

AN ABSTRACT OF THE THESIS OF

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FOR IMPROVING SPELLING IN HIGH SCHOOL AND COLLEGE:
A TWENTY-SIX CLASSROOM EXPERIMENT

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This study compared two self-instructional methods for improving spelling in high school and college: a traditional-deductive presentation of spelling rules and lists of words to exemplify each rule versus a programmed-inductive presentation leading the learner to observe the spelling behavior of words and to make generalizations.

Both the traditional-deductive and the programmed-inductive materials had been initially prepared for use in non-credit, self-help, corrective spelling classes at Oregon State University. Both emphasized the predictable behavior of common word roots adding suffixes to form common derivatives. Each presented the regularities of language. Neither attempted instruction in the irregularities called "spelling demons."

In booklet form, the programed materials comprised eight sequential units in vertical, linear format whose 130 frames required written responses and provided immediate reinforcement and continuous knowledge of results because each frame carried its own answer. They made no provision for error because steps were small and the purpose of instruction was to make spelling so clear that success was assured.

The hypothesis of the study was that if during experimentation and comparison a difference in performance in spelling appeared between the two modes of self instruction, the difference would favor the programed-inductive method.

The hypothesis was tested by 606 high school and college students in 26 paired experimental classrooms, one class of each pair using the traditional-deductive mode of instruction, the other the programed-inductive. An additional nine classrooms without match-mates raised the aggregate number to 842 students in 35 classrooms and provided additional, useful data. Seven western Oregon high schools and Oregon State University participated in the study.

Findings and Conclusions

1. An analysis of covariance compared the student's raw score on the Traxler High School Spelling Test, Form 1, before instruction with his mean score made on 13 tests during instruction but found no

significant difference attributable to method alone. Apparently, method as exemplified in this study was not a decisive variable.

2. An analysis of variance showed that on the terminal Traxler, Form 2, after instruction the boys using the programmed-inductive method made higher scores than did the boys using the tradition-deductive, a difference significant at the .05 level. Method appeared to make a significant difference among boys. No such difference appeared among girls.

3. An analysis of variance showed girls to be better spellers than boys, not only before instruction but throughout and after instruction. In the light of similar findings appearing repeatedly in other studies, a difference favoring girls in spelling would seem to be a characteristic difference between the sexes.

4. A comparison of group means on the percentile norms of the Traxler Tests showed 34 of the participating classes falling short of average performance regardless of scholastic ability. The only group to exceed the norms was a class of university seniors ready to teach English. Students in this study did not spell as well as did their predecessors, the standardization group ten years ago.

5. General improvement resulted from students' self-instructional efforts irrespective of method used. In this study, effort appeared a more decisive factor than method.

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by

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CHAPTER I

INTRODUCTION

Teachers of English in high schools and colleges are aware that many students have difficulty with spelling. They are further aware that the degree to which the difficulty afflicts their students will range from occasional inconvenience for some to severe disability in others.

Area of Concern

To write English, one must be able to combine letters into words according to recognized usage. There is otherwise no written word and, consequently, no written meaning. Being able to spell is an important skill, one that fills much of the student's time during his first six years in school. As a pupil in the elementary grades, he receives instruction in spelling. He studies words and their meanings; he analyzes their structure; he experiments with the relation of sound to symbol; he learns first to read words, then to write them. Spelling, as part of the grade-school curriculum, gets purposeful, careful, deliberate, sequential attention.

At secondary and higher levels of education, however, spelling becomes increasingly a personal problem and less a curricular concern as the student leaves the elementary grades and goes from junior high school into senior high school and thence into college. His proficiency in spelling is assumed, and instruction in spelling disappears from high school and college curricula. Testing of spelling, however, remains at all secondary levels as a means for identifying poor spellers and urging them to improve. Instruction in spelling is relegated to self instruction.

The area of concern in this study is self-instructional spelling. If high school and college students are to instruct themselves to better spelling, with what materials and in what way can they best instruct themselves? The extent of the spelling problem at secondary levels today forces educators to a choice. They must either extend spelling instruction into high school and perhaps even into college as part of the curriculum, or make self-instructional spelling possible, available, feasible, and practical.

Extent of the Spelling Problem

Every teacher of English is aware of the spelling problem. But there is no consensus about how bad the situation is, how much can be expected of students, or how much progress has been made in the teaching and learning of spelling.

Most educators see the situation as deteriorating. The New York State Department of Education (65, p. 9) has expressed the belief that the level of spelling efficiency has not increased as much as might be expected in the light of what research has revealed about the teaching and learning of spelling. A comparison of the percentages of correct spellings of a random sampling of commonly used words from the standards of the New Iowa Spelling Scale of 1955 and the Ayres Spelling Scale of 1915 indicated to them that the pupils of the earlier period were superior spellers. Sifford (84) discovered that the average spelling efficiency of pupils in his study in 1945 was lower than that of comparable pupils 30 years earlier. Fox and Eaton (31, p. 43) studied the spelling ability of 82,833 pupils in grades 2 to 8 in 3,547 teaching units in the city schools of Indiana during the 1944-45 Indiana State Testing Program. They reported that 48 percent of the pupils were retarded in spelling, that 27 percent were performing at grade level, and that 25 percent were accelerated in spelling, as judged by the Stanford Achievement Test Spelling List, Form H3, selected on the basis of its wide standardization and comparable norms from grade to grade. The average retardation was one and a half grades below the expected performance. In a follow-up study, Fox continued to investigate spelling performance among Indiana's school children by looking at data from 101,747 pupils in grades 2 to 8 in 7,681 teaching units in township

schools of the state. The second study provided findings that almost duplicated those of the first. Jones and Holder (51) in 1960 reported that 4800 pupils in the Richmond, Indiana, public schools, grades 3 to 12, showed a median performance below national norms, and that the negative deviation tended to increase through the grades, evidence supporting the report of Morrison and Perry (64) who also found retardation in spelling progressively and persistently increasing at successive grade levels.

Ayer (5) compared high school spelling scores from 1915, 1925, and 1950. Results indicated to him a deplorable falling off in high school spelling ability, and he concluded that high school boys and girls could not spell as well as their parents had spelled when in school.

A survey of freshmen college students showed Pollock (17; 73) that the students were hounded by errors in spelling. An examination of freshmen papers at Illinois has revealed that only one percent of the 1953-1954 crop could write without misspellings.

It has been asked whether college freshmen are better or poorer spellers than their parents who were on campuses 25 years earlier. Furness (33) reported results of a study made by the Department of English at Oregon State College. In the fall of 1955, 1800 freshmen took a 1927 English placement examination. They were outspelled by their 1927 predecessors. In explanation of

similar findings from other studies, Horn (47, p. 1338) suggested that factors which might account for differences in spelling achievement "then and now" are: (1) differences in the population sampled and in the sampling procedures, (2) decreased emphasis on spelling in comparison with other curricular areas, (3) the lower prestige value of spelling among today's students, (4) restrictions in the number and character of words taught, (5) a growing opposition to the systematic teaching of spelling, (6) mistaken interpretations of the values and limitations of incidental learning, (7) widespread advocacy of procedures clearly shown to be inferior, (8) less emphasis on formal aspects in all written work, (9) an allegedly less thorough grounding in phonics, and (10) complacent drift through lack of systematic appraisal. The fact is, he concluded, that the descriptions of curriculum, methods, and achievement in schools in earlier years are not adequate to afford a meaningful comparison, for the country as a whole, with present practices and achievement. It is a mistake, Horn commented, to assume that spelling has declined in all schools. Schools vary widely in achievement, and "then and now" tests show that in many schools spelling achievement is as good as it was in the same schools in earlier years. In some cases, it may even be better than it was.

Interesting statistics came from an early study made by the Oregon State Teachers Association. Called the Medford Study (68),

it made a state survey of spelling achievement, comparing pupils and adults in 1927. It showed that the average businessman at that time was able to spell, off hand, 87 percent of the most common words of everyday vocabulary; the eighth graders of the state, 87 percent; the high school seniors, 91.2 percent; teachers, 90 percent. One wonders how today's businessmen, pupils, students, and teachers might compare with the 1927 population. It is somewhat discouraging to note that high school seniors spelled better than teachers spelled, an aspect of the spelling problem not easily investigated.

But such an aspect should be investigated. How much of the spelling problem may be based on the perpetuation of the imperfections of those who teach? None who uses the English language can be wholly perfect. If pupils are expected to learn the teachers' wisdom, is it not equally logical to expect them to pick up also the teachers' mistakes? The topic is as yet so delicate that the research it will require has not been attempted. Such research needs to be done ethically, objectively, and thoroughly. Wilkinson (100) approached the problem in her study of the misspellings made by 97 student teachers in comparison with misspellings made by elementary school children at grade levels the students were preparing to teach. She found the student teachers' spelling errors basic, coinciding with the types of errors made by the children. Farinella (27) studied the degree of skill in phonetic and structural analysis of language

necessary to teaching language arts in grades 1 to 6. He concluded that an alarming number of teachers showed marked deficiency in such skill, that teacher performance was not related to the college attended, and that an advanced degree was no indicator of the degree of knowledge of phonetic and structural analysis, despite the fact that a body of skills and principles of phonetic and structural analysis exists and has been recognized generally by authors of basal textbook series in reading and spelling. Although its delicacy makes it difficult, the problem among teachers needs investigation.

Taking a less pessimistic point of view, Betts (8) commented that in school attics and storage vaults have been found tests given to children in those schools from 1845 to 1956. When the children of 1919 were given the 1845 tests, they proved better spellers than their predecessors. Comparison between spelling scores in 1928 and 1938 showed no significant difference between the achievement of the earlier generation and the later. Similar comparisons between test results in 1929 and 1947 showed the 1947 children holding the advantage. In short, he believed that today's children can hold their own in spelling. In some instances they can outspell their parents, grandparents, or great grandparents.

But Betts also warned that evidence about spelling ability was generally discouraging. Harris (44) found that the average student in seventh or eighth grade in 1947 could spell successfully only

through third grade word lists. Such a finding implied that if the average student in the seventh and eighth grade could spell only through a third grade word list, a poor speller in the seventh or eighth grade could not spell second grade or perhaps even first grade word lists, and only the superior seventh or eighth grade speller could be expected to spell fifth or sixth grade word lists, let alone seventh and eighth grade word lists.

There is no consensus about the extent of the spelling problem or the degree of alarm it warrants. Nor is there agreement about its causal factors, its remediation, or its future. But there is an increasing interest in spelling proficiency and disability, a rapidly accumulating body of research that can begin to answer questions. There is, in fact, more research available than is being used to improve the teaching of spelling. Marksheffel (59) concluded that part of the solution to the spelling problem lies in discovering how to get teachers to apply the findings of research to their classroom practices.

Need for Self-Instructional Spelling in High School and College

Self-instructional materials in spelling are essential for college students because colleges do not teach spelling. If the college student is to improve his spelling, he must instruct himself.

Self-instructional spelling is also needed for high school students because of the similar absence of spelling instruction at secondary levels. Staiger (89) reported in 1956 that spelling instruction was minimal in a number of high schools studied, that little instruction in spelling was given pupils beyond seventh or eighth grades although teachers continued to mark spelling errors and to urge improvement, and that inconsistent attention to spelling in curriculum and in subject matter fields resulted in widely varying practices. He concluded that spelling instruction is necessary at secondary educational levels and that high school students need not only to remedy old errors but to learn successful spelling in new subject matter. He found that many high school pupils wanted to learn to spell, and he urged that high schools take the responsibility for teaching, not defeating, such students.

Ayer (5) found that even in language arts courses in high schools the spelling instruction was generally either limited to a minor group of difficult words or left to the student for incidental mastery. He found few high schools attempting to develop positive attitudes toward spelling, to encourage a spelling conscience in the pupil, or to use a specialized textbook for teaching high school spelling. He found a general absence of organized, continuous programs for the improvement of spelling. In a nationwide survey involving about 40,000 pupils in secondary education, he found (1) wide

variation in spelling abilities of students at the same grade level, (2) a general falling-off in spelling performance at the ninth grade, (3) wide variation in spelling performance in different high schools in different parts of the nation, and (4) a pronounced falling-off in spelling proficiency among pupils everywhere.

In a 1962 study, Campanale (15) also concluded that a systematic program of instruction in spelling is needed in today's secondary schools. Jones and Holder (51) reported in 1960 the results of an all-out effort in the public schools of Richmond, Indiana, to improve pupils' spelling. They found at the beginning of the experimental year that medians for the total groups tended to be below national norms, that negative deviation tended to increase with progress through the grades, and that midyear groups showed little or no advantage over groups half a year behind them. Richmond did much to remove its spelling deficiencies in a two-year effort that brought median spelling performance to median competency on standardized measures and resulted in outstanding improvement at every level.

Blair (9, p. 286-295) reported a variety of effective plans used by particular secondary schools to improve spelling. He concluded that there is no single best way to teach spelling or to learn how to spell.

It has been the writer's observation that wide variation exists in spelling programs in high schools in western Oregon. Teaching practices shown useless, even detrimental, by experimental research as early as thirty years ago are still being maintained in many classes. Getting the results of research in spelling into today's classrooms is in itself a major educational problem.

The importance attached to spelling and the attention accorded it differ between schools and among teachers in western Oregon. In many high school and junior high school English classes, the writer has encountered the practice of giving the pupil a failing mark on a theme containing one or more misspellings. Teachers employing such a practice believe they are teaching spelling. Others also believe that they too are teaching spelling when they mark the pupil's misspellings, penalize him in written work, and test him periodically to see if he has responded satisfactorily to exhortation that he learn to spell. Most secondary schools use a standard handbook in English containing a section of spelling rules and a list of the difficult words commonly called spelling "demons." Some schools supplement such instruction with spelling workbooks. But penalizing and exhortation are as questionable a treatment for spelling disability as they would be for a broken leg or for dental caries.

The writer has found high school teachers aware of the spelling problems among their students. Whether or not they are also aware

of their own spelling problems demonstrated in misspellings on blackboards, bulletin boards, tests, hand-outs, etc., is another problem and is extremely delicate, although it should not be. The spelling problem is no respecter of persons, and all who use language are vulnerable. Anyone who teaches has been previously a student; students have spelling problems, demonstrable and variable and personal; graduation from college and certification to teach do not correct deeply ingrained misspellings and misunderstandings about words that make most of us less than perfect scholars; teachers' spelling difficulties go into their classrooms with them, at all educational levels, including university staff levels too; and the cycle of misspellings begins again. Nor is the writer herself exempt. The problem is common, diffuse. It should not be delicate. Instead, it needs investigation. What is the relation of the teacher's misspellings to misspellings among her pupils? How much of the spelling problem is a problem of the perpetuation of error by example? What is the relation between the teacher's pronunciation and the pupils' misspellings? Does a teacher who is an excellent speller produce pupils who are significantly better spellers than are those in an average classroom with a teacher who is herself an average speller?

In an effort to send young English teachers into their classrooms understanding their own limitations and strengths in spelling,

the writer has made it a practice to have each of her student teachers take a standardized spelling test and place himself on its norms in comparison with the high school or junior high school grade levels he is preparing to teach. It is a sobering, educative experience to see oneself objectively and realistically compared with those one expects to instruct. Classrooms need such realism to replace the defensiveness and rationalization too often apparent, especially about spelling, among teachers themselves at all teaching levels from primary grades to graduate faculties in universities. Realism must begin with the student teacher preparing to enter a future classroom where pupils will have difficulty writing English words successfully.

Self-instructional materials in spelling are well within the accomplishment of most high school students when the materials are written to their reading level. Many high school students bound for college have expressed to the writer a desire to improve their spelling before attempting college work. High school teachers too have shown interest in presenting self-instructional materials and methods to their classes.

Auto instruction in spelling has a place in high school as well as in college. Self-instructional spelling is essential, whether it be supplementary or total.

Background of the Study

This study originated in an effort to help poor spellers at Oregon State University. Students in the lowest deciles of English placement almost always have serious deficiencies in spelling. It has been the writer's observation that many such students would like to improve their spelling, especially after the first term of the sequence in freshman composition has awakened them to that necessity and to the extent of their own particular spelling difficulties, but colleges do not teach spelling, and spelling disability does not disappear of its own accord. Many of the deficient students have a long history of attempts to overcome their spelling handicaps. Others have resigned themselves to the problem, have accepted it as something against which they are helpless, have come to avoid all but the required courses in English because of it, and must seek the help of a proofreader among their more competent friends whenever faced with the demand for a written assignment.

It has been the writer's further observation that many collegiate poor spellers will attend non-credit classes held for the purpose of improving spelling skills. They will attend voluntarily and will work diligently when the opportunity presents itself for them to help themselves. Spelling instruction, regular or corrective or remedial, is not part of college or university curricular offerings for credit.

Whether it ought to be is a philosophical question that has aroused heated debates. Philosophy aside, the fact remains that spelling problems are common at the college and graduate levels and sometimes even at faculty levels, that many poor spellers seek help, and that such help must be largely self instructional.

The college assumes that the matriculating student can spell or that, if he cannot, he will take steps to achieve proficiency on his own. English placement examinations and practices, in which the testing of spelling plays a prominent role, try to identify those students who suffer handicaps in the use of written language and to schedule them into non-credit, corrective, "bonehead English" classes to remedy deficiencies where possible before permitting them to enter the regular composition courses. Even in corrective English, however, and certainly in the regular sequence of freshman composition courses, instruction in spelling is absent. Instead, the student is told that he has a spelling handicap; he is warned of the academic repercussions of his inadequacy; he is urged to overcome his handicap; he is expected to have corrected it; he is tested to see whether he did; he is penalized if he did not, and the cycle begins again as long as other subjects can absorb the blows to his grade point average and allow him to remain on campus. Most of the standard handbooks of English used on campuses contain a spelling section giving spelling rules and a list of spelling "demons." College

spelling instruction generally consists in marking the student's spelling errors and telling him to study the handbook. Students are expected to come to college efficient spellers or, if they cannot spell, to acquire proficiency independently. That only one percent may be able to spell successfully without error indicates the extent of the independent effort expected of a student population generally deficient in spelling (17; 73).

The college student's spelling problem does not originate on campus. He brings it with him to the campus from the high school, whether or not he is aware of doing so. The odds are that he had the handicap in junior high school too, or that he may have shown evidence of incipient spelling disability in the earliest grades. College spelling problems are not acute academic seizures. They are the result of slowly accumulating deficiencies, and the degree of retardation appears to be progressively greater for each year the poor speller has been in school.

The poor speller is a student who has remained inefficient while others of his peers in the classroom have understood and progressed. To expect that at the college level the poor speller can suddenly remove his spelling handicap on request by means of the same kind of materials from which he has previously failed to learn even with the help of teachers in earlier classrooms would appear to be academic folly. Means for self instruction must be available to

students who need it and must be as effective as professional skill can devise if spelling problems are to be dented in any least way at so late a stage in the educational process. The spelling section in the usual handbook with its rules and its lists of words to be memorized appears to help some students to better spelling, but it also fails to help many who want help and whose motivation is high. The problem then becomes one of effective self-instructional materials by means of which the poor speller can help himself without the live presence of an instructor.

How far can the student help himself to better spelling? What is the most effective self instruction? Are the self-instructional materials themselves an important variable in self instruction? How efficient is self instruction? How much can the student be expected to accomplish on his own? To what extent can he be self sufficient? At what point, if any, in spelling does the presence of a live instructor become imperative? What subject matter lends itself to self-instructional purposes, and what does not? Can spelling skills be learned from self-instructional materials? What is the relation of reading ability to self instruction? Is the effectiveness of self instruction in spelling dependent upon the form in which it is presented?

These are but a few of the questions that plague one who attempts to make self instruction available to college students.

Development of Self-Instructional Materials

The writer's first attempts to help college students in non-credit, self-help spelling classes began with traditional methods and materials--that is, with rules and word lists and, at that time, lists of spelling demons. Some few poor spellers benefited from such instruction but most did not. To help those who did not benefit, the writer simplified and clarified rules, prepared self-instructional worksheets exemplifying and applying rules, revised word lists to include the familiar and exclude the unfamiliar, and sought to learn which parts of spelling adapt most easily to independent study. As a result, some students benefited, but again others did not.

Discussions with students attending the corrective spelling classes revealed that the students themselves believed the spelling worksheets to be the most valuable part of the corrective process at that time. Accordingly, the writer prepared an entire series of such worksheets. At this stage, the spelling demons were discarded. The purpose behind the instruction had changed from the initial aim of helping students master rules and a list of troublesome, irregular words to a new aim of helping students understand the predictable spelling behavior of everyday words.

The transition from worksheets to programed¹ self instruction followed in obvious evolutionary development. The corrective classes tried the programed materials. Again, some benefited, but others did not.

Experimentation showed the need for revision of the programed materials, for their expansion, curtailment, restatement, clarification, and reorganization. Finally, eight units of programed spelling were ready for trial versus units using traditional rules and word lists, both methods ignoring the demons. Corrective spelling classes on campus tried both. Four classes of high school seniors at Klamath Falls conducted a pilot study using both. On the basis of results and of students' suggestions, comments, and criticisms, both were revised and rewritten.

Again, experimentation followed, this time to include 842 students in 35 high school and college classrooms. That trial provided the data for this study. Five years had elapsed between the initial attempt and the completion of the study.

¹ Whether derived forms of the word program should be spelled with one m or two is a debatable point. Current custom appears to prefer the single m. Besides, current pronunciation places major stress on the word's first syllable, a practice which would make its spelling with one m a regular spelling in accordance with the rule but irregular with the doubled consonant, mm. This study will therefore adopt the spelling with a single m throughout.

Structure and Content of the Self-Instructional Materials

The materials which were developed for use in the non-credit, self-help, corrective spelling classes and which were later used in the experimentation for this study were of two kinds: traditional and programed. Each was prepared initially, not for experimentation but for use at Oregon State University in the aforementioned spelling classes which the writer conducted for several years prior to this study.

Both the traditional and the programed materials covered the same subject matter, each emphasizing those parts of language which are regular. Neither attempted instruction in the spelling irregularities commonly called "spelling demons," troublesome words whose spelling behavior is not predictable. The demons account for only 20 percent of English spelling, a minimal portion out of all proportion to the attention they get. It has been the writer's philosophy that instruction in the 80 percent consistency is to be preferred to the 20 percent inconsistency when one is trying to instruct a confused speller. Such a policy is in accord with that of such educators as Hanna and Hanna (43, p. 20-21), who believe that pupils can best be led to observe and understand the 80 percent regularity in orthography and to gain a degree of skill with it before turning attention to the 20 percent irregularity.

Both the traditional and the programed materials presented the same 648 words. Both informed the student of the manner in which English words add certain suffixes. They did not include all possible suffixes nor all possible root words. Nor did they list all exceptions to regularity in the word groups studied. They aimed instead to investigate ways in which several common groups of everyday English words can regularly be expected to add some common suffixes to form the numerous derivatives that enrich language. They included common monosyllabic and polysyllabic roots, and they differentiated suffixes on the basis of whether the suffix began with a consonant or a vowel. They considered the predictable spelling behavior of the following classes of words, all of which were primarily adding suffixes, and the last of which was concerned additionally with spelling within the root as well: (1) monosyllables ending in silent e; (2) words ending in s, x, z, sh, ch; (3) monosyllables containing a single short vowel and ending in a single consonant; (4) words ending in y; (5) words ending in ate; (6) words ending in ce or ge; words containing the digraph dg; words ending in the single consonant c; (7) polysyllabic roots whose behavior when adding suffixes is predetermined by the position of the accent stress within the root; (8) words containing the ie or ei digraph.

The traditional materials presented a deductive approach to the eight classes of words in that they stated a rule and then listed

a number of words to which the rule applied. The programed materials, on the other hand, used an inductive approach in that they asked the student to observe the behavior of a class of words adding suffixes, to identify the particular behavior common to all in those circumstances, and, finally, to make a generalization about that behavior by means of which the behavior of additional words in the same class might be predicted.

In the few instances in which a word might permissibly have variant spellings, one of which accorded with the regularly predictable behavior of words in its class, the regular form was used and the variant ignored, the philosophy behind such a policy being that poor spellers are confused spellers who need to become aware of regularity and predictability where they had previously feared only chaos existed.

The 648 words used to exemplify the eight classes of word roots were common English words, in accordance with recommendations made by such educators as Stauffer (90), who urged that words for spelling study should be chosen on the basis of frequency of use, having found that the most commonly occurring 2,000 words with their derivatives make up 95.5 percent of the running words in adult writing. If the confused speller can learn to spell successfully 95.5 percent of the common words for which he has need, his spelling deficiency will have been overcome to an appreciable extent for

everyday purposes. Such success might also conceivably increase his desire and his courage to tackle the additional spelling problems posed by academic work in a particular subject matter.

Of the 648 words used to exemplify the eight classes of word roots included in this study, 72 percent can be found as used, or in common root or derivative form, in the Dale (20, p. 206-212) list of 3,000 familiar words. Dale compiled his list by testing fourth graders on their knowledge of the 10,000 common words, compiled in earlier lists by Thorndike in 1931, and Buckingham and Dolch in 1936. The writer used the Dale list because its appearance in 1948 made its findings more recent than those of the two preceding major lists. The 28 percent of words used in this study but not found in the Dale list include the following 46 words:

abuse	embrace	radiator
acknowledge	employ	refer
adjust	engage	regain
admit	equip	remit
amaze	fame	represent
ancient	fiend	resist
conceal	foreign	seize
conceive	inflate	severe
control	investigate	siege
convenient	leisure	spectator
crutch	mass	subtract
defer	obedient	sufficient
deficient	obtain	suffix
deplore	occur	winch
disc, disk	outrage	
emboss	pledge	

The traditional-deductive materials used in this study were prepared, not for experimentation but for use in corrective spelling classes trying to help poor spellers understand English orthography. They included spelling rules stated as clearly as the writer, using a number of standard handbooks and textbooks, was able to state them in an effort to make them so clear and so simple that, hopefully, even confused spellers might not misunderstand them and might be able to apply them. They included also the series of worksheets found useful by corrective classes during several academic terms.

The Programed-Inductive Materials

The programed materials (95) were prepared for use in booklet form, not in a form requiring a machine. They utilized inductive reasoning presented in vertical, linear format. Their 130 frames were divided into eight units, each covering the spelling behavior of a particular class of words. Most frames made a short presentation of new material, to which the student made a written response. The response was reinforced at once in that each frame carried its own answer. Knowledge of results was immediate throughout. The frames made no provision for errors because steps were small and the purpose of the instruction was to make spelling so clear that successful spelling was assured insofar as possible. The responses were straightforward, single responses in written form. No use was

made of multiple choice or true-false responses. Frequent review was provided within frames asking the student for generalizations about the words whose spelling behavior he was observing. Short self-testing frames at intervals helped the student test himself to see for himself the progress he was making, each testing frame carrying its own key for immediate knowledge of results. Whenever the student reached a point of being able to make a generalization about the spelling behavior of a class of words, he had immediate opportunity to apply that generalization to other words and to discriminate among words in order to determine which of his generalizations might hold for derivatives.

In some ways, the spelling program is a Socratic teaching device in that it constitutes a questioning teacher, albeit a paper one, and a responding learner.

Purpose of the Study

The purpose of this study was to compare two self-instructional methods for improving spelling in high school and college. One method was the traditional-deductive presentation of spelling rules with a list of words to exemplify each rule. The other was an inductive-programmed presentation leading the learner to observe the spelling behavior of words and to make generalizations applicable to similar words.

The problem was not one of taking sides for or against a traditional method of instruction in comparison with an innovational one. Who is on which side becomes a quibble. The real point is, "How can poor spellers learn to spell?" This study investigated, not the dispute between tradition and innovation but the learning process inherent in self instruction as it is affected by deductive or inductive presentation of subject matter to be learned in spelling.

The study asks: (1) Does method make a significant difference in the effectiveness of instruction? (2) Is there significant difference by sex in the results obtained by either self-instructional method?

Hypothesis

The hypothesis of this study was that if a difference in performance in spelling appeared between groups of high school and college students using the deductive-traditional method of self instruction in comparison with similar groups using the programmed-inductive method of self instruction, the difference would favor the programmed-inductive method.

CHAPTER II


REVIEW OF LITERATURE

This study in self-instructional spelling demanded cognizance of literature in (1) factors related to proficiency and disability in spelling, (2) the use of rules and word lists in spelling instruction, (3) programed instruction and programing techniques, and (4) instructional method as a significant variable in the effectiveness of instruction.

Pertinent Factors Related to Proficiency and Disability in Spelling

Many influences are apparently in operation to produce the syndrome known as spelling disability. Among them are intelligence, the ability to read, perhaps the degree of skill in using phonics for attacking new words, physiological factors, handwriting, emotional states, psychological determinants, sex differences, personality, and study habits. Which are causal, which resultant, the teacher of English is hard pressed to know. Research seeks the answers to the classroom questions. To make spelling self instructional, one must first understand the factors contributing to proficiency or disability in spelling.

The spelling problem seems rarely to exist in isolation but



appears generally as part of a larger, more complex problem comprising other difficulties in the student's use of language. As a problem, it is cumulative. Students bring their spelling deficiencies with them from the high schools to the colleges, as they brought those deficiencies with them in like manner to each preceding educational level. Spelling problems appear first in the primary grades with the students' introduction to written language. Attempts at correction exist thereafter. It is not a problem that can be expected to go away of its own accord.

Many sources have contributed information about how one learns to spell and what can go wrong in the process. Evidence has accumulated from research in psychology using words as experimental materials, from educational research directed specifically to spelling, from critical observation of teaching procedures, and from clinical investigation of spelling disability. Researchers have made extensive study of relationships between spelling ability and influential factors suspected of being at least partly causal. The present study must of necessity restrict itself to cursory presentation of findings from such research, essential as background to further consideration of the problem in the light of evidence produced by this study.

Reading Ability and Spelling Ability

Reading and spelling are closely related skills. Although reading disability does not appear without concomitant spelling disorders, spelling disability does appear on infrequent occasion without concomitant reading disability.

Hughes (49) reported a correlation of .53 between reading and spelling, of .69 between spelling and word meaning. Spache (87, p. 574) reported a correlation of .60 between spelling and vocabulary. Furness (32) found that correlations between scores on reading tests and on spelling tests usually fell in the range of .80 to .85, a high relationship indicating the comparative rarity of good spellers who are poor readers and of good readers who are poor spellers.

Ordinarily, students tend to be good or poor in both reading and spelling. They also tend to improve or to deteriorate proportionately in both abilities as they move through the elementary grades into secondary and collegiate levels. Morrison and Perry (64) found retardation progressively greater in spelling than in reading, however, among 840 children from grades three to eight. They found that retardation in spelling persisted and increased at successive grade levels, and that it interfered correspondingly with the acquisition of new skills and subject matter. They found further that the entire problem was additionally compounded and

progressively intensified by the increasing frustration and discouragement of the learner.

Staiger (87) pointed out that poor readers are also poor spellers because (1) poor readers are likely to have lower verbal aptitudes than good readers have, (2) poor readers' experiences with language are not as rich as are those of good readers, (3) poor readers are less likely to have developed habits of accurate perception of word parts, (4) poor readers are less efficient at pronouncing subvocally and using phonic generalizations when faced with new words, and (5) poor readers have had fewer contacts with words and are less likely in consequence to retain word images.

Furness (35) concluded that spelling and reading are closely related because (1) both have a common basis in vocabulary, (2) both require the ability to recognize and remember words, (3) in both, the ability to study and analyze words is fundamental. The act of spelling differs from the act of reading, however, in its sequence. The act of reading proceeds from the written form of the word to its spoken form and to its meaning in context. The act of spelling progresses in opposite fashion, beginning with the spoken word and proceeding to the meaning of that word and, finally, to its written form. Both the act of spelling and the act of reading demand that the student understand how letters function to form words.

Plessas and Petty (72) stated the case a bit differently when

they noted that good spellers are often good readers and that poor readers are invariably poor spellers.

In summary, the teacher facing a poor reader can expect him to have spelling deficiencies too. But the teacher facing a poor speller cannot assume that he is also a poor reader, although the chances are high that he will be.

The close relationship between spelling and reading is highly important to self instruction in spelling. Self instruction, whether traditional and deductive or programed and inductive, reaches the learner through his ability to read. If he reads poorly, printed self instruction is closed to him, a fact which has led some researchers to combine tapes with printed materials. It is the writer's belief, however, that a student who reads so poorly he cannot help himself by reading is a clinical case, not a self-instructional case, and as such he demands specialized help. Self instruction is corrective, not clinical or remedial. Both the latter require the live presence of a specialist.

Intelligence and Spelling Ability

Students of low intelligence are likely to be deficient in spelling skills. High intelligence, on the other hand, does not guarantee superior spelling ability in all instances. Brueckner and Bond (11, p. 348-349) found good spellers and poor spellers at all levels of

intelligence, a fact noted repeatedly throughout educational studies of spelling. In a comprehensive survey of research, Horn (47, p. 1348) listed positive correlations between spelling and mental ability, although such correlations tended generally to be lower than those found between spelling and reading abilities. In a similar survey, Spache (87, p. 568) found 57 correlations reported in studies of the two factors, the lowest correlation being .08, the highest .85, and the median .44. Furness (35), finding correlations of .30 and .40 between the two factors, concluded that although mental ability is important to success in spelling, other factors such as vocabulary, perception, word recognition, word analysis, and comprehension are perhaps more important. Blair (9, p. 265) found the relationship between intelligence and spelling much lower than that between intelligence and most other school subjects.

Although low intelligence is generally accompanied by a proportionate degree of spelling disability, a poor speller is not necessarily a person of low intelligence. In a classic study of good and poor spellers, Russell (78, p. 29) found the average IQ of his group of poor spellers to be 101.52 and that of his normal spellers to be 102.65. McGovney (62) studied spelling deficiencies among children of superior mental abilities and found poor spellers among children whose IQs ranged from 111 to 126.

One cannot assume, therefore, that poor spelling indicates low

intelligence. But in a student of low intelligence, one can expect to find spelling deficiencies.

Self-instructional spelling is for the poor speller of average or above average intelligence. Because of concomitant reading problems, mental retardation requires the live presence of the instructor.

Psychological Determinants of Spelling Success

Hanna and Hanna (43, p. 17-21) emphasized that research in the psychological determinants of spelling has neglected the serious study of the basic sciences of neurology, endocrinology, and physiology. Likewise, little attention has been paid to a related field of research in cybernetics. The electronic computer built to duplicate some human mental activities might well provide clues to the process whereby a person is able to spell. Spelling, they pointed out, demands input, imagery, and output. While it is known that the brain acts as a unit, it is not known what actually takes place in (a) perceiving the word in the sensory organs of sight, sound, and feeling, (b) transmitting these sensory impressions of the word to the brain, (c) sorting and storing the imagery in the cell assemblies, (d) recalling the image of the word on demand, (e) transmitting the image into the neuromuscular mechanism that writes it down, and (f) comparing the word as written with the image of the word as stored in the cell assembly, to provide the final complex mental evaluation that is

proofreading. Pronouncing the written word, using it in a sentence, or adding it to vocabulary storage completes the mental act about which too little is yet understood to permit speculation, much less authoritative pronouncement. There is great need for research.

Furness (34) commented in the same vein when she said that the science of biology, or its derivative, psychology, is the basis of an understanding of the act of spelling, the most elusive factor being that of imagery. Spelling is primarily a sensori-motor habit, and, like any other habit of this kind, it is acquired by repeated motor reaction to certain sensory stimuli, an act about which almost nothing conclusive is yet known.

Programed self instruction requires the active, written responses of the student studying spelling, thereby providing the repeated motor reaction to words as sensory stimuli necessary to establish the habit of proper spelling. One learns to spell by writing words correctly.

Physiological Factors and Spelling Ability

Many studies have investigated aspects of possible relationships between spelling ability and physiological factors, particularly those of vision, hearing, and speech. Research has found few relationships.

Carrell and Pendergast (16) were unable to find any significant phonetic disability reflected by comparable errors in speech and spelling among children with functional articulatory defects, a negative report belying the rather frequent assumption that speech and spelling errors are related.

In an early study, Gates and Chase (36) showed that the deaf are not necessarily handicapped in spelling.

Studying the characteristics of good and of poor spellers, Russell (78, p. 44-48) reported that tests showed no reliable or significant differences in hearing acuity between groups of normal and of retarded spellers. Nor did the types of spelling errors made by the subjects with the greatest hearing loss differ significantly from those made by the subjects with normal hearing. Furthermore, Russell could find no reliable group differences on tests of vision between good and poor spellers. On the basis of his data, he concluded that constitutional factors of visual and auditory acuity are not related to normalcy or retardation in spelling, and that slight sensory handicaps do not affect spelling ability. His conclusion does not, of course, preclude functional or organic difficulty in specific individual cases of spelling disability.

In his second study of the characteristics of good and of poor spellers, Russell (79) found spelling disability closely related to auditory discrimination, a factor not to be confused with poor

hearing or deafness. He could not establish, however, that superior spelling ability is related to superior auditory discrimination.

Early research in spelling and reading concerned itself with the question of laterality. The frequency with which left-handedness seemed to accompany reading and spelling problems appeared too great to be coincidental. Accumulated research to date has showed that handedness is neither a major question nor an important factor in difficulties of reading or spelling, although in particular individual cases it might possibly be contributive. McConville (61) could find no significant differences between laterality, reaction time, and a test of reading rate and comprehension among 110 college students. Groff (42) found that handedness, whether right or left, made no difference in spelling achievement. Betts (8) suggested that on occasion poor handwriting and, perhaps, misspellings might be evidence that the student is attempting to use the non-preferred hand. Facility with English spelling demands a well-established habit of left-to-right progression. Inasmuch as the outgoing movement of the left hand is in the opposite, right-to-left direction, the left-handed person may develop a preference for the right-to-left progression, possibly because he watches what his preferred hand does. Tachistoscopic experiments show that the left-handed catch the end letters of a word first, just as the right-handed get the initial letters first.

Failure to establish a firm left-to-right progression could conceivably affect spelling adversely.

Of interest in this respect is Russell's (78, p. 83) finding that poor spellers made reliably more errors in visual reversals than did good spellers, from which one might infer that at least some poor spellers may not have acquired the essential habit of left-to-right progression.

Shane and Mulry (82, p. 73) in a review of recent research advised that although considerable piecemeal evidence has accumulated about probable causes of spelling difficulty and, by inference, about the reasons for individual differences in the ease with which people are able to master spelling, authoritative conclusions are not yet warranted about physiological and psychological factors involved.

That physiological factors are of little importance in spelling is much to the advantage of proponents of self-instructional spelling, whether the self instruction be the traditional rules and word lists or a programed presentation.

Sex Differences and Spelling Ability

In a comprehensive synthesis of what is known about individual differences, Anastasi (2, p. 492-493) established that girls in general excel in spelling, language usage, and those school subjects depending largely on verbal abilities, memory, and perceptual speed and

accuracy, while boys excel in science, social studies, arithmetic reasoning, and those school subjects demanding spatial aptitudes. Betts (7, p. 137) found that boys comprise 60 to 80 percent of the population of retarded readers, and that boys also outnumber girls among disabled spellers. Girls surpass boys in spelling skills, in written composition, and in quality and speed of handwriting. The differences of ability between the sexes have long been apparent in language skills.

In an early study of the spelling achievement of 12,985 children, grades 2 to 8, in the public schools of Oakland, California, Sears (81, p. 39) noted a pronounced superiority of girls over boys, an advantage increasing from grade level to grade level and from year to year. His findings for 1915 are corroborated by numerous studies since that time, one of the most recent being that of Marie (57) who found that among 3,230 pupils in the third, fourth, and fifth grades of 13 schools in New York City the boys made significantly more spelling errors than did the girls.

At the college level, sex differences favoring girls in the language skills appeared as expected in a 1964 study of English placement at Oregon State University. A stratification by deciles, English placement is the basis for ability grouping among freshmen students in the composition sequence. The ratio of men to women in the general student body was slightly more than two men to one

woman, roughly a two-to-one ratio. In the lowest decile of the English placement, however, the investigators (96) found a six-to-one ratio of men to women, evidence once again that problems of spelling, reading, and related language skills show greater incidence among males than among females. In the highest decile of the English placement, the ratio had become one man to two women, a one-to-two ratio favoring the girls, evidence supporting other studies which have found females superior in spelling, reading, and related language abilities.

If spelling disability is largely a problem for males, self-instructional spelling should be prepared and presented with the boy in mind. His interests, his needs, his motivation, and his vocabulary should be the broad base for the self-instructional material, inasmuch as many more boys than girls will have need of it.

Emotional Factors and Spelling Disability

Studying spelling ability among high school students, Staiger (89, p. 284) found that many poor spellers have a defeatist attitude by the time they reach high school. They may manifest their discouragement and frustration in such undesirable behaviors as defiance, evasiveness, deliberate nonconformity, or unrealistic rationalizations of their deficiencies. A serious emotional result of prolonged difficulty is that the student usually develops a dislike

for spelling. His distaste may generalize to include dislike for writing, avoidance of English courses, or resentments against teachers, schools, or his more successful peers. Blair (9, p. 267) pointed out that deeply emotional attitudes engendered by spelling disabilities are difficult to change. Fortunately, he believed, evidence exists that attitudes can be changed, the psychological formula for such accomplishment being to "provide practice with satisfaction."

Linear, vertical programing requiring written responses, with immediate reinforcement in each frame and with steps small enough to insure success, would seem to be ideal for providing such "practice with satisfaction."

Betts (8, p. 318) found that real improvement in spelling presupposes the development of spelling conscience and of positive attitudes about spelling as an essential skill.

Wondering whether strong emotional connotations attaching to particular words might make them difficult to spell, Bloomer (10) examined the relationship between emotional intensity of words and their spelling difficulty. He found no significant relationship and concluded that emotional positiveness or negativeness of a word's meaning bears no relation to its difficulty for spelling.

Personality Factors and Spelling Ability

Only fragmentary and inconclusive evidence exists about the nature of spelling ability and its possible relation to personality factors. Using two tests of spelling ability and three well-known personality inventory tests, Holmes (45, p. 268) constructed an experiment to probe for such a relationship if it exists. He studied 1500 university juniors and seniors. He found that for college women 3.6 percent of the variance in spelling ability was accounted for by those elements in the F and Pd scales of the MMPI which assess careful attention to detail and a tendency to be individual, asocial, and perhaps egocentric. For college men 9.2 percent of the variance in spelling ability was accounted for by the single personality trait described as lack of confidence. Trends throughout the analysis indicated that for men success in spelling is more closely related to what standard personality scales would call maladjustment than to adjustment. The provocative findings of the study invite additional related research. Might such a study imply that the spelling problem in males may have cultural roots? If misspellings are evidence of normal maleness in our society, then spelling instruction is futile, whether self instructional or live.

Handwriting and Spelling Proficiency

Commenting on the fact that poor spelling and poor handwriting go hand in hand, Blair (9, p. 267) discussed reasons for the relationship. Poor spellers have a tendency to write poorly to cover up as many misspellings as possible in order to avoid censure. This defense occurs particularly among older students who have become sensitive to their spelling problems. The procedure of writing illegibly to cover up spelling errors has the effect of increasing the number of words misspelled and of compounding the problem because it does not provide the student with vivid, correct, visual and kinesthetic cues for the future writing of the word. One learns to spell a word as one writes it. The adoption of defensively illegible handwriting to camouflage uncertainty about spelling increases errors. Misspellings belong in the open where they can be recognized, Blair concluded. Legibility makes the student aware that words are composed of separate letters whose arrangement must be learned.

Herein lies a possible weakness of self-instructional methods. Inasmuch as the learner can read his own handwriting, he is not likely to be moved to improve its form or legibility without the live presence of an instructor to challenge his illegibilities.

Phonics and the Acquisition of Spelling Skills

There is no agreement concerning the role of phonics in the acquisition of spelling skills, and research has been unable as yet to resolve the controversy.

Some educators believe that the acquisition of phonics plays a relatively small part in successful spelling, a position taken by Betts (8, p. 323) who has found that overemphasis on phonics makes for spelling difficulty. Teaching a student to spell by sound, the English language being what it is, can hopelessly confuse him. The word "circumference," for example, Betts said, has the mathematical possibilities for more than one billion variant phonetic spellings in English, and the student who tries to spell words the way he thinks they sound is working against impossible odds. Petty (69) obtained sufficient evidence to warrant the conclusion that the representation of individual sounds does not show a specific relationship to the persistence of the spelling difficulty manifested by some words. His findings supported the belief held by many that learning to spell depends for the most part on attention to each word as a particular, individual problem in written reproduction.

On the other hand, Russell (79, p. 67, 80-81) found that the inability to turn sounds into letters, phonograms, or syllables is sometimes a basic cause for poor spelling. He found further that

retarded spellers spelled or misspelled by individual letters, or else attempted the word as an unsuccessful whole. Normal groups showed that the ability to blend word parts and to syllabicate were positively associated with spelling ability. Templin (93) found that phonic knowledge and spelling are somewhat more highly correlated than are phonic knowledge and reading. Holmes (46) discovered that spelling ability at the high school and collegiate levels depends to large extent on the student's ability to handle phonetic associations. Aaron (1) concluded that the ability to spell phonetic syllables tended to be predictive of spelling achievement. Newton (66) studied the contributions of 16 factors believed significant in relation to spelling achievement. She found that the ability to spell phonetic syllables was the greatest contributor to variance in spelling achievement, and that, among factors not to be classed as skills or abilities, verbal intelligence was the greatest contributor.

In a comprehensive summary of research, Ernest Horn (47, p. 1345) summarized the controversy. Both theory and evidence, he believed, suggest that some kind of phonic instruction, as yet undetermined, may be of substantial benefit to spelling. More than one-third of American words have more than one accepted pronunciation, and there are differences in regional speech. There are also differences between formal and informal speech among cultivated people. If the spelling of a word is phonetically regular in one

pronunciation of the word, it is not likely to be so in another, he said. Furthermore, most sounds can be spelled many ways in English, and the numerous exceptions to the commonest spellings make possible hundreds of variations in the written representation of sounds. More than half the words in the dictionary contain silent letters, and, he continued, the student who depends upon phonics for most spellings cannot be expected to insert by reasoning letters which do not signify sound. Approximately one-sixth of English words contain double letters, although only one of the pair is pronounced. Unstressed syllables cause phonetic spelling difficulty because pronunciation slurs or obliterates distinctions, and the student whose spelling is based on how words sound will of necessity be confused by what he cannot differentiate. The problem of relating sounds to written symbols is frustratingly complicated. Horn concluded that the available evidence warrants the teaching of phonic generalizations applying to a large number of words having few exceptions, and that phonics instruction should be some aid in spelling, but that it should not be a substitute for the direct study of words.

Herein lies a major strength of programed spelling. Not dependent upon sound but dependent entirely upon the printed symbol, the spelling program presents words by means of written analysis and direct observation of their behavior. Spelling is a written skill, not one of speech.

Study Habits and Spelling Proficiency

Brueckner and Bond (11, p. 353) summarized the findings of investigations into the relationship between study habits and spelling efficiency. They concluded that the study habits of good and of poor spellers differ considerably. Good spellers in general had systematic methods of study which, however, differed widely among pupils. Poor spellers, on the other hand, apparently studied unsystematically, variably, and sporadically, using neither discriminately nor intelligently chosen methods.

Spache (88, p. 135-136) found that poor spellers have poor habits of learning spelling. The writer has observed that in clinical diagnosis and treatment of spelling difficulty disabled spellers improved when they changed their habits of studying spelling.

Whether existing differences in study habits are causal or resultant in relation to spelling disability was not established by Brueckner and Bond. Spache (88, p. 135-136) did not hesitate to assume them causal.

Programed self instruction in spelling is in itself a method of study seeking to establish positive habits of studying, positive attitudes toward words, and confidence in self as a successful speller.

The Use of Rules and Word Lists
in Spelling Instruction

In discussing the place of rules and word lists in spelling instruction, Ernest Horn (47, p. 1344-1345) emphasized that one of the most effective uses of traditional spelling instruction is in the teaching of rules for the addition of suffixes to basic word roots, that only those rules which apply to large numbers of words and have few exceptions should be taught, and that instruction should be directed at the use of the rule instead of mere memorization of its verbal statement. In a similar statement, Thomas Horn (48) said that the most promising use of spelling rules appeared to relate to suffixes.

In this study of programmed-inductive self instruction versus traditional-deductive presentation of spelling rules and lists of words, the particular subject matter chosen for the units thus presented rules for use at their best according to Horn's criterion.

Fox and Eaton (31, p. 45) found that tested spelling proficiency in their study was best when many rules had been emphasized, and worst when no rules had been emphasized. For some students, rules and word lists superimpose an organization upon spelling and thereby contribute to their understanding of words.

Programed Instruction and Programing Techniques

Programing is so recent a newcomer that studies are not always available as yet to answer the questions arising from and about it. There are several, however, which reinforce the choices made in programing the materials in spelling used by this study, and others which would seem to indicate that little importance may attach to what was chosen. Furthermore, confusion exists about what is and is not programed material. Some see programing as only one more workbook, and they want none of it. Others see programing as a dangerous departure from everything known about learning to an untried, space-age gadgetry. What constitutes programed instruction? Programed instruction is primarily that age-old educational tool, good expository prose. Subject matter to be taught is composed into a program consisting of a series of items called "frames." Green (40, p. 117, 121) defines a frame as a unit of the program demanding a response from the student. The material in the frame builds cumulatively, and the frames proceed through the subject matter by steps. The information required to answer an item is contained in that item or in a preceding one. Because a program is largely an auto-instructional device, the answer is provided for each frame in order that the student can check his response at once before proceeding to the next item. The program may or may not be presented in a

machine. The program may be a paper booklet, or a hard-backed regularly bound textbook, or a tape, or a series of slides, or any of a number of devices for presenting to the learner a sequence of instruction by means of which he can inform himself without the live presence of an instructor.

The response itself which the learner must make has come under the scrutiny of researchers. Many kinds of responses have been tried by programers. The question arises whether it is important that the student's response be overt or covert, the latter requiring less time. Klaus (52, p. 43) found that in many cases it makes no difference whether the response is written, spoken, or merely thought; excepting for the differences of the time required, there is no measurable difference in learning. On the other hand, he found, if the goal of the program is to develop some manual or perceptual skill, active responding can be very important. Only when a student writes out the word does he receive the necessary practice in spelling it. Spelling is a written art. Pronouncing the word to himself will not likely yield the same result. Wilson and Robeck (101) found the constructed response preferable to the multiple choice response for programmed spelling.

Investigating size of step, Smith and Moore (86) found that size of step in linear programming of spelling made no significant difference in instructional effectiveness.

Reynolds and Glaser (75) studied the effects of linear and spiral programing upon amount and variability of learning. They found that the linear program took much less time than spiral programing took, that when time was fixed and the two programs were compared for effectiveness of teaching as determined by the students' gains in achievement the linear program was significantly better, but that when time was not a factor no significant differences appeared in the amount of gain resulting from the use of either program.

Annet (3) differentiated between reinforcement and knowledge of results. He maintained that they are not synonymous terms, nor are they describing the same psychological phenomenon. He believed knowledge of results to be the most important factor in human learning, and he has labeled it the KR factor. Moore and Smith (63) undertook experiments in auto-instructional materials to obtain evidence about the necessity for KR in self-teaching materials in spelling. They used two kinds of programmed texts, one having the answer within each frame for immediate KR, the other utilizing delayed KR in that the answer was not given in its frame but the word was used in a later frame. No significant differences appeared, but scores for the delayed KR group were consistently higher than those for the group getting immediate KR in each frame, a trend that might suggest a detrimental effect from overprompting.

Also studying the KR factor, Krumboltz and Weisman (54)

found that confirmation affected the error rate and that the greater the amount of subsequent intermittent confirmation the fewer the errors made by the learner.

Goldstein and Gotkin (38) compared machine programs with programmed textbooks as modes of presenting self instruction. No significant differences in effectiveness emerged from any of the eight studies reviewed. Studies were drawn from experiments conducted by Bell Telephone Laboratories, the Department of Engineering at the University of California in Los Angeles, three elementary public schools, one junior high school, and the U. S. Naval Training Device Center at Port Washington, N. Y. Pipe (71) found that automatic tutoring is accomplished by the program, not by the machine.

Green (40, p. 121-122) pointed out three essential features of the teaching program: (1) it presents material to the student in an organized, logical sequence; (2) it requires the student to make an overt response; (3) it provides feedback to the student so that he knows whether or not his response was appropriate. Green believed that programing represents the practical application, perhaps the first, of laboratory techniques in education. The task of programmed instruction, as of all instruction, involves the conditioning of a behavioral repertory. One questions Green's assumption of firstness for programmed self instruction on the bases he has listed, however, because such characteristics do not set programing apart from other

educational materials. In fact, a well-written textbook has long merited the same description.

Schramm (79, p. 11) pointed out that too little is known about what makes an effective program and where programs are more effective than other methods of instruction. Much of the research in the field has yet to reach print, much of it being in progress or in mimeographed and unpublished form. Margulies (56, p. v) emphasized that there is no longer any question about whether students learn from programmed instruction. They do. The question now is to find the most effective uses for it in particular areas.

Programing has been developed chiefly in those fields of learning where the basic elements are predictable and systematic. Taba (90), speaking to the American Educational Research Association in 1962, discussed the importance of programing as means to learning by discovery. The chief mode for intellectual productivity and autonomy, she believed, is learning by discovery. When the learner relies on his own cognitive processes, when he is aware of the relationship of the learning task and his own experience and performance, and when he has developed an attitude of search and expectation or a set to learn under his own steam, he is in a position to continue these processes on his own. Learning by discovery requires a teaching-learning strategy that amounts to setting conditions to make discovery possible. Central to this strategy is the

confrontation of learners with problem situations which demand that he assemble presented facts into new insights. Experimental teaching strategies which foster learning by discovery, she concluded, are imbedded in the programming of content and in inquiry strategies.

The programmed materials used in this study (95) were prepared on the assumption and in the hope that if the learner knows certain common words, that if he is familiar with them through having heard or read them, that if he can spell them but cannot spell derived forms of them successfully, he can profit from a self-instructional program prepared to help him first to observe the behavior of those words as they go into derived forms, to make a generalization about that observed behavior, and, finally, to apply that generalization to new words of the same class, having thus enabled himself to spell without the intervention of a live instructor. Such self instruction is learning by discovery. And materials which attempt to induce it must be Socratic in method, inductive in the approach to generalization, practical in that the learner apply his discovery immediately and repeatedly with success. Programmed self-instructional spelling gives the learner a simple, familiar, known word, and then it confronts him with the problem of constructing the derived forms of which he may be uncertain in spelling. By observation, it leads him step by step to making the necessary generalization, and it gives him ample opportunity to test that generalization successfully. Such is

its teaching-learning strategy.

The programed self-instructional spelling for this study was linear rather than spiral or branching. A booklet, it required only that the learner be able to read and that he have a pencil. It demanded a constructed, active, overt written response and made no use of true-false or multiple-choice responses. Inasmuch as spelling is a written skill, it asked the learner to practice writing words. Its steps were small to minimize error and to promote success. It tried to avoid the deleterious effects of overprompting. Each frame provided immediate knowledge of results. Subject matter was the stable, basic, predictable spelling behavior of some everyday words.

Instructional Method as a Significant Variable in the Effectiveness of Instruction

Inasmuch as this study sought to find out if there were any significant differences between two methods of presenting spelling instruction, the traditional-deductive method and a programed-inductive method, research concerned with whether or not method may be a significant variable in the effectiveness of instruction was highly pertinent.

Comparison of instructional methods, whether concerned with classroom use or independent study, has prompted investigation in many subject matters under a variety of experimental conditions.

Studies concur, however, in having the same general objective: they seek to determine whether it makes any difference which method is used to present subject matter to learners. Does it make any difference how one teaches, how one is taught, or how one learns?

A striking feature of the research is the infrequency with which significant differences emerge between methods, no matter what the subject matter serving as vehicle for the test. The absence of significant results also raises questions. Does it mean that instructional method is not the important variable? Or does it mean that experimental techniques are as yet inadequate for isolating and measuring differences between instructional methods? Interpretation is itself a controversial issue.

Marksheffel (60) compared the effectiveness of teaching spelling by three different methods to college students who were severely retarded spellers as measured by the Traxler Spelling Text, Form 1. No significant differences appeared among methods, but all groups made significant gains in spelling during instruction regardless of method. Burton (14) studied methods of teaching spelling to seniors in his high school English classes. One class used Fitzgerald's (28, p. 38) method utilizing individual word attack. A second class studied spelling incidentally, each keeping a list of his own personal spelling words. Burton found no conclusive evidence favoring any method over others. Lake (55) compared two methods for teaching spelling to

fifth grade pupils. Children in one group studied spelling as an individual problem, each keeping his own spelling list and learning new words as needed for his participation in class activities. Pupils in a second group received assignment of uniform word lists for mastery. No significant difference appeared between the two methods. Burkhart (13) investigated the effectiveness of two instructional methods and two testing procedures for teaching spelling to 969 pupils. One instructional method was functional; the other, a traditional textbook procedure. Tests were either scheduled or unscheduled. Results revealed no superiority.

Within the past five years, programing as an instructional and self-instructional method has come to the front in educational research. Porter (74, p. 80) tested the hypothesis that programmed instruction in spelling would result in more uniform learning outcomes than would normal classroom procedures. His hypothesis was not confirmed. He did find, however, that the rate of progress through the programs was faster and subject to more individual variability than progress in the normal classroom. He found further that spelling programs allowed pupils free access to more advanced parts of the program as soon as they were ready for it, whereas the normal classroom procedure tended to make all move at the same pace.

Spelling is not the only subject matter in which significant differences generally fail to appear in comparisons of instructional methods. Other subject matters and curricular activities show similar paucity of statistically significant results. Jensen (50) studied the relative effect of five different training methods used for teaching college men to swim. No significant difference emerged to indicate superiority of method. Wardian (98) investigated the effectiveness of programmed instruction for teaching the fundamentals of music to college freshmen. No significant difference appeared in her comparison of the program versus the conventional lecture-recitation method. Pikaart (70) studied eight classes of fourth-grade pupils in arithmetic. He was trying to find out whether there was difference in performance between classes taught by programmed textbook and other classes taught by traditional classroom procedures. No significant differences appeared in final mean scores. Dessart (22) compared programmed instruction with teacher-taught instruction for accelerated pupils in eighth-grade mathematics. He found that the program took much less time than did the live instructor, but that the live instructor was apparently more effective than the program as long as time was not a factor. When both were equated on the basis of time, statistically significant difference could not be established. Wesson (99) reported an experimental evaluation of selected techniques for employing programmed textbook

materials in elementary school arithmetic. He found no superiority. Smith (85) tried two methods of teaching statistics to U. S. Air Force Academy students. He compared programed instruction in elementary statistics with conventional classroom presentation of the same subject matter. No significant difference emerged in achievement. A highly significant difference emerged in the amount of time required to complete the course, the program being much faster than the conventional classroom. Flynn (29) studied the influence of programed instruction upon learning in Educational Psychology classes in relation to whether students were achievers or underachievers in college. He found a significant gain for achievers from pre-test to post-test, but all other differences failed to reach significance as sought in comparisons of post-test performance and retention, sex and performance. Stone (91) investigated the effects of the learners' characteristics on performance in programed text and conventional text formats for two classes in lower division Educational Psychology. He found no differences that could be ascribed to the mode of instruction. The program required significantly less time. Rothkopf (77), of Bell Telephone Laboratories, compared experimentally the acquisition and retention of equivalences as presented by three modes of instruction: (1) a simple list of color equivalences, (2) the same items, with mnemonic device added, and (3) a linear, self-instructional programed booklet. Results showed no statistically

significant differences in acquisition or retention over a 48-hour period, but the group using the programed materials showed substantially better retention after 48 hours.

The comparative effects of inductive and deductive approaches to subject matter have come under investigation. Yabroff (102) studied inductive and deductive sequences in programed instruction to determine the extent to which they might affect the learner's speed and accuracy. The inductive method used an instructional sequence of programed frames presenting problems for solution before statements calling for rules and definitions. The deductive method used an instructional sequence of programed frames presenting rules and definitions before sample problems to be solved. He found the methods equally efficient. No statistically significant differences appeared in achievement as shown by scores or in time. The deductive resulted in somewhat fewer errors and better attitude, while the inductive produced somewhat better speed in transfer of rules to subsequent materials, but there were otherwise no differences. The experiment included 272 upper division students at the University of Minnesota.

Studying the inductive and deductive approaches to spelling, Sharpe (83) used 460 pupils in four schools in three Illinois towns to study three methods of teaching spelling. One method was an inductive, independent study procedure emphasizing syllabic content. The

other two methods were deductive, emphasizing memorization of letters and requiring that students write identically in content. She found no significant difference favoring any method, although the trend through the data was to the advantage of the inductive, independent procedure. Corcoran (19) sought a related objective in her study of inductive and deductive instructional methods in word analysis among third grade pupils. Using 616 children in 22 classrooms, she found that all groups made gains significant at the .01 level in phonics, spelling, visual discrimination, and rules. She found no significant differences between groups in pronunciation, phonics, visual discrimination, rules, reading achievement, vocabulary, or spelling. Slight differences favored the inductive method in pronunciation and visual discrimination; the deductive, in phonics and rules. Statistically significant differences favored pupils with IQ 110 and above, a finding suggesting that intelligence is a more important variable than is instructional method.

In a study of traditional method versus innovational method, the question invariably arises about the role of motivation in producing results by either method. Wallen (97), in a nineteen-classroom experiment, found that for spelling performance the motivational power of an incentive is not related to the source of that incentive. He found no significant differences arising from variables involving group study, independent study, or performance under the direct

supervision of the teacher. O'Leary (67) compared two methods of teaching spelling: (1) a small-group plan in which instruction was differentiated according to the individual pupil's achievement, and (2) the traditional plan in which the entire ungrouped class used a uniform assignment as prescribed by a basic speller for the class grade level. She found no significant differences among high achievers, but a statistically significant difference in favor of the low achievers in the small-group plan would suggest that low achievers may profit most from differentiated spelling instruction whereas high achievers profit by almost any method.

Studies Reporting Statistically Significant Results

Using 3,230 pupils in 60 classes in third, fourth, and fifth grades in 13 schools in New York City, Marie (57) tested the comparative effectiveness of teaching spelling by three methods: (1) the inductive method whereby the learner discovered how words were alike and, from their similarities, formulated the generalization constituting the spelling rule describing those words; (2) the deductive method in which the learner read the rule and studied a list of words to which the rule applied; (3) Fitzgerald's thought method (28, p. 192-213, whereby the learner studied the word within its spoken sentence, determined its meaning, used it in a sentence, and tried to figure out what its letters might be. Test scores measured

effectiveness of instruction. She found that the thought method operated most successfully for all grade levels and for both sexes, and that pupils using the inductive method made least progress in every grade. From such a finding, one might infer perhaps that today's pupils lack sufficient experience or training to formulate generalizations. The fact that the deductive method ranked second in spelling improvement would suggest that children do reason deductively with some success, a substantiation to that extent for spelling rules and lists of words. Because the thought method produced significantly greater progress in spelling than did either of the other two methods, one might infer perhaps that the development of meaning is the single most important factor in spelling mastery.

Brydegaard (12) made an experimental investigation concerning spelling instruction in the formation of derivatives. Studying 271 pupils, she tested the assumption that if the learner knows certain root words aurally, visually, and semantically, and if he can spell them, and if he knows certain derivatives of those words aurally and semantically but cannot spell them, he can profit from an instructional program in spelling which will emphasize the generalizations underlying the formation of derivatives and promote his growth in applying them. Results showed practical and statistically significant gains in favor of her hypothesis.

Dutton (25) found a statistically significant difference at the

.05 level in favor of programed instruction in science for fourth grade pupils in a comparison of the program versus conventional classroom methods of teaching scientific concepts of light, heat, and sound.

Deterline (23, p. 59) reported that the first really extensive field study designed to test the effectiveness of auto-instructional methods was conducted by Klaus and Lumsdaine (52) covering six weeks of instruction in high school physics. Results were evaluated by achievement tests. Findings are impressively in favor of programed self instruction.

Two studies reported statistically significant results in the use of tapes to teach spelling. Gibson (37) reported the Westside High School teaching-by-tape project, which compared achievement of tape-taught pupils with that of others in regular classrooms for spelling in the seventh grade. Results were significantly in favor of the tape-taught children. Edgerton and Twombly (26) reported an experiment in auto-instructional spelling using tape-taught programs demanding constant interchange between tape and learner. Pupils using the auto-instructional program made significant gains over the controls in the regular classrooms with conventional spelling textbooks.

Implications

Accumulated research had several implications for self-instructional spelling. It also raised several questions. It did not

accord inductive presentation the preferred status frequently assumed educationally. It suggested that induction and deduction as approaches to instruction may be less important than some other variable.

It tended to show that programed instruction is as effective as many classroom procedures, and more effective than some. It showed that under some circumstances students can learn from a paper tutor, the program, as well as from a live instructor, and that the paper tutor has sometimes proven itself faster than the live tutor as disseminator of information. It implied that new formats for presenting old wisdom are not only possible but worthy in the preparation of textbooks for today's classrooms.

It examined the factors present in and perhaps causal to spelling disability or proficiency. Many influences operate to produce the complex disorder diagnosed as spelling disability, whose correction may lie in self instruction to an extent yet to be determined. Programed self instruction in spelling may conceivably lend itself usefully and economically to corrective efforts.

Accumulated research questioned whether methods alone are a significant variable in instructional effectiveness as measured by the results of instruction. It led to the question of whether present experimental techniques are isolating and measuring such differences as logic and experience have suggested must exist between methods. It suggested that in the teaching-learning process such factors as

intelligence and attitude toward spelling may be a more important variable than is the method of instruction.

The present study sought to ascertain whether either of two methods of self-instructional spelling might show superiority during trial, and whether, in the light of differences that have manifested themselves between the sexes in the ability to spell, either method of self-instructional spelling might be of more benefit to one sex than to the other.

CHAPTER III

DESIGN OF THE STUDY AND RELATED PROCEDURES

This study compared two self-instructional methods for improving spelling in high school and college: a traditional-deductive presentation of spelling rules and lists of words, and a programed-inductive presentation which led the learner to observe the spelling behavior of words and to make generalizations applicable to similar words.

This study asked two basic questions: (1) Did the method of instruction significantly affect the results of self-instructional spelling? (2) Was there significant difference in spelling performance within either sex as a result of the method of instruction?

This study then asked three additional, subsidiary questions: (3) In the light of studies which have found today's students becoming increasingly poorer spellers, where did the students participating in this study rank on a standardized criterion measure of spelling achievement? (4) Inasmuch as self instruction in spelling is predicated on the student's awareness of his spelling problem and his desire to do something to help himself overcome that problem, did his own estimate of his ability as a speller approach reality? (5) Inasmuch as self instruction should aim in practical fashion at clarifying misunderstanding of the spelling behavior of words, and

should avoid where possible the repetition of what has already been understood, what was the incidence of misspelling among words whose spelling behavior formed the basis for self instruction? Such an analysis would serve not only to evaluate the effectiveness of instruction but to improve the preparation of new materials.

The Pilot Study

This investigation began with a pilot study involving four classes of high school seniors at Klamath Falls and four classes of university students in voluntary, non-credit, corrective spelling at Oregon State University. It continued through the academic year 1961-1962. Its 149 participants were 95 high school pupils and 54 university students.

The pilot study constituted a trial during which to watch students using self-instructional materials, both programed and traditional, and to try various techniques for measuring progress during self instruction. Data from the pilot study served as the basis for the revision of all materials and for the choice of tests with which to evaluate performance and determine the effectiveness of self instruction. No statistical analysis of results was possible from data provided by the pilot study because experimental procedures had varied broadly and investigative freedoms had made data not comparable. The purpose of the pilot study was to improve format and

structure of the self-instructional materials themselves, and to select or to construct tests for assessing performance.

Population, Experimental Sample, and Students

Following completion of the pilot study and the revision of the self-instructional materials, the experiment in self instruction was begun. It extended over the two-year period 1962-1964. It concluded with the present study.

The population from which participants were drawn included the enrollments for seven western Oregon high schools and Oregon State University. The population numbered approximately 10,900 undergraduate and graduate students at Oregon State University, of whom 142 took part in the study, and approximately 9,225 pupils from the seven western Oregon high schools, of whom 700 took part in the study, making a total of 842 high school and college students participating in the study.

Cooperating Schools

Besides Oregon State University in Corvallis, the cooperating schools were Corvallis High School in Corvallis, Monroe Union High School in Monroe, Marshfield High School in Coos Bay, Klamath Union High School in Klamath Falls, and, in the Portland area,

Parkrose High School, David Douglas High School, and Milwaukie High School.

The Experimental Sample

The experimental group comprised 13 pairs of classrooms, each classroom in a pair being matched to its mate on the following six factors: (1) The two classes in each pair were at the same educational grade level (2) in the same school (3) with the same teacher (4) using self-instructional spelling simultaneously during the same academic term of the same school year (5) in the same curricular subject or course (6) in the same ability group within that school.

One class of each pair used the traditional-deductive self-instructional method and materials; the other used the programmed-inductive method and materials. Table 1 shows the composition of the experimental group.

The experimental group thus included 26 paired classrooms, in which 606 high school and college students used self-instructional spelling. Of the 606 students, 470 were high school pupils, to include 228 girls and 242 boys. Of the 606 students, 136 were university students, to include 73 women and 63 men. Of the 606 students, 312 received programmed-inductive self-instructional materials; 294 received traditional-deductive self-instructional materials.

TABLE 1
13 PAIRS OF EXPERIMENTAL CLASSROOMS

Grade	Subject and Grouping	Programed			Traditional		
		Girls	Boys	Total	Girls	Boys	Total
9th	English, heterogeneous	9	17	26	5	11	16
9th	English, average	16	18	34	20	15	35
10th	English, honors	15	11	26	9	13	22
10th	English, honors	13	10	23	11	13	24
11th	English, average	18	11	29	8	13	21
11th	English, college preparatory	17	14	31	14	12	26
12th	English, college preparatory	10	19	29	16	16	32
12th	English, basic terminal	4	10	14	5	16	21
12th	Psychology, honors elective	18	13	31	20	10	30
OSU	Education 101	11	8	19	10	9	19
OSU	Education 101	6	13	19	9	10	19
OSU	Spelling, non-credit	11	9	20	7	10	17
OSU	Education 200, prospective teachers of English	8	3	11	11	1	12
Totals		156	156	312	145	149	294
Total Number Students							606

Additional description is necessary to supplement information in Table 1. The paired classes in twelfth-grade English for basic, terminal English included pupils of less than average scholastic achievement, but none was mentally retarded. The twelfth-grade pair in elective Psychology for above-average pupils contained high school seniors of exceptional ability or accelerated courses of study,

of whom at least one-half had cumulative high school grade point averages of 3.00 and above. Education 101 was a course in Methods of Study, whose purpose was to help students increase their efficiency in college work by improving their study habits. The pair of university classes in non-credit spelling included both graduate and undergraduate students who came on a voluntary basis to improve their spelling, as previously described in Chapter I of this study. The university students in Education 200 were sophomores and juniors who were preparing to become teachers of English.

The Aggregate Group

Besides the 26 paired experimental classrooms constituting 13 pairs of matchmates, an additional nine classrooms without matchmates also tried self-instructional spelling. Data derived from such an aggregation did not lend itself, of course, to inclusion in the basic statistical analyses of variance and covariance which undergirded the study. But findings from the aggregate group were helpful in that they provided a larger sample from which to answer the three subsidiary questions asked by this study, independent of the statistical analyses of variance and covariance.

The aggregate group thus comprised 35 classrooms (Appendix A). It included 842 students, 418 girls and 424 boys. Altogether, 19 classes used the programmed-inductive self-instructional method

TABLE 2

9 ADDITIONAL CLASSROOMS WITHOUT MATCHMATES

Grade	Subject and Grouping	Programed			Traditional		
		Girls	Boys	Total	Girls	Boys	Total
9th	English, heterogeneous				13	16	29
10th	English, honors				12	13	25
10th	English, basic terminal	12	17	29			
11th	English, college preparatory				18	14	32
11th	English, basic terminal	13	15	28			
11th	English, college preparatory	13	15	28			
11th	English, average	14	17	31			
12th	Psychology, honors elective	18	10	28			
OSU	Education 408j, seniors ready to be student teachers in English	4	2	6			
Totals		74	76	150	43	43	86
Total Number Students							236

and materials (Appendix B) and 16 classes used the traditional-deductive self-instructional method and materials (Appendix C).

Distribution

Neither the experimental sample nor the aggregate group represented a normal, random distribution, nor could either be treated as such in analysis.

Purpose of the Experimental Sample and of the Aggregate Group

This study asked two major, basic questions of the experimental sample. It asked three subsidiary, general questions of the aggregate group.

The Experimental Self-Instructional Materials

The experimental self-instructional materials were traditional-deductive spelling rules and lists of words versus a programmed-inductive presentation of spelling (95) which led the learner to observe the behavior of words and to make generalizations applicable to other words in similar situations. Both methods of self instruction have been previously described in detail in Chapter I of this study.

Sequence of Presentation

The period of the self-instructional effort covered eight units of subject matter presented over eight weeks. The units were presented separately and in sequence, each being tested the week following its presentation. The classroom teacher gave students the self-instructional materials but made no class use of them, the instruction being self instruction and the purpose of the study being to determine its effectiveness. The teacher also gave the tests, by means of which progress and effectiveness were measured. In other than

experimental situations, however, the student could have given himself the tests.

To avoid contamination of data, experimental classes within each pair were kept a week apart in sequence. Inasmuch as the programed materials were the innovation and somewhat of a novelty, the traditional class in each pair was kept one week in advance of its matchmate using programed instruction.

Evaluative Instruments

This study used two kinds of tests, a criterion measure before and after self instruction and a short test over each particular unit during self instruction. The criterion measure before and after the experimental period was the Traxler High School Spelling Test, Forms 1 and 2. Thirteen short tests covered the progress of self instruction, each being pertinent to an individual unit of subject matter.

The Criterion Measure

The Traxler High School Spelling Test, Form 1 ⁹²(92), provided the initial score for each student and served as a beginning measure of his level of spelling ability or disability. Form 2 of the same test provided a terminal score following self instruction.

Each form of the Traxler contained 50 words to be written

from list dictation. The student wrote only the particular word in question, but it had been presented to him in the context of a sentence to give it meaning. Both forms of the test were scored from zero to 100 to indicate the range between no performance and perfect performance.

Published in 1955, the test offered percentile norms for ninth, tenth, eleventh, and twelfth grades. Because spelling is not taught beyond the latter grades, the Traxler's twelfth grade norms are often used to assess spelling achievement beyond those grades among college students or other adults, as in the present study. The percentile norms for the two forms were derived from scores made by 3,489 high school pupils in a testing and standardizing program conducted by the Educational Records Bureau (92).

Forms 1 and 2 of the Traxler have high coefficients of correlation for each of the four grade levels tested, all coefficients being above .90, and two being near .95 (92). No statistical study of validity had been made at time of publication. Forms 1 and 2 had showed approximate equivalence during standardization, however, and the difference between the forms in the average number of words which were spelled correctly was less than one word. That slight difference was corrected before publication. In general, raw scores on the two forms are comparable, although small differences appear at a few points within percentiles.

The Traxler High School Spelling Test was chosen for the present study because it was standardized within the past ten years, a fact which should tend to make it old enough to have been tried beyond the experimental stages, yet new enough to be fairly free of adverse effects from changes in school populations or shifts in students' basic vocabularies. Its norms should be representative.

It was further chosen because it is a list-dictation test of spelling and, as such, it measures the student's ability to write a word, not his ability to choose among multiple spellings or to proof-read misspellings presented by testmakers but not necessarily characteristic of himself.

Test to Evaluate Progress during Self Instruction

Between the initial and the terminal Traxler tests, eight short, weekly tests of 20 words each were devised for this study to cover the particular subject matter of the eight self-instructional units, whether traditional or programed. In addition, two review tests at spaced intervals probed retention. Three worksheets, each based on 50 words, yielded scores on the student's ability to manipulate word roots and suffixes. The investigation thus provided 15 test scores for each student in spelling.

Each of the three worksheet tests gave the student 25 word roots for combination as directed with a variety of suffixes to make

derived forms in common use. Each worksheet exemplified the regular spelling behavior of a particular class of words.

With the exception of the worksheets, all tests were list dictation like the Traxler. All tests and worksheets were scored in the manner of the Traxler, a score of zero representing no performance and a score of 100 perfect performance. Tests were scored thus in order that each participant might know his own performance without recourse to norms or statistical equation.

Self Classification versus Performance on a Criterion Measure

The initial activity of the experiment was to ask each student what kind of speller he thought he was and how he felt about spelling. The purpose of the brief questionnaire (Appendix D) was to learn whether poor spellers recognize their spelling problem and its extent. Each student placed himself in one of four classifications. The questionnaire invited his comments in order to learn his feeling and to secure a sample of his free, written expression under circumstances perhaps a little less threatening than those of a spelling test. The student's categorization of himself as a speller was charted on a scattergram versus his percentile rank on the first Traxler before self instruction. The aggregate group of 842 students participated.

The Incidence of Misspelling

Eight tests, each containing 20 words, covered the subject matter of eight self-instructional units and presented the student with 160 for him to spell. The incidence of misspelling occurring on specific words after a unit of self instruction designed to teach those words gave yet another kind of evaluation of the comparative effectiveness of the traditional-deductive method and materials versus the programmed-inductive method and materials (Appendix E). Percentages derived from scores made by the 842 students in the aggregate group.

Analytic Procedures

Analytic procedures were determined by the questions the study asked of the data. It asked whether method was a significant variable in self-instructional spelling, whether the results of programmed-inductive self instruction in spelling differed significantly from those of traditional-deductive self instruction within either sex, whether today's spellers are as good as spellers ten years ago, whether poor spellers know they need instruction and know how poorly they spell, and whether either method of instruction proved superior for a specific unit of subject matter as shown by the incidence of misspellings after self instruction.

Analysis of Covariance

The answer to the question of whether method was a significant variable in self-instructional spelling was sought in the experimental sample comprising 26 paired classrooms. In order to place all students on equal basis regardless of ability, age, educational level, or sex, the study compared the student's raw score on the initial Traxler with his mean score on the 13 tests during the self-instructional period. The difference between raw score on the initial Traxler and mean score for the 13 tests was analyzed for 294 students using the traditional-deductive method of self instruction versus 312 students using the programmed-inductive method. An analysis of covariance determined whether method alone made a significant difference in the results of self instruction in spelling.

Analysis of Variance

To answer the second question and find out whether the results of instruction by either method differed significantly within either sex, the study turned again to the 26 paired experimental classrooms. A comparison of the general means within each sex for spelling scores on the initial Traxler, the 13 tests during self instruction, and the terminal Traxler placed the traditional-deductive mode of instruction versus the programmed-inductive mode. Means were

subjected to analysis of variance to determine whether method had significantly influenced spelling achievement within either sex.

Participants' Rank on Percentile Norms of Initial Measure

To find out whether students as represented in this study might be as good as, or better or worse than, spellers ten years ago, the group means for each participating classroom were compared with those of the norming sample on the initial Traxler.

Self Classification versus Percentile Rank

Inasmuch as self-instructional spelling is predicated on the student's realistic awareness of his spelling deficiencies, this study placed each student's classification of himself as a speller versus his percentile rank as a speller on an initial criterion measure prior to self instruction. To expedite analysis, percentiles on the Traxler were combined into intervals of ten to form deciles. The student was thus seen in one of four self-classification cells versus one of ten decile ranks indicating actual spelling performance. Percentages within each cell showed the proportion of students achieving that particular degree of reality in assessing themselves.

Percentage of Unsuccessful Attempts for Each of 160 Words

The incidence of misspelling on each of 160 words selected for use as tests out of 648 words presented during self instruction yielded percentages based on the performance of 842 high school and college students, 462 of whom had used the programed-inductive self-instructional method and materials in spelling and 380 of whom had used the traditional-deductive presentation of spelling rules and word lists.

Although such percentages of necessity must reflect to some extent the idiosyncracies of the individual materials as used in this study, they also offered worthwhile evidence concerning the effectiveness of two modes of self instruction.

CHAPTER IV

FINDINGS

This study reported the results of a 26-classroom experiment comparing two methods of self instruction to improve spelling in high school and college. The two methods were a traditional-deductive presentation of spelling rules and lists of words versus a programmed-inductive presentation that led the learner to observe the spelling behavior of words and to make generalizations applicable to other words in similar circumstances.

To compare the two methods, the study asked two basic questions of the data from the 26 paired experimental classrooms: (1) Did method alone constitute a significant variable in the results of self instruction in spelling? (2) Did the results of the traditional-deductive method of self instruction in spelling differ significantly from the results of the programmed-inductive method of self instruction in spelling within either sex?

The study then asked three related, subsidiary questions from its aggregation of 35 classrooms, not all of which were paired but all of which had been experimenting with one or the other methods of self instruction in spelling: (3) In the light of the studies which have found today's students increasingly poorer spellers, where did participants in the present study rank as spellers on a standardized

criterion measure normed ten years ago? (4) Inasmuch as self instruction in spelling is predicated on the student's awareness of his spelling problem and his desire to help himself overcome it, did the poor spellers in this study show recognition of their inadequacy as spellers prior to testing and self instruction? (5) Inasmuch as self-instructional spelling should aim in practical fashion at clarifying misunderstanding about the spelling behavior of words, and should avoid when possible the repetition of what has been already understood, what was the incidence of misspelling among the words which had formed the basis for self instruction?

Method Alone as a Variable

To find out whether method alone constituted a significant variable in self-instructional spelling, the study analyzed the scores made by 606 high school and college students in 26 paired experimental classrooms.

Each student had taken the Traxler High School Spelling Test, Form 1, prior to the period of self instruction; and his raw score on that test provided an initial level of competence with which to make later comparisons. The raw score was used in preference to the test's percentile norms in order that all students be on equal footing, irrespective of educational grade levels, ability grouping, age, or sex.

Each student had also taken 13 tests during the period of self instruction. His mean score for those tests offered a measure of his achievement, a measure which, like the raw score on the Traxler, was free from concomitant considerations of norming samples, educational grade levels, age, and sex. Accordingly, his raw score on the Traxler was compared with his mean score during self instruction, and on that basis 312 students using the programmed-inductive method and materials were compared with 294 students using the traditional-deductive method and materials in the 26 paired classrooms of the experiment in spelling.

For accuracy of analysis, each student's scores were punched on IBM cards. A computer processed them.

Results

An analysis of covariance (Table 3) revealed no significant difference between methods attributable to method alone. Students using one method of self instruction did not perform significantly better or worse than students using the other method. The results achieved by programmed-inductive self instruction in spelling were little different from results achieved by the traditional-deductive self instruction in spelling when raw scores were used for analysis and when differences of sex, age, grade level, and ability grouping

TABLE 3

ANALYSIS OF COVARIANCE: EACH STUDENT'S RAW SCORE ON THE TRAXLER HIGH SCHOOL SPELLING TEST, FORM 1, BEFORE SELF INSTRUCTION VERSUS HIS MEAN SCORE ON THE 13 TESTS DURING HIS PERIOD OF SELF INSTRUCTION, AS DETERMINED FOR 606 HIGH SCHOOL AND COLLEGE STUDENTS IN 26 PAIRED EXPERIMENTAL CLASSROOMS IN SPELLING

X = Traxler High School Spelling Test, Form 1 (raw scores)
Y = Mean of the 13 Tests

Source of Variation	d.f.	SSX	SP	SSY	MSY	Error of Estimate SS	d.f.	M.S	F
Replications	12	7089.86	2011.526	3480.6702	290.0558				
Method	1	51.00	-22.917	10.2973	10.2973				
Error (a)	12	801.60	23.139	310.6754	25.8896	310.0075	11	28.1825	
Method and Error (a)	13	852.60	.222	320.9727		320.9726			
Adjusted Method						10.9651	1	10.9651	.39
Adjustment, Missing Observations						.0001		.0001	
								(not significant)	
Sex	1	1241.67	61.375	3.0337	3.0337				
Method x Sex	1	89.19	-8.356	.7828	.7828				
Error (b)	24	664.19	253.666	3018.4832	125.7701	2921.6037	23	127.0262	
Sex + Error (b)	25	1905.86	315.041	3021.5169		2969.4403			
Adjusted Sex						47.8366	1	47.8366	.38
								(not significant)	
Meth. x Sex + Error	25	753.38	245.310	3019.2660		2939.3900			
Adjusted Meth. x Sex						17.7863	1	17.7863	.14
								(not significant)	

were ignored. Within the scope of this study, methods were not a decisive variable in the effectiveness of instruction.

Method as a Variable in the Spelling Performance of the Sexes

The second issue with which the study concerned itself was whether method of instruction significantly influenced spelling achievement within either sex.

Table 4 shows the distribution by sex of the 606 high school and college students participating in the study. There were 305

TABLE 4

DISTRIBUTION BY SEX: 606 HIGH SCHOOL AND COLLEGE STUDENTS IN 26 PAIRED EXPERIMENTAL CLASSROOMS

Method	Boys	Girls	Total, Method
Programed-Inductive Self Instruction	156	156	312
Traditional-Deductive Self Instruction	149	145	294
Total, Sex	305	301	606

males, 156 of whom used programed-inductive self instruction and 149 of whom used the traditional-deductive self-instructional method and materials. There were 301 females, 156 of whom used programed-inductive self instruction and 145 of whom used the traditional-deductive method materials for self instruction in spelling.

Inasmuch as all students had taken the Traxler High School Spelling Test, Form 1, prior to beginning self instruction, an analysis of mean raw score performance on that test provided an initial level from which to begin comparisons between sexes and within each sex. Again, only raw scores were used and percentile norms accompanying the Traxler were ignored at this point of statistical analysis of data in order that all students be on common footing. Table 5 shows mean performance by each sex on that test.

TABLE 5

MEAN RAW SCORE ON THE TRAXLER HIGH SCHOOL SPELLING TEST, FORM 1, FOR 305 BOYS AND 301 GIRLS IN 26 PAIRED EXPERIMENTAL CLASSROOMS PRIOR TO SELF INSTRUCTION IN SPELLING

Method	Boys	Girls	Method Means
Programed-Inductive Self Instruction	59.42	66.57	62.99
Traditional-Deductive Self Instruction	54.82	67.21	61.01
Sex Means	57.12	66.89	62.00

Table 5 shows that the girls in the study were better spellers to begin with than the boys were. The general mean for the girls was 66.89, and that for the boys was 57.12. The difference between the means was statistically significant at the .01 level of confidence, a

finding that indicates that only one time in 100 times could the difference occur by chance. Table 6 shows the analysis of variance determining that significance.

TABLE 6

ANALYSIS OF VARIANCE: MEAN RAW SCORE ON THE TRAXLER HIGH SCHOOL TEST OF SPELLING, FORM 1, PRIOR TO SELF INSTRUCTION IN SPELLING IN THE 26 PAIRED EXPERIMENTAL CLASSROOMS, 305 BOYS VERSUS 301 GIRLS

Source of Variation	D. F.	Sum of Squares	Mean Square	F
Total	51	9937.51		
Replications	12	7089.86	590.82	8.84 significant .01
Method	1	51.00	51.00	.76
RxM (Error A)	12	801.60	66.80	
Sex	1	1241.67	1241.67	44.87 significant .01
MxS	1	89.19	89.19	3.22
Error B	24	664.19	27.67	

Initial mean differences within each sex, however, were not significant prior to self instruction. Differences existed of course, as shown by Table 5, but they were not significant within either sex. Such a finding means that the boys who would be given the programmed-inductive materials were not significantly better spellers than were the boys who would receive the traditional-deductive rules and word lists, although the group mean of the former was slightly higher than that of the latter prior to instruction. Girls who would be given

programed-inductive materials were not significantly poorer spellers than were the girls who would be given the traditional-deductive rules and word lists, although the group mean for the former was slightly lower than that of the latter prior to instruction. There were no significant differences within either sex prior to self instruction. But there was a significant difference between the sexes; the girls were significantly better spellers than the boys were (Tables 5 and 6) prior to self instruction.

After self instruction, a similar analysis was made of the raw scores on the terminal Traxler High School Spelling Test, Form 2, to see if a significant difference might appear within either sex after self instruction. It did.

Results

Analysis of the raw scores on the terminal Traxler showed that a wide difference had appeared between the group mean for the boys using programed-inductive self instruction and the group mean for boys using traditional-deductive self instruction, a difference favoring the programed-inductive method (Table 7).

Table 8 shows that the difference which had appeared among the boys was statistically significant, although only at the .05 level of confidence, a finding that indicates that five times in 100 times the difference could occur by chance.

TABLE 7

MEAN RAW SCORE ON THE TRAXLER HIGH SCHOOL SPELLING TEST, FORM 2, FOR 305 BOYS AND 301 GIRLS IN 26 PAIRED EXPERIMENTAL CLASSROOMS AFTER SELF INSTRUCTION IN SPELLING

Method	Boys	Girls	Method Means
Programed-Inductive Self Instruction	64.23	70.92	67.57
Traditional-Deductive Self Instruction	56.79	70.22	63.51
Sex Means	60.51	70.57	65.54

TABLE 8

ANALYSIS OF VARIANCE: COMPARISON OF MEAN RAW SCORES ON THE TRAXLER HIGH SCHOOL SPELLING TEST, FORM 2, AFTER SELF INSTRUCTION FOR 305 BOYS IN 26 PAIRED EXPERIMENTAL CLASSROOMS, THE PROGRAMED-INDUCTIVE VERSUS THE TRADITIONAL-DEDUCTIVE METHOD OF INSTRUCTION, NO DIFFERENCE HAVING APPEARED BETWEEN METHODS FOR 301 GIRLS

Source of Variation	D. F.	Sum of Squares	Mean Square	F
Total	51	10268.89		
Replications	12	7110.91	592.58	8.76 significant .01
Method	1	214.86	214.86	3.18
RxM (Error A)	12	67.68	67.68	
Sex	1	1315.05	1315.05	47.25 significant .01
MxS	1	147.90	147.90	5.31 significant .05
Error B	24	667.98	27.83	

At the conclusion of the experiment the girls were still significantly better spellers than were the boys, regardless of method used. But the boys using programed-inductive self instruction in spelling were significantly better spellers than were the boys using the traditional-deductive spelling rules and lists of words.

Participants' Rank on Traxler's Norms

Do today's students spell as well as their predecessors? In the light of recent investigations which have found students today increasingly poorer spellers, this study ranked its participants on the percentile norms provided by the Traxler High School Spelling Test, Form 1, prior to self instruction. Table 9 describes the rank of the girls as a group and the boys as a group. Percentages within each cell indicate the proportion of the group ranking at that level. For

TABLE 9

PERCENTAGES SHOWN BY 842 HIGH SCHOOL AND COLLEGE STUDENTS IN RANK ON THE PERCENTILE SCALE NORMS OF THE TRAXLER HIGH SCHOOL SPELLING TEST, FORM 1, BEFORE SELF INSTRUCTION IN SPELLING IN 35 CLASSROOMS FOR 418 GIRLS VERSUS 424 BOYS

	Percentile Scale									
	1-	10-	20-	30-	40-	50-	60-	70-	80-	90-
Girls	30%	16%	12%	12%	9%	6%	6%	3%	5%	1%
Boys	47%	14%	8%	7%	5%	6%	10%	1%	2%	-

ease of comparison, the Traxler's percentile scale has been indicated in intervals of ten to form deciles.

Only 21 percent of the girls and 19 percent of the boys ranked at or above the fiftieth percentile of the norming sample ten years ago, a finding that means that 79 percent of the girls and 81 percent of the boys ranked below the fiftieth percentile. Apparently the 842 students in the present study were poorer spellers than the norming sample.

An analysis of the group mean for each classroom (Appendix A) shows that only one class of the 35 participating in the study exceeded the norms, and that class consisted of university seniors who were ready to teach English. Their percentile rank was 65, a level above the fiftieth percentile of the pupils they were preparing to instruct but hardly a proficiency great enough to match their task.

Improvement as Shown by Percentile Ranks

Although mean performance for each of the 35 participating classrooms, with one exception, fell much below average as measured by the Traxler's percentile norms (Appendices B and C), self instruction brought general improvement to most groups regardless of the method of self-instructional spelling employed by the participants. The differences between percentile ranks before and after self instruction appear in Table 10 for the classrooms using the

programed-inductive method, in Table 11 for those using the traditional-deductive method.

TABLE 10

DIFFERENCES BETWEEN PERCENTILE RANKS BEFORE SELF INSTRUCTION AND PERCENTILE RANKS AFTER SELF INSTRUCTION, AS MEASURED BY FORMS 1 AND 2 OF THE TRAXLER HIGH SCHOOL SPELLING TEST, FOR 19 CLASSROOMS USING THE PROGRAMED-INDUCTIVE METHOD OF SELF-INSTRUCTIONAL SPELLING

Grade Level	Subject and Grouping	%ile before instruction	%ile after instruction	Difference between %iles
9	English, heterogeneous	14	18	4
9	English, heterogeneous	25	31	6
10	English, honors	28	39	11
10	English, honors	31	39	8
10	English, basic, terminal	6	8	2
11	English, college preparatory	22	27	5
11	English, basic, terminal	5	9	4
11	English, average	10	17	7
11	English, college preparatory	20	23	3
11	English, average	6	8	2
12	English, average	2	3	1
12	English, basic, terminal	1	1	none
12	Psychology, honors, elective	6	11	5
12	Psychology, honors, elective	6	10	4
OSU	Ed. 101, Methods of Study	10	12	2
OSU	Ed. 101, Methods of Study	10	22	12
OSU	Spelling, non-credit	4	8	4
OSU	Ed. 200, prospective teachers of English	21	22	1
OSU	Ed. 408j, seniors ready to be student teachers in English	65	77	12

TABLE 11

DIFFERENCES BETWEEN PERCENTILE RANKS BEFORE SELF INSTRUCTION AND PERCENTILE RANKS AFTER SELF INSTRUCTION, AS MEASURED BY FORMS 1 AND 2 OF THE TRAXLER HIGH SCHOOL SPELLING TEST, FOR 16 CLASSROOMS USING THE TRADITIONAL-DEDUCTIVE METHOD OF SELF-INSTRUCTIONAL SPELLING

Grade Level	Subject and Grouping	%ile before instruction	%ile after instruction	Difference between %iles
9	English, heterogeneous	4	8	4
9	English, heterogeneous	15	16	1
9	English, heterogeneous	27	30	3
10	English, honors	34	36	2
10	English, honors	46	44	-2
10	English, honors	46	44	-2
11	English, average	10	11	1
11	English, college preparatory	29	26	-3
11	English, average	17	23	6
12	English, average	3	5	2
12	English, basic, terminal	1	1	none
12	Psychology, honors, elective	6	10	4
OSU	Ed. 101, Methods of Study	7	11	4
OSU	Ed. 101, Methods of Study	5	10	5
OSU	Spelling, non-credit	4	5	1
OSU	Ed. 200, prospective teachers of English	24	26	2

Comparison of the two tables shows that the programmed-inductive classrooms made an overall mean gain of 4.89 percentiles in rank as compared with an overall mean gain of 1.75 percentiles in rank for the traditional-deductive classrooms, a difference in favor of the programmed-inductive self-instructional method.

All programmed-inductive classrooms, with one exception,

made measurable mean gains as determined by the Traxler norms. In the traditional-deductive classrooms, however, three classrooms lost a little, one held its own, and 12 showed improvement. The comparison again favored the programed-inductive method.

Self Classification versus Spelling Performance

The initial activity of the experiment in self-instructional spelling had been to ask each student what kind of speller he thought himself and how he felt about spelling. The purpose of the brief questionnaire (Appendix D) was to learn whether poor spellers recognized their spelling deficiency and its extent, and to secure a sample of each participant's free, written expression under circumstances perhaps a little less threatening than those of a spelling test.

The student's categorization of himself as a speller has been charted versus his percentile rank on the Traxler High School Spelling Test, Form 1, prior to self instruction in spelling. Percentages for each sex are based on 100 percent for the sex. Proportions were derived from the aggregation of 842 students in 35 classrooms.

Nine percent of the girls classified themselves as poor spellers, but the Traxler norms showed 45 percent of them ranking in the lowest 19 percentiles. More than half of the girls ranked below the thirtieth percentile. Only 1.1 percent of the girls attained the

TABLE 12

STUDENTS' ESTIMATES OF THEMSELVES AS SPELLERS COMPARED WITH WHAT THE TRAXLER HIGH SCHOOL SPELLING TEST, FORM 1, SHOWED ABOUT THEM AS SPELLERS PRIOR TO SELF INSTRUCTION: SELF CONCEPT VERSUS TEST PERFORMANCE FOR 418 GIRLS IN 35 CLASSROOMS

Self Rank	Traxler Percentile Scale									
	1-	10-	20-	30-	40-	50-	60-	70-	80-	90-
Excellent		.5%	.2%	.2%			.5%		.5%	.1%
Good	6.0%	6.0%	7.0%	7.0%	6.0%	5.0%	5.0%	2.0%	4.0%	1.0%
Average	16.0%	8.0%	5.0%	5.0%	3.0%	2.0%	.5%	.5%		
Poor	8.0%	.5%	.5%							
	30.0%	15.0%	12.7%	12.2%	9.0%	7.0%	6.0%	2.5%	4.5%	1.1%

top tenth of proficiency as measured by the Traxler.

Judged by the Traxler's norms, the 418 girls were poor spellers by comparison with their predecessors, the norming sample of ten years ago. Yet 91 percent of the girls classified themselves as average to excellent spellers. Only nine percent listed themselves as poor spellers. Whereas 51 percent thought they were good or excellent spellers, the Traxler showed only eight percent ranking in the top 30 percentiles where one would expect excellence to show itself.

The nine percent who classified themselves as poor spellers with spelling deficiencies were realistic in that their performance proved the accuracy of their classification. The 5.6 percent who listed themselves as good or excellent and who proved it by ranking in the top 20 percentiles were also realistic. Also realistic were

the middle 5.5 percent who listed themselves as average and performed there. But interpreting the responses of the remaining 79.9 percent becomes a moot issue.

The 424 boys showed related incongruities. The Traxler showed 46.2 percent of them ranking in the lowest nine percentiles, but their self classification of themselves showed 45.6 percent of them believing themselves to be good to excellent spellers (Table 10). On the Traxler's norms, 67.6 percent of them ranked in the lowest 29 percentiles, yet 88.6 percent felt themselves to be average or better. Fourteen percent said they had trouble with spelling, and they proved the accuracy of their self assessment by ranking in the lowest 19 percentiles; these boys were realistic. The 3.3 percent who felt they were good spellers and ranked in the top 30 percentiles were also realistic. But the other 82.7 percent are questionable. There was not even a small core that felt it was average and performed as such. Table 13 shows the boys' performance versus their self assessment.

Incidence of Misspelling

The incidence of misspelling for 160 particular words selected for use as tests from among the 648 words presented for spelling during self instruction offers additional means for comparing the effectiveness of programed-inductive self instruction versus the

TABLE 13

STUDENTS' ESTIMATES OF THEMSELVES AS SPELLERS COMPARED WITH WHAT THE TRAXLER HIGH SCHOOL SPELLING TEST, FORM 1, SHOWED ABOUT THEM AS SPELLERS PRIOR TO SELF INSTRUCTION: SELF CONCEPT VERSUS TEST PERFORMANCE FOR 424 BOYS IN 35 CLASSROOMS

Self Rank	Traxler Percentile Scale									
	1-	10-	20-	30-	40-	50-	60-	70-	80-	90-
Excellent	.2%	.2%		.2%		.5%	.2%	.2%	1.0%	.1%
Good	7.0%	5.0%	5.0%	5.0%	4.0%	5.0%	10.0%	1.0%	1.0%	
Average	26.0%	7.0%	3.0%	2.0%	1.0%	.5%	.5%			
Poor	13.0%	1.0%	.2%	.2%						
	46.2%	13.2%	8.2%	7.4%	5.0%	6.0%	10.7%	1.2%	2.0%	.1%

traditional-deductive spelling rules and word lists, although such detailed incidence must of course reflect heavily the idiosyncracies and peculiarities of the particular experimental materials. The complete list of 160 words appears in Appendix E to this study, together with percentages of unsuccessful attempts made to spell in both the programed-inductive self-instructional group and the traditional-deductive group as found among the aggregation of 842 high school and college students in 35 classrooms.

The most accident-prone word on the list was occurrence, misspelled 84 percent of the 842 times it was attempted, the incidence of error being almost two percent greater among those using programed-inductive materials than among those using rules and word lists.

The most easily spelled word was the plural of state, which was spelled successfully 99.70 percent of the times it was attempted, the programed group having the tiny advantage of .04 percent.

Of interest is the word suffix, misspelled by 18.47 percent of the programmed-inductive group and by 22.62 percent of the traditional-deductive rules and word lists group. The word suffix was deliberately included in the spelling tests to see whether exposure to a word teaches one to spell it. The self-instructional materials for this study dealt with suffixes and with the spelling behavior of common word roots adding suffixes to form common derivatives in everyday use. The word suffix appeared numerous times throughout self-instructional materials, whether programmed-inductive or traditional-deductive. It appeared one or more times in every unit of subject matter, and in most cases it appeared several times on every page of instruction. Nevertheless, despite repeated exposures to the word in its correct forms, both singular and plural, 18.47 percent of the programmed group failed to spell it successfully and 22.62 percent of the traditional group failed it.

From the percentages appearing for the word serviceable, one would infer that the inductive method with its 33.93 percent of misspellings was less efficient than the deductive with its markedly lower 27.75 percent. The situation reverses itself, however, on usable when 76.98 percent of those using the inductive method spelled successfully whereas only 61.80 percent of the deductive succeeded. Group means within the individual 13 tests used to assess progress during the period of self instruction showed that the

inductive method, within the limitations of this study, was more effective for teaching successful spelling of derived forms of monosyllables ending in e, and that the deductive was more effective with the ce and ge and dg words. Both methods showed the highest incidence of misspelling on tests for polysyllabic words whose spelling is governed by the position of stress among the syllables, and on tests asking for differentiation of ie from ei words.

Judged by this study and its findings among 842 high school and college students, the words seize and siege are tending to a common vowel digraph, ei apparently preferred by most misspellers.

The common mispronunciation of mischievous distorted to mischevious affected the spelling of the word in half the attempts made to write it; the remainder of its unsuccessful spellings occurred from the confusion of ei and ie, bringing the incidence of error to a mean 65 percent of attempts.

Some parts of language are more prone to misspelling than are other parts, a fact that reflected itself repeatedly in the statistical analyses of variance and covariance in which the tests over plurals, for example, were significantly different from tests over words whose spelling derived from stress within a polysyllabic root. The differences among test scores and group means were obvious by inspection. Statistical analysis continued to point them out as being significant differences among replications (Tables 6 and 8). But

because they were significant to subject matter and not to method, they had little bearing on the analyses of the study.

Related Observations and Comments

Although this study did not set out to investigate the subterfuges and defenses employed by poor spellers, its 14,314 spelling papers, tests, and worksheets which were the raw data from 842 high school and college students teaching themselves to spell showed clearly, sometimes poignantly, that aspect of the spelling problem. To be disabled or less competent than others is not generally a preferred state. The subterfuges to which poor spellers resort in order not to appear poor spellers would make additional, productive research.

The most obvious accompaniment of poor spelling is illegible handwriting, so unreadable that any spelling might be inferred from it, as has also been pointed out by Blair (9, p. 267). How much of such illegibility is deliberate camouflage and how much is evidence of the lack of understanding about how letters are formed and how they combine to form a word would be debatable.

Another of the subterfuges of the poor speller is that of what might be called "interpretive" spelling, a defense employed by pupils who may otherwise write legibly and well. The interpretive speller does not commit himself when a word presents him with a problem. Faced with a choice between ei and ie, he writes a

modified version ambiguously dotted in the middle and leaves the interpretation and the choice to the superior wisdom of the mental set of the scorer.

There are also the multiple-choice spellers, who write above and beneath the problematic syllable, leaving the scorer multiple choices as to the intent of the speller. The multiple-choice speller diffidently refrains from making the decision, but he shows his versatility with orthographic form. Closely akin to the multiple-choice speller is the patchwork speller, who writes and rewrites and revises his original spelling to the point where the correct spelling is certain to appear somewhere among his efforts. Related to both is the needlepoint speller whose words are laced with proffered additions and substitutions. He inserts letters neatly but not definitely above the syllable or digraph in question, leaving the scorer to accept or ignore them inasmuch as they are not really part of the word as written but, if necessary, they might conceivably be so considered.

Another defense characteristic of many poor spellers, especially if the speller be a girl, is the flowing, unreadable but beautiful backhand script or printing. Related to her is the esoteric penman who devises his own versions of letter forms, who perhaps makes his t in one unbroken motion of the pencil, who dots his i with a star or a checkmark or a large circle or a swoop above the

following letter, who makes e and i interchangeable loops without further differentiation at any time, who makes only the loop below the line for all such script forms as y or g or z or f or j or p or q, relying on the assumed intelligence of the scorer to supply the letter's missing head above the line. Sometimes the esoteric penman makes a sweeping line gracefully through all looped letters in his effort to cross the word's single t, and such a word as literally becomes a gobbledygook titeratty in consequence. Or the esoteric one may make little penciled push-ups of indefinite number for m or n or v or u or w or s or r without other discrimination.

Perhaps the most frustrating of the defensive spellers is the "gestaltist," whose writing appears to be English script but who deceives in that words looked at critically and directly turn out to be a kind of gibberish that is not an acceptable arrangement of legible English letters to form known English words. One suspects extensive reading problems in such a case.

The subterfuges employed by poor spellers can be sometimes entertaining, but there is nothing humorous in the occasional paper which is handed in, usually by a boy, with little that is legible on it and nothing that is correct except his name, which is carefully embroidered. The poignancy of such a problem drives one through 14,314 spelling papers and years of effort to find some way to help such a boy. Related to him is the boy whose spelling paper is

trenched with labored spellings that show the unbearable tension under which he spells. Words ought never to be that hard for anyone. Too many times the boy is not a fourth grader but a high school boy who can assemble parts to make a car but who cannot assemble letters to make a word, or a college boy who can analyze the algebraic elements in a mathematical equation but who cannot analyze the letter elements in a word. Words ought not to be that hard for anyone.

But they are hard, and for an unbelievable number of young people, if one is to accept the evidence of this study in its finding that out of 35 high school and college classrooms the only high school classes that came near to average performance on norms established ten years ago were two classes of sophomores in honors English, from whom one would expect not near-average but near-top achievement. And the only class to exceed the ten-year-old norms was a group of university seniors ready to teach English, although their mean achievement attained only the sixty-fifth percentile when as a group preparing to teach the very subject matter in which they were being tested they should have topped out on the test. What is the reason for such poor performance?

Do earlier tests need extended norming? Why has spelling performance among today's students fallen off? Why did the students in this study fail to reach even average status on a percentile scale only ten years old? Are Oregon's students such poor spellers that

they cannot compete with national spelling averages? Could the differences between norms and the performance of students in this study be in any way the result of regional differences of vocabulary? Should western schools have western tests? Or are students in high schools and colleges today writing so much less than previously that they have need for fewer skills with written language and therefore have not the motivation to learn to spell? Is it possible that mass media have so changed written and spoken communication that our own evaluative tools no longer measure performance realistically? Do we need new kinds of research and new tests of spelling?

Have school populations with their population explosions so changed within ten years that ten-year-old norms no longer describe expected performance for a basic skill in written language? Is the fact that public schools now have almost all the children of almost all of the people most of the time reason for the apparent disparity? Or is the deficit the result of decreased curricular emphasis on spelling? Does it reflect indifference or disability?

Why did 79 percent of the girls and 81 percent of the boys in this study rank below the fiftieth percentile on a well-constructed, carefully standardized spelling test only ten years old? Why were words that hard for 842 young people?

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

Summary

The purpose of this study was to compare two methods of self instruction for improving spelling in high school and college: A traditional-deductive presentation of spelling rules and lists of words versus a programmed-inductive presentation that led the learner to observe the spelling behavior of words and to make generalizations applicable to other words in similar circumstances. The study raised the following questions:

- 1) Did method alone constitute a significant variable in the results of self instruction in spelling?
- 2) Did the results of the traditional-deductive method of self instruction in spelling differ significantly from the results of the programmed-inductive method of self instruction in spelling within either sex?
- 3) In the light of studies which have found students today increasingly poorer spellers, where did participants in the present study rank as spellers on the percentile norms of a criterion measure standardized ten years ago?
- 4) Inasmuch as self instruction in spelling is predicated on

the student's awareness of his spelling problem and his desire to help himself overcome it, did the poor spellers in this study show realistic estimation of their status as spellers prior to testing and self instruction?

5) Inasmuch as self instruction should aim in practical fashion at clarifying misunderstanding about the spelling behavior of words and should avoid when possible the repetition of what has been already understood, what was the incidence of misspelling among the words which had formed the basis for self instruction?

The investigation began with a pilot study made by four high school and four university classrooms to improve the format and the structure of self-instructional materials and to select or devise tests with which to evaluate performance.

Following the completion of the pilot study and the revision of materials, the experiment itself took place. It included 26 paired experimental classrooms, each classroom in a pair being matched to its mate on six factors. Participating institutions were Oregon State University and seven western Oregon High schools. There were 606 students taking part in the experiment in self-instructional spelling, 470 of whom were high school pupils, 136 of whom were university students.

Scores from the 606 students provided data for comparison between methods. Each student took the Traxler High School Spelling

Test, Form 1, prior to self instruction. His raw score on that test was compared with his mean score on the 13 tests spaced at intervals during self instruction. An analysis of covariance found no significant difference in the results of programmed-inductive versus traditional-deductive methods of self instruction that could be attributed to method alone. Method itself as exemplified in the materials and procedures of this study was apparently not a significant variable in self instruction.

An analysis of variance on the raw scores of the initial Traxler found a significant difference in spelling performance between boys and girls, but no significant difference in spelling ability within either sex as grouped to begin self instruction. A subsequent analysis of variance at the conclusion of the self-instructional period found a significant difference in performance among the boys on the terminal Traxler, a difference significantly favoring the programmed-inductive method. No such difference appeared among the girls. Method had apparently significantly influenced performance among the boys but not among the girls in this study.

To answer the question of whether students today spell as well as, or better or worse than, their predecessors, the study analyzed scores from an aggregate group which contained the 26 paired classrooms and 9 additional unmatched classrooms, to include a total of 842 high school and college students. Only 21 percent of the girls

and 19 percent of the boys ranked at or above the fiftieth percentile of the norming sample for the Traxler High School Spelling Test, Form 1, as standardized ten years ago. Within the limitations of the study, the 842 students were not as good spellers as were their predecessors.

The comparison of self classification versus performance on a criterion measure of spelling achievement, the Traxler High School Spelling Test, Form 1, showed that few students saw themselves realistically. But such a finding must be interpreted in the light of the disparity between norms and present performance.

The incidence of misspelling showed some parts of spelling more difficult than others. Within the limitations of the study, programed-inductive instruction appeared in some instances the more effective method for a particular kind of subject matter in spelling. In other instances, the traditional-deductive method apparently had the momentary advantage.

Conclusions

1. Method alone as exemplified within the materials and procedure of this study did not appear to be a significant influence in the effectiveness of self instruction. All groups by either method made gain to an extent varying with grade level and ability grouping,

but no significant difference appeared to indicate superiority of either method.

2. Method did appear to make a difference, however, in performance within one sex, although only at the .05 level of significance. Induction was more effective than deduction, and programing was more effective than rules and word lists for boys attempting self instruction in spelling.

3. It would appear that the degree of spelling proficiency is to an extent a characteristic of general difference between the sexes, the girls spelling significantly better than the boys not only before but during and after self instruction.

4. It would appear that, at least within this sample, today's students are poorer spellers than were their predecessors, the norming sample for the Traxler High School Spelling Test, Form 1, standardized ten years ago.

5. It would appear that few students see themselves realistically as spellers, their self classifications being much higher than their demonstrated performance on a standardized criterion measure of spelling achievement.

Implications for Practice

This study found that its methods of instruction did not significantly influence the general effectiveness of instruction. Inasmuch

as all groups made gains by either method, the classroom implications are that improvement in spelling may come more from the activity of studying spelling than from a particular method within that instruction. Method alone did not make a general difference, but effort did make a difference by either method. The classroom should promote effort in spelling.

Boys did not spell as well as the girls spelled, a difference that has appeared repeatedly in studies of language arts. Inasmuch as the population of poor spellers is proportionately more male than female, corrective and remedial materials should be prepared with the male in mind. Method did appear to make some difference in spelling achievement among boys in the study. Induction was more effective than deduction, and programed self instruction was superior to the traditional spelling rules and lists of words. No such difference appeared among the girls in the study, but inasmuch as it did manifest itself among the boys it should carry over into the classroom to aid boys instructing themselves in spelling at high school and collegiate levels of education.

Students today, at least within this sample, appeared not to have the degree of spelling proficiency attained by the norming sample on the Traxler High School Spelling Test, Form 1, in its standardization ten years ago. If today's students are poorer spellers than were their predecessors, and if the deficiency is generally as

pronounced and as diffuse as this study found it to be, teachers of English have a responsibility to go to work on spelling problems at secondary and university levels. Such a responsibility does not imply inclusion of spelling in courses of study or curricula, but it does imply attention to spelling, not punitively but instructionally. It implies the need for a variety of means to self instruction among high school and college students who want to improve their spelling. It implies the encouragement of self-instructional effort and the development of positive attitudes toward spelling as an essential skill among educated persons. It implies the necessity for inculcating spelling conscience in pupils at as early an educational level as possible. An English word is a word only if its letters are in the right places to make it an English word. Spelling is an integral part of the written English which constitutes a large part of the task of teachers of English and the subject matter of many courses in English. The student himself must assume the ultimate responsibility for his own spelling. Classroom practices should help him assume it, not defeat him in it.

In this study, few students demonstrated a realistic awareness of their deficiencies in spelling or of the extent to which they were disabled. Such awareness would appear to be requisite to self instruction and to the motivation that energizes self instruction. The classroom carries the responsibility for encouraging realism to

replace the defensive devices with which students avoid facing the existence of handicap. Teachers may well begin with such realism in themselves.

Recommendations for Research

This study would ask for additional research to answer three major questions about spelling:

1. What in programmed-inductive instruction made it significantly more effective for boys than the traditional-deductive method?

2. Why do students today not spell so well as their predecessors on a spelling test based on common words in everyday use? Why has performance fallen off? Why did students in this sample fail to reach average performance on a percentile scale carefully constructed and standardized only ten years ago? Is the deficiency peculiar to Oregon's students? Could it be attributable to regional differences of vocabulary? Is it the result of changing school populations? Is it the result of lowered educational standards and expectancy? Is it evidence of the need for new research and new evaluative tools and techniques in spelling? Is it a reflection of the increasing emphasis upon the teaching of literature in English classes and of decreasing emphasis upon the importance of language skills such as spelling?

3. Inasmuch as method alone, as it was exemplified in this study and as it has been reported in a number of related studies, appeared not to be a significant factor in the effectiveness of self instruction, and inasmuch as the student's effort produced improvement by either method, might additional research do well to turn its attention to the relationship between his spelling achievement and such factors as his attitude toward spelling, his motivation or lack of it, and his estimate of his own proficiency? Spelling is part of a person's total equipment. The measure of spelling achievement no longer lies in how well he can spell an esoteric list of difficult, unrelated, obscure words. It lies instead in how fluently he can write the prose essential to everyday expression and communication, in education, business, industry, and community and personal activities. Spelling is basic to the written language. It is the responsibility of each person to make himself proficient in that basic skill. It is the responsibility of the classroom to make self instruction available to him, and to aid rather than to defeat him in his effort to help himself.

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APPENDICES

APPENDIX A

MEAN PERFORMANCE ON THE TRAXLER HIGH SCHOOL SPELLING TEST, FORM 1, BEFORE SELF INSTRUCTION FOR 842 HIGH SCHOOL AND UNIVERSITY STUDENTS IN 35 CLASSROOMS

Grade Level	Subject and Grouping	Number in class	Class Mean, Traxler 1	Norm %ile
9	English, heterogeneous	16	31.4	4
9	English, heterogeneous	29	50.0	15
9	English, heterogeneous	35	61.4	27
9	English, heterogeneous	26	49.1	14
9	English, heterogeneous	34	59.1	25
10	English, honors	22	74.0	34
10	English, honors	24	79.6	46
10	English, honors	25	79.6	46
10	English, honors	26	70.9	28
10	English, honors	23	72.6	31
10	English, basic, terminal	29	44.1	6
11	English, average	26	59.9	10
11	English, college preparatory	32	77.5	29
11	English, average	21	67.7	17
11	English, college preparatory	31	72.6	22
11	English, basic, terminal	28	49.9	5
11	English, average	29	60.8	10
11	English, college preparation	28	70.8	20
11	English, average	31	51.4	6
12	English, average	29	50.3	2
12	English, basic, terminal	14	34.4	1
12	English, basic, terminal	21	33.8	1
12	English, average	32	56.4	3
12	Psychology, accelerated	31	64.8	6
12	Psychology, accelerated	28	63.9	6
12	Psychology, accelerated	30	64.0	6
OSU	Ed. 101, freshmen and sophomores	19	69.9	10
OSU	Ed. 101, freshmen and sophomores	19	70.5	10
OSU	Ed. 101, freshmen and sophomores	19	65.7	7
OSU	Ed. 101, freshmen and sophomores	19	61.6	5
OSU	Spelling, non-credit, remedial	20	57.1	4
OSU	Spelling, non-credit, remedial	17	59.6	4
OSU	Ed. 200, prospective English tchrs.	11	79.1	21
OSU	Ed. 200, prospective English tchrs.	12	80.8	24
OSU	Ed. 408j, seniors ready to be student teachers in English	6	94.7	65

APPENDIX B

THE MEAN SCORE ON THE 13 TESTS DURING THE PERIOD OF SELF INSTRUCTION IN COMPARISON WITH THE MEAN RAW SCORES AND THEIR PERCENTILE EQUIVALENTS FOR TWO FORMS OF THE TRAXLER HIGH SCHOOL SPELLING TEST, FORM 1 BEFORE INSTRUCTION AND FORM 2 AFTER INSTRUCTION, FOR 19 CLASSROOMS USING THE PROGRAMED-INDUCTIVE METHOD OF SELF-INSTRUCTIONAL SPELLING

Grade Level	Subject and Grouping	Number in Class	Before Instruction		After Instruction		Mean Score on the 13 tests during self instruction
			Class Mean, Traxler 1	Norm %ile	Class Mean, Traxler 2	Norm %ile	
9	English, heterogeneous	26	49.1	14	52.9	18	71.68
9	English, heterogeneous	34	59.1	25	64.8	31	80.10
10	English, honors	26	70.9	28	77.3	39	91.28
10	English, honors	23	72.6	31	77.1	39	90.48
10	English, basic, terminal	29	44.1	6	48.1	8	80.64
11	English, college preparatory	31	72.6	22	76.6	27	87.68
11	English, basic, terminal	28	49.4	5	55.4	9	72.53
11	English, average	29	60.8	10	67.7	17	81.71
11	English, college preparatory	28	70.8	20	73.2	23	84.63
11	English, average	31	51.4	6	53.7	8	78.48
12	English, average	29	50.3	2	52.8	3	74.68
12	English, basic, terminal	14	34.4	1	37.6	1	71.04
12	Psychology, honors, elective	31	64.8	6	70.1	11	79.97
12	Psychology, honors, elective	28	63.9	6	67.9	10	78.92
OSU	Ed. 101, freshmen and sophomores	19	69.9	10	71.6	12	85.63
OSU	Ed. 101, freshmen and sophomores	19	70.5	10	81.1	22	86.99
OSU	Spelling, non-credit, remedial	20	57.1	4	63.7	8	84.86
OSU	Ed. 200, prospective English teachers	11	79.1	21	80.9	22	94.08
OSU	Ed. 408j, seniors ready to be student teachers in English	6	94.7	65	96.7	77	95.11

APPENDIX C

THE MEAN SCORE ON THE 13 TESTS DURING THE PERIOD OF SELF INSTRUCTION IN COMPARISON WITH THE MEAN RAW SCORES AND THEIR PERCENTILE EQUIVALENTS FOR THE TWO FORMS OF THE TRAXLER HIGH SCHOOL SPELLING TEST, FORM 1 BEFORE INSTRUCTION AND FORM 2 AFTER INSTRUCTION, FOR 16 CLASSROOMS USING THE TRADITIONAL-DEDUCTIVE METHOD OF SELF-INSTRUCTIONAL SPELLING

Grade Level	Subject and Grouping	Number in Class	Before Instruction		After Instruction		Mean Score on the 13 tests during self instruction
			Class Mean, Traxler 1	Norm %ile	Class Mean, Traxler 2	Norm %ile	
9	English, heterogeneous	16	31.4	4	33.3	8	57.50
9	English, heterogeneous	29	50.0	15	49.7	16	75.30
9	English, heterogeneous	35	61.4	27	63.6	30	82.45
10	English, honors	22	74.0	34	75.5	36	87.62
10	English, honors	24	79.6	46	80.7	44	91.96
10	English, honors	25	79.9	46	80.2	44	92.39
11	English, average	26	59.4	10	60.5	11	76.69
11	English, college preparatory	32	77.5	29	75.1	26	87.49
11	English, average	21	67.7	17	73.4	23	83.84
12	English, average	32	56.4	3	57.8	5	77.43
12	English, basic, terminal	21	33.8	1	38.6	1	65.82
12	Psychology, honors, elective	30	64.0	6	68.0	10	79.94
OSU	Ed. 101, freshmen and sophomores	19	65.7	7	68.9	11	86.42
OSU	Ed. 101, freshmen and sophomores	19	61.6	5	67.6	10	81.23
OSU	Spelling, non-credit, remedial	17	59.6	4	58.2	5	81.53
OSU	Ed. 200, prospective English teachers	12	80.8	24	82.7	26	92.02

APPENDIX D

Name _____
Grade _____
Date _____ School _____

To the Student:

How do you feel about your ability to spell? Where would you rank yourself on the following scale?

- _____ Excellent. I spell fluently and almost never have to look up a word.
- _____ Good. I spell easily. Occasionally I have to look up a word.
- _____ Average. I can spell most words, but I am not sure about many words. I need a dictionary when I write.
- _____ Poor. I have difficulty with spelling. Words are hard, and I cannot write without a dictionary. I know I have a spelling problem.

If you are a good speller, can you tell us what has helped you learn to spell? If you are a poor speller, can you tell us why spelling is hard for you. How do you think spelling might be better taught?

APPENDIX E

INCIDENCE OF MISSPELLING AMONG THE 160 WORDS USED IN EIGHT TESTS TO MEASURE PROGRESS DURING THE PERIOD OF SELF INSTRUCTION IN SPELLING

P = Programed-Inductive Method: Percentage of Students Misspelling
 T = Traditional Deductive Method: Percentage of Students Misspelling

	P	T		P	T
abusive	20.54	20.40	crying	5.43	2.93
acceptance	27.21	27.09	cutlets	12.34	14.05
acknowledging	20.90	24.41	cutting	3.08	2.23
acknowledgment	63.93	49.49	dancing	2.52	3.98
admitted	6.50	7.74	defacing	6.06	9.36
ageless	.60	1.33	deferred	26.33	21.93
amazement	28.10	33.87	deficient	45.45	47.49
ancient	19.74	20.73	deplorable	19.63	18.72
ashes	1.75	2.62	describing	23.26	25.41
batting	3.39	2.55	dirtiest	26.19	28.99
beginning	14.49	11.93	discs, disks	34.89	38.36
believable	38.75	38.06	doors	1.75	2.29
believe	7.83	8.69	dried	5.43	11.40
boyish	7.02	8.14	driving	.94	1.66
braces	8.21	10.81	dropping	8.33	5.75
branches	2.05	.65	embossed	25.73	25.48
bushes	2.93	3.60	embraceable	48.33	46.82
business	19.16	14.98	engagement	14.80	17.72
busybody	30.99	31.59	employer	10.86	17.91
buying	2.87	3.60	employment	6.80	8.70
canful	10.80	14.37	equipping	35.20	30.32
canned	2.93	3.19	eraser	27.19	31.10
careless	4.73	3.98	erasure	39.57	45.81
ceiling	20.06	16.05	exchangeable	34.13	38.12
changeable	32.12	24.41	famous	6.62	7.30
changing	5.15	5.35	fanciest	15.67	12.70
coming	11.04	9.30	fanned	10.18	6.70
concealed	34.02	34.51	fiend	35.10	33.77
conceivable	48.58	45.48	firing	13.56	13.62
controlled	26.33	20.00	foreign	26.33	23.74
convenient	38.25	35.45	freighter	25.70	29.09
cried	7.98	8.79	friend	7.21	7.35
crusts	10.85	13.11	getting	1.86	.95
crutches	20.52	20.98	glasses	1.17	2.62

	P	T
grabbed	17.28	17.25
happiness	13.73	13.68
having	1.57	1.99
hopeful	7.09	13.09
hoping	9.77	10.63
hopping	4.93	4.47
hurried	4.79	7.16
hurrying	14.05	15.96
icing	10.41	16.94
inflatable	31.72	25.08
inflation	10.57	12.04
investigator	27.47	29.96
judgment	55.75	42.14
lately	5.99	3.65
leisure	31.66	33.44
likable	24.60	39.20
looses	29.61	25.24
loses	29.88	25.57
losses	24.23	24.97
lovelier	45.04	42.34
manageable	32.72	23.74
management	10.87	13.37
managing	11.81	10.70
masses	3.22	3.60
mischievous	63.01	67.22
misjudgment	55.28	47.15
mixes	2.05	1.63
movable	27.76	46.17
movement	3.47	.66
neighbor	9.71	9.36
noisiness	38.33	46.90
noticeable	33.23	28.76
noticing	7.27	10.03
obedient	31.03	25.75
obtained	9.17	7.74
occurrence	85.50	83.54
outrageous	39.09	33.44
passes	1.17	.65
peaceable	24.84	21.40
peaceful	8.18	14.04
picnicking	26.35	27.03
picnics	15.02	19.80
pieced	23.82	23.07
placement	5.99	2.32
planning	10.18	8.62
plateful	9.25	12.14

	P	T
pledging	13.03	12.57
preparatory	31.72	36.12
preparing	6.64	5.35
pricing	11.21	11.37
quitting	22.22	16.61
radiator	12.14	14.33
ratted	5.86	4.47
receive	30.09	30.10
referred	21.30	19.03
remittance	22.18	26.77
representing	7.39	9.03
resistance	22.18	24.51
ridge	15.75	20.73
saddest	26.85	31.30
sadly	10.80	10.86
scoreless	7.57	8.63
seize	39.96	43.55
separation	27.79	23.07
serviceable	33.93	27.75
severely	41.69	41.47
siege	44.21	46.07
skater	18.53	24.75
spectator	11.82	13.35
staging	10.30	15.38
states	.29	.32
stopped	8.64	5.43
studied	8.94	12.05
studying	11.82	13.35
subtraction	9.46	8.70
sufficient	28.21	26.75
suffixes	18.47	22.62
sunless	1.23	4.47
sunned	10.80	9.26
surfacing	9.96	17.05
surprising	23.26	19.06
their	7.21	7.35
thumbs	7.62	10.49
tuneless	7.88	9.96
usable	23.02	38.20
using	4.10	9.30
wakeful	17.66	14.95
watches	3.22	2.62
weight	5.95	8.02
winches	22.87	26.22
wishes	1.46	3.27
writing	12.30	11.62