the schools was erected in the outskirts of Oklahoma City during the early years of statehood. A third was originally a junior high school located in the midst of one of the more wealthy residential areas. In recent years,

this junior high school was expanded to include senior high school when the need became apparent. The fourth school in the group was built in a new residential section which sprang up near the city limits during the early 1950's.

The students in one school apparently were members of families who had incomes which were above the average for the Oklahoma City area. The students in another school appeared to be from families in the low income group. The student bodies of the other two schools apparently were primarily from families whose incomes were near the average for Oklahoma City.

The enrollment in one school had declined rapidly in recent years. In another, the enrollment had been relatively stable for several years. The other two had experienced remarkably rapid increases in enrollment during the last four years.

The curriculum of one school included two sections of second-year typewriting; a second included three sections; a third included four sections; and the fourth included six sections.

Each of the schools involved in this investigation is fully accredited by the Oklahoma State Department of Education, and the North Central Association of Colleges and Secondary Schools.

During the 1956-57 school year the four schools had student enrollments of 696, 737, 768, and 1,792.

The schools involved in this study are general purpose senior high schools which offer curricula designed for college preparation; general, terminal education; and vocational education.

Except for the information given in the preceding paragraphs, complete anonymity of students, teachers, and schools who participated in this study will prevail so that objectivity may be maintained in the presentation of the data.

Instructional Program in Typewriting

The 15 classes of second-year typewriting involved in this study were taught by ten different teachers, eight of whom were women. Nine of the teachers taught business subjects full time, while one man taught business subjects half-time and coached varsity athletics half-time. Each of the ten teachers had pursued business teacher preparation courses of study throughout their under-graduate programs. Nine of the teachers had earned master's degrees in business education from accredited colleges or universities. The other teacher had completed a program of study in educational administration for his master's degree.

Seven of the teachers had taught business subjects for more than ten years, and three had taught business subjects more than five but less than ten years.

Each of the classes used the same textbooks which had been selected from the current list of state adopted texts.

The instructional pattern in every class was geared to the subject matter content of the textbook. Three of the teachers had a variety of supplementary materials on hand and occasionally used these materials for special drills, primarily for remedial purposes. No class used the published tests or workbooks which were available for use with the textbook. There was no evidence that films were used in any of the classes.

The typewriting classes were taught in the regular 55-minute class period used for other courses of instruction.

None of the classes was assigned homework; however, individual students in all classes were encouraged to make up any missed classwork either at home or before or after classes.

The same credit toward graduation was granted for typewriting as for the other courses taught in these schools.

Typewriting Classrooms

The classrooms were equipped with 143 Royal, 119 Underwood, 72 Remington, and 58 L. C. Smith standard typewriters of modern vintage. Four of the classrooms also included one electric typewriter, and one room contained two electric machines. Except for two cases where one model of one make of typewriter was used exclusively, the various makes were represented in each of the classrooms. Approximately 96 per cent (382 machines) of the 398 typewriters were

less than five years old, and only ½ per cent (2 machines) of the machines were more than ten years of age.

Five of the nine classrooms were equippped with tables that could be adjusted for height and appeared to be of appropriate size and type. The other four rooms were equipped with non-adjustable wooden tables of adequate size and varied height.

The rooms had an adequate number of sturdy wooden chairs which were of sufficiently varied height to meet the needs of most students.

Nine classes had stencil process duplicators available; and four classes had no duplicator available for classroom use.

All of the typewriters were under maintenance contracts with local repairmen. Under the agreement the machines were cleaned and repaired each summer, and adjusted or repaired as needed throughout the year.

All of the typewriting classrooms were sufficiently large to provide adequate working space for each student; they were well supplied with both natural and artificial light; and were well heated and ventilated. Other physical facilities, such as filing cabinets, desks, interval timers, wire baskets and demonstration stands were available in adequate amount.

Students

"The Students Typewriting Tests," Volume XIII, Test 3, which constituted the basic source from which data were obtained was administered one or more times to 49 boys and 493 girls with the expectation that at least 50 per cent of the papers would have to be thrown out for various reasons. As anticipated, two hundred and fifty-four persons failed to qualify as participants in this project because they failed to take all three tests; 42 were eliminated because of the unavailability of intelligence quotients; 8 were eliminated because of lack of personal information; 5 had taken more or less than 2 semesters of typewriting prior to 1956-57; and 2 had not taken first-year typewriting in an Oklahoma City public school. The records of the 221 students for whom complete data were obtained provide the material for statistical analysis in this study.

All of the 221 students involved in this study were enrolled in grades 10 through 12 as follows:

Grade	Number	Per Cent
10	152	68.78
11	53	23.98
12	16	7.24

The age of the students ranged from a minimum of 14 to a maximum of 18 years, with a mean age of 16.17 years.

The sample is composed of 26 boys and 195 girls.

The Students Typewriting Tests

As explained in the Source of Data section of Chapter I, the data used in this study were obtained by administering "The Students Typewriting Tests," Volume XIII, Test 3, to a group of second-year typewriting students. These tests are sponsored and distributed, as a non-profit service, by the United Business Education Association, a department of the National Education Association, 1201 Sixteenth Street, N. W., Washington 6, D. C.

Early volumes of "The Students Typewriting Tests" were planned and developed by Fred G. Nichols, a highly respected business educator who is often referred to as the "father of business education." From the outset the tests have been developed by a process of research and revision which has involved numerous, prominent business educators who have worked under the sponsorship of the United Business Education Association. The thirteenth volume used in this study was prepared by business-educator members of Theta Chapter (Indiana University) of Delta Pi Epsilon. The effort was co-directed by Elvin S. Eyster, Indiana University, Bloomington; Irol Whitmore Balsley, University of Utah, Salt Lake City; and Howard Lundquest, Kansas State Teachers College, Pittsburgh.

"The Students Typewriting Tests," Volume XIII, consists of four tests: Test 1 was prepared for use at the end of the first semester of instruction in typewriting; Test 2

was prepared to be given at the end of the second semester; Test 3 is for use at the end of the third semester; and Test 4 is designed to be administered at the end of the fourth semester of instruction in typewriting.

Since it was deemed appropriate from the research point of view to administer the same test at the end of the second, third, and fourth semesters of instruction, Test 3 was selected because it is the one nearest to the level of difficulty desirable for use at the end of both the second and fourth semesters of instruction.

Howard Lundquest[1] made the following statements to the author during a discussion of the desirability of using only one test to fulfill the purpose of this study:

> No new areas of subject matter are taken up in typewriting after the first two semesters of instruction. Subsequent classes merely refine and extend the same general areas of subject matter content that are included in first-year typewriting.
>
> "The Students Typewriting Tests" are the best available for use in a study which seeks to determine the achievement of a group in typewriting. Test 3, which was prepared for use at the end of the third semester of instruction is undoubtedly the best of the series for this study and should be given at the beginning, middle, and end of the second year.

"The Students Typewriting Tests," Volume XIII, Test 3, is administered in two parts, with separate timings. The first part is a five-minute timed writing, on which a score

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[1]Interview with Howard Lundquest, Co-director in the development of "The Students Typewriting Tests," Volume XIII, June 15, 1956.

of 60 points is the stated maximum. The second part is a thirty-minute production test composed of a rough-draft manuscript with a value of 40 points; a business letter with a value of 40 points; and a tabulation problem with a value of 20 points. Actually there is no maximum score on any part of the test. The stated maximums are the scores which would be earned if the entire test were typewritten one time, perfectly, in the allotted time. Since it is possible for any part of the test to be typewritten more than once, a score considerably in excess of the stated maximum of 160 points is possible.

National norms in terms of medians, means, quartiles, and deciles have been established for the entire series of "Students Typewriting Tests." Complete statistics regarding the norms were available for use in this report.

The foregoing material provides an over-all view surrounding the sources from which the data in this study were obtained. The nature of the schools, the instructional situations, the physical facilities, the students, and the tests are such that it must be assumed that instruction in second-year typewriting as depicted in this study is typical of instruction throughout the nation.

It is hoped that the information presented in this chapter will enable the reader to readily understand and grasp the significance of the material presented in the remainder of this report.

CHAPTER IV

BASIC DATA CONCERNING 221 TYPEWRITING STUDENTS

The purpose of this chapter is to present in tabular form the data which will be treated statistically in Chapters V, VI, and VII. Information pertaining to five personal factors normally regarded as being significant in most instructional programs is presented for the 221 students who participated in this study. Data concerning the age, sex, intelligence quotient, class in school, and grades in first-year typewriting are presented for each student. In addition, test data are presented which were obtained by administering "The Students Typewriting Tests," Volume XIII, Test 3, to the 221 second-year typewriting students for whom the personal information is given. The test data are representative of the degrees of performance ability demonstrated by the typewriting students; and as such, indicate the nature and amount of achievement attained in typewriting by individual students. The remainder of this chapter is divided into major subdivisions in which related information is presented with appropriate explanations and a certain amount of interpretation.

Sex and Age

Lay people, and educators alike, tend to formulate opinions relative to such matters as the development of manual skills. More often than not such opinions are based on personal or limited experience and not on scientific evidence. Several studies, such as Ashby's,[1] have shown that personal factors, such as sex, and age, are not highly accurate indicators of success in first-year typewriting. However, the data in this study were treated statistically to further substantiate these findings, and to determine if similar relationships exist in second-year typewriting.

Sex is commonly considered to be an important factor in learning to typewrite. Girls are generally presumed to be more adept at manipulative, clerical skills, and therefore, will normally be expected to achieve greater gains in typewriting skill during the second-year of instruction than boys, if all other factors are equal.

A second factor commonly considered to be important in learning to typewrite is the age of the student. Many older persons refrain from attempting to learn typewriting because they believe their age will be a handicap. Younger students are generally discouraged from attempting to learn typewriting because of the lack of development of muscular control and dexterity. There appears to be a belief among

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[1]Wilson Thomas Ashby, "A Statistical Analysis of Selected Factors in Predicting Achievement in Typewriting" (unpublished Ed. D. dissertation, University of Oklahoma, 1954).

business teachers that persons of immature or advanced age are handicapped in instructional programs in typewriting.

Because these assumptions exist, tests have been administered, records checked, and statistical calculations made to determine the relationship between these personal factors and achievement of the participants in typewriting.

Table I is a summarization of the information pertaining to the students who participated in this study. In tabulating the data relative to the ages of the participants the midpoint of the class interval was considered to be the true age of each person. For example, a tabulated age of 17 years includes the period between the seventeenth and eighteenth birthdays, and for statistical purposes was considered to be the midpoint in the one-year range, 17.5 years.

Analysis of Table I reveals that the sample is composed of 26 boys and 195 girls, whose ages range from a minimum of 14 to a maximum of 18 years.

Second-year typewriting is commonly regarded as a vocational preparation course for prospective office workers. Inasmuch as a preponderance of office employees are women, the ratio of girls to boys in this study appears to be a normal situation.

Slightly more than four-fifths of the participants were either 15 or 16 years of age. Actually, a majority of the students, 52.04 per cent, were 15 years of age. As indicated in Table I, only one person was younger than 15

TABLE I

SEX AND AGE OF 221 SECOND-YEAR TYPEWRITING STUDENTS

Age	Number of Boys	Per Cent of Total Students	Number of Girls	Per Cent of Total Students	Total Boys and Girls	Per Cent of Total Students
18	2	.91	6	2.72	8	3.62
17	5	2.26	24	10.86	29	13.12
16	7	3.17	61	27.60	68	30.77
15	12	5.43	103	46.61	115	52.04
14	0	0.00	1	.45	1	.45
--	26	11.76	195	88.24	221	100.00

years of age; and only 8 were as old as 18 years of age. Again, it appears that this distribution is normal.

Grade Levels

The grade levels of students constitute an indication of their educational development, and therefore, indicate readiness to pursue various types and phases of school work. As pointed out by White,[1] school-grade placement is one of the major factors that have been studied in typewriting prognosis. Since the grade-placement of typewriting is deemed to be of enough importance to warrant research into its predictive values, it was selected as one of the factors to be correlated with the achievement of the students in this study. As indicated by Table II, the grade levels of the students ranged from the tenth through the twelfth grades. Slightly more than two-thirds, or 68.78 per cent, of the students were enrolled in the tenth grade; approximately one-fourth, 23.98 per cent, were enrolled in the eleventh grade; and approximately one-fourteenth, or 7.24 per cent, were enrolled in the twelfth grade.

Intelligence Quotients

Intelligence is commonly accepted as an important factor in determining students' ability to make satisfactory progress in learning situations.

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[1] Bruce White, "Prediction of Typewriting Success," The Journal of Business Education (Wilkes Barre, Pa.: The Trethaway Publishing Company, April, 1935), p. 15.

TABLE II

GRADE LEVELS AT WHICH 221 SECOND-YEAR TYPEWRITING STUDENTS WERE ENROLLED

Grade Level	Number of Students	Per Cent of Total Students
12	16	7.24
11	53	23.98
10	152	68.78
Totals	221	100.00

Blackstone and Smith,[1] in their review of several of the most significant typewriting prognosis studies, indicate the great amount of interest which exists regarding the effect of intelligence upon typewriting success. Prior research has shown that there is little relationship between intelligence and copying test results. However, Hardaway[2] indicates that the correlation between intelligence quotients and success in typewriting becomes significant only when the measure of achievement involves the ability to arrange and produce usable work.

Since intelligence quotients indicate ability to do abstract thinking they appear to be measures of ability to perform production typewriting where judgment is exercised in such activities as typewriting correspondence, preparing tabulated material, proofreading, syllabicating words, and correcting errors.

Table III constitutes a summarization of the number of students, as well as the percentage of the total group, whose intelligence quotients lie within certain five-unit intervals. The fact that the intelligence quotients range from 61 to 134 indicates the broad range of ability of the

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[1]E. G. Blackstone and Sofrona L. Smith, Improvement of Instruction in Typewriting, Second Edition (New York: Prentice-Hall, Inc., 1949), pp. 325-329.

[2]Mathilde Hardaway, "Prognostic or Aptitude Tests for Skill Subjects," Business Education World, Volume XVII (New York: Gregg Publishing Company, March, 1945), pp. 371-373.

TABLE III

INTELLIGENCE QUOTIENTS OF 221 SECOND-YEAR TYPEWRITING STUDENTS

Intelligence Quotients	Number of Students	Per Cent of Total Students
130-134	3	1.36
125-129	3	1.36
120-124	2	.91
115-119	19	8.60
110-114	37	16.74
105-109	34	15.38
100-104	41	18.55
95-99	27	12.22
90-94	23	10.41
85-89	13	5.88
80-84	10	4.52
75-79	4	1.81
70-74	4	1.81
65-69	0	0.00
60-64	1	.45
Totals	221	100.00
Mean Intelligence Quotient: 102.97		
Standard Deviation: 11.12		

students involved in this study. This 73-point range is probably sufficient to include all levels of ability to do abstract thinking.

As shown in Table III, the intelligence quotients of 73.30 per cent of the 221 participants lie within a range of 25 points, with the upper limit of 114 and the lower limit 90 points. The interval of 100-104 points, which would include the mean intelligence quotient of a normal group, included the mean, median, and mode of the intelligence quotients of the participants in this study.

Prior Grades in Typewriting

Probable success in scholastic endeavor is often quite effectively predicted by grades received in prior courses in the same subject, or by the average grade received in a group of subjects. There are so many factors affecting grades of individuals that some students' grades fluctuate widely from year to year or from subject to subject. However, Cook and Appel[1] conclude from their study that one may predict success in typewriting from previous school grades with relatively high accuracy.

To provide more evidence relative to this matter, the achievement of the 221 participants, as indicated by their grades in first-year typewriting, will be compared with the scores earned by the participants on the September

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[1]Walter W. Cook and Marguerite Appel, "New Bases for Predicting Typing Success," Journal of Business Education (Wilkes Barre, Pa.: The Trethaway Publishing Company, January, 1941), p. 18.

administration of "The Students Typewriting Tests," Volume XIII, Test 3. A comparision of the first-year typewriting grades will be made with the achievement of the same students in second-year typewriting, as indicated by the differences in the scores earned on the three administrations of the test.

For the purposes of this study, each letter grade was given a point value in the same fashion as that used to determine grade-point averages in many schools. The following tabulation indicates the point-value assigned to the letter-grades:

Grade	Point-Value
A	4
B	3
C	2
D	1

Since two semester grades were recorded for each student in first-year typewriting, the two grades were averaged to arrive at one score for each person. This averaging process produced several scores that fall midway between the assigned values. For example, a first-semester grade of "C" and a second-semester grade of "B" produce a score for tabulation purposes of 2.5.

Table IV is a tabulation of the grade-point averages earned by the participants when they were enrolled in first-year typewriting. It is evident, from a study of the table, that the grade-point averages range from 1.0 to 4.0. Roughly, one-fourth, 23.08 per cent, of the participants

TABLE IV

FIRST-YEAR TYPEWRITING GRADE-POINT AVERAGES

ACHIEVED BY 221 SECOND-YEAR TYPEWRITING STUDENTS

Grade-Point Average	Number of Students	Per Cent of Total Students
4.0	40	18.10
3.5	11	4.98
3.0	75	33.94
2.5	18	8.14
2.0	68	30.77
1.5	4	1.81
1.0	5	2.26
Totals	221	100.00

made a grade-point average of 3.5 or better in first-year typewriting; two-fifths, 42.08 per cent, received a grade-point average between 2.5 and 3.0; one-third, 32.58 per cent made a grade-point average between 1.5 and 2.0; and only one-fortieth, 2.26 per cent, received a grade-point average of 1.0 in first-year typewriting. To the casual observer these grades seem to be abnormally high. However, since students have a tendency to pursue further phases of education in which they have been successful, and to avoid those phases in which they have been unsuccessful, this probably is a normal grade-point average for any group enrolled in the second half of a two-year subject sequence.

Scores Achieved on Typewriting Tests

As indicated in the background section of this report, "The Students Typewriting Tests," Volume XIII, Test 3, was administered to each of the 221 participants in this investigation during the second, eighteenth, and thirty-fifth weeks of the 1956-57 school year. The test was administered in two parts with separate timings. The first part was a five-minute timed writing, on which a weighted score of 60 points was the stated maximum. The second part was a thirty-minute production test composed of a rough-draft manuscript with a value of 40 points; a tabulation problem with a value of 20 points; and a business letter with a stated value of 40 points. Actually, there was no maximum score on any part of the test. The stated maximums were the

scores which would have been earned if the entire test had been typed one time, perfectly, in the allotted time. Since it was possible for any part of the test to have been typed more than once, a score considerably in excess of the stated maximum of 160 points was possible.

Basic Data Illustrated

Complete personal and achievement data pertaining to five of the participants is presented in Figure 1 to enable the reader to more fully comprehend the significance of the information presented about the total sample. The illustrative data were selected to reveal comparative achievement of students who scored high, low, and in the middle on the first test.

One may observe from the tabulations in Figure 1 that student number one, who achieved the lowest score on the September administration of the test, was a 16 year old, tenth-grade girl who had a grade-point average of 1.0 in first-year typewriting, and an intelligence quotient of 70. She scored no points on either part of the September test but, on the January test she scored 11 points on the timed writing, and 17 points on the production exercises, for a total of 28 points. On the May test, student number one scored no points on the timed writing, but scored 63 points on the production part of the test. On the timed writing, student number one achieved scores of 29 gross words per minute, nine net words per minute, and 10 errors on the September test; 29 gross

Personal Data

Student Number	Age	Sex	Grade in School	Grade-Point Average in First-Year Typewriting	Intelligence Quotient
1	16	F	10	1.0	70
56	15	M	10	1.0	115
111	15	F	10	2.0	94
166	17	F	12	3.0	86
221	15	F	10	4.0	90

Typewriting Achievement Data

Student Number	Test	Part I	Part II	Total Test Score	Gross Words Per Minute	Net Words Per Minute	Errors
1	First	0	0	0	29	9	10
	Second	11	17	28	29	15	7
	Third	0	63	63	25	13	6
56	First	3	27	30	30	10	10
	Second	0	28	28	23	1	11
	Third	0	38	38	17	0	10
111	First	9	38	47	71	13	14
	Second	22	47	69	33	19	7
	Third	35	58	93	38	28	5
166	First	29	38	67	42	26	8
	Second	39	63	102	51	34	7
	Third	42	90	132	38	22	8
221	First	48	70	118	54	44	5
	Second	44	79	123	52	40	6
	Third	55	98	153	57	51	3

Figure 1.--Illustrative Data for Five Participants

words per minute, 15 net words per minute, and seven errors on the January test; and 25 gross words per minute, 13 net words per minute, and six errors on the May test.

Since these data are merely for illustrative purposes, there appears to be no need for a further description at this time.

Total Scores Achieved

A summarization of the total test scores achieved by the 221 participants on each of the three test dates is presented in Table V. The scores were tabulated into class-intervals of ten points each for statistical purposes. Complete raw data for each student is presented in Appendix C, so that anyone who desires to do so may use it instead of the summarizations presented in the text of this report.

Study of Table V makes it evident that the scores on the first test, in September, 1956, ranged from zero to 118 points, with a mean of 49.34 points. The range of scores achieved when the test was administered the second time, in January, 1957, had increased by 23 points as evidenced by a low score of two points and a high score of 143. When the test was administered the third time, in May, 1957, the low score had increased to 22 points and the maximum had climbed to 186. The range of scores on the third test was increased considerably by two persons who scored at least 25 points higher than any other participants. As indicated at the bottom of Table V, the mean score increased from 49.34 points

TABLE V

TEST SCORES ACHIEVED BY 221 SECOND-YEAR TYPEWRITING STUDENTS

Scores	September Test		January Test		May Test	
	Number of Students	Per Cent of Total Students	Number of Students	Per Cent of Total Students	Number of Students	Per Cent of Total Students
180-189	-	-	-	-	2	.91
170-179	-	-	-	-	-	-
160-169	-	-	-	-	-	-
150-159	-	-	-	-	7	3.17
140-149	-	-	3	1.36	6	2.71
130-139	-	-	2	.91	14	6.33
120-129	-	-	10	4.52	27	12.22
110-119	5	2.26	18	8.14	30	13.57
100-109	3	1.36	21	9.50	24	10.86
90-99	7	3.17	23	10.41	28	12.67
80-89	14	6.33	21	9.50	25	11.31
70-79	23	10.41	28	12.67	22	9.96
60-69	29	13.12	27	12.22	16	7.24
50-59	20	9.05	26	11.77	7	3.17
40-49	30	13.57	16	7.24	4	1.81
30-39	35	15.84	10	4.52	6	2.71
20-29	26	11.76	10	4.52	3	1.36
10-19	19	8.60	4	1.81	-	-
0-9	10	4.52	2	.91	-	-
Totals	221	100.00	221	100.00	221	100.00
Mean Scores:		49.34		75.86		98.53
Standard Deviations:		26.17		29.95		29.94

on the first test to 75.86 points on the second, and to 98.53 points on the third test which was administered in the thirty-fifth week of the school year. It may also be observed that the standard deviation of the test scores remained relatively stable throughout the year. The standard deviation of the first test scores was 26.17 points; for the second test, 29.95 points; and for the third test the standard deviation was 29.94 points.

Another interesting fact presented in Table V is that approximately two-thirds of the scores lie within a 60-point range on each test. However, this 60-point range moved sharply upward on the scale as the year progressed. On the first test 73.75 per cent of the scores fell between 20 and 79 points; on the second test 66.07 per cent of the scores fell between 50 and 109 points; and on the third test 70.59 per cent of the scores fell between 70 and 129 points.

Production Test Scores Achieved

The production section of "The Students Typewriting Tests," Volume XIII, Test 3, consists of three parts: (1) a tabulation problem, (2) a rough-draft problem, and (3) a business letter. For evaluation purposes the authors of the test assigned a total score of 20 points to the tabulation problem; 40 points to the rough-draft problem; and 40 points to the business letter. The score for each part of the production section of the test is reduced by appropriate

penalties assessed for each of the various types of errors committed. A copy of the directions for scoring each part of the production section of the test is included in Appendix B.

In this study students were permitted to allocate their 30 minutes of work on the production section of the test among the three parts as they desired. Since various amounts of time were spent on the individual parts, the part scores would be useless for comparative purposes. Therefore, the only scores included here are the total scores for the entire production section.

Table VI is a tabulation of the point scores earned by the students on the production section of the test. It may be observed from Table VI that the mean production score achieved on the first test was 34.97 points, and that it increased to 54.88 points on the second test. When the third test was administered, in May, 1957, the production-writing score increased to 69.74 points.

The range of 70 points, from zero to 70, on the first test was the smallest of the three tests. The scores ranged from zero to 99 points on the second test, and from 21 to 128 on the third.

The standard deviations on the three tests also indicate that the scores cluster a little more closely to the median on test one than on either of the other tests.

Appendix C contains a record of the individual scores attained by the students on each part of the test. The raw

TABLE VI

PRODUCTION TEST SCORES ACHIEVED BY

221 SECOND-YEAR TYPEWRITING STUDENTS

Production Scores	First Test		Second Test		Third Test	
	Number of Students	Per Cent of Total Students	Number of Students	Per Cent of Total Students	Number of Students	Per Cent of Total Students
125-129	-	-	-	-	2	.91
120-124	-	-	-	-	-	-
115-119	-	-	-	-	-	-
110-114	-	-	-	-	1	.45
105-109	-	-	-	-	1	.45
100-104	-	-	-	-	1	.45
95-99	-	-	2	.91	13	5.88
90-94	-	-	3	1.36	9	4.07
85-89	1	.45	2	.91	21	9.50
80-84	-	-	5	2.26	9	4.07
75-79	-	-	17	7.69	25	11.31
70-74	3	1.36	21	9.50	35	15.84
65-69	4	1.81	25	11.31	29	13.13
60-64	6	2.71	18	8.14	16	7.24
55-59	9	4.07	31	14.03	16	7.24
50-54	11	4.98	19	8.60	17	7.69
45-49	21	9.50	15	6.79	8	3.62
40-44	23	10.41	18	8.14	5	2.26
35-39	39	17.65	17	7.69	6	2.71
30-34	31	14.03	6	2.71	4	1.81
25-29	19	8.60	7	3.17	1	.45
20-24	17	7.69	6	2.71	2	.91
15-19	14	6.33	4	1.81	-	-
10-14	12	5.43	2	.91	-	-
5-9	4	1.81	1	.45	-	-
0-4	7	3.17	2	.91	-	-
Totals	221	100.00	221	100.00	221	100.00
Mean Scores:		34.97		54.88		69.74
Standard Deviations:		16.55		18.35		17.75

scores achieved by the participants when the test was administered in September, 1956; January, 1957; and May, 1957, are given in that order.

Timed-Writing Test Scores Achieved

One part of "The Students Typewriting Tests," Volume XIII, Test 3, is a five-minute writing from material with a syllabic intensity[1] of 1.26. One five-minute timed writing was administered to each of the 221 participants at the beginning of the test, on each of the three test occasions. As soon as the timed writing was completed the students were asked to put it aside, ungraded, and proceed with the production phases of the test. The timed writings were graded at a later date in accordance with the International Typewriting Contest rules. A copy of the applicable portion of the International Typewriting Contest rules is provided in Appendix E.

The timed-writing test scores were first recorded in terms of gross words per minute, along with the number of errors committed. Next, the timed-writing scores were converted from gross words and errors to single-point scores through the use of a table designed for that purpose by the authors of the test. A copy of this conversion table is included in Appendix A.

Table VII is a tabulation of the point scores earned by the students on the timed-writing section of the test when

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[1]Syllabic intensity is derived by dividing the number of syllables in an exercise by the number of words contained in the material.

it was administered in September, 1956; January, 1957; and May, 1957. For statistical convenience the scores are presented in a frequency distribution with class intervals of five points each. As shown in Table VII, the means of the students' timed-writing scores were 14.65 points for the first test, in September, 1956; 21.79 on the second test, in January, 1957; and 28.93 points on the third test, in May, 1957. Interestingly, the highest and lowest scores achieved by the participants fell into the same class intervals on each of the three tests. However, the number of scores in the lowest class intervals decreased as the year progressed and the number of scores in the highest class intervals increased with each test administration. As may be observed from Table VII, the lowest class interval contained a larger percentage of the total number of scores than any other class interval, on each of the three tests.

The sum of the mean timed-writing scores plus the mean of the production test scores will not exactly equal the mean of the total test scores earned on any of the three tests because each score is treated as if it lay on the midpoint of the class interval in which it is contained. These deviations from the expected totals are not serious because any score produced by a sample will vary from the true mean of the parameter. These expected deviations will be shown in following chapters as standard errors of the means.

TABLE VII

TIMED-WRITING SCORES ACHIEVED BY 221

SECOND-YEAR TYPEWRITING STUDENTS

Timed Writing Scores	September Test		January Test		May Test	
	Number of Students	Per Cent of Total Students	Number of Students	Per Cent of Total Students	Number of Students	Per Cent of Total Students
55-59	1	.45	3	1.36	5	2.26
50-54	3	1.36	7	3.17	18	8.15
45-49	7	3.17	12	5.43	23	10,41
40-44	6	2.71	13	5.88	29	13.12
35-39	12	5.43	22	9.96	28	12.67
30-34	10	4.52	25	11.31	14	6.38
25-29	22	9.96	23	10.41	21	9.50
20-24	22	9.96	17	7.69	15	6.79
15-19	14	6.33	12	5.43	16	7.24
10-14	15	6.79	17	7.69	9	4.07
5-9	7	3.17	13	5.88	5	2.26
0-4	102	46.15	57	25.79	38	17.20
Totals	221	100.00	221	100.00	221	100.00
Mean Scores:		14.65		21.79		28.93
Standard Deviations:		14.77		15.85		16.90

The point scores achieved by the students are excellent for purposes of comparison, but they have little or no meaning for most typewriting teachers. Therefore, the timed-writing results are also stated in Table VIII and Table IX in terms of gross and net words per minute, so that the level of achievement can be shown in terms comparable to those used in other studies, and generally understood by persons interested in typewriting.

Table VIII is a presentation of the gross words per minute written by the participants on the timed writing section of the test. As indicated in Table VIII, the mean typewriting rate achieved by the students on the first timed writing was 36.98 gross words per minute. The students wrote at a mean rate of 43.11 gross words per minute on the second timed writing; and attained a mean of 46.96 gross words per minute on the third test, in May, 1957. The range of the gross words per minute written on each of the three tests varied only slightly. The minimum and maximum gross words per minute on the first test were 19 and 64; on the second test, 22 and 68; and on the third test, 17 and 63 gross words per minute. The minimum and maximum gross words per minute were lower on the third test, adminstered in May, 1957, than on either of the first two.

Table IX is a presentation of the number of errors committed by the participants on each of the five-minute timed writings. The mean number of errors committed decreased

TABLE VIII

GROSS WORDS PER MINUTE ACHIEVED BY 221

SECOND-YEAR TYPEWRITING STUDENTS

Gross Words Per Minute	September Test		January Test		May Test	
	Number of Students	Per Cent of Total Students	Number of Students	Per Cent of Total Students	Number of Students	Per Cent of Total Students
65-69	-	-	2	.91	-	-
60-64	1	.45	4	1.81	14	6.33
55-59	7	3.17	15	6.79	27	12.22
50-54	6	2.71	28	12.67	37	16.74
45-59	23	10.41	40	18.10	62	28.06
40-44	31	14.03	53	23.98	49	22.17
35-39	66	29.87	52	23.53	19	8.60
30-34	53	23.98	18	8.14	8	3.62
25-29	27	12.22	6	2.71	2	.91
20-24	6	2.71	3	1.36	2	.91
15-19	1	.45	-	-	1	.45
Totals	221	100.00	221	100.00	221	100.00
Mean GWPM:		36.98		43.11		46.96
Standard Deviations:		7.52		8.35		6.77

TABLE IX

ERRORS ON TIMED WRITINGS OF 221

SECOND-YEAR TYPEWRITING STUDENTS

Number of Errors	September Test		January Test		May Test	
	Number of Students	Per Cent of Total Students	Number of Students	Per Cent of Total Students	Number of Students	Per Cent of Total Students
0-2	7	3.17	5	2.26	14	6.33
3-5	32	14.48	41	18.56	39	17.65
6-8	32	14.48	39	17.65	49	22.17
9-11	35	15.84	38	17.20	34	15.38
12-14	33	14.83	39	17.65	24	10.86
15-17	27	12.22	17	7.69	22	9.95
18-20	13	5.88	18	8.15	15	6.79
21-23	9	4.07	8	3.62	4	1.81
24-26	11	4.98	12	5.43	5	2.26
27-29	10	4.52	5	2.26	2	.91
30-32	1	.45	5	2.26	2	.91
33-35	2	.91	1	.45	3	1.36
36-38	4	1.81	-	-	5	2.26
39-41	1	.45	1	.45	-	-
42-44	2	.91	-	-	2	.91
45-47	-	-	-	-	-	-
48-50	-	-	1	.45	1	.45
51-53	-	-	-	-	-	-
54-56	1	.45	-	-	-	-
57-59	-	-	-	-	-	-
60-62	1	.45	-	-	-	-
63-65	-	-	1	.45	-	-
Totals	221	100.00	221	100.00	221	100.00
Mean Numbers of Errors:		13.76		12.54		11.56
Standard Deviations:		9.63		8.41		8.76

slightly from 13.76 on the first test, to 12.54 on the second test, and to 11.56 on the third test. The number of errors per person ranged from one to 61 on the first test; from zero to 64 on the second test; and from zero to 50 on the third test. If the three papers containing the most errors had been eliminated from each test, the range of the errors would have been reduced by at least 12, and up to 30 errors.

The net words per minute[1] continues to be one of the most-used measures of typewriting ability. This measure can be more accurately ascertained, and more easily compared with other test results, than can production test scores.

Table X is a frequency distribution of the results of the timed-writing tests, stated in terms of net words per minute. As indicated in Table X, the participants wrote at an average rate of 14.24 net words per minute on the first timed writing; 20.15 net words per minute on the second test; and 25.76 net words per minute on the third test.

The ranges of the net words per minute typewritten by the participants were similar for the three tests. The scores ranged from zero to 52 net words per minute on the first test; from zero to 51 on the second test; and from zero to 57 on the third test. Despite the similarity of the

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[1] Net words per minute here refers to the measurement of speed utilized for many years whereby the number of five-stroke words per minute is calculated after ten-word deductions have been made for errors.

TABLE X

NET WORDS PER MINUTE ACHIEVED BY 222

SECOND-YEAR TYPEWRITING STUDENTS

Net Words Per Minute	September Test		January Test		May Test	
	Number of Students	Per Cent of Total Students	Number of Students	Per Cent of Total Students	Number of Students	Per Cent of Total Students
55-59	-	-	-	-	2	.91
50-54	2	.91	3	1.36	6	2.71
45-45	1	.45	4	1.81	10	4.52
40-44	5	2.26	17	7.69	25	11.31
35-39	6	2.72	11	4.97	28	12.67
30-34	10	4.52	24	10.86	25	11.31
25-29	20	9.04	26	11.77	31	14.03
20-24	30	13.50	32	14.48	18	8.15
15-19	25	11.31	23	10.41	24	10.86
10-14	26	11.77	19	8.60	12	5.43
5-9	23	10.41	14	6.33	9	4.07
0-4	73	33.03	48	21.72	31	14.03
Totals	221	100.00	221	100.00	221	100.00
Mean NWPM:		14.24		20.15		25.76
Standard Deviations:		11.95		13.72		14.55

ranges, the cluster of scores occur at different levels between zero and 24 net words per minute on the first test; between 15 and 34 net words per minute on the second test; and between 15 and 44 net words per minute on the third test. The standard deviation of the first test scores was 11.95; of the second test scores, 13.72; and of the third test scores, 14.55. This continued increase in the standard deviations indicates that the scores became more widely dispersed over the range as the year progressed.

Summary

The foregoing material constitutes a presentation of the primary data involved in this study. Personal information concerning the 221 participants has been provided including data relative to: (1) age, (2) sex, (3) grade placement, (4) prior grades in typewriting, and (5) intelligence.

"The Students Typewriting Tests," Volume XIII, Test 3, which was administered to the participants, was discussed, and the data gathered through its use were presented in tablular form.

The data concerning the total test scores will be treated statistically in Chapter V in a manner designed to ascertain the change in the students' typewriting abilities resulting from instruction in second-year typewriting.

Chapter VI of this report includes analysis of data regarding five personal factors of age, intelligence, grade

level, grade-point average, and sex as related to achievement of the participants in second-year typewriting.

In Chapter VII the errors committed by the participants on the three administrations of "The Students Typewriting Tests" are classified and analyzed.

CHAPTER V

DISCUSSION OF STATISTICAL PROCEDURES AND TREATMENT OF DATA PERTAINING TO ACHIEVEMENT

A major portion of this chapter is devoted to a discussion of basic statistical procedures used in the determination of the typewriting proficiency demonstrated by the participants in this study. A statistical analysis is made of the total test scores accumulated by administering "The Students Typewriting Tests," Volume XIII, Test 3, to the 221 students enrolled in the second year of typewriting. One purpose of this chapter is to indicate the level of learning, and the amount of change in the ability of second-year typewriting students, as measured by their performance on "The Students Typewriting Tests." Measures of central tendency and dispersion are calculated to provide brief, reliable summations of the test scores attained by the students. These measures are compared with the national norms for the test, which were discussed in Chapter III, to indicate the students' proficiency in typewriting at the beginning, middle, and end of the school year, and to indicate specifically their progress during the period of instruction.

The formulas used in this study were taken from Garrett,[1] and are used here for purposes similar to those described in Garrett's explanation of the formulas.

Percentiles

A percentile is the point below which a designated percentage of cases lie. For example, the 75th percentile is the point below which 75 per cent of the cases in a given sample are located. A commonly-used formula for determining percentiles was used in this report.[2]

When percentiles are stated in multiples of ten they are known as deciles. A useful over-all comparison of two or more groups is provided when the deciles of the groups are plotted as cumulative percentage curves upon the same coordinate axes. When one of the groups represents the norms, or the typical performance of a designated group, an excellent measure of performance is supplied.

The participants' proficiency in typewriting is illustrated in Figure 2 through the use of cumulative percentage curves of the scores achieved on each of the three tests. The additional plotting of the national norms provides a standard with which the performance of the participants can be compared. Since "The Students Typewriting

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[1]Henry E. Garrett, Statistics in Psychology and Education, Fourth Edition (New York: Longmans, Green and Company, 1953).

[2]Ibid., p. 66.

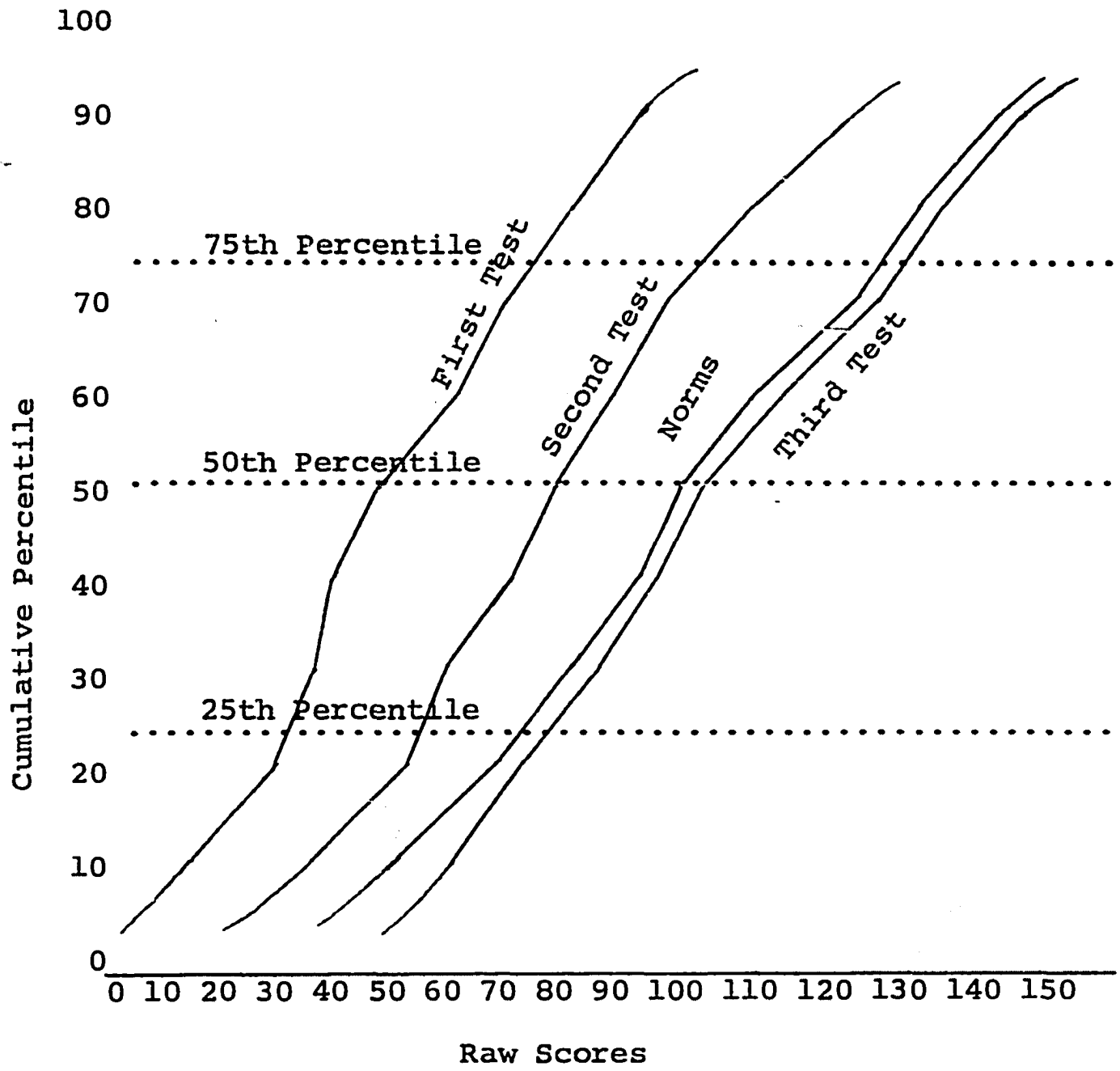

Figure 2.--Cumulative percentage curve representing the scores made on the first, second, and third administrations of "The Students Typewriting Tests," Volume XIII, Test 3, along with the norms for the test.

Tests" were designed for administration at the end of the third semester of instruction, the norms were established for persons who had completed three semesters of instruction in typewriting. Therefore, all comparisons with the norms are made on that basis.

The four cumulative percentage curves plotted on Figure 2 obviously follow the same pattern. However, it may be observed that the curve representing the percentiles of the first test lies a mean of 46.30 points to the left of the norms. The first decile, which is only 36.13 points less for the first test than for the norms, is the only decile which deviates markedly from the mean difference.

The deciles of the norms are larger than the deciles of the second test scores by a mean of 18.50 points. The deciles near the center of the range deviate most widely from the norms; while the deciles at the ends of the range most nearly approach the norms.

The deciles of the third test scores exceed those of the norms by a mean of 4.10 points. The difference in the deciles varies from .97 of a point at the ninth decile to 8.81 points at the first decile.

The point at which the participants reached a level of typewriting performance equivalent to the norms was determinded by interpolation to be the end of the thirteenth week of the fourth semester of instruction. Inasmuch as the norms were established for the end of the third semester of typewriting instruction, it appears that the participants had

progressed at a rate equal to 81 per cent of that which normally might be expected.

If an index of typewriting proficiency is established with the norms representing the base, of 100 points, the students' level of learning at the end of the second, third, and fourth semesters of instruction can be stated in meaningful, comparative terms. In this comparison of achievement, the established norm of 94 points for the mean will be considered as the base, or as an index number of 100. The mean score of 49.34 points achieved by the participants on the first test, in September, 1956, is the equivalent of an index number of 52.49. An index number of 80.70 would properly represent the performance of the students on the second test, in January, 1957; and an index number of 104.82 would be the equivalent of the mean of the third test scores, 98.53 points. On the basis of their performance on "The Students Typewriting Tests," the ability of the participants at the beginning of the third semester was equivalent to 52.49 per cent of that expected at the end of the third semester; at the end of the third semester their ability was 80.70 per cent of that expected; and at the end of the fourth semester the students' ability was equal to 104.82 per cent of that normally expected at the end of the third semester. The typewriting proficiency of the students increased 28.21 index points during the third semester, and 24.21 index points during the fourth semester, to produce a combined advance of 52.33 index points during the school year.

From the preceding discussion it is apparent that the participants' typewriting ability at the end of the fourth semester was almost exactly twice as great as their ability at the beginning of the school year. It is also evident that slightly more progress was made during the third semester than the fourth. However, it should also be noted that the achievement was considerably below that expected.

Central Tendency

A measure of central tendency is a single measure which represents all of the scores made by a group; and as such is a concise description of the performance of a group as a whole. Therefore, measures of central tendency make possible the comparison of the typical performance of a group on different tests.

Mean

The arithmetic mean, or simply the mean, is the best known and most widely used measure of central tendency. It may be defined as the sum of the scores divided by the number of the scores. Since this method of deriving the mean would require the handling of large numbers and tedious calculations in this study, the "Assumed Mean" method of calculating the mean was used.[1]

Sampling errors, and errors of measurement, cause the calculated mean to deviate from the true mean. The amount by

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[1] Ibid., p. 37.

which the calculated mean might deviate from the true mean, for these reasons, is indicated by the standard error of the mean.[1]

The reliability of the mean depends on the number of cases involved in the study, and the variability or spread of the measures. The reliability fluctuates in proportion to the square root of the number of scores; as the square root of the number of scores increases, the reliability increases. The reliability of the mean will vary with the standard deviation; as the standard deviation increases, reliability decreases.

The difference between the means of the test scores is a measure of the amount of change that occurred between the test dates. In order to determine the significance of the difference between the means of the test scores the standard error of the difference of the means was calculated.[2]

The reliability of the difference between the means can be determined through the use of a critical ratio.[3] The confidence with which one accepts a difference in the means depends upon the level of significance reached by the critical ratio. The table of the normal probability curve

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[1] Ibid., p. 182.

[2] Ibid., p. 226.

[3] Ibid., p. 215.

indicates that in a normal distribution a critical ratio of 1.96 or more can be accepted as an indication that a true difference in the means exists at the .05 level of significance. This indicates that the chances are 95 to 5 that there is a true difference between the means. When the critical ratio is as large as 2.58 it can be accepted at the .01 level of significance. The .01 level of significance indicates that in a normal distribution the chances are 99 to 1 that a true difference in the means exists.

Variability

A measure of variability shows the amount of "spread" or "scatter" of scores around a measure of central tendency. This section is a discussion of two of the most frequently used measures of variability. The meaning of each is explained; and the uses of each are described.

Range

The range is the most commonly used measure of variability and represents only a rough comparison of two or more groups. The range is determined by subtracting the lowest score from the highest. The lowest score on the first test was zero and the highest was 118, which gives a range of 118 points. The second-test scores ranged from two to 143. The lowest score on the third test was 21 and the highest was 186, with a range of 165.

Standard Deviation

A second measure of variability customarily employed in research is the standard deviation. In a normal distribution the mean ± one standard deviation will include 68.26 per cent of the distribution; the mean ± 1.96 standard deviations will include 95 per cent of the number of scores, and the mean ± 2.58 standard deviations will include 99 per cent of the scores, in the distribution. The standard deviation is less affected by sampling errors than the quartile deviation, and is therefore more reliable.

The standard deviations of the data in this study were obtained through the use of a formula designed for use with data which has been grouped into frequency distributions.[1]

Correlation

Correlation is a measure of the relationship of one variable to another. Coefficients of correlation range from the perfect positive correlation of 1.00 to the perfect negative correlation of -1.00.

A zero correlation indicates that no relationship exists between the fluctuations of two variables. Positive correlation indicates that as one variable fluctuates the second variable will fluctuate in the same direction. Negative correlation indicates that the two variables fluctuate at the same time, but in opposite directions.

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[1] *Ibid.*, p. 53.

The description of the degree of correlation will vary somewhat with the author using it. However, Garett[1] indicates that there is substantial agreement among psychologists and educators that a coefficient of correlation from .00 to ± .20 denotes indifferent or negligible relationship; a coefficient of correlation from ± .20 to ± .40 denotes low correlation; a coefficient of correlation from ± .40 to ± .70 denotes substantial or marked relationship; a coefficient of correlation between ± .70 and ± 1.00 denotes high to very high relationship.

The product-moment method[2] of determining the coefficient of correlation will be used in all parts of this study except Chapter VII. The rank-difference method[3] of computing the coefficient of correlation will be used in the discussion of errors in Chapter VII.

The rank-difference method of computing a coefficient of correlation may be used to indicate the relationship of one variable to another when scores have been arranged in order of merit. Garrett states that, "When we have only a few scores, it is often advisable to rank these scores in order of merit and compute the correlation by the rank-difference method instead of by the longer and more laborious product-moment method.[4]

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[1] Ibid., p. 173.
[2] Ibid., p. 138.
[3] Ibid., p. 355.
[4] Ibid., p. 354.

The following tabulation indicates the mean, the standard deviation, and the standard error of the mean of the total test scores earned by the participants on the three administrations of "The Students Typewriting Tests."

Test	M	σ	σ_M
First	49.34	26.17	1.76
Second	75.86	29.95	2.01
Third	98.53	29.94	2.01

The preceding tabulation indicates that the mean scores achieved by the participants increased from 49.34 points on the September administration of the test to 75.86 points on the January administration of the test. This increase in mean scores indicates that the participants were almost exactly twice as proficient in the elements tested at the end of the fourth semester of instruction as at the beginning of the third semester of instruction in typewriting. The scores were slightly less scattered on the first test than on either the second or third, and the variation of the scores around the medians was almost exactly the same for the second and third tests. Inasmuch as the error of the mean fluctuates in direct relation to changes of the standard deviation of the scores, and in proportion to the square root of the number of the scores, the standard errors of the means of 1.76 for the first test, 2.01 for the second test, and 2.01 for the third test appear to be normal.

The differences between the means, the coefficients of correlation between the scores, the standard errors of the differences between the means, and the critical ratios of the first and second, the first and third, and the second and third test scores are:

Tests	r	$diff_m$	SE_D	CR
First and Second	.57	26.51	1.75	15.14**
Second and Third	.68	22.67	1.61	14.09
First and Third	.51	49.19	1.88	26.15

**Each critical ratio is significant at the .01 level of significance.

The coefficient of correlation between the total scores earned by the students on the first and second tests in this study is .57. In accordance with the preceding description of the degree of correlation, this obtained coefficient of .57 indicates that there is a substantial relationship between scores attained on the first and second tests. The coefficient of correlation of .68 found between the results of the second and third tests indicates a marked relationship between the two scores. The coefficient of correlation of .51 between the results of the first and third tests indicates a substantial relationship between the results of the two tests. The coefficient of correlation indicates that the students who compiled the higher scores on the first test also compiled the higher scores on the later tests; conversely, the students who received the lower scores on the first test did so on the other tests.

When tested against the null hypothesis each of the coefficients was significant at the .01 level of confidence.

The calculated critical ratio of 15.14 discloses that the difference between the means of the first and second tests is one that could not have been caused by errors in sampling or testing. It is apparent that the students made substantial progress in typewriting ability between the second and eighteenth weeks of their second year of typewriting.

A critical ratio of 14.09 for the second and third tests shows that the difference between the mean scores of the second and third tests is significant at the .01 level of confidence. Therefore, a real gain in typewriting ability occurred between the eighteenth and thirty-fifth weeks of instruction.

A critical ratio of 26.15 for the first and third tests proves that there is a real difference between the means of the tests at the .01 level of significance. Therefore, a significant gain in typewriting ability was realized between the second and thirty-fifth weeks of the second year of typewriting.

In summary, the preceding statistical analysis of the total scores earned by the participants on three administrations of "The Students Typewriting Tests" conclusively indicate that a statistically significant gain in the typewriting proficiency of the participants occurred during each semester of the second year of typewriting instruction.

Quartile Scores

The belief is quite widespread that as one's ability to typewrite increases, his rate of gain in future courses of typewriting will decrease. Therefore, the cases in this study were broken into quartiles, based on the scores attained on the first test, in an effort to determine the relative amounts of gain achieved in second-year typewriting by persons with varying degrees of ability. The first quartile is composed of students who scored 29 points or less when "The Students Typewriting Tests" was administered the first time, in September, 1956; the students in quartile two scored from 30 to 47 points on the first test; the scores in the third quartile ranged from 48 to 67; and the students in the fourth quartile scored from 69 to 118 points on the first test. The complete ranges of the scores achieved by each quartile, on each test, are:

Quartile	First Test	Second Test	Third Test
First	0-29	2-109	21-129
Second	30-47	28-129	38-137
Third	48-67	22-125	32-151
Fourth	69-118	34-143	54-186

It may be observed from the preceding tabulation that the only set of scores which appears to be out of its proper sequence is the range for the third quartile on the second test. The range of the scores compiled by the students in each quartile on the first test is necessarily limited by the

method used in the determination of the quartiles. Consequently, the ranges of the test scores vary from 17 to 49 points. However, the ranges of the scores compiled by the quartiles on the second and third tests are considerably larger, with a minimum range of 99 points on the scores compiled by the second quartile on the third test; and a maximum range of 132 points for the scores earned by the fourth quartile on the third test.

The following tabulation of the means of the scores compiled by the students in each quartile indicate that the means fall into an apparently normal pattern.

	First Test		Second Test		Third Test	
Quartile	Mean	σ	Mean	σ	Mean	σ
First	16.90	8.42	53.95	25.39	76.50	13.32
Second	37.18	5.98	70.04	24.19	92.05	22.47
Third	57.48	6.13	79.05	25.14	107.05	24.28
Fourth	84.22	13.74	99.59	25.57	117.59	26.82

As indicated in the preceding tabulation, the standard deviations were lower for the first test than for either of the succeeding tests.

Again, these low measures of variability were caused by the methods used in determining the quartiles. It might be noted that the standard deviation of the scores achieved by the fourth quartile on the first test was 63 per cent larger than the standard deviation of the first-test scores compiled by any other quartile. This indicates that the

scores did not cluster closely around the median; but, instead they were widely dispersed over the entire range of the scores. On the second test, the standard deviations were similar, and large, for each quartile. On the third test, the standard deviations become progressively larger from the lower to the higher quartiles. The standard deviation of 26.82 for the test scores earned by the fourth quartile on the third test was more than twice as large as the standard deviation of 13.32 for the third-test scores achieved by the first quartile.

The following tabulation presents the difference in mean scores compiled by the students in each quartile.

Quartile	$diff_{m12}$	$diff_{m23}$	$diff_{m13}$
First	37.05	22.55	59.60
Second	32.86	22.01	54.87
Third	21.57	28.00	49.57
Fourth	15.37	18.00	33.37

The difference between the mean scores achieved by the third quartile on the second and third tests presents the only variation in the pattern of figures, as it did on the ranges of the scores discussed earlier. With the exception of the previously mentioned difference in the means, the magnitude of all of the mean differences decrease as the quartile increases. The difference between the means of tests one and two is 37.05 points for quartile one; 32.86 points for quartile two; 21.57 points for quartile three;

and 15.37 points for quartile four. The range of the differences between the means of tests two and three was much smaller than the range for tests one and two. The largest difference between the means of tests two and three occurred in the scores compiled by the third quartile. There was a mean difference of 22.55 points in the scores earned by the first quartile; 22.01 points for the second quartile; 28.00 points for the third quartile; and 18.00 points for the fourth quartile.

During the first semester, the first quartile realized a larger gain in typewriting skill, as measured by "The Students Typewriting Tests," than any other quartile. The increase in the typewriting proficiency of the second quartile was 88.69 per cent as great as that of the first quartile. The third quartile gained 58.22 per cent as much as the first quartile. The fourth quartile gained only 41.48 per cent as much as the first quartile during the first semester of the school year.

The students in the third quartile achieved the greatest gain during the second semester with an increase of 28.00 points compared with 22.55 points for the first quartile, 22.01 points for the second quartile, and 18.00 points gained by the students in the fourth quartile.

All of the differences in the mean scores are significant at the .01 level of significance when tested against the null hypothesis. This is an indication that a real gain

in the typewriting skill of the students in every quartile actually occurred during each semester. These gains could not have been caused by sampling or testing errors.

Statistical Treatment of the Part Scores

As indicated in earlier chapters, "The Students Typewriting Tests," as administered to the participants in this study, consisted of two parts: (1) a five-minute timed writing, and (2) a thirty-minute production test. Each part of the test produced one or more scores which were combined to form the over-all score for the total test. The data pertaining to over-all test scores were presented in Chapter IV, and treated statistically in the preceding section of this chapter. In the material which follows, the previously discussed statistical formulas will be applied in analysis of the data collected by means of the two parts of the test.

The Production Test Scores

As indicated in Chapter IV, the participants achieved a mean production test score of 34.97 points on the first test, in September, 1956; 54.88 points on the second test, in January, 1957; and 69.74 points on the third test, in May, 1957.

The means, the standard deviations, and the standard errors of the means of the production test scores are:

Test	Mean	σ	σ_M
First	34.97	16.55	1.11
Second	54.88	18.35	1.23
Third	69.74	17.75	1.19

The correlations between the scores, the differences between the means, the standard errors of the differences, and the critical ratios of the production test scores are:

Tests	r	$diff_m$	SE_D	CR
First and Second	.45	19.91	1.23	16.19**
Second and Third	.54	14.86	1.16	12.81
First and Third	.43	34.77	1.23	28.27

**Each critical ratio is significant at the .01 level of significance.

The table of the normal probability curve indicates that a critical ratio of 2.58 or more denotes a statistically significant difference in the means at the .01 level of significance. Thus, the calculated critical ratio of 16.19 indicates that the difference between the mean scores on the first and second production tests is one that could not have been caused by sampling errors. This is evidence that definite progress occurred in the students' typewriting ability, as measured by the production test scores, between the second and eighteenth weeks of school.

The critical ratio of 12.81 for the difference between the mean scores achieved on the second and third production tests indicates that a real difference in the means exists at the .01 level of significance. Therefore, the chances are

99 to 1 that the students performed with a higher level of proficiency on the third production test, in May, 1957, than they achieved on the second production test, in January, of that year.

The critical ratio of 28.27 for the difference in the means of the first and third production-test scores is far greater than the critical ratio of 2.58 needed to indicate a gain that is significant at the .01 level of significance. It is evident, therefore, that the participants in this study made substantial progress in typewriting ability over the entire school year.

In summary, the foregoing statistical analysis of the scores on the production section of "The Students Typewriting Tests" indicate beyond a doubt that a statistically significant gain in the typewriting proficiency of the students occurred during the course of instruction in second-year typewriting.

Timed-Writing Scores

The means, the standard deviations, and the standard errors of the means of the scores attained by the participants on the timed-writing section of "The Students Typewriting Tests" are:

Test	Mean	σ	σ_M
First	14.65	14.75	.99
Second	21.79	15.85	1.07
Third	28.93	16.25	1.09

The amount of gain in the ability of the students to typewrite from straight-copy material, as indicated by the difference in the means of the scores achieved on the timed-writing tests, are given in the following tabulation.

Tests	r	$diff_m$	SE_D	CR
First and Second	.55	7.14	.90	7.93**
Second and Third	.59	7.14	.96	7.44
First and Third	.36	14.28	1.19	12.00

**Each critical ratio is significant at the .01 level of significance.

The difference between the means of the timed-writing scores for tests one and two, as well as for tests two and three, is 7.14 points. This indicates that the amount of gain realized during the first semester was exactly the same as the increase realized in the second-half of the school year.

The critical ratio of 7.93 for the difference in the means of tests one and two is considerably larger than the 2.58 required to indicate a real difference in the scores at the .01 level of significance. The slightly larger standard error of the difference causes the critical ratio of tests two and three to be slightly less than the critical ratio for tests one and two. However, the critical ratio of 7.44 is 2.88 times as large as that needed to indicate a difference in the means significant at the .01 level of significance.

It may be concluded that statistically significant progress was made in ability to typewrite straight-copy

material during each semester of instruction in second-year typewriting, and that an equal amount of progress occurred each semester.

Gross words per minute.--To facilitate analysis of typewriting speed development, the five-minute timed writings were checked in terms of gross words per minute so that the changes in the key-stroking rate could be determined. The coefficients of correlation between the gross typewriting rates of the participants on the first and second, the second and third, and the first and third tests were calculated. Inasmuch as Garrett[1] states that a coefficient of correlation between $\pm$ .70 and $\pm$ 1.00 denotes a high to very high relationship between the two variables, it is evident that the coefficients of correlation of .72, found between the gross words per minute achieved on tests one and two, and .82 between tests two and three are high.

As indicated in the following tabulation, the means of the gross words per minute scored on the three test administrations are: 36.98 on the first test, 43.11 on the second test, and 46.96 on the third test. The standard errors of the means were relatively low at .51 for the first test, .56 for the second test, and .46 for the third test.

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[1]Ibid., p. 173.

Test	Mean	σ	σ_M
First	36.98	7.52	.51
Second	43.11	8.35	.56
Third	46.96	6.77	.46

As indicated in the following tabulation, the difference of 6.13 points between the means of the gross words per minute scored on tests one and two, has a standard error of the difference of .41 points, and a critical ratio of 14.95. Since this critical ratio is considerably larger than the needed 2.58, we can conclude that the increase in the gross stroking rate was statistically significant at the .01 level of significance.

Tests	r	$diff_m$	SE_D	CR
First and Second	.72	6.13	.41	14.95**
Second and Third	.82	3.85	.32	12.03
First and Third	.66	9.98	.44	22.68

**Each critical ratio is significant at the .01 level of significance.

The difference between the mean gross words per minute typewritten on tests two and three is 3.85, with a standard error of the difference of .32. The critical ratio of 12.03 calculated for the difference in the means of the gross words per minute typewritten on tests two and three indicates that significant progress was made in the stroking rates of the participants during the fourth semester. However, the increase in the gross words per minute was only 62.81 per cent as great during the fourth semester as during the third.

The difference of 9.98 points between the means of the gross words per minute scored on tests one and three, has a standard error of the difference of .44 points, and a critical ratio of 22.68. This critical ratio indicates that there was a statistically significant difference in the gross words per minute typed by the participants on the first and third administrations of the test.

Errors on timed writings.--The number of errors made on the five-minute writing appears to be rather high. As shown by the following tabulation, the mean errors declined from 13.76 on the first timed writing to 12.54 at the end of the third semester, and to 11.56 at the end of the fourth semester.

Test	Mean	σ	σ_M
First	13.76	9.63	.65
Second	12.54	8.41	.57
Third	11.56	8.76	.59

The differences between the means, the coefficients of correlation between the errors, the standard errors of the differences between the means, and the critical ratios of the first and second, the first and third, and the second and third tests are:

Tests	r	$diff_m$	SE_D	CR
First and Second	.50	1.22	.62	1.97*
Second and Third	.60	.98	.53	1.85
First and Third	.43	2.20	.65	3.38**

*Significant at the .05 level of significance.
**Significant at the .01 level of significance.

The critical ratio of 1.97 indicates that the difference of 1.22 points in the means of the errors made on the first and second tests is significant at the .05 level of confidence. This would indicate that 95 times out of 100 trials a difference would be found to exist between the means of the errors.

The reliability of the difference between the means of the errors occurring on tests two and three is less than the reliability of the difference between the means of the first two tests. The critical ratio of 1.85 calculated for the difference between the means of the errors of the second and third tests indicates that the difference is reliable at only the .10 level of confidence.

Garrett[1] indicates that the accuracy limits in general use by investigators include the .01 and .05 levels of confidence; but that the .10 level of confidence is not generally acceptable by investigators of educational and psychological problems.

It may be concluded from the evidence in this study, that in 95 cases out of 100 the mean number of errors will decrease during the third semester of instruction in typewriting. Although this study shows that the chances are 9 to 1 that errors will decrease during the fourth semester, the level of reliability is so low that the value of this evidence is questionable.

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[1] Ibid., p. 186.

Net words per minute.--The timed-writing scores are stated in terms of net words per minute[1] so that both the stroking rate and the errors can be taken into consideration in the computation of one score which accurately reflects straight-copy typewriting ability.

The mean, the standard deviation, and the standard error of the mean net words per minute achieved by the participants on each of the test dates are:

Test	Mean	σ	σ_M
First	14.24	11.95	.80
Second	20.15	13.72	.92
Third	25.76	14.55	.98

The means of the timed-writing scores ranged from 14.24 net words per minute on the first test to 25.76 words per minute on the third test. The mean of the net words per minute scores on the second test fell near the middle of the range, at 20.15.

The differences between the means, the coefficients of correlation, the standard errors of the differences between the means, and the critical ratios of the net words per minute achieved by the participants on the first and second, second and third, and first and third tests are:

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[1]Net words per minute here refers to the measurement of speed utilized for many years whereby the number of five-stroke words per minute is calculated after ten-word deductions have been made for errors.

Tests	r	$diff_m$	SE_D	CR
First and Second	.56	5.91	.91	6.49**
Second and Third	.53	5.61	.93	6.03
First and Third	.19	11.52	1.14	10.11

**Each critical ratio is significant at the .01 level of significance.

The mean net words per minute achieved by the students on the second test was 5.91 net words more than the 14.24 net words per minute scored on the first test. The gain continued until the mean of the third test scores exceeded the mean of the second test scores by 5.61 net words per minute. The critical ratios, at 6.49 and 6.03, were considerably in excess of the 2.58 needed to indicate a difference in the means that could not have been caused by sampling errors.

It is clear that statistically significant gains in ability to typewrite straight-copy material occurred, in approximately equal amounts, during each of the semesters.

When compared with the findings of other research studies the timed-writing scores achieved by the participants in this study appear to be extremely low. The Business Teacher survey[1] indicated that the mean typewriting speed of high-school students on five-minute timed writings at the end of the first year of instruction in typewriting, is 41 gross words a minute with 6 errors. This constitutes a score of 29 net words a minute when computed in accordance with the International Typewriting Contest rules.

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[1] Savinski, loc. cit.

A year earlier the Business Teacher personnel conducted a survey of achievement during the first semester of typewriting. This survey indicated that the average accomplishment on a five-minute timed-writing at the end of the first semester was 30 gross words a minute with 5 errors. This is the equivalent of 20 net words a minute.

Sharp[1] states that the minimum achievement standards for first-year typewriting students range from 30 to 36 net words per minute. At the conclusion of the second year, the standards range from 35 to 60 net words per minute.

Rahe[2] found that speed requirements on straight-copy material were reported as 50 to 60 net words per minute for fourth-semester typewriting.

Tonne, Popham, and Freeman[3] state that, "Research studies of typewriting accomplishment indicate that the median typewriting rate of second-year students is around 40 net words a minute at the end of the course."

Surveys by Wright,[4] Potter,[5] Cook,[6] and the National Office Management Association[7] have established the minimum performance standards for beginning typists at 40 "words a minute." The authors of the NOMA survey[8] developed a standard of 45 words per minute on ten-minute timed-writings, with

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[1]Sharp, loc. cit. [2]Rahe, loc. cit.

[3]Tonne, op. cit., p. 120. [4]Wright, loc. cit.

[5]Potter, loc. cit. [6]Cook, loc. cit.

[7]Green, loc. cit. [8]Ibid., p. 12.

five errors or less, which they believed to be a realistic standard in common use throughout the nation, in 1950. The NOMA study indicates a belief that the standard should be increased to 62 words a minute by 1957, the year in which the tests were administered to the participants in this study. Nelson[1] concludes that a typewriting speed of 50 to 60 words a minute for typists is needed for satisfactory performances.

As indicated by Table X, page 63, only 28, or 12.67 per cent, of the participants possessed the ability to typewrite as rapidly as 29 net words per minute, on straight-copy material, at the beginning of the second year of instruction. Thus, by comparison with the findings of the preceding studies, it appears far too few of the participants could typewrite as many net words per minute at the beginning of the third semester of instruction in typewriting as the minimum mean established by similar groups. By the end of the third semester, 64, or 28.96 per cent, of the participants had reached the minimum established first-year mean of 29 net words a minute. At the end of the fourth semester, 192, or 46.15 per cent, of the participants could typewrite at least 29 net words a minute on five-minute timed-writings. The mean net words per minute scored by the participants in this study never reached in the second year of instruction the means established by students in other studies at the end of the first year of instruction.

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[1]Nelson, loc. cit.

It may reasonably be assumed that the minimum employment standards of 40 net words a minute established by the numerous surveys reviewed in this study, is appropriate. Using this standard, it is evident that 8, or 3.62 per cent, of the participants could have met the minimum requirements for beginning typewriting employment at the beginning of the third semester of typewriting instruction. Twenty-four, or 10.86 per cent, possessed sufficient typewriting skill at the end of the third semester to qualify as beginning typists. By the end of the fourth semester, 43, or 19.46 per cent of the participants scored 40 or more net words per minute on the 5-minute timed writing, and therefore could have qualified in this respect for beginning employment as typists.

One of the major causes of the apparently low net-words-per-minute rates achieved by the participants on the timed writings appears to be an excessive number of errors. Most authors avoid stating a maximum number of errors acceptable on timed writings. However, prior research has indicated that more than one error per minute on timed writings is generally undesirable. When an effort is being made to establish a new stroking level, additional errors are generally acceptable. The standards set by the NOMA Survey[1] indicate that persons who commit more than one error every two minutes are unacceptable as beginning typists.

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[1]Green, loc. cit.

From the preceding discussion, the means of 13.76, 12.54, and 11.56 errors on the first, second, and third timed writings, respectively, appear to be considerably larger than the generally accepted maximum of one error per minute. If the errors had been restricted to one per minute, the net words per minute scored by the participants would have been 26.98, 33.11, and 36.96 net words per minute on the first, second, and third tests, respectively. Such net-word rates would have reached a level of 93 per cent of the generally accepted standards.

Summary

A major portion of this chaper has been devoted to a discussion of basic statistical procedures used in the determination of the typewriting proficiency demonstrated by the participants in this study. The formulas were applied to the total test scores in an attempt to ascertain the level of learning of the participants at various stages in the instructional program. These statistics were further tested so that the amount of change in typewriting ability occurring during each semester would be indicated.

The scores earned by the participants on the three administrations of "The Students Typewriting Tests," were compared with the national norms for the tests to determine the relative typewriting proficiency of the participants at the various stages of the second year of instruction in typewriting as compared with the typical performance of a group

of typewriting students at the end of the third semester of instruction.

This chapter indicates that the typewriting proficiency of the participants at the end of the fourth semester of instruction was almost exactly twice as great as their proficiency at the beginning of the third semester. However, it appears that they were not as proficient at the beginning of the third semester as they should have been. Thus, they were still below proper levels of proficiency at the end of the second year of instruction in typewriting. It is evident that slightly more progress was made during the third semester of instruction than the fourth.

The cases in this study were broken into quartiles, based on the total test scores attained on the first administration of the test, in an effort to determine the relative amounts of gain achieved in second-year typewriting by persons who possess varying degrees of typewriting proficiency at the beginning of the third semester of typewriting instruction. When the raw scores achieved on the three administrations of the test are used as a basis, the amount of gain achieved by the persons in each quartile increased as the quartile decreased.

The timed-writing and production test scores were each treated statistically to determine if statistically significant achievement occurred in the typewriting proficiency of the participants during each semester of

instruction in second-year typewriting. The results indicated that statistically significant gains in the ability of the participants to typewrite both straight-copy and production material occurred during each semester of instruction in second-year typewriting.

Chapter VI will be devoted to a statistical treatment of the data in this study in an effort to indicate the relationships between five personal factors and achievement in typewriting, as measured by scores earned by the participants on three administrations of "The Students Typewriting Tests," Volume XIII, Test 3.

CHAPTER VI

RELATIONSHIP BETWEEN PERSONAL FACTORS AND ACHIEVEMENT IN SECOND-YEAR TYPEWRITING

In Chapter IV of this report basic data are presented which involve personal factors and typewriting test scores of 221 second-year typewriting students. The personal data were accumulated from the individual records of the students in the offices of the schools involved, and from questionnaires filled in by the students. The test data were acquired through three administrations of "The Students Typewriting Tests," Volume XIII, Test 3, to the 221 student-participants. The tests were first administered during the second week of classes in September, 1956; again during the eighteenth week of instruction in January, 1957; and finally during the thirty-fifth week of instruction, in May, 1957. The test scores of the 221 students were treated statistically in Chapter V in an effort to determine the typewriting proficiency of the students at various stages of the instructional program in second-year typewriting.

In this chapter, an attempt is made, through a statistical treatment of the data, to reveal the relationships of the five personal factors of age, intelligence, grade level, grade-point average, and sex to achievement in second-year typewriting.

This research investigation was designed from the outset primarily for the purpose of determining the extent to which basic typewriting skills are extended as a result of instruction provided in the second year of typewriting in secondary schools. Since the data accumulated pertain only to typewriting during the second year of instruction, this author has been only incidentally interested in the amount of typewriting proficiency attained by students during the first year of instruction. This is true even though it is recognized that the degree to which a skill may be extended in a second year of instruction may be directly related to the amount of basic skill acquired in the first year. The data obtained in this study, by means of the first typewriting test administered in September, 1956, undoubtedly indicates quite accurately the extent of the typewriting skill acquired in the first year. However, it is with the gain in typewriting ability, indicated for the period between the first test and the third test, that this study is primarily concerned. The scores made by students on the first test are treated statistically so that comparisons can be made of the statistical relationships existing between

personal factors and typewriting ability at the beginning of the school year and the statistical relationships existing during the second year of instruction in typewriting as students made gains in typewriting proficiency.

In this study, achievement in each semester of second-year typewriting is considered to be the difference between the total scores earned by the participants on "The Students Typewriting Tests," administered at the beginning and end of that semester.

Coefficients of correlation are calculated here by the product-moment method to indicate the relationship between the personal factors of age, intelligence, and grade-point average and the achievements in second-year typewriting. The difference-between-the-means method is used to indicate the relationships between achievement and the personal factors of sex and grade level. The difference-between-the-means method is used in the latter cases because the number of intervals present in these two personal factors do not produce useful coefficients of correlation.

The remaining sections of this chapter are devoted to the presentation of information relative to the relationships of the various personal factors to proficiency and achievement in typewriting, as revealed in this study.

Correlation Between Age and Achievement in Typewriting

It is sometimes assumed by educators, as well as lay people, that a correlation exists between age and ability to

learn to typewrite. As indicated in Chapters I and IV, there is a frequent presumption of positive correlation between age and ability to learn to typewrite. At this time, a doctoral dissertation, tentatively entitled: "A Study of the Effect of Maturity on the Ability to Develop Typewriting Skill,"[1] is being completed by Dick at Boston University. Since the relationship between age and success in typewriting has apparently not been conclusively determined, an attempt is made in this study to provide additional data bearing on the subject.

Scores on First Test

The coefficient of correlation between the ages of the participants and the total test scores earned on the first test, in September, 1956, was calculated to determine whether a statistical relationship existed between the age and the typewriting proficiency of the individual participants at the beginning of their third semester of instruction in typewriting. The coefficient of correlation, as determined for the 221 students, was .15. This indicates a negligible, positive, relationship between the age and typewriting ability of the participants at the beginning of the third semester of typewriting instruction. From the instructional point of view, this evidence indicates clearly

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[1]Margaret Dick, "A Study of the Effect of Maturity on the Ability to Develop Typewriting Skill" (unpublished Ed. D. dissertation, underway, Boston University).

that the personal factor of age has little or no effect on the extent of achievement a student may attain.

Scores on Second Test

Scores on the second typewriting test, administered in January, 1957, were utilized to determine the amount of the gain in typewriting ability of each of the 221 students during their third semester of typewriting. In contrast to the treatment of the scores on the first test, where the total scores were utilized, the relationship between age and achievement here is revealed in terms of gain in total score. When the ages of the participants were correlated with the gains in proficiency they achieved in second-year typewriting the result was a coefficient of correlation of .10. Since a coefficient of correlation of $\pm$ .20, or less, is considered to be indifferent,[1] it may be concluded that there is almost no correlation between age and achievement in the third semester of typewriting. Thus again, there is evidence that from the instructional point of view the personal factor of age has little or no effect upon the extent of achievement a student may attain.

Scores on Third Test

Scores on the third typewriting test administered in May, 1957, were utilized along with the scores on the second test to determine the extent of gain achieved during the fourth semester of typewriting.

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[1]Garrett, Op. cit., p. 173.

When the coefficient of correlation was calculated between the ages of the participants in this study and the differences in the scores they achieved on the second and third tests, a correlation of .01 resulted. Actually, this correlation indicates that almost no relationship exists between age and achievement in the fourth semester of typewriting, as measured by the difference in the scores earned by the participants on the second and third administrations of "The Students Typewriting Tests."

The evidence presented here reveals that little or no relationship existed between the ages of the participants and their proficiency in typewriting at the beginning of the third semester. The data indicated that the relationship between the ages and achievement of the participants in third-semester typewriting was less than the relationship between their age and typewriting proficiency at the beginning of that semester. An even lower relationship existed between the age and achievement of the participants during the fourth semester of instruction in typewriting.

It may be concluded from the preceding discussion that age is not a significant factor in the development of one's ability to succeed in typewriting. This study indicates that in terms of the variance in age among high school students it is apparent that age has no effect upon success in typewriting.

Correlation Between Intelligence and Achievement in Typewriting

Most prior research studies have shown that there is little correlation between intelligence and ability to type-write straight-copy material. The typical conclusion is indicated by Hardaway[1] who, in effect, reports that intelligence quotients have been shown to have little relationship to typewriting success when judged by speed tests and manipulative exercises, but the relationship becomes significant when the measure of achievement involves the ability to arrange and produce usable work. This author believes that the research relating to this area has not been adequate to produce conclusive evidence. Since the test used in this study involves both straight-copy and production typewriting, it provided an apportunity to add evidence concerning the relationship between intelligence and success in typewriting.

This section constitutes an attempt to reveal the extent of the correlation between the intelligence quotients of the participants in this study and their success in the study of typewriting.

Scores on First Test

The intelligence quotients of the participants in this study were correlated with the total scores they achieved

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[1] Mathilde Hardaway, "Prognostic or Aptitude Tests for Skill Subjects," Business Education World (New York: Gregg Publishing Company, March, 1945), Volume XVII, pp. 371-373.

on the first administration of "The Students Typewriting Tests," to determine if there was any relationship between intelligence and the typewriting proficiency of the participants at the beginning of the third semester of instruction. The resulting coefficient of correlation of .28 indicates that there was only a slight positive relationship between intelligence and typewriting proficiency.

Scores on Second Test

As was done with the data concerning age, correlations based on the scores of the first and second tests were in terms of gains in total scores rather than simply correlations with the total scores.

The coefficient of correlation between the intelligence quotients of the participants and the differences in their September and January test scores was .16. This low coefficient of correlation indicates a slight, positive relationship between the intelligence of the participants in this study and their achievement during the third semester of typewriting. Although both coefficients of correlation are insignificant, it is interesting to note that this figure of .16 is considerably lower than the correlation of .28 found on the first test.

Scores on Third Test

The coefficient of correlation between the intelligence quotients of the participants and the differences in

the scores achieved by them on the January and May administrations of "The Students Typewriting Tests," was .00. This indicates that there was no relationship between intelligence and the progress achieved by the participants in the fourth semester of typewriting.

In this study, the relationship between intelligence and achievement in typewriting was low at the beginning of the third semester, and became less as the year progressed until the coefficient of correlation of zero indicated that there was no relationship between the two variables in fourth-semester typewriting. It may be concluded from the findings reported in this section that there is almost no relationship between intelligence and achievement in second-year typewriting, even when both straight-copy typewriting and production typewriting are involved. However, it must be remembered that the production phases of the test used in this study did not involve composition or other creative typewriting activity.

Correlation Between Grade-Point Average and Achievement in Second-Year Typewriting

Probable success in scholastic endeavor is quite often effectively predicted by grades received in prior courses in the same subject, or by the average grade received in a group of subjects. There are so many factors affecting grades of individuals that some students' grades fluctuate widely from year to year or from subject to subject. However,

Cook and Appel[1] report that one may predict success in typewriting from previous school grades with relatively high accuracy.

To provide more evidence relative to this matter, statistical computations were made in this study to indicate the relationship between the first-year typewriting grades of the 221 participants and their typewriting proficiency at the beginning of the third semester of instruction in typewriting, as well as their achievement during each semester of their enrollment in second-year typewriting.

Scores on First Test

The coefficient of correlation between the grade-point averages earned by the participants in first-year typewriting and the total test scores earned by them on the first administration of "The Students Typewriting Tests," in September, was calculated to determine the relationship between first-year typewriting grades and the typewriting proficiency of the participants at the beginning of the third semester of typewriting instruction. The resulting coefficient of .30 indicates a low positive correlation between the two variables.

It is interesting to note through analysis of the scores given in the appendix of this study that in general the people who scored highest on the first test were the same people who achieved high grades in first-year typewriting.

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[1]Cook and Appel, op. cit., p. 18.

Similarly in general, the individuals who made low scores on the first test were the same people who achieved low grades in first-year typewriting. However, the mass of scores between high and low were completely unrelated to the grades achieved in first-year typewriting,,which undoubtedly accounts for the fact that the coefficient of correlation for all grades and scores is only .30.

Scores on Second Test

A computation of the correlation between the grade-point averages earned by the participants in first-year typewriting and the difference in the scores earned on the September and January administrations of "The Students Typewriting Tests" produced a coefficient of correlation of .10. This coefficient of correlation indicates that there was a very small amount of correlation between the achievement of the participants in third-semester typewriting, as measured by differences in the scores earned on the September and January tests, and the marks earned by the same students in first-year typewriting.

Scores on Third Test

The coefficient of correlation was computed between the marks earned by the participants in this research project, in first-year typewriting and their achievement in fourth-semester typewriting, as indicated by the difference in the scores earned on the January and May administrations of "The

Students Typewriting Tests." The coefficient of correlation between first-year typewriting marks and progress in the fourth semester of typewriting was .10. Since a coefficient of correlation smaller than ± .20 indicates an insignificant relationship between two variables, the coefficient of correlation of .10 is an indication that very little relationship exists between grade-point averages in first-year typewriting and achievement in fourth-semester typewriting.

The preceding evidence indicates that the relationship between the grade-point averages earned by the participants in first-year typewriting and their proficiency in typewriting at the beginning of the third semester is low. However, the relationship between first-year typewriting grades and achievement in either semester of second-year typewriting was even lower than the relationship between the first-year typewriting grades and the typewriting proficiency of the participants at the beginning of the third semester of instruction.

It may be concluded from the evidence in this study that grade-point averages in first-year typewriting have no significant value in the prognostication of success in second-year typewriting. However, it is possible that high and low grades in first-year typewriting may be used to quite accurately predict success in second-year typewriting, while first-year typewriting grades of "B" or "C" have no value in predicting success. This can be determined only by means of

extensive study of large numbers of cases of individuals who achieved grade-point averages of 4.0 or 1.0 in first-year typewriting.

Difference in the Typewriting Achievement of Boys and Girls

Sex is commonly considered to be an important factor in learning to typewrite. Girls are generally presumed to be more adept at manipulative, clerical skills, and therefore, are often expected to achieve greater gains in typewriting skill during the second year of instruction than boys, if all other factors are equal. More often than not such opinions are based on limited experience and not on scientific evidence.

Because this presumption exists, scores achieved by students of different sex were compared in this study in an effort to determine if there is a difference in the levels of typewriting proficiency of boys and girls at the beginning of the third semester of instruction. The amounts of progress recorded by the two groups were studied in an effort to learn if instruction in second-year typewriting is more profitable for students of one sex than the other.

The mean scores achieved by the students of different sex on each of the three tests is given below:

Test	Mean Scores	
	Boys	Girls
First	42.20	50.24
Second	66.81	77.12
Third	83.00	100.50

As indicated by the preceding tabulation, typewriting ability of boys at the beginning of the third semester was 8.04 points, or 16.00 per cent, below the proficiency level of the female participants. By the end of the third semester the boys had gained 24.61 points compared with 26.88 for the girls. The mean score of 66.81 points achieved by the boys at the end of the third semester was 10.31 points, or 13.37 per cent, smaller than the mean score of 77.12 points achieved by the girls on the same test. The girls continued to increase their typewriting superiority over the boys until at the end of the school year, the boys' mean score of 83.00 points was 17.50 points, or 17.41 per cent, lower than the mean score of 100.50 points accumulated by the female students. The girls gained 23.38 points during the fourth semester for a combined gain of 50.26 points for the year. The boys increased their score by 16.19 points during the fourth semester for a combined total of 40.80 points gained in second-year typewriting.

The level of proficiency with which the girls performed on each administration of "The Students Typewriting Tests" was significantly higher than that of the boys.

Therefore, the results of this study indicate that girls become better typists than boys.

The mean gain achieved by the girls during the third semester of instruction in typewriting was 2.27 points greater than the gain achieved by the boys. Since this gain is significant at only the .10 level of significance we can conclude that the girls will not make much more extensive gains than the boys, but they will more than hold the advantage they possessed at the beginning of the third semester.

During the fourth semester of instruction in typewriting the girls in this study gained a mean of 6.19 more points on the test scores than the boys who participated in this study. This difference is statistically significant at the .05 level of significance, and indicates that the girls in this study achieved more progress during the fourth semester of typewriting than the boys.

The evidence presented in this section indicates that girls are in general more proficient typists than are boys at the beginning of the third semester of instruction in typewriting. They become significantly better as the instruction continues during the second year.

The evidence indicates further that girls, in general, in typewriting maintain their advantage over boys throughout the second year of instruction, and extend that advantage in a statistically significant degree.

Relationship Between Grade Level and Achievement in Typewriting

The grade level of students is an indication of their educational development, and therefore may constitute an indication of their readiness to pursue various types and phases of class work. In this section an attempt is made to indicate the relationship between the grade level of 221 students and their success in typewriting.

Since only three grade-levels are represented in this study, the difference-in-the-mean method is used to indicate the relationship between the grade level of the students and their achievement in second-year typewriting.

Scores on First Test

The calculated means of the scores, and the standard errors of the means, earned by the participants on the September administrations of "The Students Typewriting Tests," are shown below, by grade levels.

Grade Level	Mean Score	σ_M
Tenth	47.20	2.42
Eleventh	57.52	4.49
Twelfth	50.06	7.61

The calculated mean scores achieved by the participants enrolled in the three grade levels are quite different. However, the small number of cases involved causes the standard errors of the means to be relatively large. Since the 221

students involved in this investigation constitute only a limited sample, there is a possibility that the true means of the scores achieved on the September test could have been the same for each class.

The difference between the calculated means, the standard error of the difference between the means of the scores earned on the September test and the critical ratio for each difference between the means are:

Grade Levels	$diff_m$	SE_{diff}	CR
Tenth-Eleventh	10.32	41.76	0.25
Eleventh-Twelfth	7.46	40.96	0.18
Tenth-Twelfth	2.86	41.04	0.70

The critical ratio was calculated for each difference between the means to determine if there was a statistically significant difference in the mean scores earned by the students enrolled in the three grade levels. Inasmuch as a critical ratio of 1.96 is needed to indicate a statistically significant difference between the means at the .05 level of significance, it may be concluded that there is no difference in the true meansof the scores achieved on the September test by the students enrolled in the three grade levels.

Scores on Second Test

The amount of progress achieved by the students enrolled in the tenth, eleventh, and twelfth grades is indicated by the differences in the scores earned by the participants on the September, January, and May administrations of "The Students Typewriting Tests."

As indicated in the following tabulation, the mean score achieved by the students enrolled in the tenth grade was 27.86 points higher on the January test than the mean score achieved on the September test. The eleventh-grade students gained 27.14 points; and the twelfth-grade students gained 25.75 points during the third semester.

Grade Level	Mean Gain	σ_M
Tenth	27.86	2.06
Eleventh	27.14	3.76
Twelfth	25.75	6.65

A study of the preceding tabulation indicates the possibility that the true amount of mean gain achieved during the third semester could have been the same for each class.

The difference between the means, and the standard error of the difference between the means of the gains achieved by the students in the tenth, eleventh, and twelfth grades are given in the following tabulation along with the critical ratio for each difference in the means.

Grade Levels	diffm	SEdiff	CR
Tenth-Eleventh	0.72	4.43	0.23
Eleventh-Twelfth	1.39	6.15	0.16
Tenth-Twelfth	2.11	5.17	0.41

The critical ratio was calculated for each difference in the mean gain to determine if there was a statistically significant difference in the mean gains achieved by the students in the three grade levels. The critical ratios for

the differences in the mean gains achieved during the third semester are: 0.23 for the difference between the means of the gain achieved by the tenth- and eleventh-grade students; 0.16 for the difference between the means of the gain achieved by eleventh- and twelfth-grade students; and 0.41 for the difference between the means of the gain achieved by the tenth- and twelfth-grade students.

Since the preceding critical ratios are much smaller than the 1.96 needed to indicate a statistically significant difference in the means, at the .05 level of significance, it may be concluded that there is no statistically significant difference in the true means of the gain achieved by the students in the three grade levels during the third semester of typewriting instruction.

Scores on Third Test

The calculated means and the standard errors of the mean gain achieved during the fourth semester by the students enrolled in each grade level are:

Grade Level	Mean Gain	σ_M
Tenth	22.78	2.00
Eleventh	23.73	3.37
Twelfth	33.55	5.85

Because the numbers of students enrolled at the higher grade levels was small, the standard errors of the means are larger for those grade levels.

The difference between the calculated means, the standard error of the difference between the means of the gains achieved during the fourth semester of typewriting by the students enrolled in the tenth, eleventh, and twelfth grades, and the critical ratio for each difference in the means are:

Grade Levels	$diff_m$	SE_{diff}	CR
Tenth-Eleventh	0.95	3.37	0.28
Eleventh-Twelfth	9.82	6.75	1.45
Tenth-Twelfth	10.77	6.18	1.74

The critical ratio of 0.28 for the difference between the mean gains achieved by the students in the tenth and eleventh grades is much too small to indicate a significant difference between the means. The critical ratio of 1.45 for the difference between the mean gains of the students enrolled in the eleventh and twelfth grades also indicates that there is no significant difference between the mean gains of students enrolled in the eleventh and twelfth grades. Even though there was a difference of 10.77 points in the gains of the students enrolled in the tenth and twelfth grades, the critical ratio of 1.74 is again much smaller than the 1.96 needed to indicate a statistically significant difference between the means at the .05 level of significance.

It is apparent that there was no significant difference between the mean gains achieved by the 221 students involved in the various grade levels during the fourth

semester of typewriting. The information here indicates that there was no statistically significant difference in either the typewriting proficiency at the beginning of the third semester of instruction, or the amount of achievement in the third or fourth semester of typewriting instruction, of the participants enrolled in the three grade levels. Therefore, it may be concluded that the grade level in which a student is enrolled is not a significant factor in indicating his probable success in typewriting.

Summary

This chapter is devoted to a statistical treatment of the accumulated personal and test data in an effort to determine the relationships between certain personal factors and proficiency in typewriting at the beginning of the third semester of instruction, and progress made by students in the third and fourth semesters of instruction in typewriting.

Coefficients of correlation were calculated to indicate the relationships between the personal factors of age, intelligence, and grade-point average and the test data. The difference-between-the-means method was used to determine the relationships between the test data and the personal factors of sex and grade level because the number of intervals present in these personal factors were too few to produce useful coefficients of correlation.

The relationships between the personal data and the total scores earned on the first test were calculated to

indicate the statistical relationships existing between the personal factors and the typewriting proficiency of the participants at the beginning of the third semester of instruction. In contrast to the treatment of the scores on the first test where the total scores were utilized, the relationships existing between the personal factors and achievement during the third and fourth semesters of instruction are revealed in terms of gain in total scores.

The findings in this chapter indicate that there was little relationship between the typewriting proficiency of the participants at the beginning of the third semester of instruction and the personal factors of age, intelligence, grade level, or marks earned in first-year typewriting. This study indicates that there is even less relationship between the personal factors of age, intelligence, grade level, and marks in first-year typewriting and achievement in either semester of second-year typewriting, as measured by the difference in scores earned on the three administrations of "The Students Typewriting Tests," Volume XIII, Test 3, than there is between the preceding personal factors and typewriting proficiency at the beginning of the third semester of instruction in typewriting. However, the data in this chapter indicate that girls, in general, are better typists than boys at the beginning of the third semester of instruction in typewriting and become significantly better as a result of the instruction received in each semester of second-year typewriting.

CHAPTER VII

PRESENTATION AND ANALYSIS OF DATA PERTAINING TO TYPEWRITING ERRORS

This chapter is devoted to a classification and analysis of the typewriting errors committed by the participants on the tests administered in this study. The errors committed on each administration of the timed-writing and production portions of the test are presented separately so that an analysis can be made of the frequency with which various types of errors are committed on different kinds of typewriting exercises. This presentation also permits a comparison of the errors committed by students tested at the beginning of the second year of typewriting as well as a comparison of the errors as the students progressed through the third and fourth semesters of typewriting. As indicated in Chapter I, "The Students Typewriting Tests," Volume XIII, Test 3, was administered to the 221 participants on three different occasions: (1) during the second week of classes in September, 1956; (2) again during the eighteenth week of instruction, in January, 1957; and (3) finally during the thirty-fifth week of instruction, in May, 1957. The first part of the test is a five-minute timed writing made up of

straight-copy material with a syllabic intensity of 1.26. The second part of the test consists of production work involving a tabulation, a rough draft, and a business letter.

The number of errors committed by the participants on each of the five-minute, straight-copy timed writings was presented in Table IX. A brief discussion of the timed-writing errors, in Chapter IV, indicates the statistical difference in the number of errors committed by the participants on each administration of the straight-copy timed writing.

In this section the errors are broken down in terms of number and kinds of errors committed on each administration of the timed writing and production parts of the test. Analysis is made of the various types of errors to indicate any changes which occurred during the school year in the types or numbers of errors committed. A discussion of the most common types of errors committed on the straight-copy timed writing indicates the importance and persistence of single-letter substitution errors.

Errors on Straight-Copy Timed Writings

As indicated in the discussion of Table IX, in Chapter IV, the mean number of errors committed by the participants decreased slightly from 13.76 on the September test, to 12.54 on the January test, and to 11.56 on the May test. The number of errors per person ranged from one to 61 on the September test; from zero to 64 on the January

test; and from zero to 50 on the May test. If the three papers containing the most errors had been eliminated from each test, the range of the errors would have been reduced by at least 12, and up to 30. The discussion of timed-writing errors, in Chapter V, indicates that the reduction in the errors during the third semester of instruction was statistically significant at the .05 level of confidence. The reduction of timed-writing errors during the fourth semester of instruction was significant at the .10 level of confidence.

The errors made in the straight-copy timed writings involved in this study were tabulated on charts with classifications similar to those developed by Lessenberry.[1] In his error analysis, all errors were classified in terms of letter substitution;,manipulation, mental, and miscellaneous errors; with appropriate sub-classifications wherever possible. The major difference in the chart used in this study and the chart developed by Lessenberry is the elimination of the grouping of various types of errors into classifications which might imply causes of the errors.

Table XI constitutes a summarization of information concerning the kinds of errors made and the frequency with which each type of error was committed on the September,

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[1] D. D. Lessenberry, Analysis of Errors, L. C. Smith and Corona Typewriters, Inc., School Department, Syracuse, New York, 1928.

January, and May administrations of the timed writing portions of the test. As indicated in Table XI, the September test papers contained 3,064 errors; the January test papers contained 2,775 errors; and the May test papers contained 2,565 errors, for a combined total of 8,404 errors. The 663 five-minute timed writings contained a mean of 12.68 errors per paper.

When the first timed-writing test was administered in September, 1956, the participants averaged 2.77 errors per minute. As a result of the instruction offered in the third semester, the errors on the second test, administered in January, 1957, had declined slightly to an average of 2.51 per minute. When the third test was administered at the end of the fourth semester of instruction, in May, 1957, the error rate had declined to an average of 2.32 errors per minute. During the third semester of instruction, the error-rate was reduced an average of 0.26 errors per minute, or 9.39 per cent. Between the dates of the second and third administrations of the test the error-rate declined 0.19 errors per minute, or 6.86 per cent. Thus, it is evident that the errors were reduced a total of 0.45 errors per minute, or 16.35 per cent, during the second year of typewriting. This is especially significant since the writing speed increased so that at the end of the year the students were actually writing more material which contained significantly fewer errors.

TABLE XI

ERRORS COMMITTED BY 221 SECOND-YEAR TYPEWRITING STUDENTS ON FIVE-MINUTE TIMED WRITINGS

	First Test		Second Test		Third Test	
	Frequency of Errors	Per Cent of Total	Frequency of Errors	Per Cent of Total	Frequency of Errors	Per Cent of Total
Single-Letter Substitution	1,195	39.00	1,056	38.06	897	34.97
Omissions	680	22.19	577	20.79	586	22.85
Imperfect Spacing	469	15.30	439	15.83	401	15.64
Additions	367	11.98	359	12.94	308	12.01
Transposition	128	4.18	154	5.55	152	5.93
Faulty Shifting	63	2.06	75	2.70	92	3.59
Imperfect Left Margin	28	.92	23	.83	25	.97
Faulty Paragraphing	16	.52	9	.32	15	.58
Miscellaneous	118	3.85	83	2.99	89	3.47
Totals	3,064	100.00	2,775	100.00	2,565	100.00

It is perhaps significant to note that the per cent of the total number of errors which fell into each classification was relatively stable throughout the school year. With only one exception, each type of error maintained the same relative position of importance on each of the three tests.

This section also contains material designed to indicate the number and types of errors committed by students who possess different levels of typewriting proficiency. As explained in Chapter IV, the scores achieved by the participants were divided into quartiles based on the total test scores achieved on the first test, which was administered at the beginning of the second year of instruction. In Table XII information is presented relative to the frequency of the various types of errors in terms of different levels of typewriting ability.

The percentage of the total number of errors which fell into each classification is very similar for each quartile. The greatest amount by which any type of error varies from the mean for its type involves letter-substitution errors. In this case there is a 2.13 per cent deviation of the third quartile from the mean percentage of the letter-substitution errors. Thirty-one of the 36 quartile percentages deviate less than one per cent from the group mean for the same type error. Similarities in the types of errors within the quartiles indicate that the level of typewriting

TABLE XII

TIMED-WRITING ERRORS COMMITTED BY 221 SECOND-YEAR TYPEWRITING STUDENTS TABULATED ON QUARTILE* LEVELS OF ABILITY OF THE STUDENTS

Type of Error	First Quartile		Second Quartile		Third Quartile		Fourth Quartile		Totals	
	Frequency	Per Cent of Total	Frequency	Per Cent of Total	Frequency	Per Cent of Total	Frequency	Per Cent of Total	Frequency	Per Cent of Total
Letter Substitution	1,015	36.98	967	36.49	707	39.59	459	37.53	3,148	37.46
Omission	609	22.18	588	22.19	372	20.83	274	22.40	1,843	21.93
Imperfect Spacing	444	16.18	436	16.46	263	14.72	166	13.57	1,309	15.57
Addition	331	12.06	303	11.43	235	13.15	165	13.49	1,034	12.30
Transposition	136	4.95	152	5.74	86	4.82	60	4.91	434	5.17
Faulty Shifting	85	3.09	61	2.30	45	2.52	39	3.19	230	2.74
Imperfect Left Margin	20	.73	17	.64	21	1.18	18	1.47	76	.90
Faulty Paragraphing	10	.36	17	.64	8	.45	5	.41	40	.48
Miscellaneous	95	3.46	109	4.11	49	2.74	37	3.03	290	3.45
Totals	2,745	100.00	2,650	100.00	1,786	100.00	1,223	100.00	8,404	100.00

*The quartiles are based on the total test scores achieved by the students on the September administration of "The Students Typewriting Tests;" quartiles are arranged in sequence with the fourth quartile representing the one-fourth of the students who achieved the highest levels of proficiency on the first test.

ability had little or no relationship to the types of errors committed by the participants on the straight-copy timed-writing portion of the test utilized in this investigation.

It is significant that the number of errors committed by students in the higher quartiles is less than the number committed by the students in the lower quartiles. A total of 2,745, or 32.67 per cent, of the 8,404 timed-writing errors were committed by students in the first quartile; 2,650, or 31.53 per cent, of the errors were committed by students in the second quartile; 1,786, or 21.25 per cent, by students in the third quartile; and 1,223, or 14.55 per cent, of the errors were committed by students in the fourth, or top quartile. The students who ranked in the upper half of the group on the first test committed 3,009, or 35.80 per cent, of all the errors committed on the three administrations of the timed-writing test; while 5,395, or 64.20 per cent were committed by students who ranked in the lower half of the group of participants.

The data presented in this section indicate quite conclusively that as typewriting ability, as measured by total scores achieved on the test, increased the number of timed-writing errors decreased. In general, as the key-stroking ability of an individual student increases the number of errors he commits per minute decreases.

Most Common Type of Error

The most common type of error indicated in the straight-copy timed-writing involved in this study was the single-letter substitution. This type of error occurs when one alphabetic or special character is accidentally struck for another. Single-letter substitutions accounted for 3,148, or 37.46 per cent, of all the errors committed by the participants on the three administrations of the timed-writing part of "The Students Typewriting Tests," Volume XIII, Test 3. Each of the other eight classifications of errors contained from 0.48 to 21.93 per cent of the total errors committed on the timed-writing tests. Data concerning the specific typewriting characters involved in these letter-substitution errors are presented and analyzed in this section.

Analysis of Table XIII reveals the number of times other keys were incorrectly struck for each character included in the timed-writing part of the straight-copy timed-writing test. The data indicate the distribution of the letter-substitution errors for each test administration and the total for the year.

On the September test the number of letter-substitution errors ranged from zero for the "?" to a maximum of 140 for the letter "I". The "?" continued to be the character least-frequently involved on the January test with no errors, while the letter "E" held first place with 134 errors. On the May

TABLE XIII

FREQUENCIES WITH WHICH SINGLE-LETTER SUBSTITUTIONS* OCCURRED ON TIMED-WRITING TESTS COMPLETED BY 221 SECOND-YEAR TYPEWRITING STUDENTS

Character for Which Substitution Was Made	Frequency With Which Substitutions Occurred							
	First Test		Second Test		Third Test		Total	
	Number of Errors	Rank Order	Number of Errors	Rank Order	Number of Errors	Rank Order	Number of Errors	Rank Order
A	44	10	48	8	36	9	128	10
B	42	11	37	14	29	13	108	12
C	30	17	39	13	32	12	101	14
D	53	8	46	9½	50	6	149	7
E	119	2	134	1	94	2	347	1
F	15	22	22	18	17	21	54	21
G	39	14½#	46	9½	33	11	118	11
H	32	16	23	17	20	18½	75	17
I	140	1	77	3	99	1	316	2
J	10	24	13	22	7	26	30	24
K	22	19½	10	23	24	15	56	19½
L	50	9	42	12	51	5	143	9
M	40	12½	28	15	21	17	89	15
N	72	6	63	5	53	4	188	5
O	78	4	53	6	46	7	177	6
P	8	25	15	21	15	22	38	22
Q	7	26	7	24½	8	24½	22	26
R	39	14½	43	11	20	18½	102	13
S	91	3	98	2	68	3	257	3
T	76	5	71	4	44	8	191	4
U	40	12½	19	20	25	14	84	16
V	59	7	50	7	35	10	144	8
W	22	19½	24	16	22	16	68	18
X	24	18	5	28	8	24½	37	23
Y	19	21	20	19	18	20	57	19½
Z	6	27	6	26½	10	23	22	26
,	5	28	3	29	2	29½	10	28½
.	1	29½	6	26½	3	28	10	28½
-	11	23	7	24½	4	27	22	26
?	0	31	0	31	1	31	1	31
Space	1	29½	1	30	2	29½	4	30
Totals	1,195		1,056		897		3,148	

*A single-letter substitution error occurs when one character is accidentally struck for another.

#When ties occurred the average rank was used; i.e., a tie for 14th place was recorded as 14½.

test the "?" was still at the bottom of the frequency with one error, and the letter "I" was involved in the maximum, 99.

When the errors committed on the three tests were combined, the letters for which other characters were struck more than 150 times were; (1) "E", 347; (2) "I", 316; (3) "S", 257; (4) "T", 191; (5) "N", 188; and (6) "O", 177. Other characters were struck for the preceding six letters 1,476 times, or 88.83 per cent as frequently as the total of all other letter-substitution errors.

The characters used in the timed writing were ranked according to the frequency with which other characters were incorrectly struck for them. The rank-difference method was then used to compute the coefficients of correlation between the ranks of the various characters on the three administrations of the timed-writing part of the test.

The rho of .93 between the rank of the characters on the September and January tests is much greater than the .45 needed to indicate a relationship significant at the .01 level of confidence.

The rho between the rank of the characters on the September and May tests is .95, which is statistically significant at the .01 level of confidence.

The rho of .93 between the rank of the characters on the January and May tests is statistically significant at the .01 level of confidence.

The rhos indicated in the preceding paragraphs denote a very high relationship between the rank of the characters involved in letter-substitution errors on the three administrations of the test. The preceding information indicates that the characters found in the timed-writing part of "The Students Typewriting Tests," Volume XIII, Test 3, maintain their level of importance in the letter-substitution type of errors, on successive administrations of the test. The same characters most frequently had other keys incorrectly struck for them on each administration of the test.

Table XIII also contains a rank-order presentation of the characters for which other keys were incorrectly struck by the participants on the three administrations of the timed-writing part of the test. The characters are listed in the order of frequency with which they occurred on the test papers gathered throughout the year.

Table XIV indicates the frequencies with which the characters appeared in the copy and the frequencies with which the participants committed single-letter substitution errors involving each character in the timed writing.

The characters used in the timed writing were ranked in order according to the frequency of their use. A rank-difference test of correlation was then run between the rank-order determined by the frequency of use and the rank-order of the characters based on the frequency with which other keys were incorrectly struck for them. The rho of .69

TABLE XIV

FREQUENCIES WITH WHICH CHARACTERS APPEARED IN THE COPY AND WITH WHICH SINGLE-LETTER SUBSTITUTIONS* OCCURRED ON TIMED-WRITING TESTS COMPLETED BY 221 SECOND-YEAR TYPEWRITING STUDENTS

Character	Occurence in Copy		Total Errors	
	Frequency	Rank Order	Frequency	Rank Order
A	96	8	128	10
B	28	20	108	12
C	37	17	101	14
D	50	13	149	7
E	201	2	347	1
F	30	19	54	21
G	39	15½	118	11
H	71	11	75	17
I	142	4	316	2
J	2	28	30	24
K	18	23	56	19½
L	83	10	143	9
M	40	14	89	15
N	129	5	188	5
O	128	6	177	6
P	39	15½	38	22
Q	1	29½	22	26
R	85	9	102	13
S	127	7	257	3
T	149	3	191	4
U	61	12	84	16
V	21	22	144	8
W	32	18	68	18
X	4	27½	37	23
Y	27	21	57	19½
Z	4	27½	22	26
,	17	24	10	28½
.	15	25	10	28½
-	13	26	22	26
?	1	29½	1	31
Space	333	1	4	30

*A single-letter substitution error occurs when one alphabetic or special character is accidentally struck for another.

between frequency of use and frequency of substitution is statistically significant at the .01 level of confidence. This high rho indicates that the characters most frequently used were also the characters for which other characters were most frequently substituted. To further emphasize this point, the letters "E", "I", "Q", and "Z", which ranked 1, 2, and a tie for 26, respectively, on the list of characters for which other keys were most frequently incorrectly struck, occurred 201, 142, 1, and 4 times, respectively, in the straight copy material used for the timed writing. The evidence indicates quite conclusively that the typewriting characters most frequently struck incorrectly are not necessarily most difficult to strike, but merely occur most frequently in the copy to be typewritten.

Production-Test Errors

As indicated in Chapter III, the production portion of "The Students Typewriting Tests," Volume XIII, Test 3, is composed of three parts: (1) a rough draft, (2) a centering problem, and (3) a business letter. The errors committed by the participants on each exercise of the production test were tabulated into the three major types of stroking errors, manipulation errors, and mental association errors; with appropriate sub-heading assigned as needed.

For the purposes of this study, stroking errors are those resulting from incorrect manipulation of keys or bars on the typewriter keyboard. Manipulation errors are those

involving an improper use of materials or supplies, or the incorrect operation of some part of the typewriter other than the keyboard. Mental association errors are those which involve a thought process. The errors committed by the participants on each exercise of the production part of the test are indicated in separate tables in this section.

Rough-Draft Problem

Table XV indicates the number of errors committed by the participants on the rough-draft problem. As indicated in Table XV, the participants committed a total of 4,721 errors on the three administrations of the rough-draft problem. A total of 2,189, or 46.37 per cent, of the errors were made on the September test; 1,469, or 31.13 per cent, were made on the January test; and 1,063, or 22.51 per cent, were made on the May test.

Further analysis of Table XV makes it apparent that 2,484, or 52.62 per cent, of the 4,721 errors committed on the rough draft were stroking errors; 1,261, or 26.71 per cent, were mental association errors; and 976, or 20.67 per cent, were manipulation errors. The stroking errors declined in number but gained as a per cent of the total errors with each administration of the test. On the September test the 1,012 stroking errors comprised 46.23 per cent of the total errors on that test; in January the number declined to 813, and the percentage increased to 55.34; and

TABLE XV

ERRORS COMMITTED BY 221 SECOND-YEAR TYPEWRITING STUDENTS ON THE ROUGH-DRAFT PART OF "THE STUDENTS TYPEWRITING TESTS," VOLUME XIII, TEST 3

Type of Error	September Test		January Test		May Test		Total	
	Number	Per Cent of Total	Number	Per Cent of Total	Number	Per Cent of Total	Number	Per Cent of Total
Stroking Errors								
Letter substitution	528		363		322		1,213	
Strikeover	174		227		169		570	
Incorrect spacing between words	245		194		130		569	
Raised capital	65		29		38		132	
Totals	1,012	46.23	813	55.34	659	61.99	2,484	52.62
Manipulation Errors								
Inadequate correction	289		196		120		605	
Incorrect paragraph indention	68		31		21		120	
Improper vertical centering	51		33		27		111	
Improper horizontal centering	37		27		14		78	
Improper vertical spacing	19		16		11		46	
Improper use of carbon	9		2		5		16	
Totals	473	21.61	305	20.76	198	18.63	976	20.67

TABLE XV -- Continued

Type of Error	September Test		January Test		May Test		Total	
	Number	Per Cent of Total	Number	Per Cent of Total	Number	Per Cent of Total	Number	Per Cent of Total
Mental Association Errors								
Failure to make indicated rough-draft correction	342		159		73		574	
Omission of a word	182		98		50		330	
Omission or insertion of punctuation	133		70		57		260	
Improper syllabication	27		17		14		58	
Repetition of a word	20		7		12		39	
Totals	704	32.16	351	23.90	206	19.38	1,261	26.71
Grand Totals	2,189	100.00	1,469	100.00	1,063	100.00	4,721	100.00

on the May test the number dropped to 659, whereas the percentage increased to 61.99.

The errors classified as manipulation declined numerically with each test administration, but remained relatively stable in terms of the per cent of the total errors made on each administration of the rough-draft test. Manipulation errors accounted for 473, or 21.61 per cent, of the errors committed on the September administration of the test. In January the number of manipulation errors had declined to 305, or 20.76 per cent. In May, 198, or 18.63 per cent, of the errors were classified as manipulation.

The mental association errors declined, both absolutely and relatively, during each semester covered by this study. The 704 mental association errors committed on the September administration of the rough-draft test accounted for 32.16 per cent of the total errors; the 351 mental association errors on the January administration comprised 23.90 per cent of the total; and the 206 mental association errors committed on the May administration of the test accounted for 19.38 per cent of all errors on that administration of the test.

As on the straight-copy portion of the test, letter-substitution errors were encountered most frequently on the rough-draft part of the production test. The 605 failures to make adequate corrections accounted for 61.99 per cent of the manipulation errors committed on the three administrations of the rough-draft part of the test.

The most frequently encountered mental association error, failure to make indicated rough-draft correction, comprised 574, or 45.52 per cent, of the 1,261 mental association errors committed by the participants on the three administrations of the rough-draft exercise.

Centering Problem

Table XVI is a presentation of the frequency with which various types of errors were committed by the participants on the three administrations of the centering exercise included in the production portion of "The Students Typewriting Tests."

A total of 325, or 35.17 per cent, of the 924 errors were committed on the September administration of the centering exercise; 334, or 36.15 per cent, were committed on the January administration; and 265, or 28.68 per cent, of the errors were committed on the May administration of the centering test.

Stroking errors comprised 274, or 29.65 per cent, of all errors made on the centering exercise; manipulation errors comprised 519, or 56.17 per cent; and mental association errors made up the remaining 131, or 14.18 per cent.

The participants committed 77 stroking errors on the September administration of the centering test; 112 on the January administration; and 85 on the May administration. When stated as a percentage of the total errors committed on each administration of the centering exercise, the

TABLE XVI

ERRORS COMMITTED BY 221 SECOND-YEAR TYPEWRITING STUDENTS ON THE CENTERING PART OF "THE STUDENTS TYPEWRITING TESTS," VOLUME XIII, TEST 3

Type of Error	September Test		January Test		May Test		Total	
	Number	Per Cent of Total	Number	Per Cent of Total	Number	Per Cent of Total	Number	Per Cent of Total
Stroking Errors								
Letter substitution	45		48		33		126	
Strikeover	21		39		36		96	
Raised capital	7		17		12		36	
Incorrect spacing between words	4		8		4		16	
Totals	77	23.69	112	33.53	85	32.08	274	29.65
Manipulation Errors								
Improper horizontal centering	70		57		39		166	
Inadequate correction	39		51		50		140	
Improper vertical centering	44		49		47		130	
Improper spacing of heading	15		13		12		40	
Improper vertical spacing	11		15		7		33	
Totals	179	55.08	185	55.39	155	58.49	519	56.17

TABLE XVI -- Continued

Type of Error	September Test		January Test		May Test		Total	
	Number	Per Cent of Total	Number	Per Cent of Total	Number	Per Cent of Total	Number	Per Cent of Total
Mental Association Errors								
Failure to follow directions	58		36		17		111	
Omission of a word	8		1		6		15	
Omission or insertion of punctuation	3		0		1		4	
Repetition of a word	0		0		1		1	
Totals	69	21.23	37	11.08	25	9.43	131	14.18
Grand Totals	325	100.00	334	100.00	265	100.00	924	100.00

stroking errors increased from 23.69 per cent on the September test, to 33.53 per cent on the January test, then declined slightly to 32.08 per cent on the May test.

Letter substitution errors ranked fourth in frequency on the three administrations of the centering test.

One may note that manipulation errors accounted for slightly more than half of all errors committed on each administration of the centering exercise. This is a much larger percentage than the 20.67 per cent found on the rough-draft, or the 37.38 per cent encountered on the business letter. This preponderance of manipulation errors on the centering exercise appears to be normal since the major tasks encountered in the exercise involved problems which would be classified as manipulative.

The most numerous kinds of manipulation errors and the frequency with which they occurred are: (1) improper horizontal centering, 166, (2) inadequate correction, 140, and (3) improper vertical centering, 130.

Sixty-nine, or 52.67 per cent, of the 131 mental association errors were committed on the September test; 37, or 28.24 per cent, were committed on the January test; and 25, or 19.09 per cent, were committed on the May test. Failure to follow directions caused 111, or 84.73 per cent, of the total mental association errors.

Business-Letter Problem

Table XVII is a presentation of the number and types of errors committed by the participants on the business letter included in the production portion of "The Students Typewriting Tests." As indicated by Table XVII, the September test papers contained 72 errors; the January test papers contained 313 errors; and the May test papers contained 439 errors; for a combined total of 824 errors on the business letter.

Computations, based on data in Table XVII, indicate that a total of 427, or 51.82 per cent, of the 824 errors committed on the business letter were classified as stroking errors; 308, or 37.38 per cent, were manipulation errors; and the remaining 89, or 10.80 per cent, were mental association errors.

Letter substitution errors were also the most frequently committed type of error on the business letter. The 216 letter substitution errors comprised 26.21 per cent of the 824 errors committed on the three administrations of the business letter portion of the test.

As indicated earlier in this chapter, the participants were permitted to allocate the time available for the production test among the three parts as they desired. They were directed to complete the rough draft first; the centering exercise second; and finally the business letter. However, no penalty was assessed if the students failed to typewrite

TABLE XVII

ERRORS COMMITTED BY 221 SECOND-YEAR TYPEWRITING STUDENTS ON THE BUSINESS LETTER PART OF "THE STUDENTS TYPEWRITING TESTS," VOLUME XIII, TEST 3

Type of Error	September Test		January Test		May Test		Total	
	Number	Per Cent of Total	Number	Per Cent of Total	Number	Per Cent of Total	Number	Per Cent of Total
Stroking Errors								
Letter substitution	29		88		99		216	
Strikeover	2		52		68		122	
Incorrect spacing between words	3		20		27		50	
Raised capital	1		9		29		39	
Totals	35	48.61	169	53.99	223	50.80	427	51.82
Manipulation Errors								
Inadequate correction	8		46		57		111	
Improper vertical spacing	6		26		74		106	
Improper use of carbon	8		12		16		36	
Improper horizontal centering	0		14		14		28	
Incorrect paragraph indention	0		6		10		16	
Improper vertical centering	1		3		7		11	
Totals	23	31.94	107	34.19	178	40.55	308	37.38

TABLE XVII -- Continued

Type of Error	September Test		January Test		May Test		Total	
	Number	Per Cent of Total	Number	Per Cent of Total	Number	Per Cent of Total	Number	Per Cent of Total
Mental Association Errors								
Omission of a word	5		14		2		21	
Omission or insertion of punctuation	6		5		10		21	
Omission of enclosure	3		6		5		14	
Failure to capitalize company name	0		6		7		13	
Failure to underline	0		3		7		10	
Improper syllabication	0		2		2		4	
Repetition of a word	0		0		3		3	
Omission of date line	0		1		2		3	
Totals	14	19.45	37	11.82	38	8.65	89	10.80
Grand Totals	72	100.00	313	100.00	439	100.00	824	100.00

the exercises in the directed sequence. Therefore, the number of errors committed on any exercise has little meaning without corresponding data concerning the extent to which the exercise was completed by the students.

Relationship of Number of Words Written and Errors

Each time the test was administered the total number of words typed by the 221 participants on each problem in the production section was determined. The number of words typed on each problem was divided into the number of errors committed to determine the per cent of error on each part of the production portion of the test.

Table XVIII indicates the number of words typed, the number of errors committed, and the per cent of error on each exercise of the production portion of the test. Of the grand total of 209,080 words typed by the participants on the three administrations of the production part of "The Students Typewriting Tests," 96.91 per cent were typed correctly. As indicated in Table XVIII, the production material written in September contained 2,586 errors; the material written in January contained 2,116 errors; and the material written in May contained a total of 1,767 errors. The production material written in September contained 4.46 per cent error. The errors were reduced during the third semester until the 70,733 words typed in January contained 2.99 per cent error. The per cent of error declined with each administration of

TABLE XVIII

NUMBER OF WORDS WRITTEN AND NUMBER OF ERRORS COMMITTED BY 221 SECOND-YEAR TYPEWRITING STUDENTS ON THE PRODUCTION PART OF "THE STUDENTS TYPEWRITING TESTS," VOLUME XIII, TEST 3

Part of Test*	September Test			January Test			May Test			Totals		
	Words Written	Number of Errors	Per Cent of Error	Words Written	Number of Errors	Per Cent of Error	Words Written	Number of Errors	Per Cent of Error	Words Written	Number of Errors	Per Cent of Error
II	51,281	2,189	4.27	52,548	1,469	2.80	52,497	1,073	2.02	156,326	4,721	3.02
III	4,387	325	7.41	6,883	334	4.85	7,656	265	3.46	18,926	924	4.88
IV	2,344	72	3.07	11,302	313	4.55	20,182	439	2.18	33,828	824	2.44
Totals	58,012	2,586	4.46	70,733	2,116	2.99	80,335	1,767	2.20	209,080	6,469	3.09

*Part II is a rough draft manuscript, Part III is a business letter, and Part IV is a centering exercise.

the test until the material written on the May administration of the production portion of the test contained only 2.20 per cent error. This is the equivalent of 97.80 per cent accuracy on all of the material typed on the May administration of the production portion of the test.

The data presented in the following tabulations are derived in part from Table XVIII, and constitute a further explanation of the significant elements in the production test data.

On the production test administered in January, there was an increase of 21.93 per cent in the number of words written, and an 18.17 per cent decrease in the number of errors committed. This caused the per cent of error in the material written on the January production test to be 32.96 per cent lower than the per cent of error contained in the material written on the September test. The tabulation presented below indicates fully the extent of change which occurred in the number of words, errors, and the per cent of error, during the two semesters covered by this study.

Period of Instruction	Words Written		Number of Errors		Per Cent of Error	
	Increase	Per Cent of Increase	Decrease	Per Cent of Decrease	Decrease	Per Cent of Decrease
Third Semester	12,721	21.93	470	18.17	1.47	32.96
Fourth Semester	9,602	13.76	349	16.49	0.79	26.42
Total	22,323	---	819	---	2.26	---

The foregoing tabulation indicates that between the January and May administrations of the production portion of the test there was a decrease of 26.42 per cent in the per cent of error contained in the material written.

The percentage figures for the over-all second year of instruction are not the same as the totals of the two semesters because the base figure for each period is the applicable number for the beginning of that period; therefore, they are omitted from the tabulations in this section because they would tend to be confusing. However, by combining data in several of the tables in this section, it was determined that a 38.48 per cent increase in the number of words typed occurred during the year. This increase, along with a 31.67 per cent decrease in the number of errors committed, resulted in a reduction of 50.67 per cent in the per cent of error contained in the production portion of the test.

Table XVIII indicates that the participants committed 4,721 errors in the 156,326 words they wrote on the three administrations of the rough-draft exercise. The rough-draft material written on the September test contained 4.27 per cent error; on the January test, 2.80 per cent error; and on the May test, 2.02 per cent error.

Even though there were 2.37 per cent more words written on the May administration of the rough-draft than on the September administration, the 52.69 per cent decrease in the per cent of error contained therein was brought about

primarily by the 51.44 per cent reduction in the number of errors committed.

The following tabulation indicates the amount of change which occurred in the number of words, errors, and the per cent of error, on the rough-draft problem during the two semesters covered by this study.

Period of Instruction	Gross Words		Number of Errors		Per Cent of Error	
	Change	Per Cent of Change	Decrease	Per Cent of Decrease	Decrease	Per Cent of Decrease
Third Semester	1,267*	2.47	720	32.89	1.47	34.43
Fourth Semester	51**	.09	406	27.64	.78	38.61
Total	1,216	---	1,126	---	2.25	---

*Increase in number of words typed.

**Decrease in number of words typed.

As indicated in Table XVIII, the 18,926 words typed on the three administrations of the centering problem contained 924, or 4.88 per cent, errors. The centering problem typed in September contained 325, or 7.41 per cent, errors; in January 334, or 4.85 per cent, errors; and in May 265, or 3.46 per cent, errors. It is interesting to note that the mean of 95.12 per cent accuracy maintained on the three administrations of the centering test is lower than the accuracy achieved on any administration of either the rough draft or business letter portions of the test.

The number of words typed by the participants on the centering exercise increased with each administration of the

test. The number of errors committed on the January administration of the centering exercise was larger than the number of errors committed on the September administration. However, the per cent of error contained in the material declined during the semester. The per cent of error on the May administration of the centering test was 46.69 per cent as large as the error rate on the September administration of the test.

The participants typed 74.29 per cent more material on the May administration of the centering exercise portion of the test than on the September administration, while the number of errors increased by only 18.46 per cent. As a result, the per cent of error contained in the centering exercise decreased 53.31 per cent during the second year of instruction in second-year typewriting.

The following tabulation indicates the amount of change which occurred in the number of words, errors, and the per cent of error, on the centering problem during each semester covered by this study.

Period of Instruction	Words Written		Number of Errors		Per Cent of Error	
	Increase	Per Cent of Increase	Change	Per Cent of Change	Decrease	Per Cent of Decrease
Third Semester	2,486	56.67	9*	2.80	2.56	34.55
Fourth Semester	773	11.23	69**	20.66	1.39	28.66
Total	3,259	---	60**	---	3.95	---

*Increase.
**Decrease.

As indicated in Table XVIII, the 2.44 per cent of error on the three administrations of the business letter was lower than the error rate for either the rough-draft or the centering exercise. This indicates that the business-letter material typed by the participants was 97.56 per cent accurate.

The participants typed approximately eight times as many gross words on the May administration of the business letter as on the September administration. Even though the number of errors increased 409.72 per cent during the second year of instruction, the tremendous increase in the amount of material typed caused the per cent of error to decline 28.99 per cent during the course of instruction.

The following tabulation indicates the amount of change which occurred in the number of words, errors, and the per cent of error, on the business letter during the two semesters covered by the study.

	Gross Words		Number of Errors		Per Cent of Error	
Period of Instruction	Increase	Per Cent of Increase	Increase	Per Cent of Increase	Change	Per Cent of Change
Third Semester	8,958	382.17	241	334.72	1.48*	48.21
Fourth Semester	8,880	78.57	126	40.26	2.37**	52.09**
Total	17,838	---	367	---	.89**	---

*Increase
**Decrease

The increase in the per cent of error on the business letter, during the third semester of instruction, constitutes the only error rate increase on any part of the production test. This increase in the error rate is normal because only 10, or 32.36 per cent, of the 41 students who attempted any part of the business letter on the September administration of the test ranked in the lower half of the group when measured by the total score earned on the September administration of the test. On the January administration of the test 61, or 46.21 per cent, of the 132 students who attempted any part of the business letter ranked in the lower half of the group. The fact that 189, or 85.97 per cent, of the participants attempted the business letter on the May administration of the test indicates a significant increase in the production proficiency of the participants.

To indicate the differences in the number and rates of the various types of errors committed by the students who ranked in each quartile on the total score earned on the September administration of "The Students Typewriting Tests," data are summarized in Table XIX, page 154. The data indicate the number and per cent of each type of error contained in the test papers for each quartile of students. Analysis of the data indicates that the test papers contained 3,121 stroking errors; 1,803 manipulation errors; and 1,545 mental association errors.

TABLE XIX

NUMBER OF WORDS WRITTEN AND NUMBER OF ERRORS COMMITTED BY EACH QUARTILE OF 221 SECOND-YEAR TYPEWRITING STUDENTS ON THE PRODUCTION PART OF "THE STUDENTS TYPEWRITING TESTS," VOLUME XIII, TEST 3

Quartile	Words Written	Stroking Errors		Manipulation Errors		Mental Association Errors		Total Errors	
		Number	Per Cent of Error	Number	Per Cent of Error	Number	Per Cent of Error	Number	Per Cent of Error
4	55,462	272	0.49	314	0.57	256	0.46	842	1.52
3	51,074	501	0.98	396	0.78	308	0.60	1,205	2.36
2	52,318	832	1.59	512	0.98	277	0.53	1,621	3.10
1	50,226	1,516	3.02	581	1.16	704	1.40	2,801	5.58
Totals	209,080	3,121	1.49	1,803	0.86	1,545	0.74	6,469	3.09

As indicated in Table XIX, 2,801, or 43.30 per cent, of the 6,469 errors were committed by students who ranked in the lowest quartile; 1,621, or 25.06 per cent, by students in the second quartile; 1,205, or 18.63 per cent, by students in the third quartile; and 842, or 13.0 per cent, were committed by students in the upper quartile.

The data in Table XIX indicate further that the error rate declined as the quartile increased in all areas except the third quartile where there were 31 more mental association errors than in the second quartile.

The material typed by students in the lowest quartile contained 5.58 per cent error compared with 3.10 per cent error for students in the second quartile, 2.36 per cent for students in the third quartile, and 1.52 per cent for students in the upper quartile.

Summary

This chapter has been devoted to a classification and analysis of the typewriting errors committed by the participants on three administrations of "The Students Typewriting Tests," Volume XIII, Test 3. The errors committed on the straight-copy timed writing were tabulated into nine major divisions, or types, of errors. With only one exception, each type of error maintained the same relative position of importance on each of the three tests. Even though the students typed more material on each successive test the number of errors committed was actually reduced as the year progressed.

During the third semester of instruction, the error-rate was reduced an average of 0.26 errors per minute, or 9.39 per cent. During the fourth semester the error-rate declined 0.19 errors per minute, or 6.86 per cent.

The total errors committed on the timed-writing tests were distributed among the quartiles as follows: first quartile, 2,745, or 32.67 per cent; second quartile, 2,650, or 31.53 per cent; third quartile, 1,786, or 21.25 per cent; and fourth quartile, 1,223, or 14.55 per cent.

The single-letter substitution errors were classified and analyzed in an effort to determine if definite patterns of errors were present. The characters used in the timed writing were ranked according to the frequency with which other characters were incorrectly struck for them. Rhos of .93 or more indicated a very high relationship between the rank of the characters on the three administrations of the test. The rho of .69 between the frequency with which characters occurred in the timed writing and the frequency with which other characters were substituted for them indicated that the characters for which others were most frequently substituted were simply the most frequently occurring characters.

The errors committed by the participants on each exercise of the production part of "The Students Typewriting Tests," were classified into the three major divisions of stroking, manipulation, and mental association errors. A

total of 2,484, or 52.62 per cent of the errors committed on the rough-draft were stroking errors; 976, or 20.67 per cent, were manipulation errors; and 1,261, or 26.71 per cent, were mental association errors.

Stroking errors comprised 274, or 29.65 per cent, of all errors found on the centering exercise; manipulation errors comprised 519, or 56.17 per cent; and mental association errors made up the remaining 131, or 14.18 per cent, errors.

A total of 427, or 51.82 per cent of the 824 errors committed on the business letter were classified as stroking; 308, or 37.38 per cent, were classified as manipulation; and the remaining 89, or 10.80 per cent, were classified as mental association errors.

The error rate decreased with each administration of the test on all parts of the production test except the second administration of the business letter. This was because only 10, or 32.36 per cent, of the students who attempted any part of the business letter on the September administration ranked in the lower half of the group; while 61, or 46.21 per cent, of those attempting some part of the business letter on the January administration ranked in the lower half of the group.

A total of 2,801, or 43.30 per cent of all errors committed on the production test were committed by students who ranked in the lowest quartile; 1,621, or 25.06 per cent,

were committed by students in the second quartile; 1,205, or 18.63 per cent, were committed by students in the third quartile; and 842, or 13.01 per cent, were committed by students in the upper quartile.

The material typed by students in the lowest quartile contained 5.58 per cent error compared with 3.10 per cent for students in the second quartile; 2.36 per cent for students in the third quartile; and 1.52 per cent for students in the upper quartile. Slightly over two-thirds, 68.36 per cent, of all errors on the production portion of the test were committed by students who ranked in the lowest half of the group when measured by total scores achieved on the first administration of the test.

CHAPTER VIII

SUMMARY AND CONCLUSIONS

This study constitutes an attempt to discover the extent of learning of students during the course of instruction in the second year of typewriting in certain public high schools in Oklahoma. In completing the investigation, the extent of the achievement of 221 students during the second year of typewriting was determined in terms of: (1) changes in students' ability to typewrite straight-copy material; (2) changes in ability to perform typewriting production work; and (3) changes in the number and kinds of typewriting errors. From the outset, this study was designed primarily to determine the degree to which basic typewriting skills are extended as a result of instruction provided in the second year of typewriting in secondary schools.

The data in this study are limited primarily to that obtained through the administration of "The Students Typewriting Tests," Volume XIII, Test 3, to 221 students enrolled in 15 classes of second-year typewriting, taught by 10 different teachers, in four secondary schools in Oklahoma City. It is not necessarily representative of instruction in other schools in Oklahoma City or in any other part of the United States.

Personal data concerning the 221 participants were obtained from records in the administrative offices of the schools involved in this study, and from questionnaires filled out by the participants.

The first step taken in this study involved an extensive review of current literature and research concerning achievement in typewriting. The second step was the study of all available tests and the selection of the one which best measures the elements with which this study is concerned. The third step involved the selection of a group of schools which had adequate physical facilities and competent personnel who offered the spirit of cooperation and assistance necessary to insure the successful execution of a research project, and which offered a sufficiently large number of classes of second-year typewriting to make a reliable study. The fourth step was the administration of the selected test during the second, eighteenth, and thirty-fifth weeks of the 1956-57 school year. The analysis and statistical treatment of the basic data constituted the fifth step in the study. The final step was the preparation of the report which presents in detail each of the significant phases of the investigation of the extent of achievement in second-year typewriting.

Information pertaining to five personal factors normally regarded as being significant in most instructional programs was presented for the 221 students who participated in this study. Data concerning the age, sex, intelligence

quotient, class in school, and prior grades in typewriting were presented for each student. The test data obtained by administering "The Students Typewriting Tests," Volume XIII, Test 3, to the 221 second-year typewriting students for whom the personal information is given, were presented.

Formulas were developed and used for the statistical analysis of the basic data concerning the personal factors and the test data gathered through the administration of "The Students Typewriting Tests,"Volume XIII, Test 3. Summary statements of the findings resulting from the statistical treatment of the data are presented in the following section.

Summary of Findings

The data in this study are treated statistically in three different chapters. In Chapter V, a statistical analysis is made of the total test scores achieved by the participants on the three administrations of "The Students Typewriting Tests," Volume XIII, Test 3. Chapter VI consists of a statistical treatment of data in a fashion designed to reveal the relationships of the five personal factors of age, intelligence, grade-level, grade-point average, and sex to achievement in second-year typewriting. Chapter VII is devoted to a classification and analysis of the typewriting errors committed by the participants on the tests administered in this study. Therefore, this summary of findings is divided in the same manner.

Central Tendencies in Achievement

The findings relating to the typewriting proficiency, and achievement of the 221 participants during the two semesters covered by this study are indicated in the following paragraphs.

The differences between the mean scores achieved by the participants on the three administrations of the test indicate that the students were approximately twice as proficient in the elements tested at the end of the second year of instruction as they were at the beginning of that year. The gains achieved by the participants during each semester were significant at the .01 level of significance. However, the third-semester gain was 16.98 per cent greater than the fourth-semester gain.

A comparison between the scores achieved by the participants and the national norms established for "The Students Typewriting Tests," Volume XIII, Test 3, indicated that the participants in this study progressed at a rate equal to 81 per cent of that normally expected.

The test data indicated that substantial progress was made, during each semester of instruction, in the ability of the participants to typewrite straight-copy material, and that equal amounts of progress occurred during each semester of instruction. The means of 36.98 gross words per minute on the September test, 43.11 gross words per minute on the January test, and 46.96 gross words per minute on the May

test, indicated that an increase in the gross stroking rate of the participants occurred during each semester of instruction in second-year typewriting. The coefficients of correlation between the gross typewriting rates of the participants indicated a high degree of relationship between the gross-word-per-minute rates achieved by the participants on the three administrations of the timed-writing part of the test.

The number of errors committed by the participants on the timed-writing part of "The Students Typewriting Tests," Volume XIII, Test 3, declined from a mean of 13.76 on the September test to 12.54 on the January test, and to 11.56 on the May test.

The mean net words per minute of 14.24 on the September test, 20.15 on the January test, and 25.76 on the May test, indicated that statistically significant gains in ability to typewrite straight-copy material occurred, in approximately equal amounts, during each semester of instruction involved in this study.

The mean production-test scores of 34.97 points on the September test, 54.88 points on the January test, and 69.74 points on the May test indicated that the production typewriting proficiency of the participants was approximately twice as great at the end of the fourth semester as at the beginning of the third semester of instruction. The third-semester gain was 1.34 times as large as the fourth-semester gain.

When compared with the findings of other research studies, the timed-writing scores achieved by the participants in this study appear to be extremely low. When the minimum employment standards established by surveys reviewed in this study are used as a basis, approximately one person in each 28 involved in this study might be assumed to have been qualified for employment as a beginning typist at the beginning of the third semester of instruction in typewriting; one person in nine was qualified at the end of the third semester; and one person in five was qualified at the end of the fourth semester of instruction.

The cases in this study were broken into quartiles, based on the scores attained on the first test, in an effort to determine the relative amounts of gain achieved in second-year typewriting by persons with varying degrees of ability. When the mean gain achieved by students in each quartile was expressed in raw scores there was an indication that the achievement in second-year typewriting increased as the quartile decreased.

Personal Factors

A summary of the findings, reported in Chapter VI, indicating the relationships between five personal factors and achievement in second-year typewriting is contained in the following paragraphs.

Coefficients of correlation of .10 and .01 indicate that age was not a significant factor in the determination

of students' ability to achieve success in second-year typewriting, as considered in this investigation.

The grade levels in which the students were enrolled was not a significant indicator of probable success in second-year typewriting, as measured by the difference in scores earned on "The Students Typewriting Tests."

Coefficients of correlation of .16 and 0.00 indicated that there was little relationship between intelligence and achievement in second-year typewriting.

Tests of correlation between the marks earned by the participants in first-year typewriting and their achievement in second-year typewriting produced coefficients of correlation of .10, which indicate that grade-point averages in first-year typewriting have no value in the prognostication of success in second-year typewriting.

The level of proficiency with which the girls performed on "The Students Typewriting Tests" was significantly higher than that of the boys. Therefore, the results of this study appear to indicate that girls become better typists than boys.

The mean gain achieved by the female participants was 9.46 points, or 23.19 per cent, greater than the mean gain achieved by the male participants, and therefore, indicates that the achievement of girls in this study of second-year typewriting was greater than the achievement of boys.

Analysis of Control

The following paragraphs comprise a summarization of the findings concerning the classification and analysis of the typewriting errors committed by the 221 participants on the three administrations of the test used in this study.

During the third semester of typewriting instruction, the error-rate on the straight-copy timed writing declined an average of 0.26 errors per minute, or 9.39 per cent. During the fourth semester of typewriting instruction, the error-rate declined a mean of 0.19 errors per minute, or 6.86 per cent.

There was no significant difference in the kinds of timed-writing errors committed by students who ranked in the different quartiles of typewriting proficiency at the beginning of the second year of instruction in typewriting.

The errors committed on the timed-writings administered in this study indicate that approximately two-thirds of all timed-writing errors were committed by students who rank in the lower half of their class.

The per cent of the total number of timed-writing errors which fell into each classification was relatively stable throughout the year.

The most common type of error committed on the straight-copy timed writings involved in this study was the single-letter substitution, which accounted for 3,148, or 37.46 per cent, of all the errors committed by the

participants on the three administrations of the test. Each of the other eight classifications of errors contained from 0.48 to 21.93 per cent of the total errors committed on the timed-writing tests.

The characters used in the timed-writing were ranked according to the frequency with which other characters were incorrectly struck for them. Rhos of .93 or more indicated a very high relationship between the rank-order of characters involved in single-letter substitution errors on the three tests. The rho of .69 between the frequency with which characters occurred in the timed writing and the frequency with which other characters were substituted for them indicated that the characters for which others were most frequently substituted were simply the most frequently occurring characters. The evidence indicated quite conclusively that the typewriting characters most frequently struck incorrectly were not necessarily most difficult to strike, but merely occurred most frequently in the copy being typewritten.

The results of the administration of the production portion of "The Students Typewriting Tests" indicate that the per cent of error on the centering exercise was more than twice the per cent of error in rough-drafts, or business letters. The per cent of error in all types of production typewriting decreased during each semester of instruction in second-year typewriting.

The errors committed on the production portion of the test administered in this study indicate that slightly more than two-thirds of all errors committed on production typewriting are committed by students who rank in the lower half of their class. Production typewriting performed by persons who rank in the lower half of their class contain more than twice the per cent of error contained in the production typewriting performed by persons who rank in the upper half of their class.

An analysis of the tabulations of the types of errors committed on each administration of the production portion of the test indicates that the number of errors classified as stroking, manipulation, and mental association decreased as the year progressed. However, when stated as a percentage of the total number of errors committed on the respective administrations of the test, the errors classified as stroking, and manipulation increased, while mental association errors decreased as the year progressed.

Conclusions

On the basis of careful analysis of the findings of this research investigation the author concludes that:

1. At the end of one year of instruction in typewriting, the ability of students is generally limited both in terms of proficiency in typewriting straight-copy material and in proficiency in performing production-typewriting work.

They may possess proficiency sufficient to meet their own personal-use typewriting standards but they generally do not possess proficiency sufficient to satisfactorily meet standards for employment in business positions involving extensive utilization of the typewriter.

2. At the end of the second year of instruction in typewriting, the ability of students in terms of proficiency in typewriting straight-copy material and in proficiency in performing production typewriting work is generally greater to a statistically significant degree. The ability of approximately 80 per cent of the students in typewriting straight-copy material tends to remain at levels below the speed and accuracy employment standards that have been established through research techniques. Their proficiency in typewriting production work undoubtedly is below that required for employment, although standards in this regard continue to be nebulous.

3. In general, it may be concluded, that the extent of learning of students during the course of instruction in the second year of typewriting is such that selected individuals should continue to be afforded the opportunity to gain the typewriting proficiency required for employment, by means of that second year of instruction. At the same time, extensive improvement in learning in the second year of typewriting is required if significant numbers of individuals are to be enabled to achieve employment standards of proficiency.

BIBLIOGRAPHY

Ashby, Wilson Thomas. "A Statistical Analysis of Selected Factors in Predicting Achievement in Typewriting." Unpublished Ed. D. dissertation, University of Oklahoma, 1954.

Blackstone, E. G., and Smith, Sofrona L. Improvement of Instruction in Typewriting, Second Edition. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1949.

Browning, Bette Eilene. "Progress of University Typewriting Students as Measured by a Series of Production Tests." Unpublished Master's thesis, University of Tennessee, 1951.

Clements, Joseph Hardin. "Business Education in the Secondary Schools of Oklahoma." Unpublished Ed. D. dissertation, University of Oklahoma, 1954.

Cook, Walter W., and Appel, Marguerite. "New Bases for Predicting Typing Success," Journal of Business Education, XVI, No. 5 (January, 1941), 17-18.

Garrett, Henry E. Statistics in Psychology and Education, Fourth Edition. New York: Longmans, Green and Company, 1953.

Green, Vera V., Brennen, D. L., and Warner, H. A. A Survey of Vocational Requirements for Certain Beginning Jobs in Offices. Survey Summary No. 10. Philadelphia: National Office Management Association, 1950.

Hardaway, Mathilde. "Prognostic or Aptitude Tests for Skill Subjects," Business Education World, XXV, No. 7 (March, 1945), 371-373.

Hawkins, Helen I. "An Analysis of Errors Made in First, Second, and Third Semester Typewriting Classes in a High School." Unpublished Master's thesis, University of Pittsburgh, 1932.

Lawshe, C. H., Jr. Principles of Personnel Testing. New York: McGraw-Hill Book Company, 1948.

Lessenberry, D. D. Analysis of Errors. New York: L. C. Smith and Corona Typewriters, Inc., School Department, 1928.

National Business Teachers Association and Eastern Business Teachers Association. Curriculum Patterns in Business Education, Thirteenth Yearbook. Somerville, N. J.: Somerset Press, 1956.

Nelson, John Howard. "A Study of Relationships Between Achievement of Stenographers and Typists on the National Business Entrance Tests and Their Performance in Beginning Positions." Unpublished Ph. D. dissertation, New York University, 1951.

Ono, Takaharu. "Impressions of American Business Education," American Business Education, XII, No. 2 (December, 1955), 110-113.

Pasewark, Robert William. "The Effectiveness of Television as a Medium of Learning Typewriting." Unpublished Ph. D. dissertation, New York University, 1956.

Pille, Elsa. "An Analysis of First Semester Typewriting Errors." Unpublished Master's thesis, University of Southern California, 1933.

Porter, Gerald A. "What Are the Typewriting Errors Being Made by Navy Trainees in the Storekeeping Course at Indiana University?" Unpublished research study, Indiana University, 1944.

Potter, Thelma Maude. "An Analysis of the Work of General Clerical Employees." Unpublished Ph. D. dissertation, Teachers College, Columbia University, 1954.

Rahe, Harves Christian. "Review of Research in Typewriting." Unpublished Ed. D. dissertation, School of Education, Indiana University, 1950.

Savinski, Joan. "41 and 6," The Business Teacher, XXXV, No. 5 (March, 1958), 10.

Selden, William. "Curriculum Levels in Business Education--Formal and Terminal Levels: In-Service and Continuing Levels," Curriculum Patterns in Business Education, The American Business Education Yearbook, XIII, 1956.

Sharp, Becky. "The Typing II Case," The New Mexico Business Educator, VII, No. 6 (March, 1952), 35-39.

Strong, Earl P. The Organization, Administration, and Supervision of Business Education. New York: Gregg Publishing Company, 1944.

Tonne, Herbert A., Popham, Estelle L., and Freeman, M. Herbert Methods of Teaching Business Subjects. New York: Gregg Publishing Company, 1949.

U. S. Office of Education. Statistics of Public High Schools, 1927-28. Bulletin 35. Washington: Government Printing Office, 1929.

_____Chapter 5 of "Offerings and Enrollments in High-School Subjects," Biennial Survey of Education in the U. S. 1948-50, Federal Security Agency. Washington: Government Printing Office, 1951.

White, Bruce. "Prediction of Typewriting Success," The Journal of Business Education, X, No. 8 (April, 1935), 21-23.

Wilson, Hattie Will. "An Analysis of Errors Made on Straight-Copy Tests by First-Year Typewriting Students in Selected Oklahoma High Schools, During the Year 1940-41." Unpublished Master's thesis, Oklahoma Agricultural and Mechanical College, 1941.

Wright, Dorothy Marie. "An Occupational Survey of Job Requirements and Standards in 50 Topeka, Kansas, Firms Which Hire High School Graduates." Unpublished Master's thesis, State University of Iowa, 1951.

APPENDIX A

TEST, DIRECTIONS FOR ADMINISTERING AND SCORING, AND TEST NORMS

This appendix contains a copy of "The Students Typewriting Test," Volume XIII, Test 3, which was administered to the participants in this study. A copy of the Directions to Teachers for Administering and Scoring, and a set of National Norms for the test are included in this appendix.

UNITED STUDENTS TYPEWRITING TEST

Sponsored by

UNITED BUSINESS EDUCATION ASSOCIATION
1201 SIXTEENTH STREET, N. W., WASHINGTON 6, D. C.

Revision prepared by
Theta Chapter of Delta Pi Epsilon
under direction of
ELVIN S. EYSTER AND
HOWARD LUNDQUEST
Indiana University

formerly published by
TYPEWRITER EDUCATION RESEARCH BUREAU
L. C. SMITH AND CORONA
ROYAL
REMINGTON RAND
UNDERWOOD

Revised tests for
SEMESTERS I, II, III, AND IV
VOLUME XIII

VOLUME XIII — TEST 3

TYPEWRITING III

For Students Completing Third Semester of Typewriting Instruction

1 GENERAL DIRECTIONS: This test consists of four parts: Part I, a five-minute timed writing; Part II, a rough draft problem; Part III, a centering problem; and Part IV, a business letter with tabulation.

2 The following materials and supplies will be needed: three sheets (8½ x 11) of typewriting paper; one half sheet (8½ x 5½) of typewriting paper; three sheets of onionskin, or similar paper, for carbon copies; one large envelope; erasing materials; and one sheet of carbon.

3 Erasing is permitted on all work except the five-minute timed writing.

4 As you insert *each* sheet into the machine, typewrite your name and the name of your school in the upper right-hand corner.

5 You will be told when to prepare for the timed writing. As soon as time has been called on the timed writing, you are to begin immediately on Part II without taking time to check your errors or to compute your rate.

6 You will be given 30 minutes for the completion of Parts II, III, and IV. Read CAREFULLY the directions for each problem before you begin to typewrite it. As soon as you have completed one part, begin work on the next. Parts are to be typewritten in order. Continue working until time is called, as you will be given credit for partially completed problems. If you complete the test before time is called, assemble the papers in proper order and submit them to your teacher, who will give you other work to do.

DO NOT BEGIN WRITING UNTIL YOU ARE DIRECTED TO DO SO.

Type or Print

Name _____ Date _____
First Initial Last

School _____ Street _____

City _____ State _____

SUMMARY OF RESULTS

	No. of Gross Words a Min.	Total No. of Errors	Minimum Productive Rate	Maximum Possible Score	Score Earned by Student
Part I. Timed writing				60*	
Part II. Rough draft problem				40	
Part III. Centering problem				20	
Part IV. Business letter				40	
Total points				160	

*The score on Part I may exceed 60 points if bonus points are awarded.

This is to certify that the student whose name appears above has taken the Students Typewriting Test sponsored by the United Business Education Association and is entitled to the UBEA Typewriting Awards noted below. Check (x) type of award desired.

	Bronze	Silver	Gold
Certificate			
Pin			

Signed _____
(Teacher to whom awards are to be sent)

COPYRIGHT, 1950, BY UNITED BUSINESS EDUCATION ASSOCIATION

PART I—FIVE-MINUTE TIMED WRITING

DIRECTIONS: Use a 70-space line, double spacing, and a 5-space indention for paragraphs. Typewrite at your best rate; do not hurry but try to keep the carriage moving continuously. If you complete the copy before time is called, begin typewriting again from the first of the test. It is not necessary that your lines be the same length as those in the copy.

Strokes

Yes, without doubt, the little things do count in today's exacting business world. Too many promising young businessmen and business women who travel the exciting "super highway" of business with their eyes solely on the invisible future give little thought to the demands of today. They just don't realize that the little things we do well now help assure the attainment of that future position of success whether it be a position as chief clerk, counterman, salesman, executive, sole proprietor, or one of thousands of others important in the modern, intricate business machine.

Performing well the little things results in an over-all job well done and makes one an indispensable employee truly "worth his weight in gold." The conscientious worker gives a dollar's value in service for every dollar paid him--he begins work promptly, he does not "gold-brick," and he works until quitting time. There is no permanent position of success for the "clock-eyed" employee. Waiting to be told to do a thing rather than acting on individual initiative undermines one's position.

Economizing on supplies, as well as time, enhances a worker's prestige and value. Hasty, ill-planned work wastes too many supplies. The intelligent worker knows that only a profitable business operating on a minimum expense basis can guarantee him any kind of a successful future.

Keeping business affairs and the activities of fellow workers confidential is an investment which pays preferred cumulative dividends at the highest market rate. Idle gossip destroys far more than the value of the "pleasure" derived by those who contribute. If one must gossip, let it be about himself so that the listeners will be too bored to carry on the gossip "chain."

Little things? Certainly! But their stature should be measured not in size but in long-run accomplishment. Giving value for value, economizing in time and on supplies, and making the employer's and co-workers' business that of no one else will help bring to today's young worker the desired future goal.

73 153 231 311 388 468 546 589 661 735 811 885 965 1043 1088 1160 1236 1309 1374 1447 1526 1603 1681 1753 1825 1902 1980 2060

PART II—ROUGH DRAFT PROBLEM

DIRECTIONS: You are to typewrite the Articles of Copartnership shown below, making the corrections indicated. Make one carbon copy. The title is to be typewritten in solid capitals 1½ inches from the top of the paper. Use a 1½-inch left margin and a 1-inch right margin. Use double spacing, with triple spacing between the title and the first line of the copy. Use a 5-space paragraph indention. Correct any errors you may make, both on the original and on the carbon copy. Any error that cannot be corrected will be assigned a reasonable penalty.

ARTICLES OF COPARTNERSHIP

This contract, made and entered into on the first day of ~~April~~ May, 1951, by and between Charles W. Johnson, of Sonnerville, Indiana, and Robert C. Browning, of ~~Sonnerville, Indiana~~ the same city and state.

WITNESSETH: That the said parties have this day formed a copartnership for the purpose of engaging in and conducting a ~~wholesale~~ retail service station in the city ~~of Sonnerville~~ and state under the following stipulations, which are a part of this contract:

¶ First: The business is to be conducted under the firm name of The ~~Super~~ Superior Station, ~~in~~ Sonnerville, Indiana, at 496 Center Street.

SECOND: The investments are as follows: Charles W. Johnson, cash, $5,000; Robert C. Browning, cash, $5,000. ~~These invested assets are partnership property in which the equity of each partner is the same.~~

¶ THIRD: Each partner is to devote his entire time and attention to the business ~~and to engage in no other business enterprise without the written consent of the other partner~~ and is to receive a salary of $200 a month, payable in cash on the first of each month.

FOURTH: These articles shall be ~~terminated~~ dissolved at will by either party with each party sharing alike in the ~~assets~~ net worth of the firm.

IN WITNESS WHEREOF, the parties ~~of~~ aforesaid on the day and year above written have hereunto set ~~there~~ their hands and affixed ~~there~~ their seals.

(Make signature lines 2½" in length. — triple spacing)

_____ (SEAL)

_____ (SEAL)

PART III—CENTERING PROBLEM

DIRECTIONS: Typewrite the following menu on a half sheet of paper. Insert the paper in your machine so that the narrow part of the paper is your horizontal writing line. Single space the two-line heading, triple space after the two-line heading, and double space the content of the menu. Center the problem vertically so that the top and bottom margins are equal and center each line horizontally. Do not make a carbon copy. Correct any errors that can be corrected. Any error that cannot be corrected will be given a reasonable penalty.

XI CHAPTER INITIATION DINNER
Wabash Hotel

Tomato Frappe
Roast Beef with Natural Gravy
Baked Idaho Potatoes
Buttered Fresh Asparagus
Fresh Fruit Salad
Hot Rolls
Strawberry Shortcake
Milk Iced Tea Coffee

PART IV—BUSINESS LETTER

DIRECTIONS: Typewrite the following letter, setting it up attractively on the page. Arrange the tabulation so that it is indented at least five spaces from each margin of the letter. Underscore the columnar headings in the tabulation. Double space *before and after* the columnar headings. Make a carbon copy and address an envelope. Correct any errors that you may make. Any error that cannot be corrected will be given a reasonable penalty.

(Current date)

The Rapid Duplicating Company
1529 Main Street
Pittsfield, Massachusetts

Attention Mr. Raymond Black

Gentlemen:

Thank you for the inquiry about our Mimeo-Bond. Supreme Mimeo-Bond is sold in cut sizes, packed in colored boxes, 500 sheets to a box, 12 boxes to a carton. This paper is available in white only. Specifications are given in the following chart:

Stock No.	Size	Weight	Price Each Box
332	8½ x 11	16	$ 1.09
337	8½ x 14	16	1.32
342	8½ x 11	20	1.33
347	8½ x 14	20	1.63

We can supply bond envelopes in the commercial size No. 6 3/4, 5,000 to the carton, at a price of $3.45 a carton; and official size No. 10, 2,500 to the carton, at a price of $4.25 a carton.

Immediate delivery can be made on these items. Please use the order blank that is enclosed for your convenience.

Yours very truly,

SUPREME PAPER COMPANY

Richard White, Sales Manager

RW:dp
Enclosure

STUDENTS TYPEWRITING TEST

Sponsored by

UNITED BUSINESS EDUCATION ASSOCIATION
1201 SIXTEENTH STREET, N. W., WASHINGTON 6, D. C.

Volume XIII

Test 3

TYPEWRITING III - THIRD SEMESTER

DIRECTIONS TO TEACHERS FOR ADMINISTERING AND SCORING

Before administering the test, the teacher should see that each student has the stationery and other supplies necessary for completion of the test. The teacher may wish to have additional supplies on hand for emergency use. A dictionary (or dictionaries) should be provided.

The teacher should read aloud the general directions given on the first page of the student's copy of the test. Students' questions regarding the typewriting of the problems should be answered only if they do not materially affect the problems in the test. The specific directions given at the beginning of each part are to be read by the student when he is ready to typewrite that particular part.

The examination consists of four parts. The parts are to be typewritten in the order given. Students are not to take time during the test to check their errors on Part I, the five-minute timed writing. Since erasing is permitted on Parts II, III, and IV, students are to proofread and correct their errors on those parts as they are typewritten.

The TOTAL writing time for Parts II, III, and IV is 30 minutes. Writing must stop at the end of that period regardless of the amount written. The time needed by the teacher for giving directions IS NOT to be included in the writing time.

The problems of this test are intended to be challenging to the skill of third-semester typewriting students. It is entirely possible that many students will not finish all problems in the time allowed. However, the scoring plan is so constructed that each student will receive credit for whatever amount he typewrites. It is important, therefore, that all students be directed to work continuously and without interruption; credit will be given for all work done correctly.

The teacher should have other work planned for any students who may complete the test in less than 30 minutes.

After the general directions have been read to the students, the teacher is to administer the timed writing. As soon as time has been called on the five-minute writing, students are to begin at once on the other parts of the test, typewriting them in the order given.

Attention is directed to the scoring plan for this test. Of the total maximum score of 160 points, 100 points (or five eighths of the total score) are allotted to problem typewriting. Since primary emphasis during the third semester of typewriting is frequently placed on production work, it seemed best to weight the problem typewriting more heavily than the straight-copy typewriting.

DIRECTIONS FOR SCORING

Part I. Timed writing. (Maximum possible score: 60 points plus bonus)

In checking errors in the timed writing, follow the International Typewriting Contest Rules to determine what constitutes an error. Do not compute net words a minute.

After the errors have been checked, compute the gross rate of words a minute and determine the number of errors. Determine the score on this part of the test by using the CHART FOR DETERMINING SCORES ON TIMED WRITINGS--THIRD SEMESTER, which accompanies these directions.

Part II. Rough draft problem. (Maximum possible score: 40 points)

Deductions for errors: Subtract deductions for errors made from maximum points allowed. If deductions exceed maximum points allowed, the score is 0 on this part of the test.

Typographical errors: 1 point per error.

A typographical error includes such errors as: incorrectly divided word, misspelled word, incorrect paragraph indention, raised capital partially cut off, failure to space correctly between words or after punctuation marks, touching letters, strikeover, poor correction of an error, omission of a word, repetition of material, and omission or improper insertion of punctuation marks. Count only one error to a word.

Placement errors:

5 points Failure to double space the copy.

2 points Too high or too low on page.
Incorrect top margin or incorrect spacing between heading and first line of the copy.
Incorrect right margin.
Incorrect left margin.

Other deductions:

5 points No carbon copy, placement of carbon copy on back of original, or original copy typewritten on onionskin or second sheet.

1 point Failure to make a correction indicated on the rough draft.

Scoring for Partially Completed Problem

Check errors on partially completed problem. Make deductions just as for a completed problem, substituting the maximum number of points indicated below for the number of points which would have been allowed for a completed problem.

Allow a maximum of 10 points if typist has completed the first paragraph.

Allow a maximum of 20 points if typist has completed the fourth paragraph.

Allow a maximum of 30 points if typist has completed the sixth paragraph.

STUDENTS TYPEWRITING TESTS

CHART FOR DETERMINING SCORES ON TIMED WRITINGS—SECOND SEMESTER

	Gross Words a Minute																																		
Errors	50*	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14
0	80	78	76	75	74	72	71	70	68	67	66	64	63	62	60	59	58	56	55	54	52	51	50	48	46	43	39	35	31	27	23	19	15	11	7	3	0
1	78	76	74	73	72	70	69	68	66	65	64	62	59	58	56	55	54	52	51	50	48	47	46	44	40	37	33	29	25	21	17	11	7	3	0	0	
2	74	72	70	69	68	66	65	64	62	61	60	56	55	54	52	51	50	48	47	44	42	41	40	38	34	31	27	23	17	13	9	3	0	0			
3	72	70	68	65	64	62	61	60	58	57	56	52	51	50	48	47	46	42	41	40	38	35	34	32	28	25	21	15	11	9	1	0					
4	68	66	64	63	62	58	57	56	54	53	52	48	47	46	44	41	40	38	37	34	32	31	28	26	22	19	15	7	3	1	0						
5	66	64	60	59	58	56	55	52	50	49	48	44	43	42	38	37	36	32	31	30	26	25	22	20	16	13	7	1	0	0							
6	62	60	58	55	54	52	51	48	46	45	44	40	39	38	34	33	30	28	27	24	22	19	16	14	10	5	3	0									
7	58	56	54	53	50	48	47	46	42	41	40	36	35	32	30	29	26	24	21	20	16	13	12	8	4	0	0										
8	56	54	50	49	48	44	43	42	38	37	36	32	31	28	26	23	22	18	17	14	10	9	6	2	0												
9	52	50	48	45	44	42	39	38	34	33	32	38	27	24	22	19	16	14	11	8	6	3	0	0													
10	50	46	44	43	40	38	35	34	32	29	28	24	23	20	16	15	12	8	7	4	0	0															
11	46	44	40	39	36	34	33	30	28	25	24	20	17	16	12	9	8	4	1	0																	
12	42	40	38	35	34	30	29	26	24	21	20	16	13	12	8	5	2	0	0																		
13	40	36	34	31	30	26	25	22	20	17	16	12	9	8	4	1	0																				
14	36	34	30	29	26	24	21	20	16	13	12	8	5	2	0	0																					
15	34	30	28	25	24	20	17	16	12	9	8	4	1	0																							
16	30	28	24	21	20	16	15	12	8	5	4	0	0																								
17	26	24	20	19	16	12	11	8	4	1	0																										
18	24	20	18	15	12	10	7	4	0	0																											
19	20	18	14	11	10	6	3	0																													
20	18	14	10	9	6	2	0																														
21	14	10	8	5	2	0																															
22	10	8	4	1	0																																
23	8	4	0	0																																	
24	4	0																																			

Scores should be determined from this chart as follows: For a student who wrote 42 gross words a minute with 3 errors, locate the column marked "42" for the gross rate. Move down that column to the line opposite the one indicating 3 errors. The score "58" represents the number of points the student is to receive on the timed writing.

Students who make more than 24 errors on the timed writing will receive no points for this part of the test.

* For speeds in excess of 50 gross words a minute, figure the score as for 50 gross words a minute and add one bonus point for <u>each two words</u> in excess of 50. Examples: 51 gross words a minute, no bonus points; 52 and 53, one bonus point; 54 and 55 two bonus points, etc.

Scoring for Partially Completed Problem

Check errors on partially completed problem. Make deductions just as for a completed problem, substituting the maximum number of points indicated below for the number of points which would have been allowed for a completed problem.

Allow a maximum of 10 points if typist has completed the inside address.

Allow a maximum of 20 points if typist has completed the first paragraph.

Allow a maximum of 30 points if typist has completed the body of the letter.

Allow a maximum of 35 points if typist has completed the letter.

(If the envelope was addressed before the letter, allow 5 additional points.)

Part III. Tabulation problem. (Maximum possible score: 20 points)

Deductions for errors: Subtract deductions for errors made from maximum points allowed. If deductions exceed maximum points allowed, the score is 0 on this part of the test.

Typographical errors: 1 point per error.

A typographical error includes such errors as: incorrectly divided word, misspelled word, incorrect paragraph indention, raised capital partially cut off, failure to space correctly between words or after punctuation marks, touching letters, strikeover, poor correction of an error, omission of a word, repetition of material, and omission or improper insertion of punctuation marks. Count only one error to a word.

Placement errors:

2 points
- Problem too high or too low on page.
- Incorrect spacing of margins or between columns.

1 point
- Main heading not centered.
- Incorrect spacing between lines of main heading.
- Incorrect spacing between main heading and columnar headings.
- Each columnar heading incorrectly centered over listed items.
- Incorrect spacing between columnar headings and listed items.
- Single spacing of listed items. (Note: Deduct one point if the entire list is single spaced. If the list is double spaced, deduct one point for each instance where single spacing occurs.)
- Footnote typewritten a single space below last listed item.

Other deductions:

1 point
- Failure to capitalize heading.
- Failure to underscore columnar headings.

Placement errors:

5 points — Body of letter double spaced.
Unsatisfactory right and/or left margin.

1 point — Too high or too low on page.
Failure to space correctly between inside address and attention line, attention line and salutation, salutation and first line of body, last line of body and complimentary close, complimentary close and company name, company name and dictator's name and title, dictator's name and title and the reference initials, reference initials and enclosure, lines on the envelope.
Poor placement of attention line.
Poor placement of closing lines.
Failure to space correctly between column headings and body of tabulation, between column headings and last line of preceding paragraph, between body of tabulation and first line of next paragraph.
Failure to single space between the four lines of the tabulation.
Failure to underline the column headings.
Failure to space properly between the numbers contained in "size" column.
Poor placement of any one column.
Any number or word out of alignment with rest of column.

Rules for scoring the letter will also apply to scoring the envelope.

Other deductions:

5 points — No envelope or envelope addressed to the writer instead of the addressee.
No carbon copy, carbon copy on back of original, or original copy typewritten on onionskin or second sheet.

3 points — Failure to indent tabulation five spaces from each margin.
No date line.

1 point — Company name in closing lines not capitalized.
No reference initials or enclosure notation.
Poor placement of date line.

Scoring for Partially Completed Problem

Check errors on partially completed problem. Make deductions just as for a completed problem, substituting the maximum number of points indicated below for the number of points which would have been allowed for a completed problem.

Allow a maximum of 10 points if typist has completed the salutation.

Allow a maximum of 15 points if typist has completed the word "chart."

Allow a maximum of 25 points if typist has completed the tabulation.

Allow a maximum of 30 points if typist has completed the body of the letter.

Allow a maximum of 35 points if typist has completed the letter.

If the envelope was addressed before the letter, allow 5 additional points.

STUDENTS TYPEWRITING TESTS

Sponsored by United Business Education Association
A Department of the National Education Association
1201 Sixteenth Street, N. W., Washington 6, D. C.

National Norms

Volume XIII

	Test #1	Test #2	Test #3	Test #4
Quartile[1]	100	108	117	102
Median	74	88	95	89
Quartile[3]	40	56	75	73
Average Score or Points	71	82	94	88
Possible Score or Points	160	160	160	160

Scores Expressed in Units of Ten Per Cent

Highest 10 per cent	119*	124*	133*	114*
Highest 20 per cent	105*	113*	121*	106*
Highest 30 per cent	95*	104*	113*	99*
Highest 40 per cent	86*	94*	102*	94*
Median	74	88	95	89
Lowest 40 per cent	63**	78**	88**	83**
Lowest 30 per cent	48**	64**	79**	76**
Lowest 20 per cent	31**	50**	69**	68**
Lowest 10 per cent	15**	37**	52**	59**

*and higher
**and lower

UNITED BUSINESS EDUCATION ASSOCIATION
A Department of the National Education Association of the United States
1201 Sixteenth Street, N. W., Washington 6, D. C.

STUDENTS TYPEWRITING TESTS
Certified Typist Certificates and Pins

The UBEA Award Program for typists - Certified Typist Certificates and Pins - was inaugurated in response to the demand by administrators and teachers of typewriting for a program operated on a non-profit basis that would afford maximum motivation to the students and at the same time constitute a measure of the ability of the student to produce as a typist. Before employing a typist, the employer wants to know whether he can produce under office conditions. Words a minute constitute the usual measure of ability. While STUDENTS TYPEWRITING TESTS are designed to measure ability to do straight copy work, they also measure ability to produce work that is different from straight copy - work that usually confronts the typist on the job. The UBEA Awards - Certified Typist Certificates and Pins - are based upon a combination of words a minute and productive ability expressed as "minimum productive rate."

The Certified Typist Certificates and Pins may be obtained for any student who is regularly enrolled in a school which uses the STUDENTS TYPEWRITING TESTS. Three different grades of certificates and pins are issued: bronze, silver, and gold. The certificates and pins are issued to students who can typewrite at the "minimum productive rate" of words a minute as follows:

Type of Certificate and Pin	"Minimum Productive Rate"
Bronze	30 words a minute but less than 40
Silver	40 words a minute but less than 50
Gold	50 words a minute and above, and in 60th percentile or above for the group examined

The certificate is of a size to be inserted in a billfold so the student can carry it with him when applying for a position. The pin is of attractive design and manufactured by one of America's best jewelers. The fee for each certificate is ten cents to cover costs of printing, clerical work involved in filling in the required information, checking of Gold Certificate papers, and mailing. The fee for the pins is as follows: bronze pin, 75 cents; silver pin, $1.60 plus federal tax of 16 cents; gold pin, $1.90 plus federal tax of 19 cents.

The teacher should send the requisition form on page one of each test for students who have earned certificates and pins. The following information must be shown in the Summary of Results portion of page one of each test submitted for an award: (1) Gross words a minute made on "Part I, Timed Writing," (2) Number of errors made on "Part I, Timed Writing," and (3) "Minimum Productive Rate" for the entire test, calculated in accordance with the formula supplied for that purpose.

Because the UBEA Awards are sold on a low cost basis, we must request that the remittance be sent with your order, or that you use official Board of Education or school order forms. The Certified Typist Certificates and Pins will be mailed to the teacher for signature and distribution to the students.

All requests for Certified Typist Certificates and Pins, and correspondence concerning these awards, should be sent to the above address.

APPENDIX B

INDIVIDUAL DATA FORM

INDIVIDUAL DATA FORM

Name	Age	Sex

Grade	Amt. of previous typewriting

Where taken	When taken

Grades in previous typewriting

Tests:

PMA	CMM	Language	Reading
Math	Aptitude		

Kuder:

Music	Scientific	Outdoor	Persuasive
Clerical	Literary	Mechanical	Computational
Artistic	Social Service		

(Front of Card)

Date	Students Typewriting Test Scores Part I	Part II	Part III	Part IV	Total	Timed Writing GWPM	NWPM	Error
Diff. 1 & 2								
Diff. 2 & 3								
Diff. 1 & 3								

(Back of Card)

APPENDIX C

PERSONAL AND TEST INFORMATION

This appendix contains the basic data collected for each of the 221 student-participants in this research investigation. The test data for each student is grouped on three lines so that complete information is readily available for each person. The first line of test data presented for each student is that collected through the administration of the first test, in September, 1956. The second line is data obtained from the second test, administered in January, 1957. Scores achieved by the participants on the third administration of the test, in May, 1957, are presented on the third line.

Student Code Number	Age	Sex	Year in School	Prior Grade-Point Average in Typewriting	Intelligence Quotient	Test Scores: Timed Writing Score	Test Scores: Production Score	Test Scores: Total Score	Timed Writings: Gross Words	Timed Writings: Net Words	Timed Writings: Errors
1	16	F	10	1.0	70	0	0	0	27	9	10
						11	17	28	29	15	7
						0	63	63	25	13	6
2	16	F	11	2.0	86	0	0	0	27	0	29
						26	46	82	39	23	8
						31	56	87	40	26	7
3	16	F	11	1.5	93	0	0	0	26	8	9
						7	55	62	33	11	11
						6	87	93	43	9	17
4	15	F	10	2.0	83	0	1	1	29	0	24
						31	47	78	36	26	5
						13	53	66	41	17	12
5	15	F	10	3.0	89	0	2	2	25	9	8
						0	37	37	32	0	21
						43	50	93	47	41	3
6	16	F	11	1.0	91	0	3	3	32	0	17
						28	59	87	36	24	6
						4	77	81	41	9	16
7	16	F	10	3.0	92	0	5	5	38	0	29
						0	21	21	48	0	29
						0	52	52	52	0	28
8	15	F	10	3.0	87	0	6	6	38	0	61
						0	14	14	51	0	48
						0	52	52	53	0	33

Student Code Number	Age	Sex	Year in School	Prior Grade-Point Average in Typewriting	Intelligence Quotient	Test Scores: Timed Writing Score	Test Scores: Production Score	Test Scores: Total Score	Timed Writings: Gross Words	Timed Writings: Net Words	Timed Writings: Errors
9	15	F	10	1.0	82	0	7	7	41	0	44
						0	25	25	41	0	22
						0	44	44	39	0	35
10	15	F	10	4.0	114	0	8	8	33	0	26
						5	60	65	44	18	13
						16	75	91	41	17	12
11	15	F	10	3.5	101	0	10	10	40	0	37
						0	32	32	39	1	19
						0	74	74	59	0	37
12	15	F	10	4.0	92	0	10	10	41	0	27
						0	73	73	46	4	21
						16	90	106	46	2	22
13	15	F	10	3.0	112	0	11	11	32	6	13
						32	74	106	43	27	8
						9	54	63	45	11	17
14	15	F	10	2.0	93	0	12	12	36	0	37
						17	44	61	43	17	13
						20	75	95	42	22	10
15	15	F	10	4.0	112	0	13	13	26	0	25
						0	54	54	42	0	25
						18	58	76	35	17	9
16	17	M	12	2.0	98	0	13	13	27	0	20
						0	21	21	30	0	14
						0	32	32	46	0	26

Student Code Number	Age	Sex	Year in School	Prior Grade-Point Average in Typewriting	Intelligence Quotient	Test Scores: Timed Writing Score	Test Scores: Production Score	Test Scores: Total Score	Timed Writings: Gross Words	Timed Writings: Net Words	Timed Writings: Errors
17	16	F	10	2.0	79	0	13	13	33	3	15
						0	34	34	35	0	18
						26	44	70	44	24	10
18	15	F	10	3.0	84	0	14	14	53	0	38
						0	5	5	61	0	64
						0	22	22	41	0	43
19	15	F	10	2.0	104	0	14	14	29	0	17
						0	35	35	39	1	19
						8	58	66	39	11	14
20	15	F	10	2.0	102	0	15	15	31	3	14
						31	49	80	40	22	9
						15	68	83	44	16	14
21	16	M	10	2.5	103	0	16	16	35	1	17
						25	61	86	40	22	9
						36	68	104	46	32	7
22	16	F	10	1.0	75	0	16	16	19	0	12
						0	26	26	26	2	12
						0	21	21	20	0	16
23	15	F	10	1.5	94	0	16	16	29	9	10
						0	28	28	22	0	16
						0	29	29	24	0	15
24	16	F	10	1.5	81	0	17	17	27	0	15
						14	22	36	33	15	9
						0	43	43	39	3	18

Student Code Number	Age	Sex	Year in School	Prior Grade-Point Average in Typewriting	Intelligence Quotient	Test Scores: Timed Writing Score	Test Scores: Production Score	Test Scores: Total Score	Timed Writings: Gross Words	Timed Writings: Net Words	Timed Writings: Errors
25	15	F	10	3.0	96	0	18	18	32	0	24
						8	36	44	39	11	14
						3	79	82	43	7	18
26	16	F	11	2.0	83	0	18	18	29	3	13
						0	61	61	42	0	24
						0	30	30	51	0	35
27	15	F	10	2.0	127	0	18	18	30	0	24
						0	66	66	36	0	23
						0	31	31	39	0	22
28	15	F	10	2.0	79	0	19	19	36	0	54
						0	2	2	45	0	23
						0	43	43	46	0	42
29	15	M	10	3.0	106	0	19	19	21	0	22
						0	18	18	33	0	18
						14	60	74	50	14	20
30	16	F	10	2.0	93	0	20	20	20	0	12
						0	12	12	25	9	8
						35	48	83	39	29	5
31	15	F	10	3.0	105	0	20	20	35	0	19
						50	59	109	38	38	0
						32	60	92	42	28	7
32	15	F	10	4.0	101	0	20	20	52	0	27
						8	55	63	53	1	26
						35	75	110	60	32	14

Student Code Number	Age	Sex	Year in School	Prior Grade-Point Average in Typewriting	Intelligence Quotient	Test Scores: Timed Writing Score	Test Scores: Production Score	Test Scores: Total Score	Timed Writings: Gross Words	Timed Writings: Net Words	Timed Writings: Errors
33	16	F	10	2.0	95	0	21	21	35	15	10
						0	73	73	22	0	13
						7	58	65	30	12	9
34	16	F	11	2.0	91	0	21	21	30	0	17
						9	54	63	32	12	10
						0	55	55	38	0	19
35	17	M	12	2.0	118	0	22	22	23	3	10
						0	52	52	31	0	19
						0	92	92	36	20	8
36	16	M	10	3.0	89	0	22	22	24	0	15
						0	26	26	27	3	12
						0	38	38	35	0	32
37	15	F	11	4.0	103	0	22	22	30	6	12
						12	60	72	38	14	12
						25	73	98	58	24	17
38	15	F	10	4.0	119	0	22	22	31	0	20
						14	52	66	66	8	29
						44	59	103	60	34	13
39	15	F	10	2.5	110	2	21	23	34	8	13
						35	70	105	38	28	5
						39	60	99	43	33	5
40	15	F	10	3.5	104	0	23	23	48	0	31
						34	71	105	56	30	13
						33	96	129	55	29	13

Student Code Number	Age	Sex	Year in School	Prior Grade-Point Average in Typewriting	Intelligence Quotient	Test Scores: Timed Writing Score	Test Scores: Production Score	Test Scores: Total Score	Timed Writings: Gross Words	Timed Writings: Net Words	Timed Writings: Errors
41	17	F	10	2.0	100	24	0	24	32	20	6
						22	38	60	36	20	8
						41	38	79	39	33	3
42	17	M	12	3.0	92	0	24	24	29	0	19
						0	42	42	32	0	17
						10	59	69	42	12	15
43	17	M	10	3.0	70	0	24	24	27	0	22
						0	35	35	36	0	30
						12	50	62	36	14	11
44	15	F	10	2.0	99	11	13	24	39	13	13
						5	51	56	47	7	20
						47	80	127	53	41	6
45	16	F	10	2.5	93	0	24	24	23	0	14
						22	43	65	30	20	5
						31	47	78	35	25	5
46	15	F	10	3.0	92	0	25	25	36	0	36
						16	45	61	42	14	14
						21	51	72	44	20	12
47	15	F	10	2.0	95	0	26	26	25	0	14
						14	17	31	33	15	9
						25	57	82	46	26	10
48	15	M	10	3.0	99	0	27	27	31	7	12
						20	44	64	48	18	15
						28	46	74	46	26	10

Student Code Number	Age	Sex	Year in School	Prior Grade-Point Average in Typewriting	Intelligence Quotient	Test Scores: Timed Writing Score	Test Scores: Production Score	Test Scores: Total Score	Timed Writings: Gross Words	Timed Writings: Net Words	Timed Writings: Errors
49	15	F	10	3.0	96	0	27	27	32	0	25
						0	54	54	40	0	23
						0	84	84	42	0	21
50	15	F	10	3.0	102	0	27	27	41	5	18
						6	67	73	46	8	19
						0	62	62	53	0	27
51	15	F	10	3.5	112	0	28	28	38	0	11
						1	18	19	35	7	14
						50	66	116	49	43	3
52	16	F	11	2.0	88	7	21	28	35	11	12
						26	51	77	42	24	9
						16	85	101	46	16	15
53	15	F	10	2.0	105	0	28	28	36	4	16
						25	66	91	42	22	10
						42	79	121	46	36	5
54	17	F	11	3.0	81	0	28	28	41	0	25
						10	30	40	40	12	14
						35	68	103	42	24	9
55	17	F	11	2.0	87	4	25	29	26	14	6
						23	41	64	39	21	9
						43	67	110	45	37	4
56	15	M	10	1.0	115	3	27	30	30	10	10
						0	28	28	23	1	11
						0	38	38	17	0	10

Student Code Number	Age	Sex	Year in School	Prior Grade-Point Average in Typewriting	Intelligence Quotient	Test Scores: Timed Writing Score	Test Scores: Production Score	Test Scores: Total Score	Timed Writings: Gross Words	Timed Writings: Net Words	Timed Writings: Errors
57	15	F	10	2.5	110	0	30	30	33	0	24
						0	48	48	50	0	40
						0	85	85	62	0	50
58	18	F	12	3.0	80	0	30	30	31	7	12
						20	43	63	39	19	10
						45	75	120	49	39	5
59	16	F	10	3.0	113	0	30	30	43	0	27
						36	73	109	48	32	8
						34	69	103	50	30	10
60	15	F	10	4.0	130	4	26	30	32	10	11
						52	77	129	55	47	4
						54	68	122	55	49	3
61	18	F	11	2.0	81	15	15	30	38	16	11
						33	53	86	46	30	8
						3	70	73	43	7	18
62	15	F	10	2.0	73	20	11	31	39	19	10
						20	56	76	39	19	10
						17	66	83	43	17	13
63	18	M	12	2.0	107	0	31	31	35	0	18
						0	39	39	36	0	20
						0	63	63	40	0	20
64	15	F	10	2.5	101	4	27	31	33	9	12
						0	41	41	30	6	12
						28	72	100	46	26	10

Student Code Number	Age	Sex	Year in School	Prior Grade-Point Average in Typewriting	Intelligence Quotient	Test Scores: Timed Writing Score	Test Scores: Production Score	Test Scores: Total Score	Timed Writings: Gross Words	Timed Writings: Net Words	Timed Writings: Errors
65	15	F	10	3.0	106	0	31	31	43	0	28
						31	68	99	50	28	11
						45	92	137	55	41	7
66	15	F	10	4.0	110	0	31	31	31	7	12
						29	43	72	52	24	14
						40	80	120	61	37	12
67	15	F	10	2.5	97	0	31	31	33	0	27
						0	40	40	36	0	23
						0	58	58	44	0	29
68	18	M	12	2.0	106	0	31	31	29	0	28
						0	53	53	44	0	31
						0	67	67	46	0	26
69	15	F	10	3.0	101	0	31	31	33	7	13
						18	41	59	35	17	9
						26	54	80	44	24	10
70	15	F	10	3.0	109	0	31	31	36	6	15
						25	56	81	40	22	9
						15	53	68	43	15	14
71	15	F	10	3.0	105	12	20	32	34	10	12
						24	64	88	46	22	12
						16	65	81	46	16	15
72	16	F	11	2.0	113	14	18	32	33	15	9
						26	54	80	53	23	15
						25	74	99	51	25	13

Student Code Number	Age	Sex	Year in School	Prior Grade-Point Average in Typewriting	Intelligence Quotient	Test Scores: Timed Writing Score	Test Scores: Production Score	Test Scores: Total Score	Timed Writings: Gross Words	Timed Writings: Net Words	Timed Writings: Errors
73	17	F	12	2.5	115	0	32	32	42	0	26
						38	48	86	42	32	5
						38	85	123	49	33	8
74	15	F	10	3.0	101	1	31	32	36	8	14
						14	70	84	47	15	16
						31	85	116	47	27	10
75	16	F	11	2.0	95	22	11	33	36	20	8
						23	35	58	38	20	9
						17	46	63	48	12	18
76	15	M	10	2.0	102	0	33	33	28	0	15
						6	55	61	31	10	10
						14	50	64	37	15	11
77	15	F	10	3.0	111	0	33	33	35	0	22
						13	86	99	52	12	20
						10	76	86	40	10	15
78	16	F	10	3.0	109	16	18	34	29	17	6
						31	48	79	35	27	4
						13	57	70	40	14	13
79	17	M	12	2.0	102	0	35	35	22	14	4
						0	55	55	26	6	10
						0	53	53	33	0	17
80	16	F	10	3.0	91	0	35	35	35	1	17
						0	60	60	28	0	15
						28	44	72	47	25	11

Student Code Number	Age	Sex	Year in School	Prior Grade-Point Average in Typewriting	Intelligence Quotient	Test Scores: Timed Writing Score	Test Scores: Production Score	Test Scores: Total Score	Timed Writings: Gross Words	Timed Writings: Net Words	Timed Writings: Errors
81	16	F	10	3.0	91	0	35	35	39	0	22
						0	59	59	46	0	25
						0	71	71	50	0	36
82	16	F	11	4.0	112	2	33	35	39	7	16
						10	69	79	50	10	20
						26	87	113	58	26	16
83	15	F	10	3.0	90	0	36	36	32	0	17
						2	27	29	39	23	8
						43	74	117	41	31	5
84	15	F	10	3.5	81	0	36	36	35	0	18
						0	42	42	56	0	30
						2	69	71	47	5	21
85	15	F	10	2.0	105	4	32	36	28	12	8
						21	44	65	35	21	7
						23	68	91	37	21	8
86	16	F	11	2.0	106	9	27	36	34	12	11
						17	20	37	35	0	26
						0	71	71	44	6	19
87	15	F	10	4.0	106	0	37	37	39	0	20
						0	68	68	59	0	30
						37	58	95	62	36	13
88	15	F	10	3.0	116	0	38	38	37	3	17
						37	38	95	41	31	5
						32	93	125	48	28	10

Student Code Number	Age	Sex	Year in School	Prior Grade-Point Average in Typewriting	Intelligence Quotient	Test Scores: Timed Writing Score	Test Scores: Production Score	Test Scores: Total Score	Timed Writings: Gross Words	Timed Writings: Net Words	Timed Writings: Errors
89	17	F	11	2.5	101	0	38	38	31	5	13
						15	60	75	35	15	10
						26	62	88	38	22	8
90	15	F	10	4.0	88	0	38	38	46	2	22
						0	53	53	54	0	27
						0	74	74	58	0	30
91	17	F	11	3.0	108	0	40	40	48	0	42
						0	71	71	44	0	25
						38	88	126	49	33	8
92	15	F	10	3.0	110	0	41	41	36	0	35
						0	55	55	39	0	34
						10	53	63	40	12	14
93	15	M	10	4.0	106	0	41	41	42	0	35
						21	68	89	55	19	18
						42	74	116	49	37	6
94	15	F	10	3.0	118	0	42	42	39	0	20
						5	57	62	53	5	24
						44	68	112	54	40	7
95	15	F	10	3.0	102	0	42	42	31	0	16
						0	60	60	46	0	25
						3	78	81	46	0	26
96	15	F	10	2.5	112	6	36	42	36	10	13
						1	54	55	41	9	16
						42	69	111	44	36	4

Student Code Number	Age	Sex	Year in School	Prior Grade-Point Average in Typewriting	Intelligence Quotient	Test Scores: Timed Writing Score	Test Scores: Production Score	Test Scores: Total Score	Timed Writings: Gross Words	Timed Writings: Net Words	Timed Writings: Errors
97	16	M	11	3.0	98	4	39	43	32	0	27
						0	55	55	40	18	11
						34	70	104	46	30	8
98	15	M	10	2.0	115	0	44	44	32	2	15
						29	60	89	44	26	9
						49	84	133	45	41	2
99	16	F	11	2.0	114	26	18	44	38	22	8
						42	73	115	44	36	4
						43	82	125	50	36	7
100	15	F	10	3.5	100	12	32	44	44	12	16
						0	43	43	53	0	28
						22	74	96	62	24	19
101	15	F	10	2.0	96	18	27	45	49	9	15
						27	65	92	51	13	19
						26	55	81	54	24	15
102	15	F	10	4.0	109	5	40	45	39	9	15
						29	60	89	44	26	9
						12	87	99	48	12	18
103	16	F	10	3.0	90	0	45	45	32	6	13
						0	56	56	31	7	12
						16	61	77	32	16	8
104	15	F	10	3.0	116	0	46	46	44	0	35
						26	56	82	43	23	10
						39	49	88	46	34	6

Student Code Number	Age	Sex	Year in School	Prior Grade-Point Average in Typewriting	Intelligence Quotient	Test Scores: Timed Writing Score	Test Scores: Production Score	Test Scores: Total Score	Timed Writings: Gross Words	Timed Writings: Net Words	Timed Writings: Errors
105	16	F	10	2.0	103	9	37	46	34	12	11
						40	72	112	40	32	4
						42	74	116	44	36	4
106	16	F	10	3.0	114	13	33	46	56	14	21
						44	66	110	59	41	9
						40	85	125	60	26	17
107	15	F	10	2.0	97	14	32	46	33	15	9
						0	39	39	42	0	25
						0	47	47	46	0	25
108	15	F	10	3.0	114	0	46	46	29	9	10
						19	37	56	42	18	12
						38	90	128	44	32	6
109	15	F	10	2.5	104	7	40	47	46	10	18
						0	67	67	38	4	17
						32	72	104	42	24	9
110	17	F	11	3.0	76	10	37	47	41	13	14
						18	59	77	55	15	20
						43	65	108	62	42	10
111	15	M	10	2.0	94	9	38	47	32	12	10
						22	47	69	33	19	7
						35	58	93	38	28	5
112	15	F	10	3.0	103	21	27	48	37	11	8
						42	48	90	44	36	4
						19	60	79	50	18	16

Student Code Number	Age	Sex	Year in School	Prior Grade-Point Average in Typewriting	Intelligence Quotient	Test Scores: Timed Writing Score	Test Scores: Production Score	Test Scores: Total Score	Timed Writings: Gross Words	Timed Writings: Net Words	Timed Writings: Errors
113	15	F	10	3.0	105	15	33	48	45	15	15
						7	71	78	51	15	18
						44	96	140	52	40	6
114	16	M	10	3.0	82	4	44	48	26	14	6
						34	67	101	35	27	4
						51	67	118	40	40	0
115	18	F	12	2.0	98	10	39	49	30	14	8
						35	60	95	47	33	7
						54	86	140	56	48	4
116	15	F	10	4.0	115	0	49	49	39	9	22
						4	81	85	45	7	19
						28	89	117	47	25	11
117	15	F	10	2.0	119	13	36	49	41	15	13
						26	52	78	43	23	10
						28	75	103	47	25	11
118	15	F	10	2.0	106	0	49	49	46	0	26
						0	55	55	49	0	30
						18	85	103	53	17	18
119	15	F	10	3.0	95	25	24	49	35	21	7
						35	40	75	38	28	5
						42	59	101	44	36	4
120	15	F	10	2.0	95	0	49	49	39	4	17
						0	22	22	38	0	19
						35	57	92	44	30	7

Student Code Number	Age	Sex	Year in School	Prior Grade-Point Average in Typewriting	Intelligence Quotient	Test Scores: Timed Writing Score	Test Scores: Production Score	Test Scores: Total Score	Timed Writings: Gross Words	Timed Writings: Net Words	Timed Writings: Errors
121	15	F	10	2.0	98	5	45	50	38	8	15
						10	37	47	36	8	14
						0	32	32	32	0	21
122	17	F	11	3.0	95	22	28	50	33	28	7
						21	28	49	35	19	8
						50	53	103	57	47	5
123	16	F	11	2.5	113	0	51	51	48	0	25
						39	58	95	51	35	8
						43	73	116	55	39	8
124	16	F	11	2.0	106	16	35	51	42	16	13
						16	35	51	46	12	14
						35	50	85	44	30	7
125	16	F	10	3.0	105	0	51	51	41	3	19
						7	78	85	46	10	18
						20	70	90	49	19	15
126	17	F	11	2.0	109	11	40	51	28	16	6
						3	40	43	30	10	10
						22	71	93	33	19	7
127	16	F	12	3.0	110	0	52	52	31	7	12
						27	73	100	45	23	11
						52	78	130	50	46	2
128	16	F	11	2.0	92	20	34	54	29	19	5
						26	71	97	44	24	10
						18	69	87	46	18	14

Student Code Number	Age	Sex	Year in School	Grade-Point Average in Typewriting	Intelligence Quotient	Test Scores: Timed Writing Score	Test Scores: Production Score	Test Scores: Total Score	Timed Writings: Gross Words	Timed Writings: Net Words	Timed Writings: Errors
129	15	F	10	4.0	96	28	26	54	46	26	10
						10	48	58	46	12	17
						47	76	123	49	41	4
130	17	F	11	2.0	108	21	34	55	31	19	6
						54	69	123	46	46	0
						54	79	133	48	46	1
131	16	M	10	2.0	86	29	26	55	31	23	4
						30	59	89	34	24	5
						20	37	57	34	18	8
132	15	F	10	2.0	88	23	32	55	37	21	8
						23	45	68	43	21	10
						46	64	110	51	41	5
133	15	M	10	2.0	97	20	35	55	28	20	4
						46	32	78	33	33	0
						35	50	85	33	27	3
134	17	F	11	3.5	90	17	39	56	33	17	8
						50	75	125	49	43	3
						47	67	114	53	39	7
135	17	F	11	3.0	111	23	33	56	39	21	9
						21	55	76	46	20	13
						46	77	123	45	39	3
136	16	F	11	3.0	101	22	35	57	40	20	10
						18	69	87	45	17	14
						42	65	107	49	37	6

Student Code Number	Age	Sex	Prior Year in School	Prior Grade-Point Average in Typewriting	Intelligence Quotient	Test Scores: Timed Writing Score	Test Scores: Production Score	Test Scores: Total Score	Timed Writings: Gross Words	Timed Writings: Net Words	Timed Writings: Errors
137	17	F	11	3.5	110	13	44	57	42	14	14
						14	78	92	47	15	16
						38	91	129	52	28	12
138	17	F	12	4.0	102	29	28	57	64	32	16
						48	0	48	54	44	5
						48	69	117	56	44	6
139	15	M	10	2.0	92	21	37	58	35	19	8
						31	37	68	41	27	7
						32	65	97	38	26	6
140	15	F	10	2.5	114	28	31	59	33	23	5
						7	58	65	40	10	15
						28	72	100	50	26	12
141	15	F	10	4.0	133	17	43	60	26	20	3
						2	54	56	39	7	16
						22	71	93	50	20	15
142	16	F	11	2.5	103	22	38	60	36	14	11
						32	41	73	38	26	6
						48	89	137	44	40	2
143	17	F	11	4.0	110	12	48	60	36	14	11
						45	74	119	46	38	4
						49	88	137	46	42	2
144	15	F	10	2.0	97	23	38	61	37	21	8
						50	53	103	49	43	3
						49	77	126	46	42	2

Student Code Number	Age	Sex	Year in School	Prior Grade-Point Average in Typewriting	Intelligence Quotient	Test Scores: Timed Writing Score	Test Scores: Production Score	Test Scores: Total Score	Timed Writings: Gross Words	Timed Writings: Net Words	Timed Writings: Errors
145	16	F	10	4.0	110	11	50	61	44	14	15
						34	84	118	58	30	14
						35	75	110	54	32	11
146	15	F	10	3.0	117	21	40	61	35	19	8
						36	77	113	43	33	5
						42	93	135	46	36	5
147	15	F	10	3.0	100	26	36	62	37	25	21
						16	38	54	32	16	8
						20	71	91	34	18	8
148	16	F	10	4.0	109	13	49	62	47	13	17
						46	59	105	46	40	3
						45	71	116	55	41	7
149	15	F	10	4.0	101	0	62	62	46	12	17
						38	76	114	64	40	12
						52	99	151	62	50	6
150	15	F	10	3.0	112	26	36	62	31	21	5
						32	20	52	39	29	5
						40	58	98	29	29	0
151	15	F	10	4.0	105	33	30	63	34	28	3
						38	65	103	39	29	5
						35	95	130	47	31	8
152	16	F	10	3.0	107	0	63	63	32	0	19
						0	54	54	36	0	29
						41	45	86	44	30	7

Student Code Number	Age	Sex	Year in School	Prior Grade-Point Average in Typewriting	Intelligence Quotient	Test Scores: Timed Writing Score	Test Scores: Production Score	Test Scores: Total Score	Timed Writings: Gross Words	Timed Writings: Net Words	Timed Writings: Errors
153	15	F	10	2.0	113	23	40	63	39	21	9
						26	75	101	44	24	10
						33	93	126	55	29	13
154	16	F	10	3.0	110	18	45	63	45	17	14
						35	69	104	47	31	8
						51	70	121	51	45	3
155	15	F	10	4.0	97	30	33	63	34	24	5
						36	71	107	46	38	4
						53	77	130	53	47	3
156	16	F	10	1.5	109	25	38	63	45	21	12
						0	38	38	42	2	20
						20	69	89	48	18	15
157	15	F	10	2.5	102	20	44	64	38	18	10
						11	40	51	44	12	16
						18	63	81	46	18	14
158	16	F	10	4.0	86	34	39	64	37	19	9
						36	41	77	46	32	7
						39	61	100	55	35	10
159	16	F	11	3.0	101	28	37	65	45	25	10
						0	47	47	45	0	26
						0	63	63	57	0	38
160	16	F	11	2.0	97	26	39	65	37	23	7
						42	60	102	44	36	4
						50	73	123	47	43	2

Student Code Number	Age	Sex	Year in School	Prior Grade-Point Average in Typewriting	Intelligence Quotient	Test Scores: Timed Writing Score	Test Scores: Production Score	Test Scores: Total Score	Timed Writings: Gross Words	Timed Writings: Net Words	Timed Writings: Errors
161	15	F	10	2.0	113	27	38	65	32	22	5
						23	69	92	39	21	9
						20	69	89	48	18	15
162	15	F	10	2.0	101	0	66	66	42	0	28
						14	37	51	39	27	6
						0	60	60	58	0	37
163	16	F	10	3.0	102	30	36	66	35	25	5
						31	65	96	45	29	8
						47	75	122	49	39	5
164	16	F	10	2.5	105	19	48	67	45	19	13
						35	37	72	42	30	6
						35	72	107	44	30	7
165	16	M	11	3.0	96	27	40	67	30	22	4
						28	68	96	36	24	6
						35	35	70	43	29	7
166	17	F	12	3.0	86	29	38	67	42	26	8
						39	63	102	51	34	7
						42	90	132	38	22	8
167	15	F	10	3.0	108	28	41	69	35	23	6
						38	74	112	47	25	11
						45	70	115	46	38	4
168	15	F	10	3.0	94	31	38	69	35	25	5
						41	61	102	42	34	4
						45	72	117	46	38	4

Student Code Number	Age	Sex	Year in School	Prior Grade-Point Average in Typewriting	Intelligence Quotient	Test Scores: Timed Writing Score	Test Scores: Production Score	Test Scores: Total Score	Timed Writings: Gross Words	Timed Writings: Net Words	Timed Writings: Errors
169	17	F	11	3.0	114	18	51	69	45	17	14
						18	69	87	49	17	16
						0	89	89	51	1	25
170	18	F	12	3.0	103	15	55	70	34	16	9
						32	47	79	49	29	10
						43	68	111	45	37	4
171	16	F	10	3.0	109	21	49	70	46	20	13
						12	67	79	44	14	15
						42	84	126	53	37	8
172	15	F	10	2.0	96	36	34	70	31	27	3
						20	55	75	38	16	11
						31	79	110	47	27	10
173	15	F	10	3.5	99	31	39	70	40	26	7
						42	56	98	48	36	6
						26	68	94	43	23	10
174	15	F	10	2.0	100	35	35	70	38	28	5
						35	60	95	38	28	5
						36	86	122	46	32	7
175	15	F	10	2.0	112	20	50	70	34	18	8
						35	80	115	44	30	7
						40	73	113	50	36	7
176	16	F	10	2.0	101	19	52	71	36	16	10
						29	80	109	44	0	21
						28	82	110	50	24	13

Student Code Number	Age	Sex	Year in School	Prior Grade-Point Average in Typewriting	Intelligence Quotient	Test Scores: Timed Writing Score	Test Scores: Production Score	Test Scores: Total Score	Timed Writings: Gross Words	Timed Writings: Net Words	Timed Writings: Errors
177	16	F	11	4.0	113	14	58	72	52	14	19
						47	94	141	58	46	6
						59	95	154	55	53	1
178	15	F	10	2.5	89	26	47	73	43	23	10
						34	59	93	46	30	8
						51	72	123	54	44	5
179	15	M	10	2.0	102	35	38	73	38	28	5
						39	59	98	46	34	6
						15	39	54	48	16	16
180	16	F	11	4.0	110	31	42	73	38	28	5
						42	67	109	52	44	4
						48	95	143	54	44	5
181	15	F	10	3.5	101	33	41	74	38	26	6
						0	57	57	37	5	16
						38	69	107	42	32	5
182	17	F	12	4.0	117	20	54	74	28	20	4
						41	75	116	44	34	5
						57	100	157	55	51	2
183	15	F	10	2.0	99	29	46	75	39	25	7
						47	51	98	52	42	5
						29	68	97	48	26	11
184	15	F	10	3.0	100	44	32	76	38	34	2
						26	49	75	38	22	8
						25	70	95	40	22	9

Student Code Number	Age	Sex	Year in School	Prior Grade-Point Average in Typewriting	Intelligence Quotient	Test Scores: Timed Writing Score	Test Scores: Production Score	Test Scores: Total Score	Timed Writings: Gross Words	Timed Writings: Net Words	Timed Writings: Errors
185	18	F	11	2.0	102	42	34	76	38	26	6
						7	34	41	42	10	16
						41	73	114	42	34	4
186	16	F	10	3.0	105	32	44	76	33	25	4
						23	23	46	39	21	9
						28	73	101	45	25	10
187	16	F	11	2.0	100	38	38	76	42	32	5
						4	30	34	52	4	24
						33	52	85	45	29	8
188	16	F	11	2.0	100	28	49	77	29	23	3
						25	52	77	35	21	7
						8	64	72	49	9	20
189	17	F	11	3.0	111	21	56	77	44	20	12
						30	56	86	55	27	14
						35	66	101	49	31	9
190	15	M	10	4.0	126	15	63	78	44	16	14
						47	69	116	53	43	5
						41	87	128	58	38	10
191	16	F	10	3.0	86	35	42	78	42	30	6
						35	61	96	42	30	6
						23	70	93	43	19	12
192	14	F	10	2.5	116	25	54	79	41	23	9
						55	68	123	57	51	3
						54	87	141	58	50	4

Student Code Number	Age	Sex	Year in School	Prior Grade-Point Average in Typewriting	Intelligence Quotient	Test Scores: Timed Writing Score	Test Scores: Production Score	Test Scores: Total Score	Timed Writings: Gross Words	Timed Writings: Net Words	Timed Writings: Errors
193	15	F	10	4.0	112	23	57	80	38	20	9
						27	64	91	49	25	12
						45	71	116	55	41	7
194	15	M	10	4.0	109	35	45	80	39	29	5
						40	93	133	41	33	4
						59	125	184	59	55	2
195	16	F	10	4.0	73	37	47	84	56	34	11
						31	58	89	52	28	12
						39	52	91	55	35	10
196	15	F	10	3.0	109	26	58	84	39	23	8
						11	95	106	42	34	4
						43	75	118	41	35	3
197	17	F	11	2.0	97	38	46	84	39	31	4
						29	50	79	39	25	7
						28	49	77	41	25	8
198	15	F	10	4.0	105	42	42	84	55	37	9
						16	48	64	68	20	24
						23	71	94	63	25	19
199	16	M	11	3.0	115	47	38	85	37	33	2
						34	69	103	46	30	8
						51	99	150	53	39	7
200	17	F	11	3.0	134	31	55	86	32	24	4
						32	72	104	38	28	5
						54	64	118	46	46	0

Student Code Number	Age	Sex	Year in School	Prior Grade-Point Average in Typewriting	Intelligence Quotient	Test Scores: Timed Writing Score	Test Scores: Production Score	Test Scores: Total Score	Timed Writings: Gross Words	Timed Writings: Net Words	Timed Writings: Errors
201	17	F	11	3.0	110	17	69	86	39	17	11
						31	57	88	36	26	5
						15	87	102	41	7	17
202	16	F	11	3.0	107	38	49	87	44	32	6
						30	79	109	51	27	12
						48	95	143	45	17	14
203	16	F	11	4.0	121	26	61	87	47	43	2
						47	75	122	52	42	5
						45	83	128	54	46	4
204	15	F	10	3.0	101	35	54	89	38	28	5
						32	82	114	44	28	8
						46	76	122	50	40	5
205	16	F	10	3.0	108	48	41	89	39	37	1
						53	71	124	44	44	0
						41	75	116	47	37	5
206	16	F	10	4.0	109	0	89	89	46	2	22
						47	93	140	52	42	5
						53	106	159	60	46	7
207	16	F	11	3.0	116	39	51	90	33	25	4
						32	64	96	38	24	7
						22	75	97	42	18	12
208	18	F	12	2.0	110	42	49	91	36	32	2
						25	72	97	42	22	10
						4	69	73	41	9	16

Student Code Number	Age	Sex	Year in School	Prior Grade-Point Average in Typewriting	Intelligence Quotient	Test Scores: Timed Writing Score	Test Scores: Production Score	Test Scores: Total Score	Timed Writings: Gross Words	Timed Writings: Net Words	Timed Writings: Errors
209	16	F	11	2.0	106	52	39	91	52	42	5
						10	57	67	35	11	12
						47	72	119	52	40	6
210	15	F	10	3.5	114	56	36	92	58	52	2
						52	75	127	55	47	4
						52	97	149	63	51	6
211	15	F	11	3.0	116	45	49	94	44	38	3
						46	78	124	56	42	7
						48	110	158	60	44	8
212	15	F	10	4.0	124	24	71	95	55	21	17
						36	98	134	60	36	12
						58	128	186	61	57	2
213	17	F	11	3.5	102	42	56	98	43	35	4
						45	72	117	43	37	3
						50	83	133	48	42	3
214	15	F	10	4.0	119	45	55	100	46	38	4
						44	77	121	52	40	6
						22	86	108	57	21	18
215	16	F	11	2.5	117	35	69	104	48	30	9
						47	65	112	49	41	4
						33	79	112	51	33	9
216	16	F	10	2.0	94	44	63	107	44	36	4
						34	79	113	51	31	10
						29	79	108	39	7	16

Student Code Number	Age	Sex	Year in School	Prior Grade-Point Average in Typewriting	Intelligence Quotient	Test Scores: Timed Writing Score	Test Scores: Production Score	Test Scores: Total Score	Timed Writings: Gross Words	Timed Writings: Net Words	Timed Writings: Errors
217	16	F	11	4.0	112	54	58	112	49	47	1
						57	39	96	55	51	2
						35	85	120	57	41	8
218	17	F	12	4.0	61	53	60	113	58	50	4
						41	78	119	61	39	11
						39	96	135	55	35	10
219	15	F	10	4.0	122	48	65	113	56	44	6
						55	88	143	56	50	3
						35	98	133	53	31	11
220	15	F	10	2.5	104	46	70	116	52	46	6
						38	75	113	52	42	5
						35	99	134	53	31	11
221	15	F	10	4.0	90	48	70	118	54	44	5
						44	79	123	52	40	6
						55	98	153	57	51	3

APPENDIX D

GUIDE FOR COLLECTING DATA RELATIVE TO SECOND-YEAR TYPEWRITING INSTRUCTION

GUIDE FOR COLLECTING DATA RELATIVE TO SECOND-YEAR TYPEWRITING INSTRUCTION

ENROLLMENT:

Boys_____

Girls_____

Total_____

Number of Teachers:

Business_____

Total_____

Number of Typewriters:

	AGE			
	1-2 yr.	3-5 yr.	5-10 yr.	Over
Royal				
Underwood				
Remington				
L. C. Smith				
Electric				
Others				

Duplicating Machines:

Stencil

Liquid

Gelatin

Other

Books:

Text

Supplementary

Workbooks

Other

Are they free?

Desks:

	27"	28"	29"	30"
Adjustable				
Fixed Height				

Chairs:

	16"	17"	18"
Height			
Number	_____	_____	_____
Adjustable			

Outline size and shape of room, windows, doors, lighting, etc.

Teacher Qualifications:

Sex:

Female:

	1 - 5	5 - 10	more
Years Experience	_____	_____	_____

Education: _____

Major: Undergraduate_____

Graduate_____

Subjects Taught

Male:

	1 - 5	5 - 10	more
Years Experience	_____	_____	_____

Education: _____

Major: Undergraduate_____

Graduate_____

Subjects Taught

Do you have homework?_____

Do you have opportunity to make up work missed?_____

Do you have laboratory periods?_____

Length of class period?_____

Copy holders?_____

Maintenance of machines_____

Departments in school_____

APPENDIX E

EXTRACTS FROM INTERNATIONAL TYPEWRITING CONTEST RULES

EXTRACTS FROM INTERNATIONAL TYPEWRITING CONTEST RULES

1. Line spacing.--Work must be double-spaced--"two notches." Every line wrongly spaced is penalized one error in addition to all other errors in the same line.

2. Paragraphing.--Paragraphs must be indented five spaces, and only five. An error in paragraphing is penalized in addition to all other errors in the same line.

3. Spaces and punctuation points.--A space and a punctuation point are treated as parts of the preceding word; but if they are incorrectly made, inserted, omitted, or in any manner changed from the printed copy, an error must be charged unless the preceding word has already been penalized.

4. Spacing after punctuation.--If punctuation is followed by a quotation mark, the spacing follows the rule laid down for the punctuation point.

5. Cut characters.--Any word written so close to the top, bottom, or side of a sheet, that a portion of any letter is cut off, must be penalized.

6. Words wrongly divided.--A word wrongly divided at the end of a line must be penalized. A word hyphenated at the end of a line in the printed copy may or may not need the hyphen if it occurs medially in the typist's work. For instance: "Devilfish" might be hyphenated at the end of a printed line, but if it appears medially, the typist's rendering is not wrong if it conforms to any standard dictionary.

7. Faulty shifting.--If only parts of the proper character appears, an error is charged. If the complete character is discernible, no error is charged.

8. Lightly struck letters.--If the outline of any character is discernible, there is no error.

9. Transposition.--Letters transposed in any word constitute an error. Words transposed are penalized one error for the transposition; additional penalties are imposed for errors in the transposed words.

10. Rewritten matter.--In rewritten matter every error must be penalized, whether in first or second writing, and one additional error must be charged for rewriting.

11. Crowding.--No word shall occupy fewer than its proper number of spaces.

12. Piling.--If any portion of the body of one character overlaps any portion of the body of another character, or extends into the space between words to the extent that it would overlap any portion of the body of a character were there a character in that space, an error must be charged.

13. Left-hand margin.--Characters beginning all lines, except the first lines of paragraphs, must be struck at the same point of the scale. If one is printed to the left or right of that point an error must be charged.

14. Erasing.--The use of an eraser is not allowed.

15. Errors in printed copy.--Errors found in the printed copy may be corrected or writen as they are in the copy, but in no case shall an error be charged against such words unless they are omitted.

16. Last word. An error made in the last word written, whether the word is completed or not, must be charged.

17. One error to a word. But one error shall be penalized in any one word.

18. General rule. Every word omitted, inserted, misspelled, or in any manner changed from the printed copy (save in the case of transposition and rewritten matter) must be penalized. Work in which words are x-ed will not be accepted.

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

APPENDIX F

ERROR ANALYSIS DATA FORMS

ERROR CHART*

Name of Pupil_____ Class_____ Data_____

Read across the page: "a" was struck for "b"___times; for "c"___times, etc.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	,	.	-	?	Total
A: was struck for																															
B: was struck for																															
C: was struck for																															
D: was struck for																															
E: was struck for																															
F: was struck for																															
G: was struck for																															
H: was struck for																															
I: was struck for																															
J: was struck for																															
K: was struck for																															
L: was struck for																															
M: was struck for																															
N: was struck for																															
O: was struck for																															
P: was struck for																															
Q: was struck for																															
R: was struck for																															
S: was struck for																															
T: was struck for																															
U: was struck for																															
V: was struck for																															
W: was struck for																															
X: was struck for																															
Y: was struck for																															
Z: was struck for																															
,: was struck for																															
.: was struck for																															
-: was struck for																															
?: was struck for																															

*Adapted from material of Educational Division, Smith-Corona, Inc. Total Errors_____

ANALYSIS OF ERRORS

PART II

NAME_____

Typographical Errors

Incorrectly divided word_____
Misspelled word_____
Incorrect paragraph indention_____
Raised capital partially cut off_____
Failure to space correctly between words or after punctuation marks_____
Strikeover_____
Poor correction of an error_____
Omission of a word_____
Repetition of material_____
Omission or improper insertion of punctuation_____
Other_____

Placement Errors

Failure to double space the material_____
Too high or too low on page_____
Incorrect top margin_____
Incorrect spacing between heading and first line of the copy_____
Incorrect right margin_____
Incorrect left margin_____
Other_____

Miscellaneous Errors

No carbon copy_____
Placement of carbon copy on back of original_____
Failure to make a correction indicated on the rough draft_____
Other_____

Total Errors_____

ANALYSIS OF ERRORS

PART III

NAME_____

Typographical Errors

Incorrectly divided word_____
Misspelled word_____
Incorrect paragraph indention_____
Raised capital partially cut off_____
Failure to space correctly between words or after punctuation marks_____
Strikeover_____
Poor correction of an error_____
Omission of a word_____
Repetition of material_____
Omission or improper insertion of punctuation_____
Other_____

Placement Errors

Failure to use narrow part of paper for horizontal writing line_____
Too high on page_____
Too low on page_____
Failure to double space body of problem_____
Failure to capitalize heading_____
Failure to triple space between heading and first line_____
Poor horizontal placement of any line_____
Other_____

Miscellaneous Errors_____

Total Errors_____

ANALYSIS OF ERRORS

PART IV--a

NAME_____

Typographical Errors

Incorrectly divided word_____
Misspelled word_____
Incorrect paragraph indention_____
Raised capital partially cut off_____
Failure to space correctly between words or after punctuation marks_____
Strikeover_____
Poor correction of an error_____
Omission of a word_____
Repetition of material_____
Omission or improper insertion of punctuation_____
Other_____

Miscellaneous Errors

Failure to underline column headings_____
No envelope or envelope addressed to writer_____
No carbon copy_____
Placement of carbon copy on back of original_____
Failure to indent tabulation five spaces from each margin_____
No date line_____
Company name in closing lines not capitalized_____
No enclosure notation_____

ANALYSIS OF ERRORS

PART IV--b

NAME_____

Placement Errors

Body of letter double spaced_____
Unsatisfactory right margin_____
Unsatisfactory left margin_____
Too high on page_____
Too low on page_____
Failure to space correctly between:
- Inside address and attention line_____
- Attention line and salutation_____
- Salutation and first line of body_____
- Last line of body and complimentary close_____
- Complimentary close and company name_____
- Company name and dictator's name_____
- Dictator's name and reference initials_____
- Reference initials and enclosure_____

Column headings and body of tabulation_____
Column headings and last line of preceding paragraph_____
Body of tabulation and first line of preceding paragraph_____
Numbers contained in "size" column_____
Poor placement of attention line_____
Poor placement of closing lines_____
Poor placement of date line_____
Poor placement of any one column_____
Failure to indent tabulation five spaces from each margin_____
Any number or word out of alignment with rest of column_____

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