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REMEDIATING SPELLING WITH
CALLIGRAPHIC SKILLS

A Project Report
Presented to
The Graduate Faculty
Central Washington University

In Partial Fulfillment
of the Requirements for the Degree
Master of Education

by
Evelyn A. Heflen
May, 1983

REMEDIATING SPELLING WITH
CALLIGRAPHIC SKILLS

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In an effort to provide the remedial spelling student with visual-tactile-kinesthetic input, a model of spelling instruction which uses calligraphic equipment and skills was devised. Results from a pretest-posttest control group design revealed supportive evidence for the model.

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CHAPTER ONE

Introduction

Statement of the Problem

Spelling is a cause for concern in today's schools, from the elementary grades through college. Though there is a recurring push toward spelling reform (the changing of English spelling to be more phonetically regular) and an increase in the availability of word processors and other mechanical means of correction, educators tend to feel that they still must teach students how to spell. The ability to use the right words, and to spell them readily, is a basic prerequisite for written expression. Spelling is necessary for passing written examinations and completing job applications. As much as educators might sometimes wish that the need for spelling would disappear, it doesn't.

Though it has been noted for years that there are those who are educated and intelligent but who can't spell (Bronner, 1918; Charters, 1910; and Hollingworth, 1918), bad spelling is universally regarded as a symptom of illiteracy. While less spectacular than failure to read, a marked spelling disability is a handicap in student and adult life. Spelling is so easy for many people, and taken for granted, that one who fails at such a skill is assumed to be very ignorant or very careless. These assumptions, together with

the ridicule accord poor spellers, cast a stigma upon them which is difficult to erase. Many people are embarrassed throughout their lives when it is necessary for them to write. Older students can become so overwhelmed by helplessness in representing thoughts in symbols (spelling), that they are unable to write at all. Though they know the subject matter in a science or have intriguing ideas on a composition topic, the frightened students with a spelling disability may write almost nothing. When they do write, they repeatedly redo sentences so as to be able to use words they can spell, in itself a time-consuming process. To make things worse, this failure is seldom attributed to spelling disability; instead, these students are thought of as lazy or unstudied, and fail the subject. Furthermore, thought is clarified by the processes of organization and expression. When too little can be written to make comprehensive organization possible, thought itself remains clouded (Gillingham & Stillman, 1940).

In some students, failure to spell and the concomitant frustration on the part of teacher and student, leads to an emotional blocking of expression, which can extend to all aspects of school, not just language arts. This syndrome was noticed by Orton in 1937 and has not lessened since. Gillingham & Stillman (1940), explaining that their work is toward those who have "high academic potentialities," state:

No group known to us in long experience is subjected to more subtle and poignant cruelty by those endeavoring to educate them than are the children with high abstract intelligence who are thwarted by a specific reading and spelling block. With minds eager for the knowledge contained in books and ambitious for success, furthermore with a consciousness of mental power which makes frustration doubly maddening, they must see themselves day by day held back by this purely formal barrier and feel the humiliation, if not the reproach, of their parents, the accusation of carelessness from their teachers, and their classmates' scorn. To the onlooker it appears so obvious that they could if they only would. Few experiences in teaching are more exasperating than to go over and over the same page and hear a highly intelligent child make the same mistakes day after day, when the teacher has no understanding of the cause. From this exasperation of parent and teacher very many child tragedies develop. Feelings of inadequacy are often converted into conviction of deep guilt. (pp. 13-14)

Remedial training in spelling is, then, imperative, and for more fundamental reasons than is usually supposed.

As clearly as they know that they must teach students how to spell, educators know that they are not succeeding at the task. Horn (1960) in a review of spelling for the Encyclopedia for Educational Research reports a decline of spelling scores since 1915. Although the objectives of a spelling curriculum are clear--knowledge of the words used in one's writing, many conflicting (or perhaps complementary) theories are put forth as reasons for the failure to meet those objectives. And as many suggestions for changing the curriculum and methods of teaching are offered.

Spelling research, as chaotic as it is, falls into four broad areas:

1. WORD SELECTION considers issues such as whether spelling instruction should place emphasis on frequently used words or phonetically correct ones; memorization versus equipping the student to spell unfamiliar words under varying conditions; which of the 600,000 words in the English language should be taught; and grade placement of words, by difficulty or by frequency of use.

2. GENERALIZATIONS TO BE TAUGHT (OR NOT) considers ideas such as whether English orthography is regular enough to teach phonetically, which groups of words should be presented together, whether rules should be taught formally or discovered by pupils, how the study of linguistics can contribute to spelling instruction, and whether phoneme-grapheme relationships should be stressed.

3. THE RELATIONSHIP OF SPELLING SKILLS TO WRITING debates issues such as teaching by word lists or context, incidentally or directly, systematically or opportunistic-ally, casually or formally, and how--and if--there should be an integration of reading, writing, and spelling instruction.

4. THE LEARNING PROCESS AS IT RELATES TO SPELLING is divided into two aspects, learning as it applies to classroom methods, and learning as it applies to the individual student.

The first area, classroom methods, is concerned with such things as pretest-study versus study-test, the value

of materials such as flash cards, the learning that occurs by listening to the test being corrected, age readiness, length or retention, and number of repetitions which should be in a review.

The second area, individual methods, considers visual perception, auditory perception, multisensory learning, modality preference, study skills, the use of manuscript versus cursive, right brain--left brain, presentation time, variety to accomodate differences, visualization, imaging, and types of spelling mistakes.

The bulk of writing in educational journals (and traditional teaching) revolves around the first three areas of research, and writing in educational psychology deals with the first part of number four; but these areas are only directly related to the present study. The review of literature which follows will be centered on the second area of number four, the learning process itself, as it applies to methods for individuals to succeed at spelling.

Review of Related Literature

Spelling and Specific Learning Disabilities

Spelling is somewhat of a mystery and an enigma, which makes remedial spelling complex. Poor readers are almost always poor spellers (Gillingham, 1940; Stanback, 1980), but superior readers may be poor spellers, too. All developmental dyslexics (Note 1) are notoriously poor spellers,

but the spelling problem is not confined to the dyslexic. Nor is spelling ability correlated with intelligence, as many school subjects are (Hollingworth, 1918). Some of the literature is aimed at helping those with specific learning disabilities such as dyslexia, some is not. Specific learning disability (Note 2) is a term applied to extreme, debilitating cases of disorders or problems which exist to a lesser degree in those who are classified normal. It is hard to say how many have a specific language disability in spelling, because no sharp lines can be drawn (Note 3). All of us are somewhere on the continuum which has at one end those who can learn to spell easily and perfectly, and at the other end those who seemingly cannot learn to spell at all, at least by any known method. The disability issue aside, the literature reviewed in this study deals with poor spellers who have normal or above normal intelligence, but who, for various reasons, have failed to learn adequate spelling by popular classroom methods.

The Psychology of Spelling as a Multisensory-Multimotor Activity

There are no simple answers to the question, "How do we learn to spell?" However, there are dynamic principles of learning which can be taken into account to improve spelling instruction. When we know what goes on in the bodily mechanisms of students when they spell, we can then

ascertain what elements are effective, what are ineffective, and can use appropriate methods of instruction.

The activity of learning to spell is a multisensory-multimotor activity, a process of learning through the simultaneous use and reinforcement of such modalities and motor mechanisms as eye, voice, ear, muscle, and touch. This current concept has been developing for almost one hundred years.

In 1885, Cattell (cited in Sokal, 1981) worked on the nature of perceptual reactions in reading.

In 1909, Abbot and Kuhlman (cited in Bronner, 1918) studied experimentally the psychological elements involved with spelling, trying to discover success that follows auditory presentation of words as compared with visual, and to discover differences when these processes were accompanied by other motor reactions, such as the movement of the hand in writing the word.

In 1918, Bronner published The Psychology of Special Abilities and Disabilities, in which she spoke to the cause of recognizing differences in individuals, and "enumerating the types that are practically important."

In 1918, Hollingworth defined the process of learning to spell as involving the formation of a series of "bonds," wherein the separate symbols (letters) become associated with each other in the proper sequence, and have the effect of calling each other up to consciousness in the proper

order. The student, she said, by a voluntary process, binds the visual perceptions of the separate letters with the muscular movements of hand, arm, and fingers necessary to write the word. She also noted that individual students, equally poor in ability as measured on a spelling scale, needed varying types of help: oral, visual, and written.

In 1943, Fernald listed the psychological processes of spelling as (1) development of a distinct perception of the word, i.e., a consciousness in one or more of the senses, as vision, hearing, or touch, (2) development of a distinct image of the word so that the individual can recall it after the stimulus has been removed, and (3) formation of a habit, so that the process becomes so automatic that the word can be written without conscious attention.

In 1955, Hildreth stated that the following elements play a role in spelling: hearing the sounds in words and distinguishing between the sounds in similar words; getting clear-cut visual impressions of word forms and distinguishing similar words visually; matching sound elements to the symbols representing them; and pronouncing words accurately. She wrote that visual imagery and motor imagery should be emphasized along with auditory perception and oral response.

In 1963, Hanna & Hodges explained spelling as having input (biological, psychological, cultural, and maturational); throughput (communications theory, curriculum,

methodology); and output (behavioral competencies, both physical and psychological).

In 1965, Hodges described intellectual activity, including spelling) as processing information. The information is initially gathered by the sensory mechanisms, then stored within the brain, from which it is selected and processed through series of complex cognitive functions, the result being human behavior. According to Hodges, neurophysiological research indicates that human intellectual processes are series of plans-of-action for responding to situations. These plans develop from one's interaction with the environment and are used when the person responds to a similar situation. Multiple sensory experiences in learning have the advantage of triggering appropriate responses to situations because they enable the individual to select various responses from one or more sensory stimulations. A student who has learned to spell a word by the use of the senses of hearing, sight, and touch is in a good position to recall the spelling of that word when it is needed in writing because any or all the sensory modes can elicit memory of it.

In 1966, Personke and Yee described spelling behavior as proceeding from needs to strategies, involving the following processes: (1) Memory channel, when the student uses only internal input such as learned responses, generalizations, and word meanings to spell a word and to determine

if it is correct, (2) Checking channel, when the student makes use of outside sources prior to writing the word, (3) Memory-kinesthetic detour, when the student spells words such as "in," "the," etc. with no conscious thought, and (4) Proofreading-rewrite bypass, when the student rewrites the word after consulting external sources. The choice of channels for processing a spelling response will depend upon the specific situation in each case, some channels being more suitable for one situation than for another. However, students who experience difficulty with any of these processes have spelling problems.

So, multisensory experiences and the connection in memory between the various stimuli form the basis of the act of spelling, the relative importance of each sense varying with the individual. Most traditional spelling programs emphasize the aural-oral, and since this sense does not directly apply to the experiment described here, it will not be elaborated upon. The other modalities which will be considered in more detail are the visual, and a combination of the tactile (sensations from touch) and kinesthetic (sensations from muscles and tendons, by which muscular motion and position are perceived), or haptical.

Visual

The early researchers noticed a difference in the way good and poor spellers perceived words, and taught remedial spelling by requiring students to spend more time

scrutinizing the correct form of a word (Brown, 1913; Carman, 1900; Gates, 1911; Hildreth, 1955). The researchers have realized from the beginning however, that it is not visual acuity that makes a good speller, but effective visual perception and imagery.

Though remedial techniques supplement (Fernald, 1943; Gillingham & Stillman, 1940; and Orton, 1937) or even temporarily eliminate (Bannatyne, 1971; Blau & Blau, 1968; Loveless & Blau, 1980) the visual modality, good spellers seem to be distinguished by their immediate memory span for meaningful visual stimuli (DeBoer, 1961; Peters, 1970).

American-English orthography is based upon the alphabetic principle--the principle that speech sounds (phonemes) have graphic counterparts in writing (graphemes). In contrast to orthographies that employ graphic symbols to represent larger units of language such as syllables or morphemes, an alphabetically based orthography entails the encoding of phonemes into graphemes (spelling), a task that is compounded in American English because of its surfeit of graphemic options (Hanna, Hodges & Hanna, 1971; Hodges, 1963).

Encoding speech into writing involves formulating graphic symbols that can be read by the writer and by others. This calls vision into the activity. Visual memory of the spellings of phonemes and of whole words is an important ingredient in learning to spell.

For some learners, the visual process is the pre-dominant learning mode. Such persons learn to spell primarily by looking at the graphemes which form the written word, storing a visual image of the word in their brains. Since many of the words that the student will use in writing are introduced through the medium of print, visual learners have abundant visual memories to help encode phenomes into their written counterparts.

Knowledge of serial probability (letter sequences) depends on visual perception of word form, which involves transfer from visual perceptions and recall through imagery (DeBoer, 1961). Imagery is of very great importance in spelling. Through practice, students store up mental images of words, just as they do faces and telephone numbers. It is possible for a learner's preferred form of imagery to be visual, auditory, or kinesthetic. Recall, whether immediate or delayed, invokes imagery of some kind, and the shorter the exposure and the longer the sequence exposed, the more the individual must rely on some form of imagery to reconstitute the sequence. Training can help to retrieve the image in the cause of spelling. Given two weeks' training, Redaker (1963) found that after one year the imagery trained groups scored significantly higher on spelling tests than did the control group, showing that visual imagery is successful in improving spelling performance over longer periods of time.

Haptics

Though the haptic sense modality is the least utilized in traditional spelling programs, some students are predominantly what Hanna, Hodges and Hanna (1971) call "hand-minded." These students learn to spell primarily through the physical act of writing, as that act involves the muscles and nerve endings in the fingers and arm, such that a network of sensorimotor impressions (motor imagery) is created in the central nervous system.

Haptical memory is fundamental to the mastery of activities such as tying and the reading of Braille. And although spelling ability normally is not so expressly dependent upon haptical experiences, sensorimotor impressions created by the writing of graphemes are relayed to the brain as a third kind of memory in all types of learners, a haptical record that--in combination with oral and auditory and visual recollections of words--aids in the multisensory-multimotor act of spelling.

Language--including spelling--depends upon the complicated associations of visual, auditory, kinesthetic, and tactile records on the sensory areas expressing themselves along the motor paths to speech organs and hand. No matter what linguistic analyses, appropriate words, and motivators are used in a spelling program, the program will not be completely effective unless the sensory modalities and motor

mechanisms of ear, eye, voice, and hand are used, to fix the spelling of words in the student's central nervous system.

At the beginning of formal education in the United States, in Colonial times, spelling was the focus of literary training, being taught at the same time as reading, from the same book, in a multisensory fashion. (The students spelled, pronounced, and wrote on their slates.) In the 1840's, the whole-word approach to reading began to be popular, and around 1880, the practice of learning the alphabet and using spelling as an initial step in reading was abandoned. Stanback (1979) reports that

concurrent with praise for the new reading method as saving children years of drudgery, concern was expressed because the children couldn't spell the words. Then a few years later there was a growing dissatisfaction, that, although children taught by the word method learned to read faster initially in the first three grades, they did not read or spell well in the upper grades.

Perhaps the abandoning of structured, multisensory spelling programs has led to the need for structured, multisensory remedial spelling programs.

Remedial Spelling Instruction Programs

That learning to spell involves several modalities leads to the next conclusion, that when one modality is blocked, or is simply not the preferred mode of learning, the other, stronger modalities must be brought to the learning process. For normal spelling students, the sounds, sights and feel of words to be spelled are stored in the

brain and integrated to give a cognitive impression of them. But such is not the case with some individuals whose ability to discriminate speech sounds is poor, or whose visual memory is elusive.

The classroom teacher may not know a lot about the causes, identification or remediation for sensorimotor deficits, but if a learning situation is provided in the classroom in which all of the pertinent sensory modes are used, students will be able to draw upon those most appropriate for them. It must not be supposed that these various opportunities, or even special techniques, will remove the causes for a specific disability, but that by using means appropriate to the student, failure will be averted and the student will be able to spell.

The V-A-K-T (Visual, Auditory, Kinesthetic, Tactile) approach is a practical and successful way of dealing with disabled spellers. Pioneered by Dr. Grace Fernald (1943) of U.C.L.A. in the 1930's, the method has been used and refined by many. Instead of relying upon one or a few areas of the brain (those which process auditory and visual information), this technique makes use of the maximum (those which process auditory, visual, oral speech, tactile and kinesthetic), and makes use of coordinated sensory input (Heinze, 1978). All of the modalities feed information on spelling to the brain.

The students are introduced to a consciousness of two senses they have probably never used before in spelling: the tactile and the kinesthetic. The students are taught to "trace," with their fingers, words which have been written blackboard size on strips of paper. They use a pressure they can feel, and simultaneously pronounce the word. They do this three to fifteen times, until they think they know the spelling; then they cover the slip of paper and trace the word with their fingers, on the table, saying the word simultaneously. If they are certain of the spelling, they write it with a pen on a piece of paper. The spelling is then checked with the word slip. The process of covering, writing, and checking is done a minimum of three times. If a mistake occurs, the misspelled word is crossed out, and the tracing-saying repeated. The word is not copied, which would defeat the purpose of developing recall.

Gillingham and Stillman (1940), working under the direction of Dr. Orton (1937) developed a program for the coordinated teaching of reading and spelling to dyslexics. (Spelling is treated as the exact reverse of reading.) They differ from Fernald in that they start training with small units rather than whole words, and stress words which are spelled consistently, and use letter names rather than sounds, so that the same technique may be used later for nonphonetic words. The technique, called SOS (Simultaneous

Oral Spelling) has students pronounce the word, spell it orally, then write the word, saying the letter names as they write.

Bannatyne (1971) developed a system which combines some features of Fernald (no letter names) and some of Gillingham (words of similar spelling are taught together). In Bannatyne's system, the students pronounce the word carefully (no visual); pronounce the word, separating the phonemes; study the visual word, separating graphemes to match phonemes; articulate phonemes as the teacher points to graphemes in sequence; write the graphemes as lightly spaced units while articulating the phonemes in rhythmic sequence; practice using this technique, with copying and tracing, if necessary, until the word is fixed in their minds.

Childs (1971) has reorganized and simplified some of the Gillingham procedure.

Slingerland (1966) has adapted the Gillingham approach for classroom use, and has students tracing in unison in the air.

Spalding and Spalding (1972) have a program which follows the Gillingham tradition of teaching individual correspondences of the phonemes, and uses much practice, with varying modes of presentation and response (Visual-Auditory-Kinesthetic). All words for reading are learned first through spelling.

Calligraphic Techniques

Calligraphy means "beautiful writing" (Gr. *kalli-graphia*), and in the broad sense would include all lettering forms well executed. The form used in the present experiment was "Roman" (see Figure 1). The reasons for using lettering, and this particular form, as a means of V-K-T (Visual, Kinesthetic, Tactile) input for spelling are as follows:

Visual. The letters are drawn 5/8 inch high (two lines of regular, ruled notebook paper) with black ink. This makes the image larger, sharper, and of more contrast than penned or pencilled letters written in a normal hand.

The presentation time is much slower, which positively affects retention.

The letters, drawn with an inexpensive chisel-tip pen, have regularly occurring thick and thin parts, making the letters legible, similar to book print, and making the d and b, and the p and q not the exact mirror image of each other (see Figure 1).

Kinesthetic-Tactile. In the calligraphic technique, the letters are actually drawn, several strokes to a letter (see Figure 2), exposing the internal structure of words to the student. The strengths of the student must be built upon. Some persons who have trouble with language skills have above average ability in spatial skills (Stanley & Watson, 1980; Witelson, 1977). By combining their strengths

Roman abcde
Italic abcdefg
Gothic abcde

Figure 1. Lettering Styles.

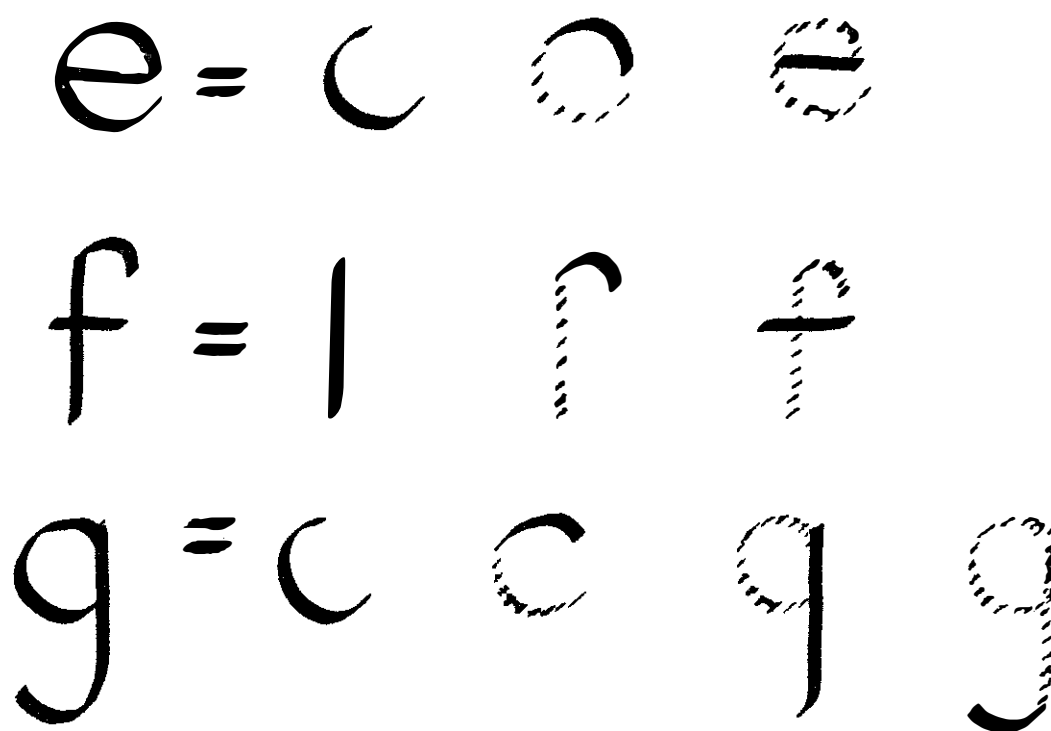


Figure 2. Examples of Roman letters drawn in several strokes.

in spatial processing with consistent practice in language, the opportunities to improve are increased.

The position of the arm and hand, and the degree at which the pen tip must be slanted on the paper are necessarily exact for the correct execution of the letters. The sloppy, all-letters-look-alike condition of many students' handwriting (a condition especially prevalent among poor spellers) is simply not possible in lettering.

Respectability

Fernald (1943) has stated that her tracing procedure must be used long enough and consistently enough to make a difference in the student's cognition. She tells of older students trying to trace in a regular classroom setting and feeling awkward about it. Lettering is a popular, admired skill about which students would not feel awkward, and which they could use long and consistently. The effect of positive attitudes toward a teaching-learning technique must never be underestimated, particularly with older students (Gillingham & Stillman, 1940; Hildreth, 1955).

Roman

The decision to use the Roman form of lettering, from a choice of several, including the popular Italic (see Figure 1), was based on its familiarity; its similarity to book print; the fact that it is vertical, rather than complicating a student's efforts with precise slants; and the fact that it can be taught to perfection, both upper and

lower case, in two to three hours (three 50-minute class periods) to students above age 10.

Purpose of the Study

The purpose of this study was to determine whether calligraphic techniques would provide remedial spellers with V-K-T (Visual, Kinesthetic, Tactile) input of sufficient strength to make a significant difference on their spelling scores.

Statement of the Hypothesis

Poor spellers who practice words using calligraphic pens, writing the Roman form of lettering, will remember the words longer and better than will those who write them with a regular (uniform width) pen, writing the way they normally do.

Null hypothesis: There will be no significant difference between the spelling memory of poor spellers who practice words using calligraphic pens, writing the Roman lettering, and those who practice the words with a regular pen, writing the way they normally do. Any difference found will be the result of chance of sampling error.

CHAPTER TWO

Method

Subjects

The subjects for this study were 22 Central Washington University students, freshmen and sophomores, who were enrolled in English 100.S, Remedial Spelling, Winter Quarter, 1983, and who were in a class which used the EIDOS spelling program (see Instruments section, below).

Instruments

The pretest and the posttest normally used in English 100.S were given. Though the tests cover a wide range of sounds, and are used for sounds diagnosis, for the purposes of this experiment, the score was only the number of words missed.

The pretest, the diagnostic test used to place the students in one of four program choices (EIDOS, Practice, Tapes, or Special Remediation), is from the Mechanics of Spelling (Milholland & Mitchell, 1976).

The posttest, also a diagnostic test, is from the EIDOS program (Howard & Cummings, 1978).

Copies of the pretest and the posttest are included in Appendices A and B.

The EIDOS program, the regular program in which the subjects were enrolled, and to which the pretest experiment

was an addition, involved two hours of class per week, and the completion of a workbook, which involved writing words, filling in blanks, separating suffixes and prefixes, and writing rules.

Design

The basic experimental design of

0 X_1 0

0 X_2 0

0 0

pretest-posttest was used.

Procedure

Random selection of subjects was not possible, as the experiment required 50 minutes per week of student time in addition to time spent in class. Each of the 22 students in the EIDOS class described above was given the opportunity to volunteer for the experiment. Three different time slots were offered. The students were told that they would be taught lettering skills, were told the hypothesis of the experiment, and were asked for eight-weeks' commitment, in which they would attend the extra, 50-minute weekly session to practice their words with lettering.

The experimental group of 10 students was taught the Roman lettering style (see Figure 1) in two 50-minute periods, and shown how to use it as a practice technique for remembering the spelling of words. After the first two teaching periods, the students spent their weekly time

lettering words from their workbook lists (see Instruments section, above).

A "placebo" group was formed to counteract the "Hawthorne effect" that the experimental group might improve due to extra attention and time. The three students in the placebo group were taught, in two 50-minute periods, the Gothic lettering style (see Figure 1). Gothic is carefully drawn, is large, and is made with special pens, and so would have some advantages of the Roman (see Calligraphic Techniques section in Review of Literature), but it is of uniform width, like large pencil printing. Like the experimental group, the placebo students spent their weekly time lettering words from their workbook.

The students in the EIDOS classes who did not volunteer for the experiment, or who wanted to volunteer but could not attend any of the available time slots, were considered the control group.

Assumptions

It is assumed that none of the experimental or placebo or control subjects had previous or concurrent training in lettering, and that none of the control group was using any such training, if it did exist, as an aid to spelling success.

Limitations

The study lasted eight weeks. The duration of English 100.S, from which the subjects were drawn, was nine weeks,

and it took one week to contact subjects and coordinate schedules.

The use of volunteers may have affected the results; these students may have been more highly motivated, and may have just practiced more due to the use of the lettering skills, which many people consider an enjoyable hobby. The "placebo" group was formed to help differentiate this (see Procedure section, above).

The groups were not randomly formed, being formed of volunteers. However, everyone had a chance to volunteer, and the groups were formed by the (random) times students were available.

The dropout rate was extremely high. Due to schedule changes and other demands of student life, of the thirteen who began the experiment, only three completed at least four 50-minute periods, which this experimenter considers to be the minimum treatment. Of those three, one dropped out of English 100.S, and did not complete the posttest. That left two--one in the experimental group and one in the placebo group--who actually completed the experiment.

CHAPTER THREE

Results

The scores for the control group do not form a normal curve, therefore standard deviation is not applicable. Since only one person in the experimental group and one in the placebo group completed the treatment, comparison of group scores is not possible.

However, since the treatment did seem to work for the experimental and placebo individuals, data is presented in such a way that scores of these individuals can be compared to scores of members of the control group who are similar to them. Subdivisions compared are Male, Female, those who missed 40 percent or more on the pretest, and those who missed less than 40 percent on the pretest.

Data are presented statistically in Table 1 and graphically in Figure 3.

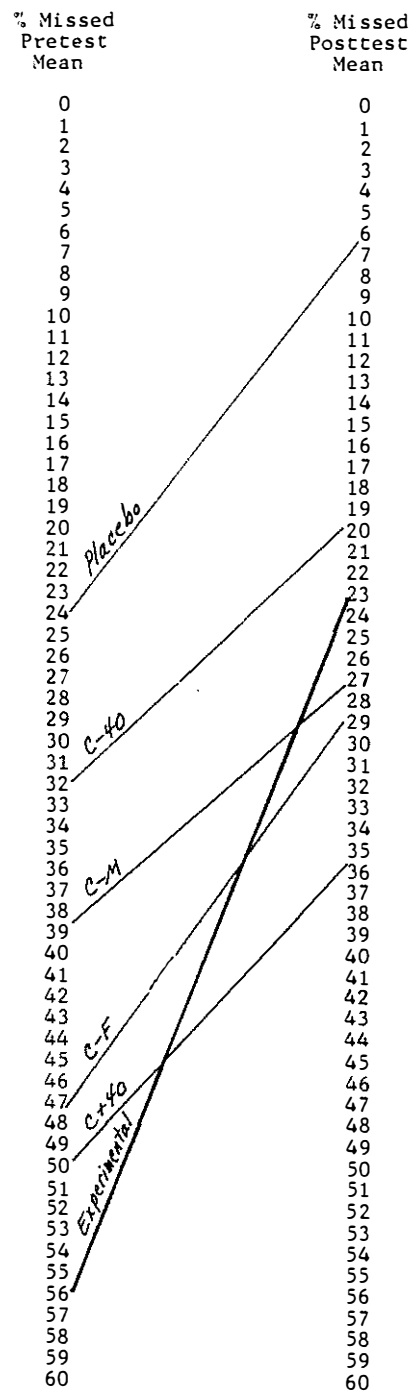
Concurrent Case Study

A student who was not enrolled in the spelling program heard about the experiment and asked to receive the treatment. She was a diagnosed dyslexic (see Note 1), and was having great difficulty with weekly quizzes in Geology 145, where she had to fill in blanks with the names of rocks and geological terms, spelled correctly.

Table 1
Means for Groups on Pretest, Posttest, Percent
of Improvement, and T Scores

Group	Pretest % Missed Mean	Posttest % Missed Mean	Percent Improvement Mean	<u>T</u> Mean
E	56.0	23.0	33.0	75.2
P	24.0	06.0	18.0	59.1
C-F	47.6	28.8	18.8	60.1
C-M	38.9	27.1	12.6	52.5
C+40	50.2	35.6	14.6	55.5
C-40	32.0	19.5	12.5	53.3

Key: E = Experimental Individual (Female, +40% missed on pretest)
P = Placebo Individual (Female, -40% missed on pretest)
C-F = Control Group, Female (5 students)
C-M = Control Group, Male (15 students)
C+40 = Control Group, Missed 40% or more on pretest (10 students)
C-40 = Control Group, Missed less than 40% on pretest (10 students)



Key: (Same as Table 1)

Figure 3. Groups Mean Improvement from Pretest to Posttest.

During her weekly 50-minute period, she lettered the names of the rocks and terms she could expect to be asked in the quiz that week. Her scores improved remarkably:

<u>Week</u>	<u>Quiz Score</u>
1	20%
2	48%
3	20%
-----Began lettering	
4	83%
5	85%
6	100%
7	95%
8	90%

CHAPTER FOUR

Discussion

Conclusions

Results of this study suggest the following conclusion: There was a statistically significant difference in the posttest scores of the experimental subject, the placebo subject, and the control group. The null hypothesis cannot be accepted. However, the limits of this study preclude any widespread, general conclusions.

Recommendations

It is hoped that the present study will lead to appreciation of the need for greater study in this area, and will stimulate other efforts in this direction. Replication of this study is recommended, incorporating the following recommendations:

1. The experimental group should contain at least 15 subjects.
2. The treatment should extend over four weeks, minimum, and preferably longer.
3. The treatment should occur with more frequency than once a week, preferably daily or tri-weekly.
3. More control over variables is recommended. This might be accomplished by the random selection of 1/2 of a

large class, who are taught in the same way except for the addition of the treatment.

5. In the present experiment, the lettering was done entirely outside of class (Spelling 100.S), the only connection being that the words which were lettered came from the class workbook. It is possible that a control group would obtain higher scores if the lettering were more intimately involved in class activities. At any rate, drop out would be reduced, and results would be more appropriate for generalization.

6. Since the placebo individual scored higher than the control group, but not as high as the experimental group, a study of several groups, each using a different lettering style (see Figure 1) might yield informative results.

7. The concurrent case study (see Results section) which used lettering as a memorizing technique had intriguing results. More research in this area is recommended.

8. The administration of a learning style/aesthetic preference inventory (such as Dunn's) and the subsequent comparison of scores might reveal which types of learners profit most from this treatment.

CHAPTER FIVE

Summary

This study was conducted at Central Washington University in a class of English 100.S, Remedial Spelling, and involved 22 freshmen and sophomore students.

The purpose of the study was to determine whether calligraphic techniques would provide remedial spellers with V-K-T (Visual-Kinesthetic-Tactile) input of sufficient strength to make a significant difference on their spelling scores.

Results from a pretest-posttest control group design revealed supportive evidence for the hypothesis; however, the limitations of the study, particularly the dropout rate in the experimental group, preclude any widespread, general conclusions.

Recommendations regarding further research include an experimental group size of at least 15 subjects, treatment as frequent as daily, more control over variables, and the use of varying lettering styles.

Reference Notes

1. The term "dyslexia" is usually employed to refer to reading disabilities, but it carries the etymological connotation of Orton's (1937) "strephosymbolia," a condition in which the student twists the symbols contained in words. Faas (1981) lists the following possible symptoms which would cause or exacerbate spelling difficulty: trouble learning and retraining the appearance of letters, inability to differentiate, interpret or remember the words that are seen, tendency to reverse letters, symbols and words, tendency to invert letters, trouble retrieving the visual image of a letter or word from memory when it is heard, trouble remembering the order in which visual stimuli are presented, difficulty learning and retaining the sounds of letters, inability to distinguish similarities and differences between sounds or to perceive sounds within a word or discrimination between similar sounds and words, inability to understand sound-letter correspondence, inability to remember the order in which a sequence of auditory stimuli was received.
2. The definition included in PL94-142, the Education for All Handicapped Children Act of 1975 is as follows:

The term "children with specific learning disabilities" means those children who have a disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, which disorder may manifest itself in imperfect ability to listen, think, speak, read, write, spell, or to do mathematical calculations. Such disorders include such conditions as perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia. Such term does not include children who have learning problems which are primarily the result of visual, hearing, or motor handicaps, of mental retardation, of emotional disturbance, or of environmental, cultural, or economic disadvantage.

3. The 1979 specific learning disability criteria for the State of Washington was as follows: ". . . a deficit of greater than or equal to 1 1/2 standard deviations below the mean or a functioning level of 2/3 or below chronological age/grade performance" (Washington Administrative Code, 1979).

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Appendix A
Words Used in Pretest

- | | |
|----------------|-------------------|
| 1. skip | 26. spaghetti |
| 2. spacing | 27. techniques |
| 3. trek | 28. intrigue |
| 4. wasteful | 29. amplifier |
| 5. compelling | 30. defying |
| 6. forgotten | 31. alignment |
| 7. spiny | 32. thorough |
| 8. bracket | 33. patrolling |
| 9. chrome | 34. paralyzed |
| 10. picnicking | 35. furlough |
| 11. unique | 36. exploit |
| 12. opaque | 37. residue |
| 13. itemize | 38. vacuum |
| 14. knack | 39. neutral |
| 15. jarring | 40. separate |
| 16. glared | 41. aspirin |
| 17. swirl | 42. accessory |
| 18. halves | 43. dismissing |
| 19. shoveling | 44. orientation |
| 20. dredger | 45. spontaneous |
| 21. phonograph | 46. conscientious |
| 22. freight | 47. serviceable |
| 23. claim | 48. stupefy |
| 24. canal | 49. eligible |
| 25. receipt | 50. reversible |

Appendix B

Words Used in Posttest

- | | |
|-----------------|------------------|
| 1. campaign | 27. jeopardize |
| 2. weight | 28. aisles |
| 3. tavern | 29. loathe |
| 4. ambassador | 30. drought |
| 5. fasten | 31. browse |
| 6. parliament | 32. heirloom |
| 7. philosophy | 33. ineffectual |
| 8. compound | 34. pneumonia |
| 9. courteous | 35. assurance |
| 10. skiing | 36. nephew |
| 11. beauty | 37. immersion |
| 12. werewolves | 38. tongue |
| 13. embroidery | 39. whittled |
| 14. peasant | 40. wrenched |
| 15. united | 41. exquisite |
| 16. bicycle | 42. wholly |
| 17. sympathy | 43. adjudge |
| 18. circuit | 44. pyrotechnics |
| 19. foreign | 45. appendix |
| 20. employees | 46. acquisition |
| 21. undoubtedly | 47. rheumatism |
| 22. crooked | 48. shearer |
| 23. despair | 49. youngster |
| 24. heartache | 50. distinguish |
| 25. guarantee | 51. unknowable |
| 26. engineering | 52. immeasurable |