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An Initial Investigation Of The Handwriting Ability And Spelling Competency Of College Freshmen

Jean Alice Serum
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AN INITIAL INVESTIGATION OF THE HANDWRITING ABILITY AND SPELLING COMPETENCY OF COLLEGE FRESHMEN

University of Nevada, Las Vegas ED.D. 1982

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University of Nevada,
Las Vegas

An Initial Investigation of the Handwriting Ability and Spelling Competency of College Freshmen

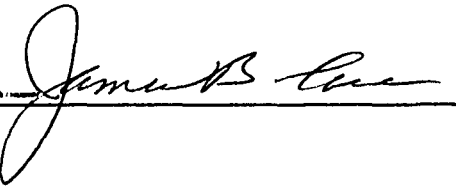
A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Education in Secondary, Postsecondary and Vocational Education

by

Jean A. Serum

April 1982

The dissertation of Jean A. Serum is approved:



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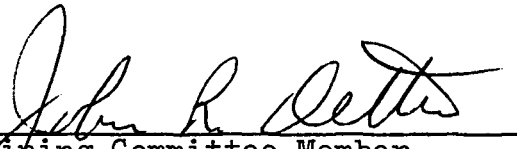

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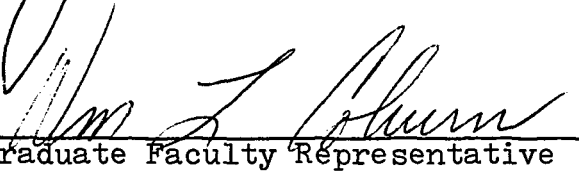

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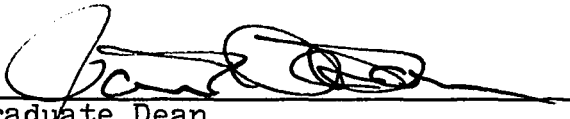

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Chapter 1

INTRODUCTION

Spelling and handwriting are among the most basic of the written language skills. At the same time, they often cause the greatest concern to parents and the public (Anderson, 1973; Burrows, Monson, & Stauffer, 1972).

Traditionally, the handwriting ability of students has been a topic of concern to educators. In 1970, Earl Wilson recalled a story of a young boy who brought home his report card with a teacher's notation to his parents: "Your son's handwriting is so bad we don't know if he can spell" (p. 16). According to Enstrom (1967), poor handwriting is the biggest "time-thief" in schools today. He believes handwriting has become a "national disgrace" (p. 35).

Illegible handwriting, however, has not only plagued the academic world, but also the business and social worlds (Enstrom, 1961; Orwig, 1955; Templin, 1960). Additionally, Dallmann (1976) reported that each year business loses large amounts of money because of errors and wasted time caused by illegible writing on sales slips, checks, and order forms. She further claimed that while some recipients of friendly letters have difficulty in determining the meaning their correspondents are attempting to express, other people refrain from writing because they know they are inefficient in that skill in terms of

efforts required and results achieved.

Inadequate spelling competencies have also been a topic of concern for parents and educators. Sandberg (1955) and Shaughnessy (1977) reported that poor spelling ability was one of the most persistent problems among college students. Spelling words correctly has been and still remains a challenge to all from the primary grades to adult maturity (Shane, Mulry, Reddin, & Gillespie, 1962). Other writers agree with this notion. Rubin (1975) found spelling errors detract from ideas presented, and the writer who makes many errors is looked upon as lacking in education. According to Kean and Personke (1976), "Misspelled words in a child's composition, a college student's paper, a report to a supervisor, a business letter, and the like seem to leap out of the page influencing the reader to lower his estimation of the writer" (p. 243). As Horn and Fowler concluded, "Even though misspellings are sometimes more of a distraction than a communication block, society is as yet not willing to accept a person's misspellings, creative as they might be" (p. 52).

Based on this evidence, spelling competency and handwriting ability are issues of importance to educators, parents, and the public. The emphasis given to spelling competency and handwriting ability, however, has shifted back and forth from "excessive attention" to

"incidental attention." Since the impact of Sputnik, the attention given to both handwriting and spelling has been increasing (Petty, 1964). Additionally, the "back-to-basics" movement has focused attention on the spelling and handwriting abilities of students.

Justification for the Study

Numerous articles have been written about handwriting and spelling. An ERIC search conducted August 4, 1981 revealed there were 2,273 articles dealing with spelling and 197 articles pertaining to handwriting skills. Only 34 articles could be identified, however, when handwriting skills and spelling were cross-referenced.

Of these 34 articles, only two publications described investigations concerning a relationship between handwriting and spelling. The first study, conducted by Otto and Rarick (1968), examined the effect of time of transition from manuscript to cursive writing upon subsequent performance in handwriting, spelling, and reading. The second study dealt with the effect of handwriting and related skills upon the spelling score of above-average and below-average readers in the fifth grade (Strickling, 1973). Although neither study actually examined the relationship between handwriting ability and spelling competency, the researchers provided a basis for such a study. Otto and Rarick noted that as children move through the elementary grades and develop skill in

handwriting, volume of letter production increases and precision of letter formation improves. Additionally, Strickling noted that a timed task scored for the number of legible letters written per minute could be used to measure handwriting speed and accuracy.

The remaining 32 articles were based on opinions, beliefs, and practices. All of these publications pertained to the elementary school grades; none of them dealt with college students.

In view of these findings, it appears there is a lack of research concerning whether a relationship between handwriting and spelling exists, particularly at the higher educational levels. As noted by Johnson (1956), "Many complex factors affect the learning of any skill; much of learning is achieved through many interrelated abilities" (p. 271). According to Petty (1964), the acquisition of skills in one area of proficiency will help strengthen the skills in another area of proficiency. For example, development of handwriting abilities should strengthen spelling competencies.

Thus, spelling and handwriting skills may be interrelated. Fernald, reporting in 1943 on the development of handwriting and spelling skills, suggested that as one progresses through the school grades, handwriting ability and spelling competency should improve. Re-

search regarding the relationship between these skills, however, has been neglected, especially at the secondary and postsecondary levels.

Purpose of the Study

The purpose of this study is to examine the cursive handwriting abilities and spelling competencies of male and female college freshmen to determine whether or not a relationship exists between these two characteristics. This study would, thus, fill a void in the literature regarding this topic.

Significance of the Study

The significance of this study is to be found in its potential for showing whether or not a relationship exists between handwriting and spelling. Should a relationship be shown to exist, teachers might adjust their methods of teaching handwriting and spelling. For example, handwriting and spelling instruction might be more beneficial and efficient if they were combined. As Petty (1964) states, "An experience affecting one (skill) cannot be isolated from the others" (p.843). The findings of this study could be used by the curriculum decision-makers to re-evaluate the structure of handwriting and spelling courses.

Statement of the Problem

What is the relationship between the handwriting abilities and spelling competencies of male and female

college freshmen?

Definition of Terms

The following definitions of terms were used in this study:

College freshmen--eighteen and nineteen year old students who were enrolled in college for the first time.

Spelling competency--absolute number of correct responses on the WRAT spelling subtest.

WRAT--Wide Range Achievement Test, Level II. Published by Jastak Associates, 1978.

Handwriting ability--absolute number of cursive letters written in one minute that are not confused with any other letter on the SMHA.

SMHA--the Serum Measurement of Handwriting Ability. This score is interval in nature and consists of the average number of cursive letters produced in one minute during the copying task.

Copying task--the following sentence was to be written twice in cursive: You can very quickly judge the excellence of a person's handwriting by analyzing the letter formation, spacing, slant, and alinement.

English 101--Composition and Rhetoric. A course intended for the training of the student in the principles of rhetoric and exposition.

Hypotheses

The following null hypotheses were formulated to answer the problem statement:

H_o:1 There is no relationship between the handwriting ability and spelling competency of college freshmen.

H_o:2 There is no relationship between the handwriting ability and spelling competency of male college freshmen.

H_o:3 There is no relationship between the handwriting ability and spelling competency of female college freshmen.

H_o:4 There is no significant difference at the .05 level in the mean handwriting ability scores between male college freshmen and female college freshmen as determined by the Serum Measurement of Handwriting Ability.

H_o:5 There is no significant difference at the .05 level in the mean spelling competency scores between male college freshmen and female college freshmen as measured by the spelling subtest of the Wide Range Achievement Test.

Assumptions

This study was based on the following assumptions:

1. Since the "natural" transition time from high school to college would place students in the eighteen-nineteen year bracket, most college freshmen would be

eighteen or nineteen years old.

2. At the college level, handwriting ability and spelling competency can be adequately measured.

3. A linear relationship exists between handwriting ability and spelling competency.

4. The handwriting ability and spelling competency of the subjects would be commensurate with their grade placement.

5. The subjects would be serious in their approach to the handwriting and spelling tasks.

Limitations

The study was limited to only those college freshmen who were eighteen or nineteen years old, and who were enrolled in English 101 at the University of Nevada, Las Vegas (UNLV). Only those students enrolled in college for the first time were included as subjects. Students who transferred to UNLV from other institutions and/or students who were repeating English 101 were excluded from the study.

Summary

Spelling and handwriting, the most basic of the written language skills, have caused a great deal of concern to parents, educators, and the public. Inadequate spelling and handwriting skills are evident in the academic, business, and social worlds.

Although numerous articles have been written about

handwriting and spelling, little research has been conducted on the relationship of these skills. Thus, an investigation regarding the relationship between handwriting and spelling abilities, especially at the higher educational levels, would provide useful information for curriculum decision-makers. This study, therefore, was designed to determine whether such a relationship exists among college freshmen.

Chapter 2

REVIEW OF LITERATURE

This study examined the relationship between cursive handwriting ability and spelling competency of male and female college freshmen. Both spelling and handwriting have been objects of research for several generations (Ferreira, 1978). Enstrom (1965) noted that since 1930 handwriting "has been on the skids" (p. 22). According to a report by Shane et al. in 1962, spelling achievement of school children has also declined since 1930.

Based on these facts, the researcher found it appropriate to trace the development of handwriting instruction and spelling instruction to gain insight into possible relationships between these areas. As noted by Wiersma, "Information is needed about the problem so that it can be put in the proper context and the research can proceed effectively" (1980, p. 45). Additionally, the literature review examined the relationship between handwriting speed and legibility as well as the relationship between handwriting and spelling. Thus, this chapter is divided into four sections: (1) development of handwriting instruction, (2) development of spelling instruction, (3) relationship between handwriting speed and legibility, and (4) relationship between handwriting and spelling.

Development of Handwriting Instruction

Traditionally, cursive handwriting was a skill passed from parent to child (Graham & Miller, 1980). Prior to the 1920's, as American children began their formal education, cursive handwriting was emphasized (Early, Nelson, Kleber, Treegoob, Huffman, & Cass, 1976).

According to Burns (1968), manuscript style was introduced in England in the early 1900's. This style gained acceptance in 1913 after Edward Johnston convinced teachers of its superiority to cursive. A few years later, Marjorie Wise traveled to the U.S. to offer a course on manuscript writing for teachers at Columbia University. Since then, manuscript has been widely accepted for beginning handwriting in American schools.

Generally speaking, manuscript is introduced in grades one and two, and instruction in cursive writing usually begins in grade three (Graham & Miller, 1980). Usually, four to six weeks are required for the transition (Burns, 1968). Most handwriting sessions are less than twenty minutes daily (Enstrom, 1967).

The attention and emphasis given to handwriting has not been constant. As Enstrom stated, "From near the beginning of this century up until the early forties, handwriting in many schools was better taught than had been generally the case before or has been the case since" (1970, p. 133). He believed this was partly due

to the fact that larger schools employed one or more full time "penmanship supervisors." These specialists were trained mostly by private companies that sold books and other handwriting supplies to schools.

Since 1930, handwriting skills have reportedly deteriorated (Enstrom, 1965; Freeman, 1954; Shane et al., 1962). Several writers have stated reasons for this deterioration. Enstrom (1965) identified five reasons for this decline:

1. In the 1920-30's, college instructors rebelled against arbitrary methods, many of which were not supported by research.
2. There was a general rebellion against the narrowness of teaching handwriting. As a rule, handwriting was isolated from the rest of the curriculum.
3. The Great Depression of 1929 tended to eliminate many "fads and frills." Thus, handwriting was deleted from many educational programs.
4. The "Progressive Education" movement of the 1930-40's provided less formality, great permissiveness, and heavy reliance upon incidental and integrated teaching approaches.
5. In the 1930-40's, colleges were not preparing teachers for handwriting. (p. 22)

There was agreement among writers that handwriting

skills have declined because handwriting practices have been based on habits, traditions, public opinions, and popular trends rather than research evidence (Graham & Madan, 1981; Green & Petty, 1975; Groff, 1960). Kean and Personke (1976) suggested that handwriting may be losing its value in school, business, and society since "being able to write is no longer the province of the educated few" (p. 238).

Some writers indicated that excellence in handwriting is no longer very important in the modern world of the typewriter (Dallmann, 1976; Smith, 1972). The typewriter has had an impact on written communication; however, it has not replaced handwriting (Deverell, 1974; Shane & Mulry, 1963; West & Freeman, 1950). This statement was further supported in 1960 when Templin surveyed 454 adults regarding their weekly writing activities, the types of instruments used and the amount of writing done. She found that the average adult wrote slightly less than nine pages of handwritten material a week. King, Emans, and Cianciolo (1973) concluded that despite automation, there is a growing realization that people use handwriting more today than in the past.

Unlike most other areas of instruction, handwriting instruction has seemed to remain relatively untouched and unchanged during the past two decades (Huitt, 1972). He predicts, however, that college teachers will place

renewed emphasis on the ways of teaching handwriting in preservice method classes since handwriting skills are too important to be left to chance. As Enstrom (1965) wrote, "The plight of the teacher who does not take time to teach handwriting is as sad as that of a woodcutter who is so busy chopping that he has no time to sharpen his ax" (p. 26). According to Burns (1968), handwriting is one of the few subjects taught in school that is used for a lifetime.

Horton (1973) suggested that perhaps handwriting is beginning to be recognized as an essential skill which can greatly facilitate general school learning. Handwriting, if taught well, not only strengthens expression, but also strongly supports practically all other school learnings (Enstrom, 1961).

In conclusion, the literature review of this section reveals that although handwriting has been a traditional element in the elementary school, it is probably the most poorly taught subject (Enstrom, 1966). The attention and emphasis given to handwriting has been inconsistent. The decline of handwriting skills may be the result of instructional programs based on belief rather than research.

Development of Spelling Instruction

Since at least the thirteenth century, there has been dissatisfaction with the ability of children and

adults to spell correctly (Hodges, 1964). The beginning of a real systematic attack upon the teaching of spelling as spelling was noted in 1783 with the publication of Noah Webster's famous "blue-backed" spelling book (McKee, 1939). At that time, spelling was emphasized to the extent that other subjects in the curriculum suffered (Dallmann, 1976).

During the nineteenth century, a large number of spelling textbooks appeared (McKee, 1939). He found that the early textbooks shared two characteristics. First, no attempt was made to list words that were important for children to learn to spell. The selection of words tended to be a rather haphazard guessing game. Words were chosen that were relatively unimportant and exceedingly difficult to spell. Secondly, spelling textbooks contained a large number of words; many texts contained between three thousand and four thousand words.

McKee (1939) further stated that beginning around 1910, research started to occur on the teaching of spelling. Dallmann (1976) added that spelling was the first elementary school subject to be placed under the careful scrutiny of research.

Traditionally, research concentrated on spelling tests and scales, word lists, teaching procedures, textbooks, and instruction. Fernald (1943) reported that "poor spelling is the result of bad habits, due, for the

most part, by faulty techniques imposed upon the child by those who attempt to teach him to spell" (p. 181). In 1954, Horn found that 2,000 words constituted approximately 95% of the words in adult writing. He also stated that spelling errors detract from the effectiveness of any written work and are likely to bring penalties in compositions and tests written at school, especially in grades 4-12, as well as in college. Wilkinson (1958) examined the spelling errors of 97 student teachers. His findings indicated that the errors made by student teachers were somewhat similar to those made by elementary school children--an implication that rather basic spelling faults exist. According to Carroll (1966), students need to acquire a concept of what is likely to be regular and, within limits, test the regularity of every item to find out whether it is regular or irregular. Yee (1969) noted that the test-study-test method was superior to the study-test approach. Horn (1969) added that learning spelling words by a synthetic approach was a better technique than learning words by syllables. In 1977, Wenzel suggested that direct instruction in spelling is necessary and should continue beyond the elementary grades.

There was agreement among educators that spelling is important. With an increase of subject matter in the curriculum at the elementary school level, however, justifica-

tion for more than fifteen minutes per day for spelling instruction is not warranted (Rubin, 1975).

Although numerous studies have been conducted in the area of spelling, one may question the quality of the research. As Sherwin concludes, "There is no shortage of studies; the problem, as usual, is to find food value before one succumbs to verbal engorgement" (1969, p. 104).

Both handwriting ability and spelling competency have declined since 1930. Like handwriting instruction, spelling instruction has been limited to less than twenty minutes per day at the elementary levels. Since time limitations are evidenced in both handwriting instruction and spelling instruction, efficient and effective instructional programs are necessary. Information regarding the relationship between these two areas would appear useful to educators; however, research studies concerning this topic are lacking.

Relationship between Handwriting Speed and Legibility

No one characteristic of handwriting exists separately from other characteristics. They are interrelated in the handwriting process; one characteristic is dependent on others. As an example, letter formation is closely related to spacing, slant, alinement, and weight of the line. Legibility and speed of handwriting are thought to be the most important factors in handwriting. The following research will support this notion.

There was substantial agreement among writers that legibility is the fundamental objective of handwriting programs (Anderson, 1965; Otto & Anderson, 1969; Powell, Bolduc, Crews, Kantowski, Smith, & Wenzel, 1976; Soltis, 1963). Since letter formation was noted to be the most important factor in determining the legibility of handwriting (Bell, 1969), Quant (1946) suggested this aspect should receive the greatest emphasis in teaching children to write. Petty, Petty, and Becking (1976) agreed that legibility is of utmost importance. They added that since handwriting must be done with reasonable speed for it to be a useful skill, the development of satisfactory speed is the second most important consideration.

Several studies have been conducted on letter formation, legibility, and speed. Handwriting research has shown that the majority of illegibilities can be traced to errors in letter formation that are a result of incorrectly made basic strokes (Milone & Wasylyk, 1981).

Newland (1932) studied the development of illegibilities in handwriting from the lower grades to adulthood. According to his findings, the illegibilities of only four letters-o, e, r, t-constituted 47% of the errors. His extensive study also revealed that high school students wrote 136% more illegibly than did elementary school students; adults wrote 52% more illegibly than did high school students, or over 350% more illegibly than did

elementary school students. Thirty years later, Shane et al. reported that adults wrote three and one-half times more indecipherable letter forms as did elementary school children. The fact that illegibilities increase with age was also cited by Shane (1955) and Wenzel (1977).

In 1952, Fitzgerald conducted a study of handwriting in adults. He found that the letters r, n, e, a, and v contributed to 48% of the illegibilities. Irwin (1955) noted that poor writers failed to close o's, dot i's, and cross t's. Horton (1970) studied the illegibilities in the cursive handwriting of sixth graders. He found r was the most difficult letter to write.

A report by Freeman (1954) revealed that the average rate for a second grader was thirty letters per minute, while an eighth grader could be expected to produce eighty letters per minute. He added that an adult who does a great deal of writing may easily reach 130 letters per minute. Hildreth (1960) found handwriting speed to be a matter of practical concern as the child matured because "time for note-taking for school studies, and even personal correspondence, is always at a premium" (p. 7).

In 1963, Schell and Burns found that letter forms varied as they examined the letter forms in commercial handwriting instructional programs. Provided that writing is legible, researchers recommended that personal variations of letter forms be acceptable (Ediger, 1965; Otto &

Koenke, 1969; Schell & Burns, 1963; Shane et al., 1962; Wenzel, 1977). If a letter is recognized at sight and not confused by any other letter, Bell (1969) encouraged teachers to accept the letter as being legible.

Rondinella (1963) found that teaching experience had little or no effect on subjectivity in grading handwriting samples of elementary school children. Samples from 239 children in grades 4, 5, and 6 were rated by 210 intermediate teachers. The teachers' ratings were then compared to those of experienced raters using published scales. Although the correlation between the two groups was significant, it was low (.41); inconsistencies among teachers' ratings of particular samples were also great. Many teachers were unaware of the major criteria for grading handwriting.

Otto, Askov, and Cooper (1967) claimed that formal handwriting scales are not necessary once teachers had established a set of criteria for making legibility judgments. This claim was further supported by Askov, Otto, and Askov (1970) when they found inter-judge reliability coefficients to be as high without the use of scales as with them.

Studies revealed that legible handwriting may lead to higher grades on written assignments, while illegible handwriting may result in lower grades. Briggs (1970) asked 50 teachers to "impression mark and rank" 100 es-

says. His findings indicated that handwriting ability had a significant influence on teachers' markings. In a similar study involving 45 teachers and 36 student teachers, Markham (1976) found that papers with better handwriting consistently received higher scores than did those with poor handwriting, regardless of the quality of content.

Thus, the literature review in this section supports the premise that legibility and speed are the most important factors in handwriting ability. Researchers also agree that personal variations of letter forms should be accepted if they are recognized at sight and not confused by any other letter. Additionally, formal handwriting scales are not necessary if a set of criteria for making legibility judgments has been established.

Relationships between Handwriting and Spelling

Numerous educational authorities have speculated about the relationship between handwriting and spelling. Illegible handwriting was commonly listed among the factors that contribute to spelling difficulty (Betts, 1956; Green & Petty, 1975; Horn, 1950). Other investigators claimed handwriting directly contributes to spelling achievement (Gray, 1969; Kaminsky & Powers, 1981). Some educators noted that some spelling errors are, in reality, handwriting errors (Freeman, 1954; Green & Petty, 1975; Hildreth, 1955; Kyte, 1958).

A report by Horn (1969) stated that "increased speed and improved legibility in handwriting enables students to convey language in written form with greater facility, which in turn helps to expand their written vocabulary and ultimately, to increase their potential for scoring higher on spelling tests" (p. 1291). He added that correlations between handwriting and spelling were not high, with an average of about .20.

Otto and Koenke (1969) stated that failure in spelling might be manifested in careless, illegible handwriting. They suggested that illegibilities might result, too, from a kind of negative motivation--the desire to hide misspellings. This notion was further supported by Shaughnessy (1977). She added that "uncertain spellers often deliberately camouflage their uncertainty by writing illegibly so that it becomes difficult to separate genuine misspellings from illegibilities" (p. 163).

The effect of the time of transition from manuscript to cursive upon the subsequent performance in handwriting, spelling, and reading was studied in 1968 by Otto and Rarick. They used 120 fourth graders and 120 sixth graders who made the transition from manuscript to cursive at various times from the first-half of the second grade to the second-half of third grade. They found that early transition to cursive handwriting was associated with legible handwriting; late transition to cur-

sive was associated with rapid handwriting. The conclusion drawn by the investigators was that transition time is not as important as the nature of the instructional programs in terms of the effect upon later achievement in handwriting, spelling, and reading.

A similar investigation by Bolen (1964) involved 312 third graders who made the transition from manuscript to cursive at two different times. He analyzed his data for the influence of handwriting treatments, intelligence, and sex upon the spelling gain. No significant difference was noted in the spelling achievements of the two groups.

Bader (1970) compared the effects of four presentation-practice combinations of manuscript-cursive writing on the spelling achievements of 120 fourth graders. Each of the four groups studied spelling words according to a specified combination. Posttest spelling scores were compared with the pretest scores. Analysis of the data showed no significant difference between manuscript and cursive handwriting upon spelling achievement.

The purpose of Strickling's research study (1973) was to determine the effect of handwriting and related skills upon the written spelling score of 136 fifth graders. Comparisons were made between above-average and below-average readers and between sexes in performances on oral and written spelling tests and tests of

handwriting and related skills. She reported that students made lower scores on the written spelling tests than on the oral spelling tests. The lower score on the written spelling test was mainly due to handwriting errors. Additionally, boys who were below-average readers had the greatest problem in handwriting.

In summary, then, the literature review in this section reveals that numerous educational authorities have only speculated on the relationship between handwriting and spelling. Empirical research in this area, however, has been neglected. As noted by Byers, "One area which has had almost no attention is the effect of handwriting upon spelling" (1963, p.87). As evidenced in this review, the studies by Otto and Rarick (1968) and Strickling (1973) were the only attempts to determine if a relationship exists between handwriting and spelling.

Summary

The following statements summarize the research literature:

1. Usually, manuscript is introduced in first grade while cursive begins in third grade.

2. Generally, less than twenty minutes are devoted daily to handwriting instruction at the elementary level.

3. Generally, less than twenty minutes are devoted daily to spelling instruction at the elementary level.

4. Both handwriting and spelling achievements have declined since 1930.

5. Legible handwriting can greatly facilitate general school learning.

6. Legibility and speed are considered the most important factors in handwriting.

7. A majority of illegibilities can be traced to errors in letter formations as a result of incorrectly made basic strokes.

8. Illegible handwriting was commonly listed among the factors that contribute to spelling difficulty.

9. Formal handwriting scales are not necessary if a set of criteria for making legibility judgments has been established.

10. Generally speaking, boys have more problems with handwriting ability than do girls.

11. Adults who do a reasonable amount of writing may easily reach 130 letters per minute.

In conclusion, the review of literature reveals that handwriting and spelling have been topic of concern among educators, and an ERIC search conducted in August 1981 revealed there were 2,273 articles dealing with spelling and 197 articles pertaining to handwriting. When handwriting skills and spelling were cross-referenced, only 34 articles could be identified. Of these, 32 articles were based on opinions, practices,

and beliefs and would offer information of limited value to curriculum developers. Only two publications, Otto and Rarick (1968) and Strickling (1973), are based on research of the relationship between handwriting and spelling, and both of these studies pertained to the elementary school grades.

Chapter 3

RESEARCH METHODS

The intent of this research was to examine the cursive handwriting ability and spelling competency of male and female college freshmen to determine whether or not a relationship existed between these two characteristics, and to determine whether a significant difference existed in the handwriting ability, and spelling competency, of male and female college freshmen. The writer chose to examine only the cursive handwriting since this form has been traditionally the socially accepted form of handwriting (Anderson, 1966; Hildreth, 1960; Groff, 1960). This chapter is divided into six sections: (1) selection of subjects, (2) selection and administration of the instruments, (3) scoring of the instruments, (4) collection of data, (5) hypotheses to be tested, and (6) method of data treatment.

Selection of the Subjects

The population included college freshmen enrolled in English 101 at the University of Nevada, Las Vegas (UNLV). For the purpose of this study, "college freshmen" were defined as those eighteen and nineteen year old students who were enrolled in college for the first time.

During the 1981-82 Fall Semester, forty sections of English 101 were offered at UNLV. Since this study

involved correlational procedures, a minimum of 10 subjects was required for each variable (Thorndike, 1978, p. 184). To ensure sufficient sample size, the writer decided to test six sections of English 101. The Director of Freshman Composition, Dr. Leon Coburn, was asked to select the six "representative" sections to be used for this study. According to Dyer (1979), this type of probability sampling technique is permissible and is used by many educational researchers because of the convenience. Dyer explains, "In purposive/expert choice sampling, experts choose 'typical' or 'representative' cases on the assumption that with judgment and reason a satisfactory sample can be chosen" (1979, p. 95).

To determine which students were eligible for the study, the examiner asked the subjects to identify their papers by name, sex, and age. They also indicated whether they were enrolled as first semester students at UNLV or had been students at another institution.

Based on the information gathered, the examiner selected the subjects which qualified for the study. Of the total 115 subjects tested, 88 fit the criteria for the population sample--eighteen or nineteen year old students who were enrolled in college for the first time. The remaining 27 subjects were excluded because they failed to meet the criteria for "college freshmen". Of these 27 subjects, ten were rejected because

they were "transfers" from other institutions; eight subjects had only attended UNLV, but were not enrolled as first-semester students, and the remaining nine subjects were rejected because they were not between the ages of eighteen and nineteen.

Hence, the final population sample included 88 college freshmen from six "representative" sections of English 101 who were eighteen or nineteen years old, and enrolled in college for the first time; there were 40 males and 48 females.

Selection and Administration of the Instruments

For the purpose of this study, measurements for both spelling competency and handwriting ability were obtained from each subject. Instruments were selected which would yield the appropriate information in a minimum amount of time. The administration time for both instruments involved a total of twenty minutes. The examiner administered the instruments to the six sections of English 101 during the last week of September and the first week of October, 1981.

Spelling Instrument

The examiner chose the spelling subtest of the Wide Range Achievement Test (WRAT) as the appropriate instrument. Thorndike (cited in Buros, 1972) found the following:

The test has value in a clinical or research

> setting in which one is testing students of diverse ability and background that one cannot tell in advance what level of test would be appropriate, and needs to get a quick estimate of each person's general level of ability and educational background. (p. 37)

The procedures used in the administration of the WRAT spelling subtest were as follows: At the beginning of the testing situation, each student was supplied with a #2 pencil and a response form; the examiner said the word, then read a sentence with the word in it, and then repeated the word to be spelled. A total of 46 words were given. (See Appendix A for a copy of the WRAT spelling subtest and the student response form.)

Handwriting Instrument

To obtain a handwriting measurement, the researcher collected handwriting samples from each subject and utilized the Serum Measurement of Handwriting Ability (SMHA) to score the handwriting samples. The SMHA was designed and pilot-tested according to the following procedures.

In order to establish inter-judge reliability using the SMHA, three potential judges were given a two-hour in-service training session on letter formations and how to score handwriting samples. Using an overhead projector, the researcher demonstrated the application of the SMHA to three cursive handwriting samples. The three

potential judges were then asked to judge five cursive handwriting samples according to the standards discussed during the inservice training session.

The results of the prestudy pilot-study indicated the judges were highly consistent in the application of the SMHA to the five practice handwriting samples. The inter-judge reliability coefficients for the three judges during the pilot-test resulted in the following: $\underline{r}$ (1,2)=.98, $\underline{r}$ (1,3)=.97, $\underline{r}$ (2,3)=.99. The obtained coefficients were considered to indicate an accepted degree of inter-judge reliability since correlation coefficients between .70 and 1 show a "high to very high relationship" (Van Dalen, 1973, p. 231).

The handwriting measurement involved the writing of a sentence which contained every letter of the alphabet. Handwriting ability was based on the number of letters written in a timed one-minute copying task that were not confused by any other letters as scored by the SMHA. The examiner's decision to base handwriting ability on legibility and speed was supported by Freeman, reporting in 1954, that both speed and legibility are important in handwriting:

> Speed is of chief concern to the writer; legibility is of concern both to the writer and to the reader. Speed is important to the writer in order that he may save time in writing;

> legibility is important to the writer because clearness in expression tends to make thinking itself clearer. Legibility is important to the reader in order that he may save time and effort in reading. (p. 4)

The following procedures were used to obtain the handwriting samples. Each student received a typed copy of the selected handwriting exercise and a #2 pencil. The directions on how to perform the handwriting exercise were printed at the top of the exercise and orally explained to the students.

Students were instructed to copy a typewritten sentence twice in cursive at their normal rate. They were given neither further instructions, nor told the purpose for which they were writing. The examiner then instructed the students to begin the copying task, and at the same time started a stop watch which was out of the students' view. Exactly one minute after the task began, the students were asked to stop and place a large X after the last letter written. They were permitted to complete the task untimed and without further interruptions. (See Appendix B for a copy of the handwriting exercise.)

Scoring of the Instruments

The spelling subtest of the WRAT was scored by the examiner. Each word was marked either correct or

incorrect; no partial credit was given. If a word was written illegibly, it was considered incorrect. The absolute number of correctly spelled words was recorded as the measurement for spelling competency.

The measurement for handwriting ability was based on the SMHA. For the study itself, each of the three judges scored the handwriting samples separately from the others. Each judge was given 88 consecutively-numbered response sheets along with the handwriting samples which were also numbered consecutively.

The judges were instructed to circle, on their response sheets, any illegible letter produced by a student during the one-minute timed copying task. The judges examined only those letters produced before the X, placed by the student during the handwriting exercise.

After the judges identified the illegible letters on each sample, the chief examiner subtracted the number of illegible letters from the total number of letters produced in the one-minute timed copying task, and recorded this score in the bottom right hand corner of the judge's response sheet.

When the scoring had been completed, the investigator averaged the absolute numbers of the three judges' scores for each of the 88 handwriting samples to obtain a score for handwriting ability for each subject. (See Appendix C for a copy of the judges' response form, the

SMHA, and a copy of its development.)

Collection of Data

During the last week of September and the first week of October 1981, the investigator administered the WRAT spelling subtest and the one-minute timed copying task to the subjects in the selected six sections of English 101. The testing conditions were the same for each section; nothing "special" happened in any one section to influence the results of the tests. The subjects recorded their responses for both exercises on separate response sheets which were provided by the investigator.

The data used in this study was obtained from the subject's response sheets of the WRAT spelling subtest and from the judge's scoring sheets of the SMHA. Information charts were then compiled for each of the six sections. Each chart contained five headings: (1) student identification number, (2) sex, (3) spelling raw score, (4) handwriting speed raw score, and (5) handwriting ability raw score. This information was then transferred to IBM data cards for processing in the CDC Cyber 7300 at the University of Nevada, Las Vegas.

Hypotheses Tested

The null hypotheses tested in this study were as follows:

H_0:1 There is no relationship between the hand-

writing ability and spelling competency of college freshmen.

H_o:2 There is no relationship between the handwriting ability and spelling competency of male college freshmen.

H_o:3 There is no relationship between the handwriting ability and spelling competency of female college freshmen.

H_o:4 There is no significant difference at the .05 level in the mean handwriting ability scores between male college freshmen and female college freshmen as determined by the Serum Measurement of Handwriting Ability.

H_o:5 There is no significant difference at the .05 level in the mean spelling competency scores between male college freshmen and female college freshmen as measured by the spelling subtest of the Wide Range Achievement Test.

Method of Data Treatment

Since both the handwriting ability and spelling competency measurements yielded equal interval data, the Pearson product-moment correlation was selected to determine whether or not a relationship existed between handwriting ability and spelling competency of college freshmen. Wiersma (1980) reported the following:

If the researcher is interested in the relation-

> ship of two variables and wants a measure of the extent of this relationship, a correlation coefficient is used. The coefficient would be the Pearson product-moment if variables are at least interval scale measurement. If not, another coefficient appropriate for the measurement would be used. (p. 281)

The analysis of variance (ANOVA) was selected to determine whether a significant difference existed between handwriting ability, and spelling competency, of male and female college freshmen. According to Nie, Hull, Jenkins, Steinbrenner and Bent, the one-way analysis of variance allows users to "statistically test whether the means of subsamples into which the sample data are broken are significantly different from each other" (1975, p. 259).

The level of significance was set at .05. According to Ferguson (1981), it is a common practice to adopt levels of significance of either .05 or .01. Since this study involved an initial investigation of the handwriting abilities and spelling competencies of college freshmen, the writer selected the .05 level.

Summary

This chapter discusses the research methods used to determine whether or not a relationship exists between the cursive handwriting ability and spelling competency

of male and female college freshmen. For this study, the spelling subtest of the Wide Range Achievement Test was used to measure spelling competency. Handwriting competency was measured by the Serum Measurement of Handwriting Ability. A comparison of the performance of the spelling test with the performance of the handwriting exercise was used to determine if a relationship existed between these characteristics among college freshmen.

Chapter 4

ANALYSIS OF THE DATA

This study examined whether or not a relationship exists between the handwriting ability and the spelling competency of male and female freshmen, and whether or not a significant difference exists between the handwriting ability, and spelling competency, of male and female college freshmen.

A total of 88 subjects from six representative sections of English 101 were utilized to collect the data used in this study; 48 subjects were females and 40 subjects were males. An information chart was compiled for each section. Each information chart contained the following data for each subject: student identification number; sex; spelling raw score, which was the absolute number of correctly spelled words on the WRAT; handwriting speed, which consisted of the absolute number of letters written per minute; and handwriting ability score, which was derived by subtracting the total absolute number of illegible letters from the total absolute number of letters produced in the one-minute timed copying task. (See Appendix D for the information charts.)

The data from each of these information charts was prepared for analysis at the University of Nevada, Las Vegas, Computer Center using the Statistical

Package for the Social Sciences - Version 8 (SPSS). The SPSS is an integrated system of computer programs designed for the manipulation and statistical analysis of many types of data, with a particular emphasis on the needs of the social sciences (Nie et al., 1975).

The information for this chapter is divided into three major sections: (1) demographic data of the subjects, (2) statistical analysis of the data, and (3) additional data considerations. The demographic data reports information on the distribution of age and sex for each section; and the distribution of mean raw scores, standard deviations, and ranges for each section for the WRAT and the SMHA. The analysis of data is presented in the sequence of the null hypotheses stated in Chapter 3. Each null hypothesis is followed by the summary of the data, the decision regarding the null hypothesis, and a discussion of the results. The last section consists of additional data considerations, which examined the difference between the raw scores for handwriting speed and handwriting legibility of male and female college freshmen.

Demographic Data of the Subjects

Distribution of Age and Sex

Table 1 shows the distribution of sex and age among the selected six sections. The table reveals that the population sample included 48 females and 40 males.

Table 1

Distribution of Age and Sex of the Subjects

for each Representative Section of English 101

Section	Number	Sex		Age (in years)	
		Male	Females	18	19
A	12	5	7	9	3
B	14	7	7	14	0
C	14	10	4	13	1
D	16	8	8	16	0
E	15	3	12	14	1
F	17	7	10	16	1
Total	88	40	48	82	6

Of these subjects, 6 were nineteen years old and 82 were eighteen.

The sex distribution of the population sample appears consistent with 4 of the 6 sections, with Section C and Section E being the exceptions. Section C had 10 males and only 4 females, and Section E had 12 females and only 3 males.

According to Table 1, age was not evenly distributed. This study was to include "college freshmen" who were eighteen and nineteen years old and who were enrolled in college for the first time. The population sample, however, consisted of 82 eighteen year olds and only 6 nineteen year olds. Since the nineteen year old subjects only consisted of about 7% of the population sample, the results of this experiment are more indicative of the eighteen year old university student.

Distribution of Scores for the WRAT and the SMHA

Table 2 contains the mean raw scores, standard deviations, and ranges for the WRAT spelling subtest for each of the six sections. A maximum score of 46 was possible, and individual raw scores ranged from 18 to 41.

A review of this table indicated that the mean raw scores were all very close in absolute value for the six sections. The overall mean raw score for all six sections was 30.59, with an average standard devia-

Table 2

Mean Raw Scores, Standard Deviations, and Ranges for the WRAT Spelling Subtest for each Representative Section of English 101

Section	Number	Mean Raw Score-WRAT[a]	Standard Deviation[b]	Range
A	12	31.42	5.41	19-40
B	14	30.43	5.28	18-41
C	14	31.43	4.24	22-38
D	16	29.56	6.32	20-37
E	15	30.53	4.59	20-36
F	17	30.47	3.56	24-37

Note: Maximum score = 46

[a]Overall mean raw score for the six representative sections was 30.59.

[b]Overall average standard deviation for the six representative sections was 4.91.

tion of 4.91. Using these values, the standard error of the mean was .52. Mean raw scores among the sections ranged from 26.56 to 31.43, while standard deviations ranged from 3.56 to 6.32.

As shown in Table 2, the distribution of mean raw scores for spelling competency for each of the six sections was well within one average standard deviation of the overall mean. To determine whether the samples were representative of the population, the central limit theorem was considered. According to Wiersma, this theorem specifies that the "underlying distribution of the mean has a mean equal to the population mean" (1980, p. 261). Based on this theorem, and using the calculated .52 for the standard error of the mean for spelling competency, it can be said with 95% confidence that the population mean for spelling ability falls within the 28-33 range of values.

Table 3 contains the mean raw scores, standard deviations, and ranges for the one-minute timed copying task of the SMHA for each of the six sections. There is not a fixed maximum score; results depend on the student's ability. The individual raw scores ranged from 26 to 125.

The overall mean raw score for the six sections was 72.00 with an average standard deviation of 17.78. Using these values, the standard error of the mean

Table 3

Mean Raw Scores, Standard Deviations, and Ranges for the One-Minute Timed Copying Task of the SMHA for each Representative Section of English 101

Section	Number	Mean Raw Score-SMHA[a]	Standard Deviation[b]	Range
A	12	82.33	20.12	53-125
B	14	70.79	16.52	52-115
C	14	64.36	19.07	29-089
D	16	65.25	17.51	26-097
E	15	75.00	7.50	54-085
F	17	75.71	16.78	49-104

[a]Overall mean raw score for the six representative sections was 72.00.

[b]Overall average standard deviation for the six representative sections was 17.78.

was 1.9. Mean raw scores among the sections ranged from 64.36 to 82.33, while standard deviations ranged from 7.50 to 20.12.

As shown in Table 3, the distribution of mean raw scores for handwriting ability for each of the six sections was well within one average standard deviation of the overall mean. To determine whether this sample was representative of the population, the central limit theorem was again considered. Based on this theorem, and using the calculated 1.9 standard error of the mean for handwriting ability, it can be said with 95% confidence that the population mean falls within the 68.2-75.8 range of values.

Thus, the sample mean for handwriting ability and the sample mean for spelling competency were within the .95 confidence interval of the respective population means. It was assumed, therefore, that the six sections used in the study are representative of the UNLV college freshmen population.

Statistical Analysis of the Data

Hypothesis One

H_0:1 There is no relationship between the handwriting ability and the spelling competency of college freshmen.

Table 4 provides a summary of the results of the

Table 4

Summary of the Pearson Product-Moment Correlation between Spelling Competency and Handwriting Ability of College Freshmen

Source	Number	Mean	Standard Deviation	Pearson r^a
Spelling	88	30.59	4.91	
				.19
Handwriting	88	72.00	17.79	

[a].22 needed for significance at the .05 level.

Pearson product-moment correlation between handwriting ability and spelling competency of college freshmen. The computed $\underline{r}$ was .19.

Based on this result, and using 86 degrees of freedom, the computed $\underline{r}$ did not exceed .21, which is required for significance at the .05 level. Therefore, the researcher failed to reject H_0:1.

As shown in Figure 1, there is no linear relationship between the handwriting ability and the spelling competency of college freshmen. Since the correlation between these two variables resulted in .19, $\underline{r}^2$ was .04. According to Nie et al. (1975), $\underline{r}^2$ is a measure of the proportion of variance in one variable "explained" by the other, i.e., less than 5% of the error in predicting one variable has been eliminated by knowledge of the other variable.

Hypothesis Two

H_0:2 There is no relationship between the handwriting ability and the spelling competency of male college freshmen.

Table 5 gives the summary of the results of the Pearson product-moment correlation between handwriting ability and spelling competency of male college freshmen. The computed $\underline{r}$ was .24.

Based on this result, and using 38 degrees of freedom, the computed $\underline{r}$ did not exceed .31, which is required

Figure 1

Scattergram for Handwriting Ability and Spelling Competency of College Freshmen

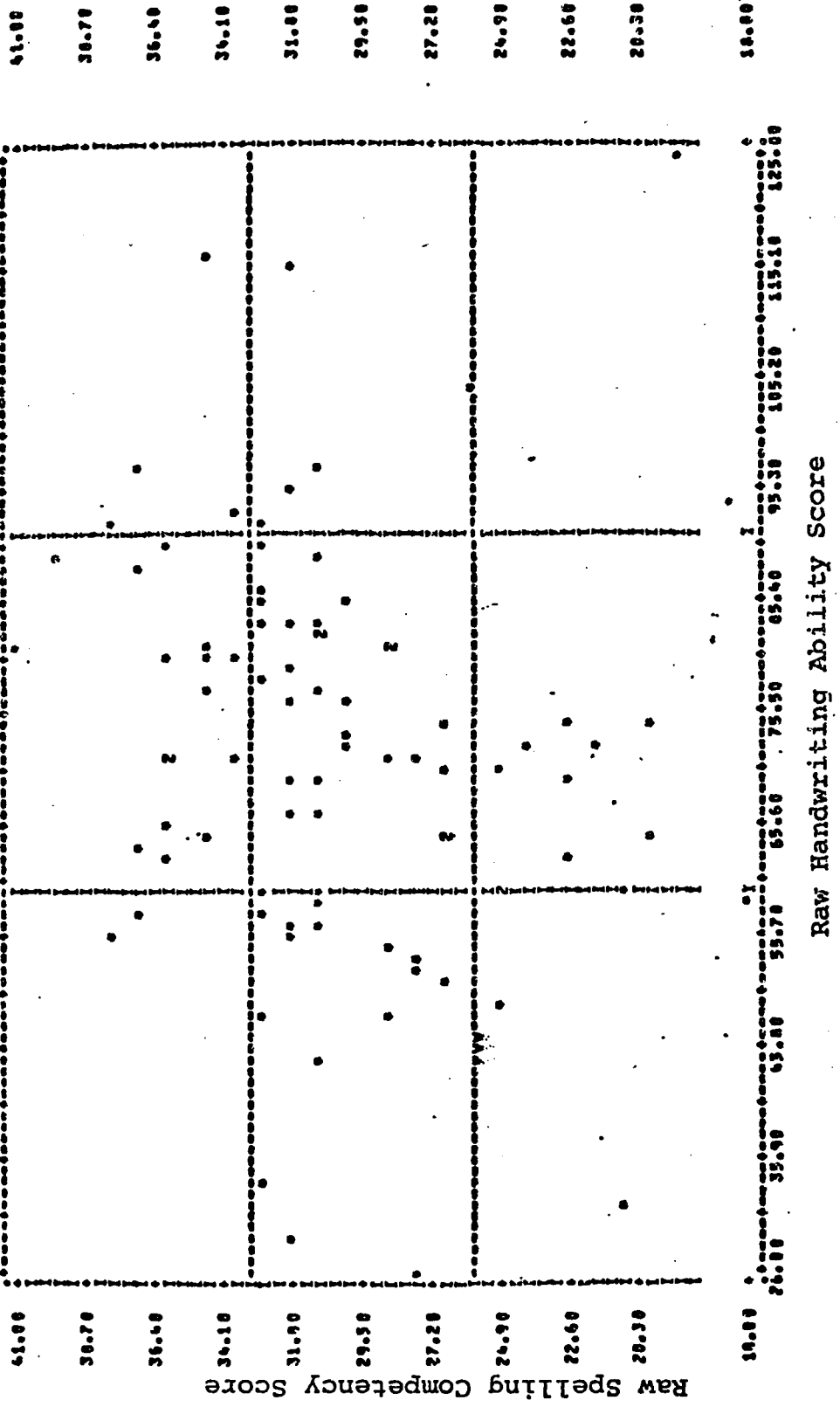


Table 5

Summary of the Pearson Product-Moment Correlation between Spelling Competency and Handwriting Ability of Male College Freshmen

Source	Number	Mean	Standard Deviation	Pearson r^a
Spelling	40	29.60	5.26	
				.24
Handwriting	40	65.95	18.32	

[a].32 needed for significance at the .05 level.

for significance at the .05 level. The researcher, therefore, failed to reject H_0:2.

Figure 2 displays a scattergram for the variables, handwriting ability and spelling competency, of male college freshmen. From Figure 2, it is quite clear that no linear relationship exists between these two variables. For an r of .24, r^2 is .06. Thus, less than 7% of the error in predicting one variable has been eliminated by knowledge of the other variable.

Hypothesis Three

H_0:3 There is no relationship between the handwriting ability and the spelling competency of female college freshmen.

Table 6 gives a summary of the results of the Pearson product-moment correlation between the handwriting ability and the spelling competency of female college freshmen. The computed r was .03.

Based on this result, and using 46 degrees of freedom, the computed r did not exceed .29, which is required for significance at the .05 level. The researcher, therefore, failed to reject H_0:3.

As shown in Figure 3, there does not appear to be a linear relationship between the handwriting ability and the spelling competency of female college freshmen. Since the correlation between these two variables was .03, r^2 was slightly less than .01. Thus, less than

Figure 2

Scattergram for Handwriting Ability and Spelling Competency of Male College Freshmen

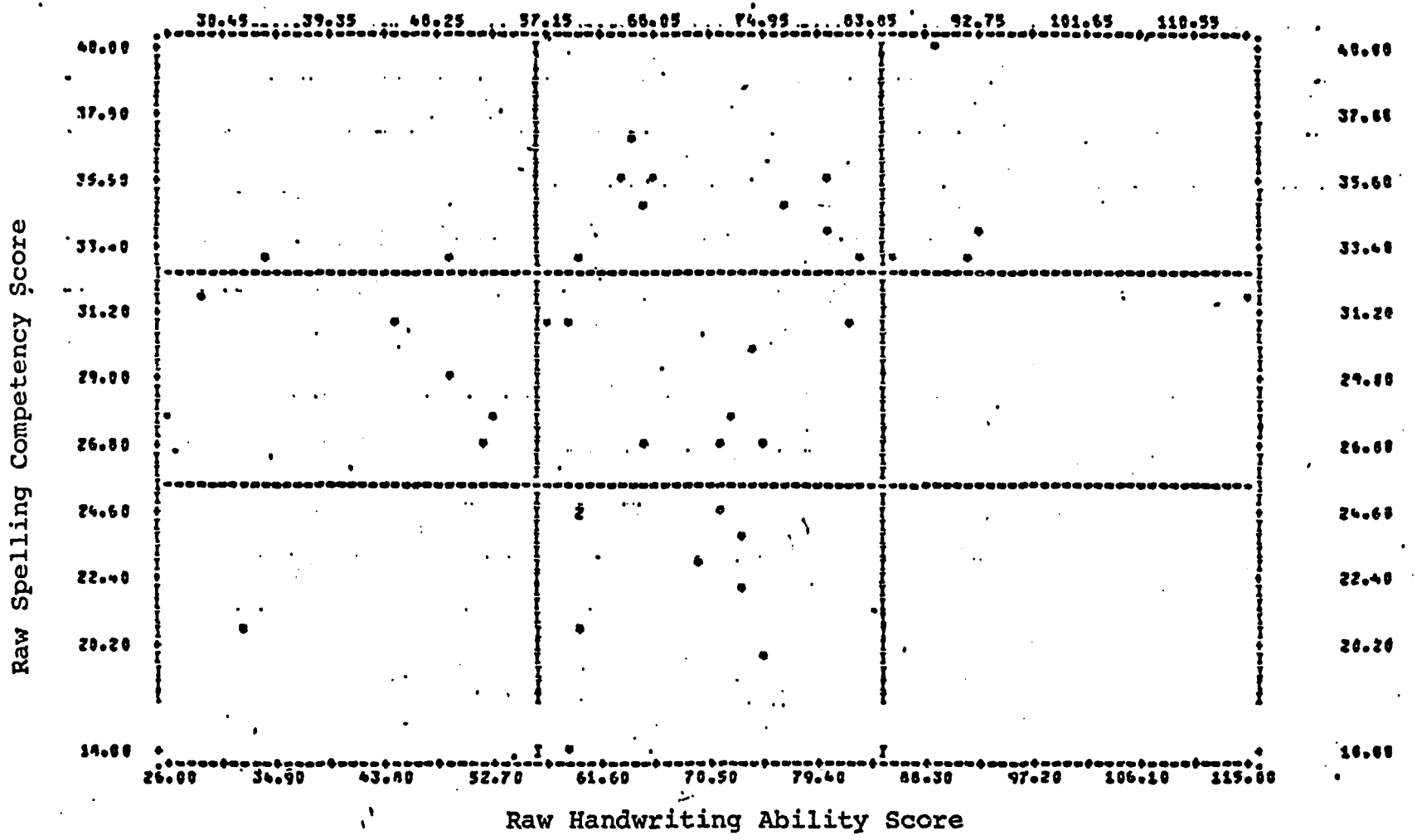


Table 6

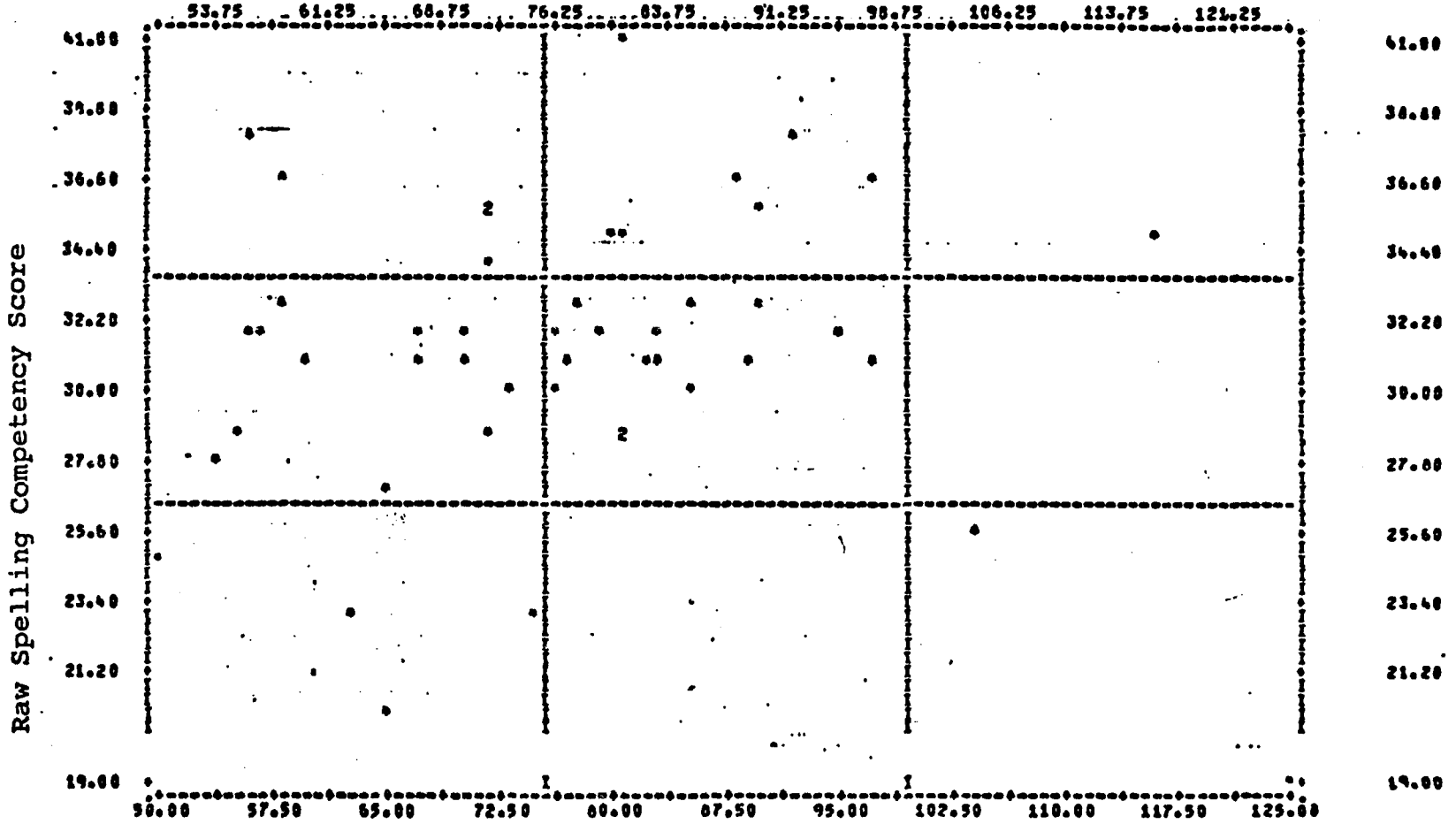
Summary of the Pearson Product-Moment Correlation between Spelling Competency and Handwriting Ability of Female College Freshmen

Source	Number	Mean	Standard Deviation	Pearson r^a
Spelling	48	31.42	4.50	
				.03
Handwriting	48	77.04	15.81	

[a].30 needed for significance at the .05 level.

Figure 3

Scattergram for Handwriting Ability and Spelling Competency of Female College Freshmen



1% of the error in predicting one variable has been eliminated by knowledge of the other variable.

Hypothesis Four

H_0:4 There is no significant difference at the .05 level in the mean handwriting ability scores between male college freshmen and female college freshmen as determined by the Serum Measurement of Handwriting Ability.

Table 7 provides the summary of the sources of variation, degrees of freedom, sum of the squares, mean sum of the squares, and the F-ratio for determining whether or not a significant difference existed between the handwriting ability of male and female college freshmen. The analysis of variance reveals that the between-groups mean square was 2684.18, and the within-group mean square was 288.81. The F-ratio, calculated by dividing the between-mean square by the within-mean square, resulted in 9.29.

Based on this result, and using 1 degree of freedom for the greater mean square and 86 degrees of freedom for the lesser mean square, the computed F-ratio did exceed 3.96, which is required for significance at the .05 level. The researcher, thus, rejected H_0:4.

Hence, the results of the one-way analysis of variance indicated that a significant difference existed in the handwriting ability of male and female college

Table 7

Summary of the One-Way Analysis of Variance for the Handwriting Ability of Male and Female College Freshmen

Source	Degrees of Freedom	Sum of Squares	Mean Sum of Squares	F-ratio[a]
Between	1	2684.18	2684.18	9.29
Within	86	24837.82	288.81	

[a]3.97 needed for significance at the .05 level.

6.97 needed for significance at the .01 level.

freshmen at the .05 level. Since a significant F-ratio was obtained, it was concluded that the differences in the handwriting ability means associated with the sex factor were larger than what would be expected by chance in 5 cases out of 100.

Hypothesis Five

H_0:5 There is no significant difference at the .05 level in the mean spelling competency scores between male college freshmen and female college freshmen as measured by the spelling subtest of the Wide Range Achievement Test.

Table 8 lists the sources of variation, degrees of freedom, sum of the squares, mean sum of the squares, and the F-ratio for determining whether a significant difference existed between the mean spelling competency scores between male and female college freshmen. The analysis of variance reveals that the between-groups mean square was 72.01, and the within-group mean square was 23.60. This resulted in an F-ratio of 3.052.

Based on this result, and using 1 degree of freedom for the greater mean square and 86 degrees of freedom for the lesser mean square, the computed F-ratio did not exceed 3.96, which was required for significance at the .05 level. Therefore, the researcher failed to reject H_0:5.

Table 8

Summary of the One-Way Analysis of Variance for the Spelling Competency of Male and Female College Freshmen

Source	Degrees of Freedom	Sum of Squares	Mean Sum of Squares	F-ratio[a]
Between	1	72.01	72.01	3.05
Within	86	2029.27	23.60	

[a]3.97 needed for significance at the .05 level.

Thus, the results of the one-way analysis of variance indicate that a significant difference did not exist between the spelling competency of male and female college freshmen at the .05 level. Since the F-ratio was not significant at the .05 level, it was concluded that the differences in spelling competency means associated with the sex factor were not larger than what would be expected by chance.

Additional Data Considerations

Although it was not intended as part of the original study, the researcher examined the differences between handwriting speed and handwriting legibility scores to search for possible insight into the distribution of the mean raw scores for the handwriting ability of male and female college freshmen.

For this study, the previously-mentioned Serum Measurement of Handwriting Ability was used to obtain the handwriting ability raw scores for each subject. As noted earlier, the inter-judge reliability coefficients for use of the SMHA in this study were considered high (.97-.99). Since the judges, and their use of the SMHA method, were not a major source of error, the researcher decided to investigate further the difference between raw handwriting speed scores and raw handwriting legibility scores. Handwriting speed consisted of the total absolute number of letters written in the one-

minute timed copying task from the total absolute number of letters written in the one-minute timed copying task.

Table 9 shows the handwriting speed raw scores and the handwriting legibility raw scores of male subjects for each representative section of English 101. Overall, the male subjects produced a total of 3,680 letters per minute; however, 1,052 letters were illegible, resulting in a 71% legibility rate. Legibility rates ranged from 64% to 76% among the male subjects within the six sections.

Table 10 shows the handwriting speed raw scores and the handwriting legibility raw scores of female subjects for each representative section of English 101. Overall, the female subjects produced a total of 4,883 letters per minute; however, 1,185 letters were illegible, resulting in a 76% legibility rate. Legibility rates ranged from 72% to 85% among female subjects within the six sections.

Female subjects produced more legible letters per minute than did the male subjects. Both groups, however, produced a large number of illegible letters--29% of the letters produced by males and 24% of the letters produced by female subjects were illegible.

Further investigation of Tables 9 and 10 revealed that lack of speed might have influenced the handwriting ability scores of male and female college

Table 9

Raw Scores for Handwriting Speed and Handwriting Legibility of Male Subjects for each Representative Section of English 101

Section	Number of Males	Speed[a]	Illeg.[b]	Leg.[c]	%of Leg.
A	5	442	108	334	.75
B	7	651	157	494	.76
C	10	838	238	600	.72
D	8	678	202	476	.70
E	3	304	72	232	.76
F	7	767	275	492	.64
Total	40	3,680	1,052	2,628	.71

[a]Total absolute number of letters written in the one-minute timed copying task.

[b]Total absolute number of illegible letters written in the one-minute timed copying task.

[c]Total absolute number of legible letters written in the one-minute timed copying task.

Table 10

Raw Scores for Handwriting Speed and Handwriting Legibility of Female Subjects for each Representative Section of English 101

Section	Number of Female	Speed[a]	Illeg.[b]	Leg.[c]	% of Leg.
A	7	761	117	644	.85
B	7	629	132	497	.79
C	4	406	105	301	.74
D	8	798	230	568	.71
E	12	1,191	298	893	.75
F	10	1,098	303	795	.72
Total	48	4,883	1,185	3,698	.76

[a]Total absolute number of letters written in the one-minute timed copying task.

[b]Total absolute number of illegible letters written in the one-minute timed copying task.

[c]Total absolute number of legible letters written in the one-minute timed copying task.

freshmen. According to Freeman (1954), the average adult who does a great deal of writing, such as a college student, may easily produce a total of 130 letters per minute. Under the conditions of this study, the male subjects produced an average of 92 letters per minute, while the female subjects produced an average of 101 letters per minute. Thus, either Freeman's norms are outdated, or the population sample does not represent average adults who do a great deal of writing.

Differences were found to exist in the raw scores for handwriting speed and handwriting legibility of male and female college freshmen. Males produced an average of 92 letters per minute when speed was the only factor considered. When legibility was also considered a factor, males averaged 67 letters per minute. Females produced an average of 101 letters per minute when speed was the only factor considered. When legibility was also considered a factor, females averaged 77 letters per minute.

Overall, females produced more letters per minute and more legible letters per minute than did the males. Thus, it appears that male college freshmen were at a disadvantage when handwriting speed and handwriting legibility were the dependent variables considered in this study. The dependent variable conditions may have contributed markedly to the results obtained for all null hypotheses.

Summary

The statistical procedures used to test the five null hypotheses were the Pearson product-moment correlation and the one-way analysis of variance. The hypotheses were tested at the .05 level. A table showing the results of the data analysis was constructed for each hypothesis. Only one hypothesis was rejected. At the .05 level, a significant difference existed between the mean scores for the handwriting ability of male and female college freshmen.

Chapter 5

SUMMARY

This study examined the cursive handwriting ability and spelling competency of male and female college freshmen to determine whether a relationship existed between these two variables, and to determine whether a significant difference existed between the handwriting ability, and spelling competency, of male college freshmen and female college freshmen. A review of literature established that a study of this nature had not yet been done; thus, this study was an initial investigation regarding the handwriting ability and spelling competency of college freshmen. This chapter summarizes the study, summarizes the findings, and offers recommendations for further study.

Summary of the Study

The subjects used in this study were college freshmen who were enrolled in English 101 at the University of Nevada, Las Vegas. Only those eighteen and nineteen year old students who were enrolled in college for the first time were considered eligible for the study. A total of 115 subjects were tested in the six representative sections of English 101 chosen for the study. Of the 115 subjects tested, a total of 88 subjects were selected to participate in this study; 48 were females and 40 were males, and 82 were eighteen years old and

6 were nineteen years old. The remaining 27 students, who were not included in this study, were ineligible because they did not meet the selection criteria as outlined in Chapter 3.

The instrument selected to measure spelling competency was the spelling subtest of the Wide Range Achievement Test; and a timed one-minute copying task, which was scored by the Serum Measurement of Handwriting Ability, was the process used to measure handwriting ability. In each of the six representative sections of English 101, the investigator used the same testing procedures to gather the data for the subjects.

The raw scores obtained from the handwriting ability assessment procedure and the spelling competency instrument were judged to have yielded equal-interval data. This data was then treated statistically to test the five null hypotheses formulated for this investigation. The Pearson product-moment correlation was used to test H_o:1, H_o:2, and H_o:3. The one-way analysis of variance was used to test H_o:4 and H_o:5, with a priori significance level set at .05.

Summary of the Findings of the Study

Analysis of the data led to the researcher's decision to fail to reject four null hypotheses and to reject one null hypothesis. Null Hypotheses One, Two, Three, and Five were not rejected; Null Hypothesis Four

was rejected.

The first three null hypotheses examined the raw scores for spelling competency and handwriting ability to determine if a relationship existed between these variables for college freshmen, for male college freshmen, and for female college freshmen; no relationship between the variables was detected for any of these categories. The last two null hypotheses were concerned with the difference between the mean scores for handwriting ability, and spelling competency, of male college freshmen and female college freshmen. The handwriting ability score was the dependent variable in Null Hypothesis Four. There was a significant difference at the .05 level between the mean scores of the two groups of college freshmen for handwriting ability. For Null Hypothesis Five, spelling competency was the dependent variable. There was no significant difference at the .05 level between the mean scores of the two groups of college freshmen for spelling competency, and the researcher failed to reject H_0:5. It is of interest to note, however, that the difference between the mean scores for the two groups of college freshmen for spelling competency was significant at the .10 level.

Thus, the researcher rejected only Null Hypothesis Four. At the .05 level, a significant difference existed between the mean scores for handwriting ability of the male college freshmen and the female college freshmen.

As noted earlier, handwriting ability was dependent on both speed and legibility. Further investigation of the data for the handwriting ability of the two groups revealed that females wrote faster and more legibly than did the males. Perhaps this factor might have influenced the results obtained for all null hypotheses.

The overall findings of the study support the position that a relationship does not exist in the handwriting ability and spelling competency of college freshmen. Additionally, no significant difference existed in the spelling competency of male college freshmen and female college freshmen; however, a significant difference existed between these two groups for handwriting ability.

Recommendations for Further Study

As a result of this investigation, the following recommendations are offered:

1. This study should be replicated with other eighteen year old college freshmen from universities with similar size and entrance requirements. Since this study was an initial investigation of the handwriting ability and spelling competency of college freshmen, additional studies would allow for comparisons to be made on the obtained results.

2. An experimental study whereby handwriting instruction and spelling instruction are combined as a single subject should be conducted. The effectiveness

of the experimental study could be measured through a pretest and a posttest, and compared with results obtained from the traditional instructional programs. Findings from a study of this nature could provide useful curriculum-decision-making information.

3. Research should be conducted to establish current adult norms for handwriting speed.

4. Research should be conducted to establish current adult norms for handwriting legibility.

5. Research should be conducted to establish current adult norms for spelling.

6. This study should be replicated with college sophomores, juniors, and seniors to see if a trend exists in handwriting ability and spelling competency.

7. This study should be replicated with junior college students for comparisons with university students.

8. This study should be replicated with high school seniors for comparisons with college freshmen.

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APPENDICES

APPENDIX A (Cont.)

Reliability and Validity

of the

Wide Range Achievement Test

Reliability of Spelling Subtest - Level II

Range .92 - .98 (cited in Buros)

Validity of Spelling Subtest - Level II

As noted in the teacher's manual, the validity of the test was demonstrated through the following:

1) the correlation of test results with outside criteria as teacher's ratings or chronological age,
2) the correlation of the scores of one achievement test with those of another,
3) the correlation of the achievement scores with mental ability or intelligence ratings,
4) a factor analysis of a large number of abilities to determine the factor loadings inherent in each subtest. (p. 49-62)

The correlations between WRAT and WAIS T-scores for males and females, ages 18 to 24, ranged from .82 - .83.

APPENDIX B

Handwriting Exercise

DIRECTIONS: Rewrite, in cursive, the following sentence twice in the spaces provided. DO NOT BEGIN UNTIL INSTRUCTED.

You can very quickly judge the excellence of a person's handwriting by analyzing the letter formation, spacing, slant, and alinement.

APPENDIX C

The Serum Measurement of Handwriting Ability

THE SERUM MEASUREMENT OF HANDWRITING ABILITY

The Serum Measurement of Handwriting Ability (SMHA), was designed to assess cursive handwriting samples. It consists of the number of cursive letters written in one minute that are not confused with any other letter. The following statements serve as a basis for the SMHA:

1. Providing a letter is not confused with any other letter, personal variations of letter forms are accepted.
2. The letter t must be crossed properly.
3. The letter i must be dotted properly.
4. The letters e and i must be looped.
5. The tops of rounded letters (m, n, h) must be rounded - not pointed.
6. Looped letters (a, d, g, o, p) must be left open, but closed at the top.

APPENDIX C (cont.)

APPLICATION OF SMHA

1. The letter a( ) should not be confused with ci( ), o( ), or u( ).
2. The letter b( ) should not be confused with li( ), l( ), k( ), or f( ).
3. The letter c( ) should not be confused with e( ), i( ), or a( ).
4. The letter d( ) should not be confused with cl( ), I( ), or a( ).
5. The letter e( ) should not be confused with i( ), l( ), or c( ).
6. The letter f( ) should not be confused with b( ), or j( ).
7. The letter g( ) should not be confused with y( ), or g( ).
8. The letter h( ) should not be confused with li( ), p( ), b( ), l( ), or k( ).
9. The letter i( ) should not be confused with e( ).
10. The letter j( ) should not be confused with any other letter.
11. The letter k( ) should not be confused with h( ).
12. The letter l( ) should not be confused with e( ).
13. The letter m( ) should not be confused with u( ).
14. The letter n( ) should not be confused with v( ), s( ), or u( ).
15. The letter o( ) should not be confused with a( ), r( ), or u( ).

APPENDIX C (cont.)

16. The letter p ( ) should not be confused with j ( ), or s ( ).
17. The letter q ( ) should not be confused with q ( ).
18. The letter r ( ) should not be confused with i ( ), s( ), half n( ), u( ), or e( ).
19. The letter s( ) should not be confused with r( ), i( ), or o( ).
20. The letter t( ) should not be confused with l( ).
21. The letter u( ) should not be confused with oi( ). or w( ).
22. The letter v( ) should not be confused with r( ).
23. The letter w( ) should not be confused with u( ), or m( ).
24. The letter x( ) should not be confused with r( ), or n( ).
25. The letter y( ) should not be confused with j( ).
26. The letter z( ) should not be confused with any other letter.

APPENDIX C (cont.)

Development of the SMHA

The Serum Measurement of Handwriting Ability (SMHA) was based on information from the literature review. As a part of this study, the researcher examined numerous handwriting instructional programs and several related articles. Although commercial programs were identified for assessing legibility of cusive handwriting of elementary school level students and secondary school level students, no commercial program was found for determining the legibility of adult cursive handwriting.

The researcher, therefore, developed the SMHA process to assess legibility of adult cursive handwriting. The following procedure was followed to establish the reliability and validity of the SMHA method. First, the researcher examined the existing commercial handwriting programs for assessing cursive handwriting legibility to determine what handwriting characteristics were integral to these programs. Then, the researcher selected those characteristics which were common to the majority of the commercial handwriting assessment programs; this listing of common characteristics then became the judgmental assessment criteria for measuring cursive handwriting legibility for the SMHA process. The judgmental assessment criteria used in the SMHA, thus, were established by the handwriting literature (Burns, 1968; Dallmann, 1974; Enstrom, 1965; Quant, 1969; Smith, 1972), and the validity

APPENDIX C (cont.)

of the criteria of assessment for the SMHA process was, thus, established for measuring cursive handwriting legibility. Since these assessment criteria applied to cursive handwriting of elementary school level students and secondary school level students, and there was no difference noted in the literature in the legibility requirements for cursive handwriting of individuals at any level, these criteria were deemed to apply to adult cursive handwriting.

After the criteria of assessment for the SMHA was established, the researcher collected handwriting samples from subjects randomly selected from a school containing a wide variety of young adults. The handwriting samples consisted of one-minute timed copying tasks.

Two judges scored the handwriting samples using the commercially-published Zaner-Bloser Evaluation Scale for High School. The judges were then instructed in the use of the SMHA process, and they scored the handwriting samples using it. It was noted that in each of the handwriting samples, the judges found that students who obtained high scores on the Zaner-Bloser also received high scores on the SMHA.

Although both the Zaner-Bloser and the SMHA emphasize speed and legibility, the Zaner-Bloser scale describes legibility as letter formation, spacing, size and proportion, line quality, alignment, and slant, while the SMHA describes legibility as those cursive letters not confused with any

APPENDIX C (cont.)

other letter, i.e., a measurement of the same characteristics of the Zaner-Bloser. The Zaner-Bloser scale consists of seven levels (AA, A, B, C, D, E, F), with AA being the highest score and F being the lowest score. The seven levels are assumed to be equal-interval in nature. The SMHA consists of the absolute number of letters produced in a one-minute timed copying task that are not confused with any other letter. Thus, the data yielded from the SMHA was also interval in nature.

Since both the Zaner-Bloser and the SMHA yielded equal-interval data, the researcher was able to determine the degree of correlation between these two methods for assessing legibility of cursive handwriting. The Zaner-Bloser scale was converted to a number scale: AA=7, A=6, B=5, C=4, D=3, E=2, F=1; the SMHA process yielded data consisting of the absolute number of cursive letters produced in a one-minute timed copying task that were not confused with any other letter. Each judge compiled scores for each subject using the Zaner-Bloser method and the SMHA process. Then the Pearson Product Correlation Coefficient for the two methods was determined for each judge. The correlation resulted in $r=.82$ for each of the judges. The validity of the SMHA was established in this manner. (See Table A at the end of this section for the validity coefficients of the Zaner-Bloser and the SMHA.)

APPENDIX C (cont.)

In order to establish the reliability of the SMHA process, the researcher presented a two-hour inservice training session to three potential study judges on how to use the SMHA. After the inservice training session, the three potential judges were asked to score five handwriting samples according to the SMHA. Interjudge reliability coefficients for the five handwriting samples ranged from r=.97 to r=.99. Based on these results, the SMHA process for assessing adult cursive handwriting legibility was considered a reliable assessment tool for use in the study. (See Table B at the end of this section for the interjudge reliability coefficients for the pilot-study using the SMHA process.)

APPENDIX C (cont.)

Table A

Validity Coefficients between

the Zaner-Bloser and the SMHA

Subject	Judge X[a]		Judge Y[b]	
	Z-B	SMHA	Z-B	SMHA
A	6	104	6	102
B	5	95	6	95
C	5	90	5	91
D	3	60	2	61
E	3	75	3	75
F	3	74	4	74
G	3	80	4	81
H	1	50	1	48
I	4	76	4	78
J	6	94	5	92
K	3	65	4	65
L	7	103	6	104
M	2	60	2	60
N	4	79	4	79
O	5	88	5	88
P	4	92	5	92
Q	3	79	4	78
R	4	79	4	79
S	5	92	5	90
T	3	69	3	67

[a] $\underline{r}$=.82 for Judge X.

[b] $\underline{r}$=.82 for Judge Y.

APPENDIX C (cont.)

Table B

SMHA Pilot-Study Scores

for Calculation of

Interjudge Reliability Coefficients

Sample	Judge 1	Judge 2	Judge 3
A	97	98	98
B	58	54	51
C	91	91	92
D	73	71	67
E	81	87	88

r (1,2)=.98

r (1,3)=.97

r (2,3)=.99

APPENDIX C (cont.)

Response Form

You can very quickly judge the excellence of a person's handwriting by analyzing the letter formation, spacing, slant, and alinement.

You can very quickly judge the excellence of a person's handwriting by analyzing the letter formation, spacing, slant, and alinement.

Raw Score _____

Student Number_____ Less Errors _____

Total Score _____

APPENDIX D

Information Chart for Section A

Student I.D. #	Sex	Raw Score Spelling	Raw Score Handwriting Speed	Raw Score Handwriting Ability
101	M	28	85	72
102	F	30	87	73
103	F	35	134	116
104	M	28	104	53
105	F	31	97	83
106	F	38	109	92
107	F	34	94	72
108	F	32	97	83
109	F	19	143	125
110	M	40	95	89
111	M	35	73	65
112	M	27	85	65

APPENDIX D (cont.)

Information Chart for Section B

Student I.D. #	Sex	Raw Score Spelling	Raw Score Handwriting Speed	Raw Score Handwriting Ability
201	M	25	85	71
202	F	32	67	57
203	M	27	67	52
204	M	36	80	63
205	F	32	79	70
206	M	32	154	115
207	F	41	109	81
208	F	31	87	60
209	F	33	64	58
210	F	32	92	76
211	M	18	70	59
212	M	30	83	74
213	M	25	112	60
214	F	32	131	95

Appendix D (cont.)

Information Chart for Section C

Student I.D. #	Sex	Raw Score Spelling	Raw Score Handwriting Speed	Raw Score Handwriting Ability
301	M	25	67	60
302	F	35	85	80
303	M	27	109	71
304	F	38	100	56
305	M	31	56	45
306	M	33	97	83
307	M	22	97	73
308	F	30	109	76
309	M	32	35	29
310	M	33	97	34
311	M	37	76	64
312	M	33	119	92
313	F	31	112	89
314	M	33	85	49

APPENDIX D (cont.)

Information Chart for Section D

Student I.D. #	Sex	Raw Score Spelling	Raw Score Handwriting Speed	Raw Score Handwriting Ability
401	M	36	109	66
402	F	31	80	67
403	M	21	85	60
404	F	33	96	85
405	M	23	92	70
406	F	31	109	77
407	M	33	76	60
408	F	37	107	97
409	F	23	109	63
410	F	37	115	58
411	M	31	102	82
412	F	20	97	65
413	M	36	109	80
414	M	28	49	26
415	M	21	56	32
416	F	32	85	56

APPENDIX D (cont.)

Information Chart for Section E

Student I.D. #	Sex	Raw Score Spelling	Raw Score Handwriting Speed	Raw Score Handwriting Ability
501	F	29	109	81
502	F	36	92	72
503	F	30	100	85
504	F	27	109	65
505	M	34	100	80
506	M	20	112	75
507	F	32	119	79
508	F	33	100	78
509	F	35	97	81
510	F	31	77	70
511	F	36	92	72
512	M	35	92	77
513	F	28	84	54
514	F	23	97	75
515	F	29	115	81

APPENDIX D (cont.)

Information Chart for Section F

Student I.D. #	Sex	Raw Score Spelling	Raw Score Handwriting Speed	Raw Score Handwriting Ability
601	M	31	92	57
602	F	36	100	90
603	F	29	90	72
604	F	37	97	88
605	F	25	94	50
606	M	27	105	75
607	M	33	109	86
608	M	29	112	49
609	F	31	105	97
610	M	24	92	73
611	F	31	126	82
612	F	33	120	90
613	F	29	131	55
614	F	26	126	104
615	F	32	109	67
616	M	31	126	59
617	M	34	131	93