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A STUDY OF THE RELATIONSHIP BETWEEN SCORES ON THE MINNESOTA
VOCATIONAL TEST FOR CLERICAL WORKERS AND THE 1946
NATIONAL CLERICAL ABILITY TEST IN STENOGRAPHY

BY

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CHAPTER I

THE PROBLEM

INTRODUCTION

One of the functions of education is the counseling of individuals in the selection of fields of work in which they will perform most effectively and in which they will be well adjusted. Many students registering for shorthand fail or drop out before the completion of the course for a number of reasons, one of which has been identified as the lack of the aptitudes and interests necessary to succeed in this type of work. According to a statement in the Tenth Yearbook of the Eastern Commercial Teachers' Association, it is apparent that "many of those who are studying shorthand for vocational reasons lack the aptitudes, interests, and abilities required for this kind of work."¹

In a discussion of the selective feature emphasized by the George-Deen Act for the distributive courses, Nichols stressed the need for further effort along the lines of guidance in all vocational courses:

We shouldn't wait for some law to awaken us to the necessity for more care in the selection of students for other vocational courses in our field. We should keep everlastingly at the task of converting those in

¹ Eastern Commercial Teachers' Association, Tenth Yearbook (1937), p. 16.

control of our secondary schools to the belief that permitting anyone, regardless of inaptitudes or scholastic deficiencies, to enroll for vocational stenographic, bookkeeping, clerical, or distributive courses is a disservice to all parties involved, including the student who fritters away valuable time on a hopeless task.²

In a report of a survey made in the Northside High School, Fort Wayne, Indiana, Eyster said:

Several significant facts were revealed . . . many pupils were electing shorthand who lacked the capacity, aptitude, and interest to profit to the fullest extent from instruction in the subject; . . . average class achievement was low compared to acceptable standards of occupational proficiency; and . . . class and individual progress was slow due to an evident lack of interest, capacity, aptitude, and morale of many of the pupils.³

Bell found that failures among students of first semester shorthand in a large city school system varied from 30 to 35 per cent. He asked this question: "As a developing individual, should not the student be saved from that complex which accompanies any effort that results in failure instead of in success?"⁴

² F. G. Nichols, "Criticism, Comment and Challenge-- Selective Enrollments," The Journal of Business Education, Vol. 15 (September, 1939), p. 9.

³ Elvin S. Eyster, "Prognosis of Scholastic Success in Shorthand," The National Business Education Quarterly, Vol. 7 (December, 1938), p. 31.

⁴ I. P. Bell, "Why Not Reduce Our Shorthand Failures?" The National Business Education Quarterly, Vol. 7 (December, 1938), p. 40.

Formulated principles of business education reported in the Eighth Yearbook of the National Business Teachers Association summarize points of view of leaders in the field of business education that the school is responsible for guiding the student into the proper vocation:

Those who do not possess interests, aptitudes, and abilities necessary for success in the callings for which training is given should be discouraged from taking those courses.⁵

Every school, public or private . . . should see to it that through the use of all available means every student who enrolls for occupational business courses shall be potentially trainable and placeable in the fields for which training is being given.⁶

Aptitude and fitness for the occupation may be revealed by certain tests and by try-out courses.⁷

The financial expense to the public of training an individual who is not placeable in certain vocations, in addition to the frustration of the individual himself, constitutes an economic loss to society. Each time an individual fails to succeed in a job or, for lack of interest and ability, does not produce, society as a whole pays. Training and retraining are costly, not only to the employee and to the public but also to the employer in labor turnover and loss of efficiency in his business. Experimentation

⁵ National Business Teachers Association, "Principles of Business Education," Eighth Yearbook, (1942), p. 115.

⁶ Ibid., p. 117.

⁷ Ibid., p. 118.

with clerical aptitude tests is being carried on by employers, employment counselors, and educators in an endeavor to determine the predictive value of these tests.

Various studies in shorthand prognosis are reviewed in the following chapter. The low coefficients obtained for the measured factors indicate very little relationship between the predictive measure and the criteria.

The importance of guidance necessitates continued research dealing with various aspects of aptitude testing. It is the purpose of this investigation to study the relationship between certain measures of clerical aptitude and stenographic achievement.

STATEMENT OF THE PROBLEM

The specific purpose of this study is to determine the extent of relationship existing between scores on the Minnesota Vocational Test for Clerical Workers and scores on the National Clerical Ability Test in Stenography for 1946. The following comparisons of scores on the various tests were made to discover the predictive value of the Minnesota test: (a) Minnesota Numbers and Stenographic, (b) Minnesota Names and Stenographic, (c) Minnesota Numbers and combined Fundamentals and General Information, (d) Minnesota Names and combined Fundamentals and General Information. The tests were administered to college senior girls majoring in

Business Education at the Woman's College of the University of North Carolina during the spring of 1946.

A detailed description of the tests and the characteristics of the group studied are presented in Chapter III.

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CHAPTER II

REVIEW OF RELATED STUDIES

A review of the literature in shorthand prognosis reveals that various factors have been investigated in an endeavor to find some guide to prognosis of shorthand achievement. The criteria of success in shorthand in most studies have been teachers' grades or supervisors' ratings of employee performance, both of which are subjective measures of success. The correlation coefficients obtained in most of the studies are low. Blackstone summarized the results of research in shorthand prognosis up to 1941 in the following statement:

All sorts of factors have been studied . . . Thus far no correlations of importance have been found, possibly because of faulty criteria and failure to combine results of various tests into multiple correlations. The highest single correlation has been found with spelling. English and Intelligence tests come next. The quest for a single test which will reveal stenographic capacity has been fruitless; the possibilities of test batteries remain largely to be explored.¹

The United States Employment Service, realizing the need of fitting persons to the proper jobs, has done extensive research with aptitude testing in various fields. In the Clerical field, test batteries were compiled and comparisons made of workers' scores on these batteries and

¹ E. G. Blackstone, "Commercial Education," Encyclopedia of Educational Research, 1941, p. 332.

their performance on the job. This research was based on the assumption that, because of the complexity and variety of duties in clerical occupations, tests must be "specifically designed to measure competency for the different varieties."² Studies of various classifications of clerical workers, with the exception of stenographers, were reported. The coefficients of correlation between the Employment Service battery and the various criteria ranged from .12 for bookkeeping machine operators to .64 for key driven calculator operators.³

Cruzan⁴ reported a study of the relationship between four standardized tests and teachers' grades for beginning and intermediate shorthand students at the School of Intensive Business Training, Oklahoma A. and M. College, to determine the predictive value of the tests. She used the Turse Shorthand Aptitude Test, the Minnesota Vocational Test for Clerical Workers, the Psychological Examination for College Freshmen, and the Cooperative English Test. Low coefficients were obtained for all the correlations of these tests with teachers' marks: Numbers test and Names

² W. H. Stead et al., Occupational Counseling Techniques (New York: American Book Company, 1940), p. 137.

³ Ibid., p. 154.

⁴ Fairah Cruzan, "Predicting Shorthand Ability by Prognostic Testing," Research Studies in Business Education, 4 (Oklahoma A. & M. College, Stillwater, Oklahoma, 1947), pp. 15-18.

test of the Minnesota Clerical Test, .114 and .137 respectively; Turse Shorthand Aptitude Test, .229; Psychological Examination, .271; and Cooperative English Test, .475. She concluded that none of the four tests has sufficient forecasting efficiency to warrant its use in shorthand prognosis.

Eriksen⁵ selected for study sixty-three workers with varying academic and Minnesota Clerical aptitude test scores. The sixty-three individuals were given a five months' training course in shorthand, typewriting, bookkeeping, business English, and office practice. Students were rated on their chances for success by their teachers, who did not know the Minnesota test scores. Those rated by their teachers as having an excellent or good chance for success had scores on the Minnesota test much higher than those rated as having a poor chance for success. Of the students who attained a speed in dictation of 80 words or more a minute, all but one had a percentile rank above 85 on the Minnesota test. All of the students except three who did not attain a dictation speed over 40 words a minute had a percentile rank below

⁵ E. G. Eriksen et al., "A Demonstration of Individualized Training Methods for Modern Office Workers," Bull. of Empl. Stab. Res. Inst., Vol. 3, No. 2, University of Minnesota, 1934. Reported by Dorothy M. Andrew and Donald G. Paterson, Minnesota Vocational Test for Clerical Workers (Manual of Directions. New York: The Psychological Corporation, 1946), p. 3.

75 on the Minnesota test. Eriksen concluded that the Minnesota test did have predictive value in shorthand.

Osborne⁶ made a study of shorthand prognosis, using a battery of tests which included the Otis Self-Administering Tests of Mental Ability, the Iowa Silent Reading Tests, the I. E. R. General Clerical Test C-1, the Revised Minnesota Paper Form Board Test, and the Gates Visual Perception Tests. For the criterion of success in shorthand, she used the Shorthand Learning Test, Semester I, constructed and partially standardized by Carmichael⁷ as a part of his doctor's research. Coefficients were obtained for correlation of the Shorthand Learning Test with each of the other measures: Chronological age, $-.18$; Otis test, $.376$; Iowa Silent Reading Test, $.357$; I. E. R. General Clerical Test, $.375$; Minnesota Paper Form Board Test, $.08$; and Gates Visual Perception Tests, $.09$. Measures which yield such low coefficients of correlation, she concluded, are not valuable in the prediction of shorthand success. She then combined some of the tests and secured a multiple correlation

⁶ Agnes Elizabeth Osborne, The Relationship Between Certain Psychological Tests and Shorthand Achievement (Contributions to Education, No. 873. New York: Teachers College, Columbia University, 1943).

⁷ V. H. Carmichael, "Preparation and Partial Standardization of a Testing Program in Shorthand." (Doctor's Thesis, University of Pittsburgh, 1937).

coefficient of .435, which she also concluded is too low to be valuable in the prediction of shorthand success.

Limp⁸ administered a battery of tests consisting of forty parts to 118 first-year students after one week of instruction in shorthand and typewriting to determine which tests would be most valuable in predicting the aptitudes and abilities of high school freshmen to learn shorthand. Most of the tests were selected from the Terman Group Test of Mental Ability, the Hoke Prognostic Test of Stenographic Ability, and the Downey Will-Temperament Test. The criterion of success in shorthand was obtained by combining the average of the rankings given students by the shorthand teachers at the end of the third and the fifth months, the average of grades on weekly typewriting speed tests, and the grade in shorthand for the semester. From the forty tests given, the ten which yielded the highest positive or the highest negative coefficients of correlation with the criterion were selected for a test battery for additional study. Four of the ten tests were eliminated because they were found to be comparable. The remaining six tests were utilized in determining a predicted score in terms of grades by a process of weighting. The best weight to attach to each test score was determined

⁸ Charles E. Limp, "A Work in Commercial Prognosis," Journal of Educational Research, Vol. 16, No. 1 (June, 1927), pp. 48-56.

by a regression equation. A coefficient of .61 was found for correlation of the predicted scores and the criterion scores. Limp concluded "A student with a predicted grade of 70 or below is liable to make a low grade or fail in the course while a student with a predicted grade of 90 or above will probably pass with a high grade."⁹

Rogers,¹⁰ in 1917, administered ten psychological tests to forty-five students of typewriting and shorthand in the Extension Department of Columbia University. The criteria of success in stenography included midyear grades in shorthand, examination grades in English, and objective scores on monthly typewriting exercises. Correlations of the separate psychological tests with stenographic marks yielded coefficients ranging from .07 to .46. Correlations of combined psychological test scores with stenographic marks yielded coefficients ranging from .40 to .63. Rogers concluded that the results of this study give a "far more reliable criterion for vocational guidance in the field of stenography than has ever been attained by any other method."¹¹

⁹ Ibid., p. 55.

¹⁰ H. W. Rogers, "Psychological Tests for Stenographers and Typists," The Journal of Applied Psychology, Vol. 1 (September, 1917), pp. 268-274.

¹¹ Ibid., p. 274.

Eyster¹² conducted a survey of shorthand work in Northside High School, Fort Wayne, Indiana, to determine whether shorthand success could be predicted. This study covered a five-year period beginning 1927-1928. Five factors were considered in the study. Eyster stated that attempts had been made "to reduce the five factors to a composite measure"¹³ but that such attempts had been unsuccessful. The five factors considered were:

1. Mental rating
2. Average English grade during the time the pupil had been in high school
3. Average of all grades, excluding English, during the time the pupil had been in high school
4. Score on the Hoke Prognostic Test of Stenographic Ability
5. Subjective personal trait ratings given by teachers of business for each semester the pupil was in high school.

As a result of an examination of these five factors, pupils were divided into three groups: group assured of success, group with 50-50 chance, and doubtful group. These groupings were compared with failures as reported by teachers' grades. (The teachers and pupils did not know the prognosis was being made.) Of the first group, 2.4 per cent failed; of the second group, 49.2 per cent failed; and of the third group, 100 per cent failed. Eyster concluded that the

¹² E. S. Eyster, "Prognosis of Scholastic Success in Shorthand," National Business Education Quarterly, Vol. 7 (December, 1938), pp. 31-40.

¹³ Ibid., p. 33.

results of the experiment were adequate for guidance purposes, and the method of selection was inaugurated at the school.

Ohmann,¹⁴ after making a subjective analysis of various abilities needed in stenographic work, developed tests to measure: motility, language, following directions, memory span, substitution, vocabulary, general intelligence, spelling, handwriting, and rating of character traits. A battery of tests was constructed and given to a group of stenography students. Students' scores on the test battery were correlated with their scores on a test in shorthand which consisted of the dictation and transcription of a business letter. Coefficients of the separate correlations were low (0 to .36), but a multiple correlation coefficient of .62 was obtained when the combined scores of the five best tests (those yielding the highest coefficients) were used. Ohmann concluded that a correlation yielding a coefficient of .62 does have some value if groups are considered.

A study of the relationship between the Hoke Prognostic Tests of Stenographic Ability and the Rollinson Diagnostic

¹⁴ O. A. Ohmann, "The Possibility of Prognosis in Stenography," Research Studies in Commercial Education, No. 1, (University of Iowa, 1926). Summarized by E. G. Blackstone in "Commercial Education Research Abstracts," The Business Education World, Vol. 14 (April, 1934), p. 507.

Shorthand tests was conducted by Blanchard.¹⁵ Thirty-seven high schools in eighteen states participated in the study, reporting test scores secured from 1,279 shorthand students. A coefficient of .23 was reported for the correlation of the Rollinson Test with the Hoke Test. As only a partial report was given, the results cannot be accepted as final.

The Hoke Prognostic Test of Stenographic Ability was also studied by Jessup,¹⁶ with thirty-nine students who had studied shorthand one and one-half years. The criterion of shorthand achievement was the Hoke Achievement Test. A check was made by recording the current and previous grades in shorthand and noting the students who passed the 60 and the 80 word Gregg transcription tests. Correlation coefficients between the total scores on the Hoke Prognostic test and the Hoke Achievement test ranged from .01 to .426. Jessup concluded that the total scores do not forecast ability in shorthand. Four parts of the prognostic test yielded correlation coefficients ranging from .34 to .358. These parts do have

¹⁵ C. I. Blanchard, "Results of Hoke-Rollinson Research Study," American Shorthand Teacher, Vol. 9 (October, 1928), pp. 37-39, 44.

¹⁶ Eva M. Jessup, "The Application of Prognostic and Achievement Tests to Shorthand," Journal of Commercial Education, Vol. 57 (June, 1928), pp. 173-174.

some value, in her opinion, and the parts of the test dealing with motor reaction, memory, spelling, and symbols throw the entire test out of balance.

Wood¹⁷ gave a battery of tests to two groups of students--50 at the beginning of the fall semester and 100 at the beginning of the spring semester--to determine the reliability of predictive tests for shorthand success. The test battery was made up of the Hoke Prognostic Test, the Terman Mental Ability Test, the Downey Will-Temperament Test, and the Monroe Reading Comprehension Test. An achievement test in shorthand consisting of 800 words was correlated with the predictive tests. Teachers' marks also were correlated with the Hoke and Terman Tests. The Downey Will-Temperament test showed a negative correlation with criteria. Coefficients for the correlation of the other tests with criteria ranged from -.015 for substitution of symbols to .463 for the Hoke with advanced shorthand and .364 for the Hoke with elementary shorthand.

The relationship of the Terman Group Test of Mental Ability, Form A, and the Stanford Revision of the Binet-Simon Vocabulary Test and shorthand and typewriting was

¹⁷ Ethel H. Wood, "An Experiment with Predictive Tests in Stenography," The Journal of Commercial Education, Vol. 57 (December, 1928), and Vol. 58 (January, 1929). Summarized by E. G. Blackstone in "Commercial Education Research Abstracts," The Business Education World, Vol. 14 (April, 1934), p. 508.

studied by Cooley.¹⁸ Class grades in shorthand and typewriting were used for the measure of achievement. Blackstone's tests were used to determine the grades in typewriting. The correlations yielded the following coefficients:

Shorthand scores and I. Q.	.22
Shorthand scores and vocabulary scores	.32
Typewriting and I. Q.	.08
Typewriting and vocabulary scores	.19

Worley¹⁹ made a study of 536 graduates of Langley High School in Pittsburgh over a seven-year period prior to 1931, to determine the relative value of intelligence and school marks in various subjects for predicting shorthand success, also determined by teachers' marks on this subject. An average of grades was used. The following coefficients were found for correlation of shorthand with these measures:

I. Q.	.398
Senior High School English	.528
Junior High School English	.707
Science	.418
Mathematics	.408
Typewriting	.526
Language	.707

¹⁸ Mazie R. Cooley, "Relation of the I. Q. to Success in Learning Shorthand and Typewriting," (Master's Thesis, University of Pittsburgh, 1928). Summarized by E. G. Blackstone in "Commercial Education Research Abstracts," Business Education World, Vol. 14 (April, 1934), p. 508.

¹⁹ Raymond J. Worley, "Relative Value of the I. Q. and the Marks for Predicting Success in Shorthand," (Master's Thesis, College of Education, Harvard University, 1931). Summarized by E. G. Blackstone in "Commercial Education Research Abstracts," Business Education World, Vol. 14 (April, 1934), p. 508.

Worley concluded that the I. Q. has very little value in predicting shorthand success.

In the studies reviewed, only five of the investigators felt that the results of their studies justify selection on the basis of the predictive measures they studied. Limp believed his "predicted score" method was valuable. Rogers concluded that the results of his study give a "far more reliable criterion for vocational guidance in the field of stenography than has ever been attained by any other method."²⁰ Eyster's five factors, in his opinion, do pick successful shorthand students. Parts of the Hoke Prognostic Test for Stenographic Ability were found by Jessup to have some predictive value. Eriksen concluded that the Minnesota Clerical Test has predictive value in shorthand.

Four of the five investigators who considered the results of their studies valuable for prediction of shorthand success, measured shorthand success in terms of teachers' grades or ratings. Jessup used the Hoke Achievement Test, which is also a measure of school achievement in shorthand. In this study it is assumed that in predicting success in stenography, some measure of success on the job would be a more valid criterion than school success in terms of teachers' grades. The test used as a criterion of success in stenography

²⁰ Rogers, op. cit., p. 274. Reported in 1917.

for this study purports to measure employability at the beginning level. This instrument is described in the following chapter.

THE MISSISSIPPI VOCATIONAL TEST FOR CLERICAL EMPLOYMENT

The Mississippi Vocational Test for Clerical Workers, hereafter referred to as the Mississippi Test, was selected as the predictive measure for this study, because of its wide use by business firms and employment agencies in experiments with employment testing. The following references to its use are illustrative of the extent which the test has been utilized.

The National Industrial Conference Board, in 1941, reported the extensive use of employment tests.

There is no doubt whatever that the use of employment tests with its long history and value as an aid to selection, has not only become widespread but that many types of industry are using it.

The Mississippi Test is one of the many tests used by business firms in the clerical field. It is reported as being of

¹ National Industrial Conference Board, Inc., "Experiments With Employment Tests," Chapter 13, Personnel Policies, Vol. 12 (Conference Board Reports, New York, 1941), p. 11.

² Mary Brown Allen, "Use of Clerical Tests in Hiring Clerical Employees," *Modern Business Education*, Vol. 12 (New York, 1941), p. 11.

CHAPTER III

MATERIALS USED AND GROUP STUDIED

THE MINNESOTA VOCATIONAL TEST FOR CLERICAL WORKERS

The Minnesota Vocational Test for Clerical Workers, long form, was selected as the predictive measure for this study, because of its wide use by business firms and employment counselors in experiments with employment testing. The following references to its use are indicative of the extent to which the test has been utilized.

The National Industrial Conference Board in 1941 reported its extensive use by employment departments:

There is no other clerical test that has received as much experimental attention as this. Repeated tests with it have shown its value as an aid in selecting not only office workers but many types of factory workers.¹

Aull,² after making an examination of a number of studies covering educational and business research, concluded that the Minnesota test is one of the most widely used aptitude tests in the clerical field. It is reported as part of

¹ National Industrial Conference Board, Inc., "Experience With Employment Tests," Studies in Personnel Policy, No. 32 (Conference Board Reports, New York, 1941), p. 23.

² Mary Bowen Aull, "Use of Clerical Tests in Hiring Clerical Employees," Modern Business Education, Vol. 12 (November, 1946), p. 11.

the clerical test battery compiled by the United States Employment Service for use in its counseling service.³

Cruzan⁴ reported that the Minnesota Clerical test was one of a battery in use at the School of Intensive Business Training, Oklahoma A. and M. College, Stillwater, Oklahoma, in 1942. Ghiselli⁵ compared the Minnesota Clerical test with the General Clerical Battery of the United States Employment Service. After an analysis of the test scores of 562 clerical workers he concluded that only a slight increase in efficiency could be obtained through the combination of other tests with the Minnesota Clerical test.

The Minnesota Vocational Test for Clerical Workers consists of two parts, a number checking test and a name checking test (hereafter referred to as the Numbers test and the Names test). In each of the parts there are two hundred pairs of items, one hundred of which are the same and one hundred of which are different. The items of the Numbers test range from three-place through twelve-place

³ W. H. Stead et al., Occupational Counseling Techniques (New York: American Book Company, 1940), pp. 137-154.

⁴ Fairah Cruzan, "Predicting Shorthand Ability by Prognostic Testing," Research Studies in Business Education, No. 4 (Stillwater: Oklahoma A. and M. College, 1947), pp. 15-18.

⁵ E. E. Ghiselli, "A Comparison of the Minnesota Vocational Test for Clerical Workers with the General Clerical Battery of the United States Employment Service," Journal of Applied Psychology, Vol. 26 (February, 1942), pp. 75-80.

numbers. If the pairs of numbers are identical, the respondent puts a check mark on the blank line between them; if they are different, he omits the check mark. The time limit for this test is eight minutes. The items of the Names test range from seven through sixteen letters. The same checking procedure is used for the Names test as for the Numbers test, with a time limit of seven minutes.

A scoring formula of rights minus wrongs is recommended by the authors of the test to correct for guessing, carelessness, or inaccuracy. This recommendation was followed in the present investigation, and the authors' norms established on the scores of 181 employed women stenographers and typists were used for comparisons.⁶

The reliability of the test is reported to be "sufficiently high to warrant its application in individual diagnosis":

When odd-even items or comparable forms are compared, the reliability is about .90. Test-retest reliability is .85 when the second testing is about ten weeks later.⁷

The validity of the test has been studied by various methods. The results are considered by the test authors⁸ to

⁶ Dorothy M. Andrew and Donald G. Paterson, Minnesota Vocational Test for Clerical Workers (Manual of Directions. New York: The Psychological Corporation, 1946), p. 4.

⁷ Ibid., p. 2.

⁸ Ibid.

be sufficiently high to establish the validity of the test. The results of the studies are reported in Table I.

Investigators report that an individual's score on an aptitude test is not conditioned by training and experience. Bingham states in Aptitudes and Aptitude Testing that "A person's performance is but little affected by his previous training and experience; neither is it closely related to his academic intelligence."⁹ Andrew and Paterson found the relationship between scores on the Minnesota test and measures of experience and training to be negligible:

The relationship between Clerical Test scores and years of clerical experience for about one hundred clerical employees is negligible, .08; a low but positive relationship, .30, was found between Clerical Test scores and years of clerical experience for 155 employed and unemployed women clerical workers between the ages of seventeen and twenty-nine. Those with many years of experience do not seem to have any marked advantage in taking the Clerical Test.

A slight negative correlation, -.13, was obtained between Clerical Test scores and amount of commercial training for a group of 65 employed clerical workers. Scores on the Clerical Test do not seem to be affected by commercial training. When two groups were tested before and after commercial training, there was no gain in the second testing, as compared with the first testing, beyond the normal practice effect obtained in control groups. The normal practice effect in repeating the test after time intervals from three to six months varies between 7 and 12 per cent. Thus the Minnesota Clerical Test fulfills the requirements of an aptitude test in that training and experience do not seem to exert any large or specific effect on test scores.¹⁰

⁹ W. Van Dyke Bingham, Aptitudes and Aptitude Testing (New York: Harper and Brothers, 1937), p. 156.

¹⁰ Andrew and Paterson, op. cit., p. 3.

TABLE I*

COEFFICIENTS OF CORRELATION BETWEEN RATINGS AND MINNESOTA CLERICAL TEST SCORES

Ratings	Group Tested	Product Moment Correlation	Contin-gency Coeffi-cient	Num-ber of Cases
Personal history, general clerical	Employed clerical	.75 ± .03	.73 ± .07	138
Personal history, filing	"	.60 ± .04	.66 ± .06	138
Supervisors', general clerical	Company A, clerical		.28 ± .13	97
Supervisors', filing	" "		.37 ± .20	34
Supervisors', general clerical	Company B, clerical		.37 ± .25	22
Supervisors', filing	" "		.42 ± .24	22
Combined, general clerical	Company A, clerical		.54 ± .10	97
Combined, general clerical	Companies B, C, D, clerical		.61 ± .13	41
Combined, general clerical	File clerks		.63 ± .10	62
Combined, filing	Company A, clerical		.56 ± .16	34
Combined, filing	Companies B, C, D, clerical		.64 ± .15	28
Combined, filing	File clerks		.60 ± .11	62
Commercial teachers'	H. S. commercial students	.58 ± .04		

*Manual of Directions for Minnesota Vocational Test for Clerical Workers

THE NATIONAL CLERICAL ABILITY TEST IN STENOGRAPHY

The National Clerical Ability Test in Stenography for 1946 was used in this study as the measure of achievement in stenography. This test was compiled and administered under the direction of a Joint Committee representing the National Council for Business Education and the National Office Management Association. An experimental testing program was carried on for four years prior to 1938, when the program was made permanent "to meet an insistent demand for a better means of evaluating the results of teaching the vocational business subjects in our public and private schools."¹¹

Since 1938 the dictation material of the stenographic test has been revised annually, with the form of the test standardized "to retain the qualities of reliability and validity"¹² which were established by an analysis of the test. This analysis was made through a study in which the tests were given to a group of students ready to go to work and to a group of employed workers. Since 1946 the tests, now known as United-Noma Business Entrance Tests, have been under the direction of the United Business Education Association and

¹¹ Joint Committee on Tests, National Clerical Ability Tests (Bulletin No. 1, 1939. Cambridge, Massachusetts), p. 1.

¹² Joint Committee on Tests, United-Noma Business Entrance Tests (Bulletin No. 5, 1947. Dedham, Massachusetts), p. 4.

the National Office Management Association. Percentile norms are established annually on the scores of hundreds of individuals who take the tests.

The following claims for the tests have been made by the Joint Committee of 1947:

The School is enabled to measure its product, . . .

The Employer, in interviewing applicants can be certain that one with a U-N BET certificate is qualified . . . the certificate is based not upon opinion, but upon the comparison of accomplishment of practical work by hundreds of young people in scores of schools.

The certificate, in many communities, will earn preference in employment.¹³

The tests are intended "to determine readiness for work at intermediate office levels; that is, as new, but skilled workers."¹⁴ They are constructed by a committee of school people and office people who "should do a better job than each individual teacher."¹⁵ The tests in so far as is possible, are "samplings of office work."¹⁶

The Joint Committee of 1947 reported that an analysis made "a few years ago"¹⁷ resulted in the findings that the

¹³ Joint Committee on Tests, op. cit. (Bulletin No. 5), p. 4.

¹⁴ Ibid., p. 2

¹⁵ Ibid.

¹⁶ Ibid.

¹⁷ Ibid., p. 4.

tests are "highly reliable and valid."¹⁸ The tests were administered to a "group of school students ready to go to work, and to a group of young folks who had been employed from 6 to 18 months."¹⁹ The employed workers completed the test, whereas the students tended to drop out near the middle. The students, however, did a higher grade of work on the material they completed. The conclusion was offered that school standards are higher than office standards, but that schools do not build up the sustained ability necessary to perform efficiently for long periods of time. The results of this analysis support the claim of the Joint Committee that the sustained dictation and transcription in the National Clerical Ability Test in Stenography follows the pattern of the office situation, since employed stenographers had little difficulty completing the test.

The National Industrial Conference Board has endorsed the National Clerical Ability Testing service:

The value of this program to the business world is being proved in a number of ways: Some companies have such confidence in the test that candidates for employment who present such certificates are given no further examination, others have agreed to place local students who are accredited on their approved waiting list, and others have succeeded in inducing private and public schools to give their last-year students an opportunity

¹⁸ Joint Committee on Tests, op. cit. (Bulletin No. 5), p. 4.

¹⁹ Personal Letter of April 28, 1947, from the Secretary of the Joint Committee.

to participate . . . The judgment of one accountant, A. W. T. Ogilvie, Chicago, represents an independent appraisal of its promise: "I have given this project a great deal of thought and discussed it with some of my friends who are well versed in office management. All are enthusiastic about it."²⁰

No information was obtainable concerning the number of firms who use the test for employment purposes or who employ workers on the basis of proficiency certificates. Wide interest in the tests is indicated in the following excerpt from a letter written by the Secretary of the Joint Committee, March 11, 1947:

I cannot give you an estimate of the number of firms who use the tests for employment purposes. I can only say that we have filled orders for tests from at least three hundred business firms within the last twelve months. Many firms indicate that they would like to use our tests for employment purposes if we could furnish short forms.

The interest and financial support of the National Office Management Association indicates that businessmen consider the program valuable. In July, 1947, Dr. J. Frank Dame was employed by that Association as Technical Director to head its educational division, which includes the testing program.

The National Clerical Ability Test in Stenography for 1946, used in this investigation, consisted of business letters and one interoffice bulletin. Dictation time was 35 minutes; transcription time, 90 minutes. The test

²⁰ National Industrial Conference Board, Inc., op. cit., p. 28.

material was to be dictated at not over 75 words a minute. Provision was made for redictation of words or phrases at the end of stated intervals, if requested by participants. Transcripts with uncorrectible errors were thrown out, and only mailable or correctible transcripts were credited toward the final score. As students were permitted to erase and correct errors, a penalty for uncorrected correctible errors was imposed, which resulted in a lower score.

Each person taking the Stenographic test was required to take a Fundamentals test and a General Information test, both of which consisted of multiple-choice questions. The Fundamentals test, with a time allotment of 35 minutes, included English, arithmetic, and social science questions. The General Information test, to be completed in 25 minutes, presented statements of a general nature, the answers to which would indicate an individual's alertness to everyday events reported by radio, newspapers and books, and moving pictures.

The test was administered in testing centers approved by the Joint Committee, and the test papers were sent to the Secretary of the Joint Committee for checking and scoring by correctors selected by the committee. The Joint Committee made this claim for the scoring of the tests:

Only trained correctors grade them. Two aims are necessary in correcting nation-wide tests, uniformity and efficiency. If more than one person grades transcripts, they must think alike. Also a trained

corrector will not let a test be graded too low in error. He double checks any test which receives a low grade. He knows by experience whether he adds up a column of credits accurately. Our correctors are loyal to BET and are justifiably proud of their records with us.²¹

For each of the tests a passing score was arbitrarily set by the Committee as the minimum score commensurate with employability.

THE PARTICIPATING GROUP

The tests described above were administered to all seniors in the Business Education Department of the Woman's College of the University of North Carolina. The students were girls who had chosen business training as their major field of study. They were preparing to become either office workers or teachers of business subjects. Since the girls were college seniors, their age and maturity approached that of employed workers. Their common interests were indicated by their having chosen business or business teaching as a vocation.

Only sixty-five of the seventy-eight girls who took the achievement test took the aptitude test. One of the sixty-five girls had an incomplete score on the achievement test and was therefore excluded from the study. The final group considered in this study was composed of the sixty-four girls who took both the aptitude and the achievement tests.

²¹ Joint Committee, op. cit. (Bulletin No. 5), p. 4.

CHAPTER IV

PROCEDURE AND FINDINGS

ADMINISTERING AND SCORING THE TESTS

The selected tests were administered to the senior girls in the Business Education Department of the Woman's College, University of North Carolina, in the spring of 1946. The approximate time for giving the test in Stenography was specified by the Joint Committee. Moreover, it was desirable, for the purpose of this investigation, to measure the vocational abilities of the students at a period in their formal training when they neared their initial-employment status. The Minnesota test was given at this time because of administrative convenience. As was pointed out in Chapter III, attainment on aptitude tests in general and the Minnesota Clerical Aptitude test in particular is not affected materially by training. It was assumed, therefore, that the predictive value of the aptitude test would not be influenced by its administration near the end of formal business training.

The Minnesota Vocational Test for Clerical Workers was administered by the investigator to the girls during their regular shorthand class periods, and the test papers were scored according to the formula, rights minus wrongs, recommended by the authors of the test.

The National Clerical Ability Tests in Stenography, Fundamentals, and General Information were given by the official administrator of the testing center, and the test papers were sent to the Joint Committee for checking, scoring, and issuing of certificates. Results were reported separately for the Stenographic, the Fundamentals, and the General Information tests, but in issuing certificates the Fundamentals and General Information test scores were combined.

The critical score set by the Joint Committee for the 1946 Stenographic test was 69, and the "Minimum Acceptable Mark"¹ for the Fundamentals and the General Information tests was a combined score of 25. Individuals scoring below the minimal score on either test were not granted certificates of employability.

The critical scores for the tests were established on the basis of the returns for all who took the 1946 test, hereafter referred to as the National Group. Employed stenographers, unemployed stenographers, and students were eligible to take the tests. The taking of the test was optional and usually only those students considered as having a reasonably good chance of passing were advised to take the tests. However, the test was administered to the total Woman's College group as one of the requirements for graduation.

¹ Joint Committee on Tests, National Clerical Ability Tests, Program of 1946, Table of Percentiles.

TREATMENT OF THE DATA

Comparative Scores on the Two Sets of Tests

The students' scores on each of the two parts of the Minnesota test were arranged in descending order for comparison with the scores on the Stenographic test and with the combined scores on the Fundamentals and the General Information tests. Table II gives the scores arranged in the order of attainment on the Numbers test, and Table III gives the corresponding data for the Names test. Stenographic scores below the critical score of 69 are starred in the tables.

It is apparent from inspection of the tables that the distribution of Stenographic scores does not correspond closely to that of the scores on either the Numbers test or the Names test. Statistical measures of the relationship were obtained by correlations of the scores on the various tests: (a) Numbers and Stenographic, (b) Names and Stenographic, (c) Numbers and Combined Fundamentals and General Information, and (d) Names and Combined Fundamentals and General Information. The resulting coefficients are reported in Table IV. Practically no relationship was found between the scores on the Numbers test and Combined Fundamentals and General Information tests ($r = .003$); slight positive relationship was revealed for the other comparisons (.119 to .237).

Because of the lack of relationship found when all

TABLE II

SCORES OF WOMAN'S COLLEGE STUDENTS ON THE MINNESOTA NUMBERS
TEST AND THE PARTS OF THE 1946 NATIONAL CLERICAL
ABILITY TEST IN STENOGRAPHY

Minne- sota Numbers	Steno- graphic	Combined Fund. & Gen. Info.	Minne- sota Numbers	Steno- graphic	Combined Fund. & Gen. Info.
164	78	36	122	108	40
161	125	44	121	39*	40
160	87	31	120	87	25
158	127	38	120	94	41
153	85	36	119	107	40
153	29*	37	117	85	34
151	104	38	117	101	43
151	129	33	116	72	38
150	117	35	115	86	33
149	99	40	114	134	33
148	101	27	113	108	46
146	80	29	113	34*	33
146	134	42	112	109	39
145	97	42	112	87	34
143	136	38	112	121	41
143	86	38	111	103	36
141	109	44	111	92	30
137	100	45	111	110	39
136	76	33	111	130	43
136	109	50	109	70	33
134	140	40	109	111	26
134	97	38	105	130	39
133	57*	37	105	80	30
132	78	46	104	87	34
130	58*	37	103	92	38
128	82	39	99	71	41
127	116	44	97	78	42
127	65*	35	95	7*	32
124	113	47	90	49*	35
124	81	29	89	78	39
123	122	38	81	69	42
123	116	45	73	81	47

*Cases falling below the Stenographic Critical Score

TABLE III

SCORES OF THE WOMAN'S COLLEGE STUDENTS ON THE MINNESOTA NAMES TEST AND THE PARTS OF THE 1946 NATIONAL CLERICAL ABILITY TEST IN STENOGRAPHY

Minne- sota Names	Steno- graphic	Combined Fund. & Gen. Info.	Minne- sota Names	Steno- graphic	Combined Fund. & Gen. Info.
186	104	38	136	57*	37
180	99	40	135	82	39
178	85	36	135	116	44
178	109	50	131	108	40
178	130	43	129	121	41
177	127	38	128	130	39
173	87	31	126	65*	35
168	109	44	126	87	34
168	78	36	125	7*	32
163	134	42	124	107	40
159	78	46	124	34*	33
157	76	33	121	108	46
155	140	40	115	85	34
154	125	44	113	81	47
153	80	29	112	109	39
152	136	38	112	129	33
151	86	38	111	78	39
151	103	36	110	58*	37
150	113	47	110	94	41
148	101	27	109	101	43
148	97	38	109	69	42
146	29*	37	108	92	30
146	97	42	107	92	38
145	117	35	106	134	33
144	122	38	104	110	39
143	86	33	102	39*	40
141	100	45	101	111	26
141	81	29	101	49*	35
140	87	25	96	87	34
139	116	45	95	80	30
139	72	38	92	71	41
139	70	33	91	78	42

*Cases falling below the Stenographic critical score

TABLE IV

COEFFICIENTS OF CORRELATION AND ALIENATION FOR RELATIONSHIP
 BETWEEN SCORES ON THE VARIOUS PARTS OF THE MINNESOTA
 AND THE NATIONAL CLERICAL ABILITY TESTS

Tests	r	P. E.	k
Names and Stenographic	.237	.118	.97
Numbers and Stenographic	.275	.116	.97
Names and Combined Fundamentals and General Information	.119	.123	.99
Numbers and Combined Fundamentals and General Information	.003	.125	.99

cases were included, the extreme cases were selected for study on the assumption that measurable differences in stenographic ability might be revealed by comparison of the cases scoring in the upper quarter with the cases scoring in the lower quarter on the separate parts of the Minnesota test. The data for the cases selected on the basis of the Numbers test scores are given in Table V. The corresponding data for the cases selected on the basis of the Names test scores are given in Table VI.

The data were analyzed for the statistical significance of the differences between the means. Table VII gives the ratios obtained by the application of the formula $\text{Diff.}/\sigma_{\text{diff}}$. Although the differences between the means of the two groups on the Minnesota Numbers test and the Minnesota Names test yielded highly significant ratios (16.3 and 19.3), the differences between the means of the corresponding Stenographic test scores yielded ratios of 1.74 and 2.45, which do not reach the 1 per cent level of significance.

Comparison with National Norms

Minnesota Clerical Test: Tables VIII and IX give the Woman's College students' scores on each part of the Minnesota

TABLE V

SCORES ON THE STENOGRAPHIC TEST OBTAINED BY STUDENTS SCORING
ABOVE THE 75 PERCENTILE AND BELOW THE 25 PERCENTILE
ON THE MINNESOTA NUMBERS TEST

Upper Fourth		Lower Fourth	
Numbers Test	Stenographic Test	Numbers Test	Stenographic Test
164	78	111	92
161	125	111	110
160	87	111	130
158	127	109	70
153	85	109	111
153	29	105	130
151	104	105	80
151	129	104	87
150	117	103	92
149	99	99	71
148	101	97	78
146	80	95	7
146	134	90	49
145	97	89	78
143	136	81	69
143	86	73	81

TABLE VI

SCORES ON THE STENOGRAPHIC TEST OBTAINED BY STUDENTS SCORING
 ABOVE THE 75 PERCENTILE AND BELOW THE 25 PERCENTILE
 ON THE MINNESOTA NAMES TEST

Upper Fourth		Lower Fourth	
Names Test	Stenographic Test	Names Test	Stenographic Test
186	104	111	78
180	99	110	58
178	85	110	94
178	109	109	101
178	130	109	69
177	127	108	92
173	87	107	92
168	109	106	134
168	78	104	110
163	134	102	39
159	78	101	111
157	76	101	49
155	140	96	87
154	125	95	80
153	80	92	71
152	136	91	78

TABLE VII

SUMMARY OF THE STATISTICS COMPARING THE UPPER AND THE LOWER
 QUARTERS OF THE SCORES ON THE MINNESOTA CLERICAL
 TEST AND THE STENOGRAPHIC TEST

	Numbers Test		Names Test	
	Numbers	Stenog.	Names	Stenog.
Mean, Upper Fourth	151.31	100.87	167.44	106.06
Mean, Lower Fourth	99.5	83.44	103.25	83.94
Diff. of Means	51.81	17.43	64.19	22.12
S. E. of Diff.	3.24	10.09	3.32	9.00
Ratio of Diff. to S. E.	16.3	1.74	19.3	2.45
Level of Signif. exceeded	1%	10%	1%	2%

TABLE VIII

PERCENTILE RANKS OF THE NORMS* AND WOMAN'S COLLEGE STUDENTS'
SCORES ON THE MINNESOTA NUMBERS TEST

Percentile	Norms	Woman's College Scores
100	196	164
90	180	152
80	169	146
70	161	136
60	154	128
50	147	122
40	139	117
30	136	112
20	122	109
10	110	98
0	70	73

*Results from 181 Employed Women Stenographers and Typists

TABLE IX

PERCENTILE RANKS OF THE NORMS* AND WOMAN'S COLLEGE STUDENTS' SCORES ON THE MINNESOTA NAMES TEST

Percentile	Norms	Woman's College Scores
100	200	186
90	189	175
80	178	155
70	170	149
60	164	143
50	158	137.5
40	152	126
30	146	114
20	137	109
10	118	101.5
0	75	91

*Results from 181 Employed Women Stenographers and Typists

Clerical test compared with the percentile norms for these tests established on the results obtained from 181 employed women stenographers and typists.

Although all the Woman's College students attained scores on the Minnesota Numbers test within the range of the norms, the top score of the Woman's College group fell at approximately the 75th percentile of the norms, and the median of the Woman's College group fell at the 20th percentile of the norms.

The Woman's College students' scores for the Names test had a tendency to run slightly higher in relation to the norms than their scores for the Numbers test. The top score of the Woman's College group fell slightly below the 90th percentile of the norms, although the median of the Woman's College group for this test also fell at the 20th percentile of the norms.

National Clerical Ability Test: Table X gives the comparison of the scores of the Woman's College students on the Stenographic test with the National norms for the test established on the results from the total group that took the 1946 Stenographic test. The Woman's College students' scores on the Stenographic test compare more favorably with the norms for the test than their scores on the Minnesota test compare with the norms for the Minnesota test. Approximately 85 per cent of the Woman's College students attained

TABLE X

PERCENTILE RANKS OF THE NATIONAL NORMS* AND WOMAN'S COLLEGE STUDENTS' SCORES ON THE 1946 STENOGRAPHIC TEST

Percentile	Norms	Woman's College Scores
100	230	140
90	141	129
80	131	116
70	119	108
60	110	101
50	103	93
40	90	86
30	80	80
20	65	76
10	47	57
0	5	7

*Results from the Total Group Taking the 1946 Stenographic Test

the critical score of 69 for the Stenographic test, whereas only slightly more than 75 per cent of the total National group attained this score. The range of the Woman's College students' scores was 7 to 140; that for the National group, 5 to 230. Approximately 10 per cent of the National group surpassed the top score of the Woman's College group. The median of the Woman's College group fell near the 45th percentile of the norms for the Stenographic test. Students' scores corresponded with norms at the 30th percentile and were considerably higher at the 20th and the 10th percentiles.

All Woman's College students attained combined scores on the Fundamentals test and the General Information test above the critical score of 25; hence none were disqualified because of low scores on these tests. Table XI gives the percentile comparisons of the combined scores of the Woman's College group on the tests with the norms for the tests.

Examination of Isolated Cases

Eight of the sixty-four Woman's College students attained Stenographic scores below the critical score of 69 set for the 1946 test. (See starred scores in Tables II and III, pages 33 and 34.) An examination of the position of these scores with reference to the distributions of scores on the parts of the Minnesota test shows that they were scattered throughout the distributions. In Table II, four of the eight

TABLE XI

PERCENTILE RANKS OF THE NATIONAL NORMS* AND WOMAN'S COLLEGE STUDENTS' COMBINED SCORES ON THE NATIONAL CLERICAL ABILITY FUNDAMENTALS TEST AND GENERAL INFORMATION TEST

Percentile	Norms	Woman's College Scores
100	55	50
90	47	45
80	43	42
70	41	40
60	38	39
50	36	38
40	34	37
30	31	35
20	29	33
10	25	30
0	11	25

*Results from Total Group Taking 1946 Fundamentals Test and General Information Test

who failed the Stenographic test were above the median and four below the median of the students' scores on the Numbers test. One of the eight had a score above the 75th percentile. In Table III, page 34, seven of the eight failing the Stenographic test attained scores on the Names test below the median for the group.

The Stenographic scores of the eight students and their corresponding Numbers test scores and Names test scores are given below:

Stenographic	Numbers	Names
65	127	126
58	130	110
57	133	136
49	90	101
39	121	102
34	113	124
29	153	146
7	95	125

A comparison of the Numbers test scores and the Names test scores of these eight students with the norms for the Numbers test and the norms for the Names test given in Tables VIII, page 40, and Table IX, page 41, shows that the students' scores with one exception fell below the 30th percentile of norms for both the Numbers test and the Names test. If the score representing the 30th percentile of norms for the Minnesota test were selected as a screening point, seven of the eight failures on the Stenographic test would be eliminated.

On the other hand, thirty-seven, or 66 per cent, of the 56 individuals who passed the Stenographic test obtained

Numbers test scores below the 30th percentile of norms, and thirty-five, or 63 per cent, of the 56 passing students obtained Names test scores below this percentile. If the 30th percentile were used for screening failures, more than half of the students who passed would also be eliminated.

Classical Workers and scores on the National Classical Society Test in Stenography for 1938. The tests were administered to sixty-four Woman's College seniors in the Business Administration Department in the spring of 1938.

All Woman's College students obtained scores on the stenography test within the range of scores established on the scores of 121 successfully employed stenographers in 1938. Their attainment on the stenographic test was comparable to that reported for the National Group. The percentage of the Woman's College group receiving stenographic certificates was larger than the percentage of the National Group receiving certificates. The median of the Woman's College group approximated the median of the National Group, falling at the 19th percentile of the National norms. Woman's College students' scores were significantly higher at the 20th and the 10th percentiles. The top score of the National Group, however, surpassed the top score of the Woman's College students. It is possible that the highest scores of the National Group were made by highly skilled employed stenographers, whose status is not comparable to that of college students without employment experience.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This study was undertaken to determine the relationship between scores on the Minnesota Vocational Test for Clerical Workers and scores on the National Clerical Ability Test in Stenography for 1946. The tests were administered to sixty-four Woman's College seniors in the Business Education Department in the spring of 1946.

All Woman's College students attained scores on the Minnesota test within the range of norms established on the scores of 181 successfully employed women stenographers and typists. Their attainment on the Stenographic test was comparable to that reported for the National Group. The percentage of the Woman's College group receiving proficiency certificates was larger than the percentage of the National Group receiving certificates. The median of the Woman's College group approximated the median of the National Group, falling at the 45th percentile of the National norms. Woman's College students' scores were considerably higher at the 20th and the 10th percentiles. Ten per cent of the National Group, however, surpassed the top score of the Woman's College students. It is possible that the highest scores of the National Group were made by highly skilled employed stenographers, whose status is not comparable to that of college students without employment experience.

Correlations of scores obtained on the parts of the Minnesota test (Numbers and Names) with the scores obtained on the parts of the National Clerical Ability Test (Stenographic and combined Fundamentals and General Information) showed little relationship, with coefficients ranging from .003 to .275.

The tests did not reveal significant differences in stenographic achievement for cases representing the extremes in scores attained on the Minnesota Numbers test and for cases representing extremes in scores attained on the Minnesota Names test. The ratios of the differences of the means to their standard errors did not reach the 1 per cent level of significance.

On the basis of the comparisons of individuals' scores on the two parts of the Minnesota test with the norms for the test, it is impossible to set a critical score for the Minnesota test which would select those likely to fail the Stenographic test, since any critical score which would exclude failures would also exclude approximately one-half of the students passing the Stenographic test.

CONCLUSIONS

Based upon the findings in this study, the conclusion is that the Minnesota Vocational Test for Clerical Workers is not a predictive instrument for stenographic ability as measured by the National Clerical Ability Test for 1946.

The findings of the study indicate that the two tests do not measure the same thing. There may be some question as to the validity of the criterion of success in stenography, which purports to measure employability at the beginning level. A follow-up of the eight students who failed the Stenographic test might show that they had become successfully employed. Since employment standards vary from firm to firm, an employee who did not attain the status of employability for one firm might be successful in another firm.

The fact that the eight students who failed the Stenographic test had scores on the Minnesota test which were above the lowest percentile of norms for the Minnesota test would indicate that they were potentially trainable for clerical work. The aptitude test may indicate potentiality for clerical work in general. In the case of stenography, however, there may be additional abilities measured by the Stenographic test which are not measured by the Minnesota test.

RECOMMENDATIONS

It is recommended, therefore, on the basis of the findings of this study, that the Minnesota Vocational Test for Clerical Workers not be used as a single measure for prediction in stenography. It is further recommended that additional research be carried on in an endeavor to determine a valid measure for prognosis of stenographic success, and that further study be done to construct a valid measure for determining stenographic ability.

BIBLIOGRAPHY

20000

Hitchcock, W. Van Dyke, Attitudes and Attitude Testing. New York: Harper and Brothers, 1917, pp. 7-19, 247-248, 267-268.

Horn, E. H., Educational Psychology for Industrial Engineers. New York: American Book Company, 1914.

Howe, H. C., Brubaker, A. S., and Warner, W. T., Psychology, Principles, and Methods in Business Management. Chicago, Ill.: South-Western Publishing Company, 1924.

National Industrial Conference Board, World War II: Psychological Aspects, 1947.

Hull, Clark L., The Influence and Measurement of Multiple Choice Tests. Chicago, Ill.: South-Western Publishing Company, 1947.

BIBLIOGRAPHY

Hull, Clark L., Multiple Testing. New York: World Book Company, 1947.

National Industrial Conference Board, Principles of Personnel Selection. New York: McGraw-Hill Book Company, 1941.

National Industrial Conference Board, Psychological Aspects of Personnel Selection. New Jersey: Somerset Press, Inc., 1947.

National Industrial Conference Board, Inc., Experiences With Employment Tests. Studies in Personnel Policy, No. 34. Conference Board Reports, New York, 1941.

Osborne, Agnes Wilbur, The Relationship Between Certain Psychological Tests and Efficient Achievement. Teachers College Contributions to Education, No. 573. New York: Teachers College, Columbia University, 1941.

Odell, Charles W., Statistical Methods in Education. New York: D. Appleton-Century Company, Inc., 1933.

Orsted, William H., et al., Occupational Counseling Techniques. New York: American Book Company, 1940, pp. 1-7, 137-174.

BIBLIOGRAPHY

BOOKS

- Bingham, W. Van Dyke, Aptitudes and Aptitude Testing. New York: Harper and Brothers, 1937, pp. 3-90, 142-165, 209-265.
- Broom, M. E., Educational Statistics for Beginning Students. New York: American Book Company, 1936.
- Dame, J. F., Brinkman, A. R., and Weaver, W. E., Prognosis, Guidance, and Placement in Business Education. Cincinnati: South-Western Publishing Company, 1944.
- Eastern Commercial Teachers' Association, Tenth Yearbook, Philadelphia, 1937.
- Endicott, Frank S., The Guidance and Counseling of Business Education Students, Fifth Annual Delta Pi Epsilon Lecture, Chicago, Illinois, December 27, 1946. Cincinnati: South-Western Publishing Company, 1947.
- Hull, Clark L., Aptitude Testing. New York: World Book Company, 1928.
- National Business Teachers Association, "Principles of Business Education," Eighth Yearbook, Ann Arbor, Michigan: the Ann Arbor Press, 1942.
- _____, "Effective Business Education," Ninth Year Book. Somerville, New Jersey: Somerset Press, Inc., 1943.
- National Industrial Conference Board, Inc., "Experience With Employment Tests," Studies in Personnel Policy, No. 32. Conference Board Reports, New York, 1941.
- Osborne, Agnes Elizabeth, The Relationship Between Certain Psychological Tests and Shorthand Achievement, Teachers College Contributions to Education, No. 873. New York: Teachers College, Columbia University, 1943.
- Odell, Charles W., Statistical Method in Education. New York: D. Appleton-Century Company, Inc., 1935.
- Stead, William H., et al., Occupational Counseling Techniques. New York: American Book Company, 1940, pp. 1-29, 73-112, 137-174.

PERIODICAL ARTICLES

- Andrew, Dorothy M., "An Analysis of the Minnesota Vocational Test for Clerical Workers," I and II, Journal of Applied Psychology, 21:18-47, February, 1937, and 21:139-171, April, 1937.
- _____, and Paterson, Donald G., Minnesota Vocational Test for Clerical Workers, Manual of Directions. New York: The Psychological Corporation, 1946.
- Aull, Mary Bowen, "Use of Clerical Tests in Hiring Clerical Employees," Modern Business Education, 13:7-15, November, 1946.
- Bell, I. P., "Why Not Reduce Our Shorthand Failures?" National Business Education Quarterly, 7:35-40, December, 1938.
- Bills, Marion, "Ability and Aptitude Tests for Clerical Workers," Journal of Business Education, 19:13-14, December, 1943.
- _____, "Methods for the Selection of Comptometer Operators and Stenographers," Journal of Applied Psychology, 5:275-283, September, 1921.
- Blackstone, E. G., "Prognosis in Business Education," Business Education World, 19:533-536, March, 1939.
- _____, "Commercial Education," Encyclopedia of Educational Research, 1941, p. 332.
- Blanchard, Clyde L., "Results of the Hoke-Rollinson Research Study," American Shorthand Teacher, 9:37-39, 44, October, 1928.
- Carmichael, V. H., "Preparation and Partial Standardization of a Testing Program in Shorthand." Doctor's Thesis, University of Pittsburgh, Pittsburgh, Pennsylvania, 1937.
- Cooley, Mazie R., "Relation of the I. Q. to Success in Learning Shorthand and Typewriting." Master's Thesis, University of Pittsburgh, 1928. Summarized by E. G. Blackstone in "Commercial Education Research Abstracts," Business Education World, 14:507-508, April, 1934.

- Crawford, John Edmund, Review of Educational Research, 14:5-46, February, 1944.
- Crouse, John C., "What Constitutes Research in Business Education?" National Business Education Quarterly, 9:9-12, May, 1941.
- Cruzan, Fairah, "Predicting Shorthand Ability by Prognostic Testing," Research Studies in Business Education, Vol. 44, No. 4. Bulletin of Oklahoma Agricultural and Mechanical College, Stillwater, Oklahoma, February, 1947.
- Davidson, Mildred L., "The Selection, Guidance, and Training of Graduate Secretarial Students," National Business Education Quarterly, 7:40-45, December, 1938.
- Drake, Charles A., "Aptitude Testing," Personnel Journal, 18:340-345, March, 1940.
- Eyster, Elvin S., "Prognosis of Scholastic Success in Shorthand," National Business Education Quarterly, 7:31-40, December, 1938.
- Forsgard, Fred G., "Indices to Mastery in Business Courses, Part I," Journal of Business Education, 16:17-18, February, 1941.
- Garrell, Henry E., "Forecasting Job Efficiency," Personnel Journal, 20:276-282, February, 1942.
- Ghiselli, E. E., "A Comparison of the Minnesota Vocational Test for Clerical Workers with the General Clerical Battery of the United States Employment Service," Journal of Applied Psychology, 26:75-80, February, 1942.
- Hahn, Milton, "The Selection of Pupils for Commercial Subjects" Business Education World, 20:489-491, February, 1940.
- Hardaway, Mathilde, "Theory Tests and Skill Tests," Business Education World, 25:138-140, November, 1944.
- _____, "Prognostic Tests for Skill Subjects," Business Education World, 25:371-373, March, 1945.
- _____, "Prognostic or Aptitude Tests for Skill Subjects," Business Education World, 25:427-428, April, 1945.
- _____, "Prognostic or Aptitude Tests for Skill Subjects," Business Education World, 25:489-490, May, 1945.

- Hittler, George M., "Our Experience With the National Clerical Ability Tests," Business Education World, 20:715-717, April, 1940.
- Jessup, Eva M., "The Application of Prognostic and Achievement Tests to Shorthand," Journal of Commercial Education, 57:173-174, June, 1928.
- Joint Committee on Tests, National Clerical Ability Tests, Bulletin No. 1, November, 1939. Cambridge, Massachusetts.
- _____, National Clerical Ability Tests, Directions for 1946 Edition. Dedham, Massachusetts.
- _____, United-Noma Business Entrance Tests, Bulletin No. 5, 1947. Dedham, Massachusetts.
- Lessenberry, D. D., "Research Is No Better Than the Method Used," National Business Education Quarterly, 11:5-6, 50, 57, May, 1943.
- Limp, Charles E., "A Work in Commercial Prognosis," Journal of Educational Research, 16:48-56, June, 1927.
- Monroe, Walter S., "Commercial Education," Encyclopedia of Educational Research, 1941, pp. 329, 332-333, 854-855.
- National Office Management Association, "Selecting the New Employee," Noma Forum, 21:3-14, October, 1946.
- Nichols, F. G., "Criticism, Comment & Challenge--Selective Enrollments," Journal of Business Education, 15:9, September, 1939.
- Ohmann, O. A., "The Possibility of Prognosis in Stenography," Research Studies in Commercial Education, No. 1. State University of Iowa, 1926. Summarized by E. G. Blackstone in "Commercial Education Research Abstracts," Business Education World, 14:507-508, April, 1934.
- Rogers, H. W., "Psychological Tests for Stenographers and Typists," Journal of Applied Psychology, 1:268-274, September, 1917.
- Rowe, Clyde E., "Significant Research in Shorthand," National Business Education Quarterly, 8:21-22, 48, May, 1940.
- Royer, J. Everett, and Landrum, Merle L., "Production Tests Measure Competency," Journal of Business Education, 19:15-16, April, 1944.

- Rowe, Clyde E., "Significant Research in Shorthand," National Business Education Quarterly, 8:21-22, May, 1940.
- Royer, J. Everett, and Landrum, Merle L., "Production Tests Measure Competency," Journal of Business Education, 19:15-16, April, 1944.
- Selby, P. O., "Are Predictive Tests Reliable?" Journal of Business Education, 17:13-15, October, 1941.
- Sherman, Marsdon A., "A Study of Prognosis in Shorthand," Business Education World, 22:696-698, April, 1942.
- Solomon, Richard S., "Do Your Tests Pick Good Workers?" Personnel Journal, 20:177-183, November, 1941.
- Swanson, Edwin A., "Prognosis in Business Education," National Business Education Quarterly, 11:11-14, 43, May, 1943.
- Tonne, Herbert A., "What Are Job Standards for Stenographic Service?" Journal of Business Education, 22:25-27, January, 1947.
- Tuckman, Jacob, "A Study of the Turse Shorthand Aptitude Test," Journal of Business Education, 19:17-18, November, 1943.
- Turse, P. L., "A Defense of Aptitude Tests," Journal of Business Education, 17:19-20, December, 1941.
- _____, "Problems in Shorthand Prognosis," Journal of Business Education, 14:17-18, 20, May, 1938.
- _____, "Let's Be Critical About Research," Business Education World, 22:397-399, January, 1942.
- Veon, Dorothy H., "Secretarial Aptitude Test," Journal of Business Education, 20:26, November, 1944.
- Wanous, S. J., "Tests Used and Standards Established for Employing Office Workers," National Business Education Quarterly, 9:17-20, 58-60, March, 1941.
- Wood, Ethel H., "An Experiment with Predictive Tests in Stenography," Journal of Commercial Education, 57, December, 1928, and 58, January, 1929. Summarized by E. G. Blackstone in "Commercial Education Research Abstracts," Business Education World, 14:507-508, April, 1934.

Worley, Raymond J., "Relative Value of the I. Q. and the Marks for Predicting Success in Shorthand," Master's Thesis, College of Education, Harvard University, 1931. Summarized by E. G. Blackstone in "Commercial Education Research Abstracts," Business Education World, 14:507-508, April, 1934.