

A COMPARATIVE STUDY OF TWO METHODS OF TEACHING
SPELLING TO LOW - ACHIEVING EIGHTH - GRADE STUDENTS

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ABSTRACT

A COMPARATIVE STUDY OF TWO METHODS OF TEACHING SPELLING TO LOW-ACHIEVING EIGHTH-GRADE STUDENTS

by Diana R. Umstattd

Objectives: It was the purpose of this study to compare two theories of learning by examining the results of two exemplary methods of teaching spelling. A practice method proposed to establish routine, repetitive steps for studying words as individual problems. A strategy method proposed to lead students to discover and develop understandings about the intrinsic relations within the structure and organization of words.

It was hypothesized that retention of information and transfer of learning would be greater for the students who studied by the strategy method than for the students who studied by the practice method.

Procedures: In this experimental study, a pretest-posttest control group design was used to

compare the effectiveness of two methods of teaching spelling. The subjects were one hundred nine eighth-grade students in an inner-city junior high school, selected on the basis of performance on a spelling screen test, and randomly assigned to a control and two experimental groups. Within a period of two weeks, pre- and posttests and five hours of treatment were administered to the respective groups.

Both treatments included routines of study, test, and review. Visualization, pronunciation, and writing of words were emphasized by the practice method. Repetition and reinforcement were required. The strategy method provided opportunities for the students to manipulate and interact with meaningful groupings of letters within the structure and organization of words. The making of comparisons and the discovery of generalizations were stressed.

Data for comparing the two methods of teaching were obtained from batteries of tests administered to the control and experimental groups. Tests of visual-perceptual abilities and spelling achievement were included. Scores from the daily spelling tests of the treatment groups produced additional information.

The analysis of covariance technique was applied to pre- and posttest data to provide a means of control of initial group differences and a test of significance. Raw data obtained on the daily spelling tests were transformed to standard scores as a means of producing equal units of measure for purposes of comparison. Product-moment coefficients of correlation were computed to determine (1) the reliability of the tests newly developed for this study and (2) the relationship between spelling achievement and four visual-perceptual abilities.

Conclusions: The differing methods of instruction produced different effects on over-all spelling achievement. It was shown that, in this instance, the transfer of learning was significantly greater for the students who studied by the strategy method than for the students who studied by the practice method. In this investigation, the differing methods of instruction produced no significant differences in daily spelling achievement or four visual-perceptual abilities.

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By

Diana R. Umstattd

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CHAPTER I

INTRODUCTION

This study compared two methods of teaching spelling to low-achieving eighth-grade students in an inner-city school. Each of the methods was rooted in a different theory of learning and instruction. One method emphasized practice and reinforcement while learning to spell words. The other method directed the students in the use of strategies which would lead to the discovery of information about meaningful parts of words. Both kinds of instruction proposed to teach the students "how to study" lists of words for spelling.

The motive for the investigation developed from a survey of the daily writings of students in a large junior high school in the inner-city area of an industrial community. The study showed that the students failed in their attempts to spell new and difficult words introduced in their daily work. Furthermore, their writings revealed a high frequency of errors in the spelling of easy words which they had

studied while in the elementary grades. Their work indicated that many of the learning experiences of the elementary school had been forgotten or had failed to transfer to junior high school spelling tasks. The students were in need of learning experiences which would (1) compensate for their current inadequacies in spelling and (2) would transfer to the spelling requirements of future activities.

The ability to remember or to perform a task after the passage of some time and the ability to apply the knowledge under different circumstances are two effects of learning experiences. The two effects have provided topics for many investigations. From those studies, theories have developed to explain the learning processes of both recall and transfer.

According to one learning theory, the acquisition and retention of information are the results of practice, reinforcement, and repetition of experiences. Learning is gradual and irregular. Improvement in performance is the result of rewarded behavior. Success is determined by the number of experiences, the length and frequency of practice periods, and the amount of material to be learned. Transfer is

believed to be the result of learned behavior applied to commonalities in the new situations.

In a second theory, inquiry, discovery, and insight are considered to be essential to learning and to recall. Success in learning is determined by the organization and structure of the content studied. Through adequate organization, or grouping, intrinsic relations are made apparent. Such organization enables the learner to gain understanding by discovering, developing, or creating consistent and inherent relations. Repetitions of experiences are said to be unnecessary to learning and recall when the subject is told, or discovers, the principle of the relations. Furthermore, the understanding of the principle of the relations enables the subject to transfer the learning to new and different tasks.

In this study, two methods of teaching spelling were used to compare the above theories. Both methods are described in the literature on research in the teaching of spelling in the elementary grades. This investigation involved the teaching of spelling to students in the eighth-grade.

Statement of the Problem

The main purpose of this research was to compare two theories of learning by studying the effectiveness of a practice and a strategy method of teaching spelling to low-achieving eighth-grade students.

In this study it was hypothesized that in a population of below median spellers:

1. Eighth-grade students who are taught by the strategy method will make greater improvement in spelling than eighth-grade students who are taught by the practice method, as measured by a test of general achievement in spelling.
2. Eighth-grade students who are taught by the strategy method will make greater improvement in spelling than eighth-grade students who are taught by the practice method, as measured by tests of daily spelling achievement..
3. Eighth-grade students who are taught by the strategy method will make greater

improvement in spelling than eighth-grade students who are taught by the practice method, as measured by performance on four tests of visual perception: word discrimination, phrase discrimination, visual memory, and syllabication awareness.

4. Eighth-grade students who rank high in spelling will manifest the following visual-perceptual abilities more predominantly than eighth-grade students who rank low in spelling: word discrimination, phrase discrimination, visual memory, and syllabication awareness.

Definitions of Terms

Practice method.--As used in this investigation, the practice method of teaching spelling was a method of instruction which proposed to establish routine, repetitive steps for learning specific words. It encouraged the students to approach the learning of each word as an individual problem and sought to develop habitual procedures for learning the serial arrangement of letters. Visualization, pronunciation, and writing of the words were emphasized.

Strategy method.--The strategy method of teaching spelling, as used in this study, directed the students toward making a sequence of decisions en route to learning daily lists of words. The students made judgments about groups of words by noting their similarities, their distinctive features, their structural patterns, and the relationship of spellings to meanings. Syllabication of words was emphasized.

General achievement in spelling.--A spelling test to measure the general or over-all level of performance of students was constructed for use in this investigation. Parallel forms were used for screening students and for pre- and posttest measures. The words in the tests were selected from a graded list. They were not included among the words studied during the treatment periods. A score of one was given for each word correctly spelled. An additional score was given for each syllable correctly spelled when the tests were re-scored for a second analysis of covariance.

Daily spelling achievement.--The number of words learned per day under the conditions imposed by the two treatments was identified as the daily spelling achievement. Fifteen multisyllabic words were

studied each day. A student was credited with having learned the words which he could spell on the daily test which immediately followed the directed study of the words. A score of one was given for each word correctly spelled. An additional score was given for each syllable correctly spelled.

Performance on visual-perceptual tests.--

Performance on visual-perceptual tests refers to scores obtained on the word discrimination, phrase discrimination, visual memory and syllabication tests. The four tests were newly developed for this investigation to measure the performance of students when confronted with tasks of reading, copying, and comparing the spellings of words.

Assumptions and Limitations

Assumptions.--For the purpose of this investigation five assumptions were made, namely:

1. Neither mental ability nor physical disabilities would explain the level of spelling achievement and the kinds of errors observed within the sample population.

2. Regular instruction in spelling had been given to the subjects during their years in the elementary schools and some instruction in spelling had been given to them during their year in the seventh grade.
3. The performance on the spelling test was a valid sample of the students' ability to spell.
4. The fifteen words on each of the daily lists were of social usefulness to teenagers.
5. The control and experimental groups were equalized in spelling ability and other variables were randomly distributed by the method of assigning individuals to groups.

Limitations.--This study was limited to low-achieving eighth-grade students in a large junior high school in the inner-city area of an industrial community. The treatment groups, of fifty students each, were approximately twice the size of the average instructional groups in the school in which the study was conducted.

The measurement of the effectiveness of the

two methods of teaching spelling was limited to the data obtained during, and as a result of, five hours of treatment within a two-week period of time.

This researcher was assisted by two department staff members and a junior high school teacher. The researcher and the department staff members were unacquainted with the students and unfamiliar with the routines and schedules of the junior high school.

All data were obtained under formal testing conditions. It was not possible to compare the data with the students' spelling performance in informal and self-directed situations, or on daily assignments.

Methods and Procedures

This short-term experimental study used a pretest-posttest control group design to compare the effectiveness of two methods of teaching spelling. The subjects were 150 students enrolled in an inner-city junior high school. A spelling screening test was administered to all the eighth-grade students in the school. The 150 students whose scores fell immediately below the median on the test were assigned ranks. Using the rank-order listing, the subjects were alternately assigned to a control and two experimental

groups.

A battery of pre- and posttests was administered to the three groups of students and five hours of differential treatment were given to the experimental groups within a two-week period of time. The treatment sessions for both methods of instruction consisted of daily programs of study, test, and review.

Significance of the Study

Junior high school students meet many new words each day. Some of the words are peculiar to a given discipline. Other words are new because of the instructional level of the textbooks and the maturity level of the concepts being presented. The store of words learned in the elementary school is not sufficient for success in succeeding years. Increasing numbers of secondary students, in inner-city schools, are unable to communicate in written assignments because of spelling problems. Their achievement level in spelling is below that of national norms for students of comparable ages and mental abilities.

Much of the success of students in the junior high school is dependent upon written communications.

The students who can spell usually receive higher ratings than those who achieve similar levels of understanding but fail to demonstrate their learning with accurately written words. The problems of the poor spellers persist because improvement classes are not part of the regular curriculum and the students lack the necessary skills for learning to spell easily and independently. Research is needed to find a method of teaching spelling that will enable students to learn how to spell independently at the rapid rate which is expected of them.

CHAPTER II

REVIEW OF RELATED LITERATURE

Learning to spell the hundreds of words used in the written communications of a typical school day is a task with which every junior high school student is faced. Individual students meet the problem with varying degrees of success. Some students experience failure in spelling most of the time.

Studies have been conducted to determine the level of difficulty of spelling words. Information is available to explain why some words are learned more easily than others, and investigations of eye-movements have been made to tell how individuals perceive written symbols. Methods of teaching spelling in the elementary schools have been studied and data have been gathered to determine the characteristics of good and poor spellers. Nevertheless, the daily spelling problems for many of the boys and girls remain the same.

In the opinion of the writer, more studies are needed which focus attention on underlying theories of learning. Parents, teachers, and students want to know how to study spelling. They want to know the conditions for learning spelling which contribute to remembering the words after a passage of some time. They want to know the conditions for learning spelling which enable learners to apply knowledge to new words and in different situations.

The present study compared two underlying theories of learning, as they apply to the teaching of spelling. Summaries of studies which provide the conceptual framework for the investigation and related studies concerned with the teaching of spelling are presented in this chapter.

Two Kinds of Learning

Katona¹ used college students as subjects in a series of studies devoted to gaining an understanding of two kinds of learning. Connections established by repeating the same contents or responses over and over were characteristic of one of the kinds

¹George Katona, Organizing and Memorizing (New York: Columbia University Press, 1940).

of learning. Understanding of a procedure, insight into a situation, and recognition of relations were phrases used to describe the second kind. Katona's test of the first learning process was retention. Application was the test of the second process.

Katona² found that there are not only senseless and sensible materials to be learned but that sensible material may be learned with or without real understanding. He concluded that a special kind of grouping forms the explanation for the learning process which is to be distinguished from drill and memorizing. He noted that adequate grouping is possible when there exists an intrinsic relationship of the parts to the whole and learning takes place if the organization of the material serves to make that relationship apparent.

Katona's³ studies showed that repetition of a series was unnecessary when the principle was discovered by the subject, or when it was told to the subject. Answers were given with greater certainty

²Op. cit.

³Ibid.

by students who had learned the intrinsic relations. Furthermore, knowledge of the principle enabled subjects to construct individual items which were forgotten. An explanation of the importance of organization had been offered by the Gestalt psychologists (of whom Katona was a representative). They affirmed that all visual percepts are influenced by knowledge that comes with experience and that comprehension of symbolic forms is partly dependent on the circumstances under which the forms are learned.

Numerous studies by Bruner⁴ indicate that a sequence of decisions is involved in attaining a concept and that the pattern of decisions is affected by many factors. Among the determinants cited are:

- (1) the learner's objectives in the situation,
- (2) the number and quality of exhibited attributes of a concept, and (3) the nature of the restrictions imposed upon the learning situation. His experiments have pointed to the importance of skimming and scanning of content, to the manipulation of materials, and to the freedom to control the order of information received.

⁴ Jerome S. Bruner, Jacqueline J. Goodnow, and George A. Austin, A Study of Thinking (New York: John Wiley & Sons, 1956), pp. 50-125.

He has observed subjects who were confronted with a variety of learning tasks and noted that the attainment of a concept often appeared to happen suddenly, as if by discovery. The insight and understanding of concepts are not wholly "sudden", he contends, but are imbedded in a longer, ongoing process.

A Study of the Characteristics
of Good and Poor Spellers

When confronted with a population of poor spellers researchers are concerned with the characteristics of the learners as well as with their level of achievement. How do these students differ from a population of good spellers? Why are they unable to spell at a level commensurate with their grade placement?

Russell⁵ studied the characteristics of good and poor spellers in the fifth and sixth grades by comparing them on auditory discrimination abilities, specific visual perception, vocabulary, and certain mental abilities. After measuring the relationships

⁵David H. Russell, "A Second Study of Characteristics of Good and Poor Spellers," Journal of Educational Psychology, XLVI (March, 1955), 129-41.

between fifteen different variables and spelling he noted that the highest correlations with spelling scores were those of the combined auditory-visual test and a total miscellaneous score. An extension of the study found that visual and auditory discrimination abilities were not so closely related at the seventh- and eighth-grade levels of spelling ability.

The spelling performance of the eighth-grade students, in this present study, was two or more grade levels below their grade placement. Based upon findings in Russell's⁶ investigation it was assumed, therefore, that their visual and auditory discrimination abilities would be closely correlated with their spelling performance and that tests of visual perception could be used as measures of the effectiveness of methods of teaching spelling.

Studies of the Relationship of the Characteristics
of Words and Their Level of Difficulty

Much of learning is related to the future. Students devote years of their lives to study in order to gain knowledge and understandings which will serve

⁶Op. cit.

them at a later time. Bruner⁷ has said that learning should not only take us somewhere but that it should enable us to go further more easily. He states that learning serves the future through (1) its specific applicability to tasks that are highly similar to those learned earlier and (2) by rendering later performance more efficient through transfer of principles and attitudes. The latter is accomplished, he continues, through the teaching and learning of structure, rather than simply through the mastery of facts and techniques.

Researchers have been studying the teaching and learning of spelling to discover that which will enable the learners to go further more easily. Some have sought answers through a study of the characteristics of words and their respective levels of difficulty. Petty⁸, for example, was concerned with words containing certain phonetic elements. He found no significant relationship between the persis-

⁷Jerome S. Bruner, The Process of Education (New York: Vintage Books, 1960), pp. 11-21.

⁸Walter T. Petty, "Phonetic Elements as Factors in Spelling Difficulty," Journal of Educational Research, LI (November 1957), 209-14.

tence of spelling difficulty in socially useful words and the presence of certain phonetic elements in those words. His evidence seems to support the belief that in learning spelling each word must be approached as an individual problem and that present learning serves the future by supplying a bank or resource pool of known words.

In a study in 1965, Haber⁹ concluded that the difference in probability of perception of the letters for rare as compared to frequent words completely disappeared when the subjects had prior knowledge of the word. However, repeated exposures of the word increased the possibility of seeing the letters, regardless of whether the subjects had prior knowledge of the word. The findings tend to support the importance of the teaching and learning of facts and techniques. Furthermore, if familiarity with words means word recognition it might suggest that students spend more time in the development of larger sight vocabularies. On the other hand, if learners have

⁹Ralph N. Haber, "Effect of Prior Knowledge of the Stimulus on Word-Recognition Processes," Journal of Experimental Psychology, LXIX (March, 1965), 282-86

had earlier contacts with frequent words it may be that they have gleaned information about meanings and the concomitant structures of the words. Haber's repeated exposures of rare words may have been compensations for the learner's dearth of information regarding the meanings and structures of the rare words. His observations may suggest that various methods of teaching provide learners with differing qualities of awareness of form and structure of words. Perhaps, for example, students can be taught to perceive structure in rare words without the support of repeated exposures.

After a series of investigations, Miller¹⁰ concluded that immediate memory is limited in the number of items to be recalled and proposed a magic number 7 ± 2 as the range of human attention or immediate memory. An item was defined as a familiar unit or chunk of information, composed of organized bits of information which form as the result of much learning. To increase the number of bits of informa-

¹⁰George A. Miller, "The Magical Number 7, Plus or Minus 2: Some Limits on our Capacity for Processing Information," Psychological Review, LXIII (March, 1956), 81-97.

tion an individual can handle larger and larger chunks must be built, he said. Each chunk must contain more information than the preceding unit. Probably the simplest way to build larger chunks, Miller theorized, was to group the input events, apply a new name to the group, and then remember the new name rather than the original input events.

Miller's¹¹ theory appears to support the theory of teaching structure of content and suggests that the characteristics of words and their level of difficulty must be studied not only in terms of letters and phonetic elements but also in terms of larger, meaningful groupings of letters, such as syllables, roots, and affixes. To teachers and students, the findings seem to suggest that words not be studied as a serial arrangement of letters or phonetic elements but as combinations of meaningful groups of letters which have commonalties with other words of similar origin, meaning, or use.

Studies of Methods of Teaching
and of Learning to Spell

Due to the importance of spelling in modern

¹¹Op. cit.

society, educators and psychologists have directed much attention to the methods and theories for its teaching. They have been concerned with specific perceptual training and with developmental programs, with short-term training, and with transfer of learning. The following studies relate (1) to some of the divergent points of view regarding the teaching of spelling and (2) to the nature and purposes of this study.

Radaker¹² gave two weeks of imagery training to two groups of fourth graders and found that after one year the imagery-trained groups scored significantly higher on spelling tests than did the control group. No significant differences appeared between the group who received two sessions of practice and the group who received six sessions of practice. These findings are in agreement with those of an earlier investigation by Mason¹³ in which the experimental group who recieved exercises in word discrimination

¹²Leon D. Radaker, "The Effect of Visual Imagery Upon Spelling Performance," Journal of Educational Research, LVI (March, 1963), 370-72.

¹³Geoffrey P. Mason, "Word Discrimination and Spelling," Journal of Educational Research, L (April, 1957), 617-21.

made gains significantly greater than those of the control group both in discrimination and spelling.

Staiger¹⁴, who has done a series of studies related to spelling in the high school within the past fifteen years, described two patterns of spelling instruction which usually can be observed in the elementary schools: the modern language-arts approach to spelling, and the formal, textbook-dictated approach. Both methods emphasize systematic practice in overcoming errors, in word building, and in relating sounds to words. Individual progress records are kept, proof-reading abilities are developed, and the rules of spelling are taught.

In the first approach, the objectives are to develop the spelling skills of each pupil according to his stage of language development. Spelling is considered a personal matter and an integral part of the school curriculum. In the formal approach, spelling becomes a ritualized procedure for all students to follow, whether or not they profit from it. Findings indicate that often the list of words in the

¹⁴ Ralph C. Staiger, "The Spelling Problem in High School," Education, LXXVI (January, 1956), 280-85.

textbook is memorized by children for a weekly test only to be forgotten as soon as the test is given.

Summary.--Boys and girls in the junior high schools are confronted with the problem of spelling hundreds of words each day. Some of the words were studied in the elementary school but did not become an integral part of the learners' curriculum. Memorized lists of words have been forgotten. Other words are new to the students and may be specific to the content which is being studied. Many of the students fail to learn new words easily and independently.

In this chapter, two theories of learning have been discussed. They have been described as processes for memorizing material and gaining understanding of content. According to one theory, learning occurs by repeating the same content or responses over and over again, as in all forms of drill. The other theory emphasizes strategies for grouping and organizing material to make inherent relations in content apparent. Studies have been summarized to describe the effects of practice and the role of strategies in the learning process.

The present study compared the above mentioned

theories of learning by means of exemplary methods of teaching spelling to low-achieving eighth-grade students. Related studies of the teaching of spelling have been reviewed. Some of the investigations were concerned with content, some with methodology, and others with the characteristics of the learners. As a group, the studies have presented evidence that spelling can be improved.

CHAPTER III

THE METHOD OF INVESTIGATION

This study required the collection of data from which valid conclusions could be drawn concerning the relative effectiveness of two methods of instruction. Retention and transfer of learning in spelling were considered to be good criterion measures for the effectiveness of the two approaches. Scores from daily spelling tests were used to determine the recall of information. Performance on a general test of spelling achievement and four tests of visual perception were used to measure the transfer of learning to new content under different conditions.

The plan of the study, the pilot projects, the tests for the measurement of remembering and achievement, the treatment methods and materials, and the subjects will be described in this chapter.

Plan of the Study

Pilot studies were conducted for the purpose of

developing tests, instructional procedures, and materials used in this investigation. Twelve students were interviewed and tested individually. Eighth-grade students enrolled in three remedial reading classes and in five sections of modified English, from three junior high schools, participated in one or more of several other small studies. The performance, reactions, and comments of the students aided in the development of reliable tests, in the designing of the final forms of the teaching materials, and in the refinement of procedures to be followed throughout the study.

One hundred fifty low-achieving eighth-grade students, from a fourth junior high school, were randomly assigned to the control and two experimental groups required for this short-term study. A pretest-posttest design was used to obtain data pertinent to determining the relative effectiveness of two imposed treatments and the relation of competence in visual perception to spelling achievement. Daily spelling tests were administered to gain information regarding the immediate recall of material learned by the subjects.

Finally, product-moment coefficients of correlation were computed and analyses of covariance were made of the respective data. One-tailed tests for significance at the .05 level were applied, in order to draw valid conclusions concerning the outcomes of the study.

The Pilot Studies

First among the pilot studies which preceded this investigation was one which included individual testing and interviewing of twelve subjects. The students were of high-average to superior in intelligence. They were selected on the basis of their poor performance on the weekly spelling tests in an eighth-grade English class. As a group, their performance showed high correlation between spelling achievement and ability to proofread lists of words and between spelling achievement and the immediate recall of multisyllabic words. Their performance showed very low correlation between spelling and the immediate recall of abstract designs. The subjects complained about classroom practices which required them to "trade papers and correct" the responses of peers. However,

they demonstrated little difficulty when asked to compare single pairs of words.

The first edition of the battery of pretests was administered to eighth-grade students enrolled in classes of remedial reading. The battery included a spelling test and four tests of visual perception: word discrimination, phrase discrimination, visual memory, and syllabication. Untimed testing procedures were used and item analyses were made of the responses.

The same remedial reading students used the first editions of instructional materials developed for this investigation. At a later session the students commented freely about their reactions to the materials. Revisions were made, as recommended.

Heterogeneously-grouped classes of eighth-grade students in a second junior high school participated in the next pilot study. The pretest and post-test batteries of tests were administered and the treatments were applied. Data were analyzed to determine the ability of the batteries of tests to differentiate poor spellers from good spellers and to establish the reliabilities of the parallel forms of the tests.

Three classes of homogeneously-grouped eighth-grade students participated in a final pilot study. One class was an "average" group in a low-middle class school. Two classes were "modified" sections in an inner-city school. All groups were kept intact for the study. Tests and treatments were administered to the students in their respective classrooms. The teachers of the classes served as monitors.

The Testing Instruments

Because this investigation was concerned with spelling achievement and visual-perceptual abilities which may be related to performance in spelling, it was necessary to use performance tests which measured the competence of the students when confronted with the tasks. Parallel forms of a spelling achievement test and a battery of four tests of visual perception were specially constructed to meet these needs in the study. A description of the tests is given below. The complete content of the tests and the instructions for administering each of them are given in the Appendix.

The Test of Spelling Achievement

Three parallel forms of a spelling achievement

test were developed for use in this study. Each form consisted of sixty words which were systematically selected from the eighth-grade column of the New Iowa Spelling Scale¹ and ranked in an ascending order of difficulty, as determined by the Scale. Each word was pronounced, used in a sentence, and then pronounced a second time when the tests were administered. One form of the test was used as the screening measure to identify low-achievers for inclusion in this study. The other forms were used as pre- and posttests in the experiment.

The Tests of Visual Perception

1. Word Discrimination Test. Forty pairs of words were selected for each form of the test. The two words in each pair were similar in visual form, in pronunciation, or in a combination of ways. Transparencies which were hinged and masked enabled the examiner to present one word and then cover it as the second word of the pair was shown. Each word was exposed for

¹Harry A. Greene, The New Iowa Spelling Scale (Iowa City, Iowa: Bureau of Educational Research and Service, 1954).

one second. The pupils responded to an item by encircling S (same) or D (different) on an answer sheet, arranged thus:

1. S D

2. Phrase Discrimination Test. Twenty-five pairs of phrases were selected for each form of this test. The two phrases in each pair were similar in visual form, in pronunciation, or in a combination of ways. The form of the stimulus material, the instructions, and the answer sheets were comparable to those used in the Word Discrimination Test.
3. Visual Memory Test. Rare words and para-logs² of five to eight letters in length were selected for each form of the test of Visual Memory. The words were written on transparencies in large block letters. Each word was exposed for one second. The students responded to the items by writing the words on their answer sheets.

²Benton J. Underwood and Rudolph Schulz, Meaningfulness and Verbal Learning (New York: J. B. Lippincott Company, 1960), Appendix C.

There were twenty-five items on the test.

- 4, Syllabication Test. Coined words were constructed by the investigator to test the students' ability to recognize common structural patterns in words. Each of the twenty-five test items was written on a transparency in a pronounceable form and in an irregular or unpronounceable form, as: sa ts ta and sat sta. The two forms of the coined word were presented simultaneously. After an exposure of one second the students identified the pronounceable form by encircling A (above form) or B (bottom form) on their answer sheets.

In the pilot studies, the spelling achievement tests were shown to be reliable, parallel measures (.82-.94). The range of difficulty of items on the instruments provided opportunity for obtaining a measure of spelling achievement for both poor spellers and average spellers.

Likewise, the battery of tests of visual perception were shown to be reliable and parallel

instruments. As determined in the last pilot study, the correlation of the parallel forms of the test of visual memory was highly significant (.81), the correlations of the two forms of word discrimination (.40) and phrase discrimination (.38) with 49 d.f. were significant at the .01 level; and the correlation of the tests of syllabication (.36) exceeded the required value of $t_{.05}$ with 49 d.f. Each of the tests of visual perception were shown to correlate significantly with spelling achievement.

The battery of tests of visual perception and the spelling test were administered to the experimental and control groups of students under comparable conditions during randomly selected hours for both pre- and posttest measures. The tests were administered by the investigator with the assistance of two department staff members and a junior high school teacher.

The Subjects

This comparative study of two methods of teaching spelling was undertaken as a result of a survey of the writings of some low-achieving students in the junior high schools. The student's performance

indicated that the teaching and learning of lists of spelling words in the elementary school years and in the language arts core program of the seventh grade were not serving them in their later academic work. It was evident that they were in need of instruction which would be effective for learning how to spell, both immediately and in future years. For this reason, eighth-grade students were involved in this short-term study of methods of teaching spelling.

The subjects were selected from among the more than 350 eighth-grade students enrolled in an inner-city junior high school. The building is near the main business district of a city in which three large foundries are located. Many of the students are first- and second-generation descendants of the unskilled laborers employed in the city's foundries and related industries. Other students are sons and daughters, or grandchildren, of the business, governmental and professional leadership in the community. It is an integrated school district with representation from the average and the extremes of the socio-economic and ethnic groups in the area.

Advanced, regular, modified, and special

education groupings are used within the instructional program of the school. The modified groups make up the largest portion of the total population. Special education classes are maintained for those whose intelligence quotients are 75 or less, as measured by an individual test of mental ability.

The above-mentioned junior high school was selected for this study because of its integrated population and the high proportion of poor spellers within its student body. Exclusive of the special education classes, the school held a sufficient number of students for the control and two experimental groups required for this investigation.

According to official school records, the students' current levels of spelling performance and achievement could not be explained by mental ability, physical handicaps, nor spelling performance while in the elementary schools. It was assumed that equalized experimental groups could be formed by randomization, without problems of differential diagnosis and matching.

Two weeks prior to the initiation of this study, the Junior High School's English teachers

administered Form I of the 60-item Spelling Achievement Test to the 307 eighth-grade pupils who were present on the scheduled day. The results showed a range of 0-60, a mean of 30.7, a median of 30.5 and a standard deviation of 9.02. The 154 students who scored from 0-30 (inclusive) were considered for this investigation. A subjective analysis of the test papers revealed numerous irrelevant responses and rejection of words by the four students who obtained scores of 0 and 1. They were excluded from the study. The names of the 150 students who scored from 2-30 were placed in rank-order and alternately assigned to the control and two experimental groups.

The hours for the administration of tests and treatments were scheduled by the principal of the School and then randomly assigned to the respective groups. The schedule varied from day to day to randomize the effects of time and external events.

Tardiness during the first hour of each day, heavy rainfall on one occasion, and a conflict with a homemaking class party contributed largely to the attrition of subjects which occurred. The Control

Group had fewest causes for attrition. It met for pre- and posttests only and ended with forty-two subjects.

The Strategy Group suffered the greatest amount of attrition because of a schedule which included three first-hour class periods. Both experimental groups were involved in the conflict with the homemaking class party. The Strategy Group finished with a total of thirty-one subjects and the Practice Group with a total of thirty-six.

One hundred nine students completed the required tests and hours of treatment. Their performance was used as the basis for data collected and analyzed in this investigation.

The Two Methods of Teaching

It was the purpose of this study to compare two theories of learning by examining the results of two methods of teaching spelling. One method, referred to as the practice method proposed to develop habitual procedures for studying words as individual problems. A second method, called the strategy method, proposed to involve the students in making judgments about groups

of words, or about a single item as it related to a group. Five hours of treatment were applied within a two-week period of time, on the same days and under comparable conditions for both experimental groups. The study procedures were directed by this investigator with the assistance of two department staff members and a junior high school teacher.

Fifteen words (3 categories of 5 words each) were studied daily. The words were judged by this investigator, and verified by subjects in the pilot studies, to be of social usefulness to the students. The treatment sessions included study, test, review--in that order. The categories were kept intact during the study portions of the sessions, but the words were not presented in categorical order on the daily tests or throughout the review periods. Scores obtained on the daily tests were used as measures of daily achievement in spelling.

The words studied on Treatment Day I are shown in Table 1. A complete list of the words used in this study may be found in the Appendix. A detailed description of the two methods of teaching will be given in the succeeding paragraphs.

TABLE 1
STUDY WORDS FOR TREATMENT DAY I

Category 1	Category 2	Category 3
Oldsmobile	apple	mechanic
Pontiac	banana	secretary
Cadillac	pineapple	carpenter
Thunderbird	watermelon	electrician
Studebaker	grapefruit	engineer

1. The Practice Method.

- A. words in the first category were presented on transparencies. Students viewed each word, pronounced it, visualized its form on the blank screen, viewed it a second time, visualized it again, and tried writing it on a practice paper. Self-checking followed. Additional practice was provided for those who made errors.
- B. words in the second category were presented in cursive writing on dittoed sheets which included spaces for recording numbers of vowels, consonants,

"tall" letters, and "letters below the lines". Following each count, the response was compared with that of the teacher's, as shown on a transparency. Lastly, the students wrote the words in spaces provided on the dittoed sheets.

- C. Each student had a collection of five slips of paper for studying words in the third category. One word was on each slip. The teacher asked that the words be arranged in alphabetical order, in an ascending order of length, or in order of perceived difficulty. Following two or three activities which required the students to attend to all the words the students were on their own for viewing, pronouncing, visualizing, writing and checking the words.
- D. Repetitions and variations of some or all of the above activities continued throughout the study portion of each treatment session.
- E. A test of the mastery of the fifteen

words followed twenty minutes of study.

Staff assistants distributed and collected the test papers.

- F. Finally, the teacher used transparencies to direct a review of the words of the day. Pupils wrote the words which they thought they had missed on the test, gave themselves credit for those they knew, and in various ways visualized the corrected forms of the words.

2. The Strategy Method.

- A. The first activity for the Strategy Group involved the use of packets of syllables. With the pieces spread out before them as parts of a jig-saw puzzle, the students studied the syllables to find clues to identification of words in the category. As discoveries were made and insights were gained the students shared comments about their progress. Final responses were checked against answers presented

in syllabicated and whole forms on the screen.

- B. A heterogeneous arrangement of syllables needed for words in the second category was presented on a screen, by means of a single transparency. Students were encouraged to survey the array, looking for commonalities and intrinsic relations. They were invited to share generalizations about the material. As words were "discovered", they were written on practice papers. The students checked their responses against a completed list which was shown on a second transparency.
- C. Each student had a collection of five slips of paper for studying words in the third category. The words were presented in syllabicated forms on the slips of paper. Students grouped words according to common endings, common roots, or meanings of the words. They "played" with the papers as the words were used in sentences, as the objects

they symbolized were described, and as the words were defined.

- D. Testing procedures for the strategy method were the same as those for the practice method.
- E. Review activities were similar to those used by the practice method except that attention was focused upon syllables, common endings, and groups of letters that gave meanings to the words.

Hypotheses to be Tested

This study was designed to test the following hypotheses regarding a population of eighth-grade students whose level of spelling achievement was below the median of their group:

1. The students who are taught to spell by the strategy method will make greater improvement in spelling than those who are taught to spell by the practice method, as measured by parallel forms of a test of spelling achievement.
2. The students who are taught to spell by the strategy method will make greater

improvement in spelling than those who are taught to spell by the practice method, as measured by daily tests of spelling achievement.

3. The students who are taught to spell by the strategy method will make greater improvement in spelling than those who are taught to spell by the practice method, as measured by parallel forms of four tests of visual perception--word discrimination, phrase discrimination, visual memory, and syllabication.
4. The students who do best in spelling will manifest four visual-perceptual abilities more frequently than the students who do least well in spelling, as measured by visual-perception tests of word discrimination, visual memory, and syllabication awareness.

CHAPTER IV

TEST RESULTS AND DATA ANALYSIS

Two methods of teaching spelling were used in this study to compare two underlying theories of learning. Data for the study were obtained from pre- and posttests administered to a control and two experimental groups. Quantitative results of the tests will be presented in this chapter. Observational data, scores on related measures, and daily performance records will be provided to aid in the analysis and interpretation of the findings.

Measurement of Spelling Achievement

Spelling achievement tests.--The instruments for measuring the overall spelling achievement level of the students were newly developed by this researcher for the investigation. A screening test provided data for selecting the students. Parallel forms of the instrument were administered as pre- and posttests to

measure the relative effectiveness of the two methods of teaching spelling.

In order to determine the reliability of the instruments, product-moment coefficients of correlation were obtained between parallel forms of the test administered to the Control Group. The correlations ranged from .72 to .81 and all were statistically significant at the one per cent level.

Summaries of the performance of students on the three forms of the spelling achievement test are shown in Tables 2, 3, and 4. The screening test was

TABLE 2

SUMMARY OF SPELLING SCREENING TEST
ADMINISTERED TO TOTAL SAMPLE POPULATION

Basic Data		Test Results	
No. of Students	307	Range	0-60
No. of Test Items	60	Mean	30.7
		Median	30.5
		Q ₁	17.3
		Q ₃	44.0
		Stand. Dev.	9.02

TABLE 3

SUMMARY OF SPELLING SCREENING TEST DATA
BY EXPERIMENTAL GROUPS, AFTER ATTRITION

Group	No. in Group After Attrition	No. of Test Items	Mean	Stand- ard Devia- tion
Control	42	60	18.67	8.01
Practice	36	60	17.69	8.40
Strategy	31	60	18.42	8.43
Total	109	60	18.34	8.19

TABLE 4

SUMMARY OF SPELLING PRE- AND POSTTEST DATA
(NUMBER OF WORDS CORRECTLY SPELLED)
(60 items on each test)

Group	No. in Group After Attri- tion	Spelling Pretest		Spelling Posttest	
		Mean	S.D.	Mean	S.D.
Control	42	22.21	7.91	23.95	7.67
Practice	36	21.97	9.33	22.67	7.98
Strategy	31	23.10	8.47	25.55	7.62
Total	109	22.39	8.49	23.98	7.77

administered to all eighth-grade students who were in attendance in Junior High School on the day the test was given. The pre- and posttest forms were administered to all members of the experimental groups who were present on those designated test days. Results reported in Table 2 are based upon responses of 307 students. Results reported in Tables 3 and 4 are based upon the performance of the 109 students who completed the required tests and hours of treatment.

The data, provided in Table 2, indicate a wide range (0-60) in spelling performance among the eighth-grade students in the School. The names of the 150 students selected for this study were placed in rank-order and alternately assigned to the control and two experimental groups. Differences among the means and the standard deviations of the groups, as shown in Table 3, were due to errors in measurement and to the high attrition which followed. Tardiness, absenteeism, and competing interests on the school schedule contributed to the losses. At the close of the investigation it could not be said that the groups were equal nor random samples from the school population. Statistical adjustments of data, using analysis of

covariance, had to be made in order to determine the relative effectiveness of the two methods of instruction. Those results are presented in Table 5.

TABLE 5

ANALYSIS OF COVARIANCE OF TOTAL SCORES (NUMBER OF WORDS CORRECTLY SPELLED) BASED ON ADJUSTED SUMS OF SQUARES:
SPELLING POSTTEST ON SPELLING PRETEST

Source of Variation	Adjusted SS	df	Mean S y.x	F y.x
Among	329.31	2	164.66	2.278
Within	7586.27	105	72.25	
Total	7915.58	107		

$F_{.05}$ for 2, 105 df = 3.09

With the acceptance level of significance set at .05, the F ratio was computed and compared with the F criterion value of a one-tailed test for 2 and 105 degrees of freedom. The obtained F value of 2.278 was less than the criterion value. As determined by the F test, there were no significant differences among the means due to treatment effects. Those results could have occurred by chance. Were there other differences in spelling achievement? Did differences show up in daily work?

A subjective analysis of the responses to items on the daily spelling tests indicated that the Strategy Group tended to correctly spell syllables more frequently than did the Practice Group. Was that trend also present on the spelling posttest?

In answer to the above questions, the spelling tests were re-scored. Credit was given for syllables correctly spelled and mean scores were calculated. A summary of the results are shown in Table 6.

TABLE 6

SUMMARY OF STUDENTS' TOTAL SCORES (NUMBER
OF SYLLABLES AND WORDS CORRECTLY SPELLED)
(60 items on each test)

Group	No. in Group After Attri- tion	Spelling Pretest*		Spelling Posttest**	
		Mean	S.D.	Mean	S.D.
Control	42	73.52	22.00	89.12	24.47
Practice	36	75.08	26.52	87.36	25.31
Strategy	31	77.03	24.46	97.94	25.00
Total	109	75.04	24.08	91.05	24.84

* Possible Score = 178

** Possible Score = 197

A study of the data presented in Table 6, indicated that the differences among the posttest

mean scores were greater than the differences among the pretest mean scores. To determine the significance of the trend the analysis of covariance technique was used. The acceptance level was set at .05 and the F test of significance was applied to the results. As shown in Table 7, there was a significant difference among the newly obtained means.

TABLE 7

ANALYSIS OF COVARIANCE OF TOTAL SCORES (NUMBER OF SYLLABLES AND WORDS CORRECTLY SPELLED) BASED ON ADJUSTED SUMS OF SQUARES: SPELLING POSTTEST ON SPELLING PRETEST

Source of Variation	Adjusted SS	df	Mean S y.x	F y.x
Among	1353	2	676.50	3.59*
Within	19772	105	188.3	
Total	21125	107		

* $F_{.05}$ for 2, 105 df = 3.09

Because of the significant difference shown to exist among the means, it was necessary to calculate adjusted posttest means for the groups. The adjusted means were required to test the hypothesis regarding the relative effectiveness of the strategy and practice methods of instruction.

The regression coefficient for within groups was calculated to estimate the regression of posttest scores on pretest scores. This coefficient removes any systematic influence due to difference among means and was used in the computation of adjusted posttest means. The results of the calculations are given in the following table.

TABLE 8

ADJUSTED POSTTEST MEANS OF
NUMBER OF SYLLABLES AND WORDS CORRECTLY SPELLED

Group	No. in Group	Means		
		Spelling Pretest*	Spelling Posttest**	Adjusted Posttest
Control	42	73.52	89.12	90.41
Practice	36	75.08	87.36	87.33
Strategy	31	77.03	97.94	96.25

* Possible Score = 178

** Possible Score = 197

The acceptance level was set at .05 and a one-tailed t test was used to estimate the significance of differences among the adjusted means shown in Table 8. The following formula was used.

$$SE_D \text{ between any two adjusted means} = SD_{y.x} \sqrt{\frac{1}{N_1} + \frac{1}{N_2}}$$

In the above formula:

SE_D = standard error of difference between means

SD = standard deviation

N = number in group

The obtained differences between means and the accompanying errors are shown in Table 9.

TABLE 9

DIFFERENCES BETWEEN ADJUSTED GROUP MEANS OF POSTTEST SPELLING SCORES (NUMBER OF SYLLABLES AND WORDS CORRECTLY SPELLED)

Groups	Groups		
	2	3	1
1. Control	D = 3.08 SE_D = 3.12		
2. Practice		D = 8.92** SE_D = 3.36	
3. Strategy			D = 5.84# SE_D = 3.25

(D = difference between means of groups.)

** For Ns of 31 and 36, with 105 df, $t_{.05}$ = 6.67 and $t_{.01}$ = 8.83

For Ns of 31 and 42, with 105 df, $t_{.05}$ = 6.45 and $t_{.01}$ = 8.53

As measured by the t test, the difference between the means of the Strategy and Practice Groups was highly significant. It was concluded that the strategy method of teaching produced greater improvement in

spelling than the practice method of instruction.

The difference between the means of the Strategy and Control Groups approached significance at the .05 level. There was no statistical difference between the means of the Control and Practice Groups.

Daily spelling achievement.--Daily treatments for the Practice and Strategy Groups included the study of fifteen spelling words under imposed conditions, a test over the material, and a review of the words. The daily tests were scored to give credit for total number of syllables and words learned--one credit for each syllable and one additional credit for each word. The data were collected to compare the effects of repetitive, rote learning with the effects of learning which included an understanding of the structure and organization of content.

The distributions of scores on the daily tests had different standard deviations. An average score based upon all the daily tests would not give equal weight to each examination. Before the original measures could be compared they had to be transformed into comparable units. The following formula was used to translate the sets of measures into standard scores with

means of 50 and standard deviations of 10.

$$Z = 50 + 10 \left(\frac{X - \bar{X}}{s} \right)$$

where X = original measurement

$\bar{X}$ = the mean of the distribution

s = the standard deviation of the distribution

Following the transformation of raw data into standard scores, the daily mean scores for the Practice and Strategy Groups were computed. Those scores are presented in Table 10. As shown in the Table, the

TABLE 10

MEAN SCORES ON DAILY SPELLING TESTS
BY TREATMENT GROUPS AND DAYS

Treatment Group	Mean Scores				
	Day I	Day II	Day III	Day IV	Day V
Practice	48.07	49.31	49.13	50.06	48.84
Strategy	52.28	50.81	50.93	49.95	51.38
Practice Group $\bar{X}$ = 49.00			Strategy Group $\bar{X}$ = 51.07		

Strategy Group mean for five days exceeded the Practice Group mean for five days by 2.07 points. The Strategy Group started out ahead of the Practice Group and ended ahead of the Practice Group. On four days out of five the mean score of the Strategy Group excelled the mean

score of the Practice Group, and on the remaining day the Strategy group fell behind by only .11 of a point.

The daily differences and the cumulative gain made by the Strategy Group as a result of five hours of treatment are shown in Table 11. It can be observed

TABLE 11

CUMULATIVE DIFFERENCES BETWEEN MEAN
SCORES ON DAILY SPELLING TESTS OF
PRACTICE AND STRATEGY GROUPS

Day	Means		Differences Between Means of Groups	
	Practice Group	Strategy Group	Daily	Cumulative
I	48.07	52.28	+ 4.21	4.21
II	49.31	50.81	+ 1.50	5.71
III	49.13	50.93	+ 1.80	7.51
IV	50.06	49.95	- .11	7.40
V	48.84	51.38	+ 2.54	9.94

that the daily differences between means of the groups were not significant but the cumulative effects of treatment were growing. The positive results of treatment were in favor of the strategy method of instruction.

Measurement of Visual Perception

The four tests of visual perception described in Chapter 3 were newly devised for this investigation to measure the performance of the students when confronted with tasks of editing, reproducing, and studying words. The Word and Phrase Discrimination Tests were administered to determine the ability of the students to compare the spellings of words, singly, and in context; immediate recall was measured by Visual Memory; and the ability of the students to recognize common structural patterns within words was assessed by Syllabication. Parallel forms of the instruments were administered as pre- and posttests to determine the relative effectiveness of two methods of teaching spelling.

Reliability of the tests of visual perception.--

In order to determine the reliability of the tests of visual perception, product-moment coefficients of correlation were obtained between parallel forms of the tests and between split-halves of the pretests. Correction was made for continuity of the latter. The

correlations were obtained from Control Group data and are listed in Tables 12 and 13.

TABLE 12

CORRELATIONS BETWEEN PARALLEL FORMS OF TESTS
OF VISUAL PERCEPTION ADMINISTERED TO CONTROL GROUP

Test of Visual Perception	Parallel Forms of Test	
	Correlation	Significance
Word Discrimination	.30	*
Phrase Discrimination	.10	
Visual Memory	.80	**
Syllabication	.15	
* .05 level = .304 ** .01 level = .393		

TABLE 13

CORRELATIONS BETWEEN SPLIT-HALVES OF VISUAL PER-
CEPTION PRETESTS ADMINISTERED TO CONTROL GROUP
(Correlations have been corrected for continuity)

Test of Visual Perception	Split-Halves of Pretest Forms	
	Correlation	Significance
Word Discrimination	.44	**
Phrase Discrimination	.02	
Visual Memory	.44	**
Syllabication	.65	**
* .05 level = .304 ** .01 level = .393		

The value of r that would be needed to meet the requirements of significance at the .05 level with 40

(N-2) degrees of freedom was obtained from a table. As shown in Table 13, the pretest forms of Word Discrimination, Visual Memory and Syllabication Tests were statistically reliable at the .01 level. They could be used in this study to compare the relationship of visual perception to spelling achievement.

The pre- and posttest forms of the Word Discrimination and Syllabication Tests correlated significantly at the .05 and .01 levels, respectively, and were considered to be parallel forms. They could be used in this study to collect data for determining the relative effectiveness of the two methods of teaching spelling.

Pre- and posttest forms of the Phrase Discrimination and Syllabication Tests did not prove to be parallel. Neither was the Phrase Discrimination Test a reliable measure, as determined by Control Group scores on the pretest forms of the instrument. These findings were very unexpected. All instruments had been used and refined in a series of pilot studies. The pre- and posttest forms of all measures were parallel as determined by the last pilot study. (See Table 14)

TABLE 14

CORRELATIONS BETWEEN PARALLEL FORMS OF TESTS
OF VISUAL PERCEPTION ADMINISTERED TO PILOT STUDY GROUP
(N = 49)

Test of Visual Perception	Parallel Forms of Test	
	Correlation	Significance
Word Discrimination	.40	**
Phrase Discrimination	.38	**
Visual Memory	.81	**
Syllabication	.36	*
* .05 level = .288 ** .01 level = .372		

The coefficients of correlation obtained in this present investigation were smaller than those obtained on one of the first pilot studies. What happened? What caused the failures?

Were the students in this study lower in spelling achievement level and mental ability than the students in the pilot studies? If less capable, did speed of tests and guess scores have a greater influence on performance than had been true in pilot studies?

In retrospect, this writer is aware that the strength of illumination, the size of the images, and the distance of the images from the subjects were not

the same for the experimental groups as they had been for pilot-study groups. The number of students in this study and the physical facilities of the Junior High School required the use of an auditorium-sized screen and seating arrangements at tables. A classroom sized screen and compact arrangements of student desks were used in the pilot studies. Did those changes in physical facilities cause the obtained differences in reliability?

Performance on the tests of visual perception.--

Three of the tests of visual perception were found to be reliable instruments and were used to collect data for inclusion in this study. All of the instruments utilized paralog and words, in randomized orders. Stimuli were presented on transparencies with the aid of an overhead projector and a flash exposure technique. The students viewed each stimulus for one second. The Word Discrimination and Syllabication Tests had two-choice answers to which the pupils responded by encircling their preferences on mimeographed answer sheets. Tables 15 and 16 present the results obtained on those tests.

TABLE 15

SUMMARY OF STUDENTS' PRE- AND POSTTEST
PERFORMANCE ON WORD DISCRIMINATION TEST
(40 items on each test)

Group	Number in Group	Word Discrimination			
		Pretest		Posttest	
		Mean	S.D.	Mean	S.D.
Control	42	25.93	3.44	25.17	3.17
Practice	36	27.00	3.31	25.80	3.42
Strategy	31	26.90	4.36	27.08	3.02
Total	109	26.57	3.92	26.57	3.92

TABLE 16

SUMMARY OF STUDENTS' PRE- AND POSTTEST
PERFORMANCE ON SYLLABICATION TEST
(25 items on each test)

Group	Number in Group	Syllabication			
		Pretest		Posttest	
		Mean	S.D.	Mean	S.D.
Control	42	16.05	3.07	16.12	3.06
Practice	36	17.00	2.90	15.22	2.77
Strategy	31	15.70	3.99	15.77	2.83
Total	109	16.27	3.32	15.72	2.91

Visual Memory Test required subjects to write each word or paralog on an answer sheet immediately after viewing the stimulus on the screen. A summary

of the scores obtained on pre- and posttest forms of Visual Memory is provided in Table 17.

TABLE 17

SUMMARY OF STUDENTS' PERFORMANCE ON PRE- AND POSTTEST
FORMS OF VISUAL MEMORY TEST
(25 items on each test)

Student Population	Number in Group	Visual Memory Pretest		Visual Memory Posttest	
		Mean	S.D.	Mean	S.D.
Control Group	42	9.14	5.87	8.69	4.45
Practice Group	36	10.44	5.09	10.38	4.62
Strategy Group	31	10.73	4.73	11.35	5.01
Total	109	10.03	5.31	10.01	4.66

Pre- and posttest forms of Word Discrimination and Visual Memory were used in the collection of data to compare the relative effectiveness of two methods of teaching and studying spelling. In order to provide a measure of control of initial differences among groups and a test of significance the analysis of covariance technique was applied to the data. The one-tailed F test, set at .05 level of significance with 2 and 105 degrees of freedom, was made. The results of the analysis, adjustments, and test of significance are shown in Tables 18 and 19.

TABLE 18

ANALYSIS OF COVARIANCE BASED ON ADJUSTED SUMS
OF SQUARES: WORD DISCRIMINATION POSTTEST
ON WORD DISCRIMINATION PRETEST

Source of Variation	Adjusted SS	df	Mean S y.x	F y.x
Among	33.21	2	16.61	1.64
within	1060.69	105	10.1	
Total	1093.90	107		

$F_{.05}$ for 2, 105 df = 3.09

TABLE 19

ANALYSIS OF COVARIANCE BASED ON ADJUSTED SUMS
OF SQUARES: VISUAL MEMORY POSTTEST
ON VISUAL MEMORY PRETEST

Source of Variation	Adjusted SS	df	Mean S y.x	F y.x
Among	54.40	2	27.20	2.16
Within	1323.67	105	12.61	
Total	1378.07	107		

$F_{.05}$ for 2, 105 df = 3.09

The obtained F ratios did not equal the criterion value of F for 2 and 105 degrees of freedom, at the .05 level. The hypothesis that the strategy method of teaching would bring about greater improvement in

word discrimination and visual memory than would the practice method of teaching was rejected. The observed differences could have occurred by chance.

Relationship of the Tests of Visual Perception
to Spelling Achievement

The battery of tests of visual perception was developed and administered to provide information pertinent to determining the relationship of visual perception abilities to spelling achievement. The strengths and weaknesses of the tests have been discussed. The intercorrelations among the several tests and the contributions of the tests to this study will be presented in these paragraphs.

Pretest forms of all instruments were used to secure the data recorded in Table 20. Coefficients of correlation were computed to show the relation of spelling achievement to each of the abilities measured by the tests of visual perception. Coefficients of correlation were also computed to show the relation of each test of visual perception to other tests of visual perception in the battery. A one-tailed test of significance, at the .05 level, with 40 (N-2) degrees of freedom, was made.

TABLE 20

INTERCORRELATIONS AMONG THE VISUAL PERCEPTUAL
AND SPELLING PRETESTS ADMINISTERED TO CONTROL GROUP

Test	1. Spell- ing	2. Word Discrim- ination	3. Phrase Discrim- ination	4. Visual Memory	5. Syllab- ication
1					
2	.377*				
3	.355*	.390**			
4	.726**	.417**	.415**		
5	.311	.150	.169	.398**	

* For 40 df = .358

** For 40 df = .393

It was shown in Table 12 that the Phrase Discrimination Test was not a reliable instrument. In Table 20 the data indicated that the results obtained on the pretest form of the instrument do correlate significantly with Spelling. A further analysis of the Phrase Discrimination Test, made by forcing Spelling and Phrase Discrimination scores onto dichotomous scales, indicated that the instrument did discriminate between good and poor spellers. The chi square obtained as a measure of the degree of relationship between the two variables was 7.71 and is significant at the one per cent level.

The relationship of Syllabication to Spelling was not significant, according to pretest data. Inspection of the posttest responses of the pupils revealed that the highest ranking spellers in the Strategy Group also ranked very high in syllabication skills. That relationship was not apparent for the other Groups nor for the average and poor spellers in the Strategy Group. The observation suggested to the investigator that the test may have attempted to measure a skill which had not been a part of the learning of the experimental population, prior to this study.

A positive relation between poor spellers and poor syllabication skills was noted in the Practice Group. By forcing the data onto dichotomous scales it was possible to apply the two-tailed chi square test as a measure of the relationship between the two variables. The chi square value obtained was 2.68, with one degree of freedom. That value is significant at the .10 level.

The relationship between Syllabication and Visual Memory, given in Table 20, was significant at the one per cent level. Visual Memory, in turn, was highly correlated with Spelling. The chain relation-

ship may suggest the presence of commonalities among the abilities studied.

Relationship of Spelling Achievement
to Intelligence and Other Factors

It is well known that methods of instruction are not the sole determinants of achievement levels and quality of performance in spelling. For this reason data will be presented to show the relationship of spelling to intelligence, reading, arithmetic, attendance, and sex. Due to the history of mobility and absenteeism of the sample population test scores were not available for all of the students, in some instances. It was assumed that the data were representative of the total group.

Spelling achievement and intelligence.--The Lorge-Thorndike Intelligence Test was administered when the students were in sixth grade. Scores were available for 66 of the students in this study. When Intelligence was compared with Spelling pretest the obtained product-moment correlation coefficient was .58. It is significant at the one per cent level.

Spelling achievement and arithmetic success.--
The Spelling Pretest scores were not significantly

correlated with the eighth grade California Arithmetic Test scores which were available for 90 students. The product-moment coefficient of correlation was .20.

Spelling achievement and reading success.--

Spelling Pretest scores were compared with the eighth grade California Reading Test scores which were available for 73 of the students. The product-moment coefficient of correlation was .42. It is significant at the one per cent level.

Spelling achievement and attendance in school.--

Because of the high attrition of students in the experiment it seemed important to know the relationship of spelling performance to attendance in school. There was no correlation (.04) between the first semester's attendance record and eighth-grade Spelling Pretest. However, the personal record cards indicated that poor spellers tended to be absent on test days more frequently than did good spellers. There were fewer intelligence test scores and fewer academic achievement test scores available for low-achieving students than for average- and high-achievers. Notations on the cards referred to make-up tests and to related data. As a result, the scores of poor spellers tended to be less comparable and less reliable.

Spelling achievement related to difference in sex.-- A simple analysis of variance technique was used to test for difference in Spelling due to sex. The results are shown in Table 21. There was a significant difference due to sex which influenced the treatment results as can be observed in the data presented in Table 22. Furthermore, competing interests on the school schedule had different effects upon Boys and Girls. Those effects were evidenced by attitudes while studying and by attrition from the project. It is suggested, therefore, that initial controls for sex be included in the designs of studies concerned with comparative methods of teaching spelling.

TABLE 21

ANALYSIS OF VARIANCE OF PRETEST SPELLING SCORES (WORDS CORRECTLY SPELLED) BY BOYS AND GIRLS IN STUDY

Component of Variability	SS	df	V	F
Sex Difference	429	1	429.0	6.68*
Error	6874	107	64.24	
Total	7303	108		

$F_{.05}$ for 1, 107 df = 3.94

TABLE 22

A SUMMARY OF SPELLING PRE- AND POSTTEST DATA (WORDS
CORRECTLY SPELLED) BY BOYS AND GIRLS IN STUDY
(60 items on each test)

Student Population	Num- ber in Group	Spelling Pretest		Spelling Posttest	
		Mean	S.D.	Mean	S.D.
Boys					
Control	18	19.22	7.00	21.72	6.32
Practice	17	20.53	10.60	21.12	8.94
Strategy	22	21.50	9.07	23.95	8.31
Total	57	20.49	8.80	22.40	7.94
Girls					
Control	24	24.46	7.90	25.62	8.25
Practice	19	23.26	8.10	24.05	7.00
Strategy	9	27.00	5.30	29.44	3.61
Total	52	24.46	7.60	25.17	7.28

Summary of the Results Obtained

The first analysis of Spelling Pre- and Post-test data was based upon the total number of words correctly spelled. As measured by the analysis of covariance technique and the F test of significance, there were no significant differences among the means of the groups. The observed differences could have occurred by chance.

A subjective analysis of daily work indicated that the Strategy Group tended to correctly spell a greater number of syllables than did the Practice Group. On the basis of those observations, the tests were re-scored to give credit for number of syllables correctly spelled. The new data were analyzed and the F test of significance was applied. The results indicated that a significant difference existed among the means of the groups.

Adjusted posttest means were calculated and the t test was applied to differences between means of groups. The difference between means of the Strategy and Practice Groups was significant at the .01 level. It was concluded that the strategy method of instruction had brought about greater improvement in learning to spell than had the practice method.

Mean scores obtained on the five daily spelling tests revealed no significant differences between groups due to treatment effects. However, the Strategy Group means exceeded the Practice Group means on four days and were a near-tie (-.11) on the fifth day. The cumulative gain in differences between mean scores was

9.94 in favor of the Strategy Group.

Four tests of visual perception were newly developed for this study. Parallel forms were constructed for use as pre- and posttest measures. As determined by numerous testings in a series of pilot studies the tests were statistically reliable and the forms were parallel. Data obtained in this study indicated that one instrument was not reliable and that pre- and posttests forms of two measures were not parallel. The writer was unprepared for the latter findings. were the students in this study of lower achievement and ability levels than those in the pilot studies? If lower, did speed of tests and guess responses have greater influence on results than they had had previously? Did change in physical arrangements interfere with perception of stimuli?

Data for answering the above questions were not available. Scores obtained on the reliable tests and parallel forms of measures were used to test the hypotheses raised by this study. Scores obtained on the other measures were disregarded or treated as observational data.

Visual Memory and Word Discrimination scores were used to determine the relative effectiveness of two methods of instruction. There were no significant differences among means of groups on these measures, as determined by the F test of significance.

Following the strategy method of treatment there was observational data to suggest that good spellers tended to do well on Syllabication. The trend was not evident among students in the Control and Practice Groups. Following the practice method of treatment there was some statistical evidence (.10 level) that poor spellers tended to do poorly on Syllabication.

Visual Memory and Word Discrimination scores were highly correlated with Spelling. Phrase Discrimination differentiated between good and poor spellers when the respective results were placed on dichotomous scales. Syllabication was highly correlated with Visual Memory but not with Spelling.

Data were presented which indicated that girls did better than boys in spelling. As a result of sampling errors and high attrition a disproportionate number of boys were in the Strategy Group. The anal-

ysis of covariance technique was used to obtain a measure of control for those and other initial differences among groups.

As measured by overall spelling achievement, the strategy method of instruction produced greater improvement in spelling than did the practice method. The trend was also evident as measured by daily performance and tests of visual perception. Two tests of visual perception correlated highly with scores on the test of spelling achievement and with other tests of visual perception.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The main purpose of this research was to compare two theories of learning by studying the relative effectiveness of a practice and strategy method of teaching spelling to low-achieving, eighth-grade students. Both methods proposed to teach the students "how to study" lists of words for spelling. The strategy method provided opportunities for learners to make decisions about meaningful parts of words. It focused attention on the structure of content and the intrinsic relations within the organization of the teaching materials. The practice method emphasized repetitive practice and reinforcement. It included the use of visualization, pronunciation, writing, and self-evaluation.

Summary of the Investigation

Development of tests.--The first step in this investigation was the development of pre- and post-

test instruments for measuring spelling achievement and four types of visual perception abilities. Appropriate content and testing procedures were required and pilot studies were needed to determine the reliability of each test.

Suggestions for content, materials, and testing procedures were obtained from reports of related experimental studies and from eighth-grade students who were poor spellers. A graded word list provided the basis for the selection of items on the spelling achievement tests. Lists of paralog, spelling words, and reading words were resources for the content of the tests of visual perception. Additional words were coined by the writer.

In preparation for construction of the battery of tests, twelve eighth-grade students were individually interviewed and tested. The students were of high-average intelligence and known to be poor spellers. They were interested in their spelling problems and willing to assist in describing them. The students raised questions about proposed testing procedures and offered suggestions for content.

The first and second editions of the battery

of new tests were administered to pupils enrolled in classes of remedial reading. The pupils and the teacher of remedial reading aided in making revisions. Students who were enrolled in courses of modified English in two other junior high schools participated in later pre- and posttest trials and in a complete pilot study.

The content of the battery of tests and directions for its administration have been placed in Appendix I.

Selection of students.--Form I of the Spelling Achievement Test newly constructed for this investigation was administered to all eighth-grade students who were present on a given day in one inner-city junior high school. Names of the 150 students whose scores fell immediately below the median were placed in rank-order and alternately assigned to a control and two experimental groups. One hundred nine of the students completed the required tests and hours of treatment for this study.

Experimental procedures.--Within a two-week period of time pretests, posttests, and five hours of treatment were given to the respective control and experimental groups. One treatment, known as the

practice method of teaching spelling, emphasized routine procedures of visualization, pronunciation, and writing of words. The students were taught to think of each item as a new and independent task. A second treatment, called the strategy method of teaching spelling, provided opportunities for students to look at meaningful parts of words and to compare groups of letters with similar groupings in other words. Teaching materials for the strategy method directed attention to intrinsic relations in the structure and organization of content. Both methods of instruction included daily programs of study, test, and review. The daily spelling tests were used as sources of data for making comparisons of the two imposed conditions of learning.

Content of teaching materials.--Fifteen new words, judged to be of social usefulness to teenagers, were studied during each of the five hours of treatment. The daily lists of words consisted of three categories of five words each. Stimuli were presented in whole-form for study by the practice method. They were presented in a variety of syllabicated forms for study by the strategy method. The practice method

focused attention upon the serial arrangement of single letters. The strategy method provided opportunities for examining and manipulating the large structural units (syllables) or which words are composed.

The complete list of study words and procedures for both methods of instruction may be found in Appendix II.

Method of handling the results of the testing.--

In order to determine the reliability of the tests newly developed for this study coefficients of correlations were obtained (1) between scores on parallel forms of the test of spelling achievement, (2) between scores on parallel forms of each of the four tests of visual perception, and (3) between scores on split-halves of each of the pretest measures of visual perception. The latter were corrected for continuity.

The spelling achievement test was accepted because of the reliability of the parallel forms and the range of the instrument. The length of the test and the ascending order of difficulty of items provided for continuous responses within the achievement levels of all the students.

The tests of visual perception were administered

because they appeared to measure performance similar to that required of students who are learning to spell new words. The tasks had been described by the low-achieving students interviewed for this study and in the literature related to this investigation.

Standard scores were used to transform the five sets of daily test scores into comparable units. Daily mean scores were calculated for groups and for individual students.

Product-moment coefficients of correlation were obtained to describe the relation of spelling achievement (1) to each of the four tests of visual perception (2) to scores on school-recorded tests of intelligence, reading achievement, and arithmetic achievement, and (3) to absenteeism during the first semester of the eighth-grade year.

Chi square was computed as an index of the relation between spelling achievement and two tests of visual-perceptual ability, namely: phrase discrimination and syllabication.

The simple analysis of variance technique and the t test were used to determine differences in spelling performance due to difference in sex.

In order to draw valid conclusions regarding the relative effectiveness of the treatments, the analysis of covariance technique and the F test of significance were applied to word discrimination, visual memory, spelling achievement and daily spelling test data. The assumptions underlying the procedures were that (1) the analysis of covariance would correct for initial differences due to sampling errors and high attrition of subjects and that (2) if the methods of instruction made differences in spelling performance, in word discrimination ability, and in visual memory the obtained values of F would be larger than its criterion value, in each instance.

Posttest forms of the phrase discrimination and syllabication tests were not statistically reliable for use as parallel measures. They could not be used to analyze data for comparing two learning theories exemplified by the methods of teaching spelling.

Master data sheets have been placed in Appendix III. They provide records of spelling achievement, daily spelling test scores, and scores on four tests of visual perception.

Findings and Conclusions

Two systems of scoring were applied to responses on the spelling achievement tests. When only the correctly spelled words were credited there were no significant differences among the group means, as determined by the F test. When credit was given for correctly spelled syllables a difference, significant at the .05 level, was indicated among the group means. Using adjusted mean scores and the t test, it was determined that a difference, significant at the .01 level, existed between the means of the Strategy and Practice Groups, in favor of the Strategy Group.

No differences were found between the mean scores of the daily spelling tests of the treatment groups when the F test of significance was applied to the data. However, the Strategy Group was ahead four days out of five and was a near-tie on the fifth day (-.11). The cumulative gain of the Strategy Group over the Practice Group was 9.94.

No significant effect on the word discrimination and visual memory abilities of the students was produced by either of the methods of instruction, as measured by pre- and posttest forms of the respective measures.

Observational data indicated that the differing methods of instruction seemed to produce differing qualities of responses. The group who had interacted with the structure and organization of content tended to use structure and organization in their responses. Good spellers in the Strategy Group tended to do well in Syllabication. Poor spellers in the Practice Group did poorly on Syllabication. The latter trend was statistically significant at the .10 level, as estimated by the chi square index of the relation.

The frequency distributions obtained on measures of spelling achievement and visual memory ability indicated a wide range of individual differences within each group. The scores on word discrimination, phrase discrimination and syllabication tests were clustered near the medians on the respective measures.

Scores obtained on the test of visual memory correlated significantly with spelling achievement and with each of the other tests of visual perception. The test of word discrimination correlated significantly with tests of spelling achievement, phrase discrimination, and visual memory. The syllabication test did not prove to be a reliable instrument.

Spelling performance was highly correlated with reading achievement and with intelligence. It was not significantly related to arithmetic achievement nor to attendance in school during the first semester of the eighth-grade year. Lastly, girls did significantly better in spelling than boys.

On the basis of the results presented these conclusions concerning a population of below median spellers seem warranted.

1. The students who were taught by the strategy method did make greater improvement in spelling than the students who were taught by the practice method, as measured by a test of general achievement in spelling.
2. The students who were taught by the strategy method did not make greater improvement in spelling than those who were taught by the practice method, as measured by daily tests of spelling achievement.
3. The students who were taught by the strategy method did not make greater improvement in spelling than those who were taught by the practice method as measured by two tests of visual perception: Word discrimination

and visual memory.

4. The students who ranked highest in spelling manifested the following visual-perceptual abilities more predominately than those who ranked lowest in spelling: Word discrimination, phrase discrimination, and visual memory.

Implications and Suggestions for Further Research

Implications of the Findings

The motive for this research resulted from an examination of writings of low-achieving eighth-grade students. Their responses indicated that they were in need of instruction which would help them learn to spell words easily and independently. The findings of the study are considered to have the following implications for the problem which prompted the investigation.

1. Five one-hour sessions of treatment by a strategy method of instruction can bring about improvement in spelling achievement among a population of below median spellers.
2. Reliable tests of spelling achievement can

be developed by classroom teachers, with the aid of graded word lists. The tests can be constructed to measure the wide range of variability among individuals.

3. Visual memory is closely correlated with spelling performance and with other visual-perceptual tasks.
4. Reliable tests of visual perception can be developed by teachers and administered in a regular classroom setting with the use of an overhead projector.

Suggestions for Improvement and Follow-up

A number of questions have been prompted by this study which suggest problems to be considered for further research. The questions are:

1. What are the relative effects of the two underlying theories of learning when applied to children's first experiences with words?
2. What is the interaction effect of method of teaching spelling and sex of learners?
3. What would delayed testing of spelling achievement show regarding the relative

effectiveness of the two methods of instruction?

4. what would delayed testing of words studied during treatment periods show regarding the relative effectiveness of the two methods of instruction?
5. Did testing procedures decrease the power of the tests to measure four specific types of visual-perceptual abilities?
Could testing procedures be developed to decrease the influence of visual memory on other tests of visual perception?
6. Did the illumination, size of forms, and distance of stimuli from subjects effect the findings on the four tests of visual perception?
7. would the use of a mechanical flash device increase the reliability of the four tests of visual perception?

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APPENDICES

1. TESTING MATERIALS

A. SPELLING ACHIEVEMENT TESTS

Spelling Screening Test (Spelling Test, Form I)

Directions (to be read to the students):

Today we are going to have a spelling test. We want to see how well you can spell, as compared with other eighth graders in the nation.

There are sixty words in the test. You are to write the words on the sheets of paper which have been passed to you.

First, write your name at the top of the paper, as indicated. Be sure to write your first and last names.

Now we will begin the test. I will pronounce each word once. Then I will use the word in a sentence. Then I shall repeat the word.

Ready.....The first word is:

- | | |
|-------------------|--|
| 1. <u>fished</u> | He <u>fished</u> with a bamboo pole. |
| 2. <u>brick</u> | We need red <u>brick</u> for the chimney. |
| 3. <u>dresser</u> | She put her gloves in the top drawer of the <u>dresser</u> . |
| 4. <u>wedding</u> | The bride wore a long veil for her <u>wedding</u> . |

21. useful The book is useful because it gives many new ideas.
22. comfort The footstool gave some comfort to his feet.
23. pairs She bought three pairs of shoes.
24. tumble He can tumble like a tumbleweed
25. happier She is happier living in the city.
26. musical It was a musical program.
27. sway The trees sway in the wind.
28. addressing The secretary was addressing the envelopes.
29. sober The boy was sober when he faced the judge.
30. lodge The boy scouts stayed all night at the lodge.
31. prompt Be prompt with your reply because we are awaiting your answer.
32. boast He likes to boast about the fights he has had.
33. device Can you make a device to hold the door open?
34. quack The baby ducks like to quack at the kitten.
35. disposition He had a moody disposition every Monday.
36. writes He writes a letter every day.

37. engagement She announced their engagement at the party.
38. regards He regards the boy as a young brother.
39. bathe The birds like to bathe under the sprinkler.
40. hence He was late, hence the bus was gone.
41. medicine He took some medicine to stop his coughing.
42. volumes The story was told in three volumes.
43. investigation The F.B.I. carried out the investigation.
44. sense The answer did not make sense to us.
45. lettuce She wanted some lettuce in her sandwich.
46. scenery The scenery was beautiful throughout our trip.
47. autumn Colored leaves make autumn a beautiful season.
48. examinations She wrote examinations in every subject.
49. inhabitant He was an inhabitant of the village.
50. abandon Did the mother dog abandon her puppy?
51. alfalfa The cows enjoyed eating the alfalfa.

52. illustration She drew the illustration for the book.
53. economics Economics is a science dealing with the production and use of wealth.
54. pilgrims The pilgrims traveled many days to visit the shrine.
55. artificial Many people are using artificial sweetening in their foods.
56. definite His answer was a definite "no."
57. representative Did your representative go to the student council meeting?
58. occasionally Occasionally we have a tornado in this area.
59. convenience The fountain was placed there for your convenience.
60. ridiculous The clown was dressed in a ridiculous suit.

The Spelling Pretest
(Spelling Test, Form 2)

Directions: Our last test is a spelling test. There are sixty words in the test. You are to write the words on the last two pages in your booklet. (Demonstrate.)

Now we will begin the test. I will pronounce each word once. Then I will use the word in a sentence. Then I will repeat the word. Ready.....The first word is:

1. keep I will keep the ice cream in the refrigerator.

- | | |
|----------------------|---|
| 2. <u>alive</u> | The frog is <u>alive</u> . |
| 3. <u>alike</u> | No two words are <u>alike</u> . |
| 4. <u>happiest</u> | He is the <u>happiest</u> boy I know. |
| 5. <u>wine</u> | The <u>wine</u> is made from grapes. |
| 6. <u>bats</u> | Many <u>bats</u> live in the cave. |
| 7. <u>horn</u> | The bicycle <u>horn</u> does not work. |
| 8. <u>bride</u> | The <u>bride</u> wore a long veil. |
| 9. <u>log</u> | Put another <u>log</u> on the fire. |
| 10. <u>mistake</u> | It was a <u>mistake</u> to quit so soon. |
| 11. <u>tune</u> | He is playing a new <u>tune</u> on the piano. |
| 12. <u>sixth</u> | I was in the <u>sixth</u> grade. |
| 13. <u>anywhere</u> | Put the box down <u>anywhere</u> . |
| 14. <u>pillow</u> | Rest your head on this <u>pillow</u> . |
| 15. <u>dame</u> | My master lost his fiddle stick.
My <u>dame</u> has lost her shoe. |
| 16. <u>anyway</u> | We are late, but we will go <u>anyway</u> . |
| 17. <u>conducted</u> | He <u>conducted</u> the band. |
| 18. <u>devote</u> | How many hours do you <u>devote</u> to study? |
| 19. <u>pin</u> | Will you <u>pin</u> the picture on the bulletin board? |
| 20. <u>hens</u> | The <u>hens</u> were scratching in the farmyard. |

21. artist The artist was seated by his easel.
22. berry The birds are in the berry bushes.
23. crack That bump will cause the glass to crack.
24. riding He is riding the Palomino.
25. distance The distance from here to Detroit is about 100 miles.
26. feature We went to see the first feature at the theater.
27. landscape He will landscape your lot for you.
28. peanuts Peanuts are good when roasted and salted.
29. thrill The toboggan ride gave us a thrill.
30. sweater The school sweater is blue.
31. rye Rye bread is made from rye not wheat.
32. edge The edge of the paper is torn.
33. social The ice cream social will be on Saturday.
34. chased The dog chased the car.
35. damaged The fire damaged the books.
36. furnished The school furnished the paper and pencils.
37. swear He will swear to it in court.
38. dispute Did he dispute the referee?

39. lofty The eagle flew to lofty heights.
40. nicest That is the nicest thing that
could have happened.
41. threw He threw the paper on the ground.
42. tunnel We drove through the dark tunnel.
43. engine The engine stopped when we were on
the bridge.
44. pearl The pearl was in the oyster.
45. stupid That was a stupid mistake.
46. occupation His occupation is farming.
47. grief She is weeping because of her grief.
48. qualified Is he qualified to vote?
49. scenes The act is divided into three
scenes.
50. nickel You can park there for one nickel.
51. qualities What are the qualities of a good
clerk?
52. society Is society responsible for him?
53. promptly Answer the letter promptly.
54. illustrations She drew the illustrations for the
book.
55. adjourned The meeting adjourned at midnight.
56. available No water is available at this park.

57. definition The definition of the word helped me.
58. initial She wrote her middle initial on the paper.
59. convenient That is not a convenient time for me.
60. adequate I think two gallons of paint will be adequate.

The Spelling Posttest
(Spelling Test, Form 3)

Directions: Our last test is a spelling test. There are sixty words in the test. You are to write the words on the last two pages in your booklet. (Demonstrate.)

Now we will begin the test. I will pronounce each word once. Then I will use the word in a sentence. Then I will repeat the word. Ready.....The first word is:

1. able Is he able to walk without crutches?
2. beside She sat beside me at the theater.
3. gray The sky was gray all day.
4. vote Be sure to vote at the election.
5. pal He is a good pal of mine.
6. cone I lost the ice cream when the cone broke.
7. wing I was sitting next to the wing of the airplane.

- | | |
|-----------------------|--|
| 8. <u>reaching</u> | The swimmer is <u>reaching</u> for a rope. |
| 9. <u>making</u> | They are <u>making</u> a dog house. |
| 10. <u>rushing</u> | The water is <u>rushing</u> over the dam. |
| 11. <u>during</u> | The rain fell <u>during</u> the night. |
| 12. <u>spending</u> | We are <u>spending</u> our allowances. |
| 13. <u>bathing</u> | The nurse is <u>bathing</u> the baby. |
| 14. <u>tower</u> | They put a new bell in the <u>tower</u> . |
| 15. <u>male</u> | The <u>male</u> bird is a bright red color. |
| 16. <u>carts</u> | He pushed the book <u>carts</u> out of the library. |
| 17. <u>eyes</u> | His <u>eyes</u> grew tired from reading. |
| 18. <u>meet</u> | I will <u>meet</u> you at the office. |
| 19. <u>china</u> | Our <u>china</u> dishes are from England. |
| 20. <u>shirt</u> | The boy's <u>shirt</u> was torn. |
| 21. <u>formed</u> | The bricks <u>formed</u> a wall. |
| 22. <u>fisherman</u> | That lonely <u>fisherman</u> caught no fish today. |
| 23. <u>policeman</u> | A <u>policeman</u> patrols this block regularly. |
| 24. <u>convention</u> | The club's <u>convention</u> will be in May. |
| 25. <u>lane</u> | Form one <u>lane</u> of traffic because of the bridge. |

26. investment She thought the house was a good investment.
27. level We are not many feet above sea level.
28. useless Skiis are useless in this weather.
29. rifle He shot it with a deer rifle.
30. comfortable Wear comfortable shoes when walking.
31. coming The train is coming now.
32. region The swampy region is filled with animal life.
33. bridge They built a new bridge across the river.
34. palace A queen lived in that palace.
35. stem The stem of the flower is broken.
36. preacher He was a preacher in the country church.
37. writing I am writing a letter about it.
38. hoping We were hoping you would come today.
39. medium I like to buy the medium-sized eggs.
40. stunts The clown's stunts were performed from a high wire.
41. Wednesday Wednesday is the middle day of the week.
42. gloomy We spent that gloomy day inside our cabin.
43. ability He has the ability to break it with his hands.

44. register It is time to register for fall classes.
45. steer You can steer the car while we push it.
46. engineer The engineer of the train talked with us.
47. blossoms The apple blossoms are beautiful.
48. image The carving was a good image of the man.
49. glorious It was a glorious day for a parade.
50. policies All his insurance policies were in the desk.
51. invitation She received an invitation to the party.
52. opinion He did not tell us his opinion about the play.
53. sensible It seemed to be the sensible thing to do.
54. liability All of the debts are his liability.
55. economy Our local economy does not finance summer playgrounds.
56. mutual The boys reached a mutual agreement.
57. schedule The class schedule is posted on the board.
58. ordinarily Ordinarily, we eat our lunch at 11:30 a.m.

59. initiation The initiation of new members will be next week.
60. temporarily The tennis rackets are temporarily out of stock.

B. TESTS OF VISUAL PERCEPTION

Word Discrimination Tests

Directions: Our first activity is to see how rapidly you notice words which are alike and words which are different. Some of the words will be real words. Some will not be real words but they will look like real words. The words are written in pairs, as:

time	time	sitwell
time	tame	citwell

(Illustrate on screen.)

I will show you first one word and then the other word on the screen. If the words in the pair are the same put a circle around (S) for same. If the words in the pair are different put a circle around (D) for different. (Demonstrate.)

Get ready. Look at the screen. Here is the first pair of words. (1 second exposure-total) Put a circle around (S) if they are the same. Put a circle around (D) if they are different.

Word Discrimination Pretest

- | | |
|-----------------|----------------|
| 1. inquisitions | 3. detrimental |
| inquisitions | detrinental |
| 2. disclosure | 4. islanders |
| disclozure | inlanders |

- | | |
|-----------------------------------|--------------------------------------|
| 5. penetration
penetration | 19. hospitality
hospitulity |
| 6. perpendicular
perpendicular | 20. orthography
orthography |
| 7. principle
principal | 21. lieutenant
luetenant |
| 8. consternation
constermation | 22. mathamatician
mathematician |
| 9. treacherous
treacherous | 23. anthropology
anthology |
| 10. innovation
innvocation | 24. florescence
florescence |
| 11. automotive
automotice | 25. leplislation
legislation |
| 12. receive
recieve | 26. quadruped
quadruple |
| 13. temperatures
temperstures | 27. palmist
psalmist |
| 14. stratosphere
stratosphere | 28. registration
resignation |
| 15. continental
continental | 29. hemorrhage
hemorrhage |
| 16. commendation
commemoration | 30. intoxicate
intoxicant |
| 17. eucalyptus
eucalyptus | 31. reorganization
reorganization |
| 18. thoroughly
throughly | 32. unfamiliarity
unfamiliarity |

- | | |
|------------------------------------|----------------------------------|
| 33. mischievous
mischievous | 37. governmental
governmental |
| 34. commedian
comedian | 38. aquiraum
aquarium |
| 35. catafalque
catalogue | 39. acquisitions
acquisitions |
| 36. interrogative
interrogation | 40. innomerable
innumerable |

Word Discrimination Posttest

- | | |
|-----------------------------------|--------------------------------------|
| 1. quite
quiet | 10. popalur
papular |
| 2. xylophone
xylophone | 11. substantiation
substantiation |
| 3. enclozure
enclosure | 12. registrarion
registration |
| 4. inflormation
inflammation | 13. multiplacation
multiplication |
| 5. continuously
continuously | 14. acknowledgment
acknowledgment |
| 6. conversation
conservation | 15. convenience
convenience |
| 7. decloration
declaration | 16. recitation
resitation |
| 8. geographer
geographar | 17. philosophical
philosophical |
| 9. quadrilateral
quadrilateral | 18. certificate
cerfiticate |

- | | |
|--------------------------------------|--------------------------------------|
| 19. contradiksion
contradiction | 33. oscillation
oscallation |
| 20. imperturbable
imperturbable | 34. carbohydrate
cardohydrate |
| 21. insalation
insulation | 35. calculation
calculation |
| 22. destination
destination | 36. majician
magician |
| 23. pneumonia
pneumonia | 37. catechism
catachism |
| 24. nonnitrogenous
nonnitrogenous | 38. petrification
petrifaction |
| 25. continuum
continual | 39. nondescriptain
nondescription |
| 26. unseasonable
unreasonable | 40. palindrome
palindrome |
| 27. theoretical
theoretical | |
| 28. stalagtite
stalagmite | |
| 29. rendezvous
rendazvoes | |
| 30. luminate
lamine | |
| 31. schematic
schematic | |
| 32. zoological
zoologist | |

Phrase Discrimination Tests

Directions: Our second activity is almost the same as the first. This time we want to see how rapidly you notice phrases which are alike and phrases which are different. The phrases are written in pairs, as:

a dark day	a dark day
a dark day	a dark sky

(Illustrate with overhead projector.)

If the two phrases in a pair are the same put a circle around (S). If the two phrases in the pair are different put a circle around (D). (Demonstrate on transparency.)

Get ready. Look at the screen. Here is the first pair. (One second exposure-total) Put a circle around (S) if they are the same. Put a circle around (D) if they are different.

Phrase Discrimination Pretest

- | | |
|-----------------------------|-----------------------|
| 1. accompanied chicken | 7. helwig patronage |
| accompanied children | helwiq patronage |
| 2. practical representative | 8. awry competition |
| principle representative | awry competition |
| 3. both committees | 9. laboratory benches |
| both committees | laboratory benches |
| 4. artificial blocks | 10. originally booked |
| artificial blocks | originally booked |
| 5. bottle supplant | 11. transferred bench |
| bottle supplement | transferred bunch |
| 6. intricate embroidery | 12. branch centers |
| intricate embroidery | branch centres |

- | | |
|--|--|
| 13. bright brick boxes
bright broken boxes | 20. clear curiosity
clean curiosity |
| 14. bluebirds' habitation
bluebrids' habitation | 21. beloved fraternity
beloved fraternity |
| 15. preliminary booklet
preliminary distinction | 22. benefits candidates
benefits candidates |
| 16. dejected physician
depicted physician | 23. bigger achievement
bigger achievement |
| 17. extremely exhausted
extremely exhawsted | 24. essential belonging
essential belonging |
| 18. brokerage realtors
brokerage relators | 25. unfortunately bent
fortunately bent |
| 19. every intelligentia
every intelligentia | |

Phrase Discrimination Posttest

- | | |
|---|--|
| 1. brothers carried caps
brothers camping caps | 8. regretting clearing
regretting clearing |
| 2. fee preference
fee preference | 9. luxurious refrigerator
luxurious refrigerator |
| 3. scarcely burning
scarcely bunning | 10. enthusiastic employees
enthusiastic employees |
| 4. succeeded election
succeeded election | 11. buy mechanical
by mechanical |
| 5. dark bud formation
dark dud formation | 12. chloropyll filled
chloraphyll filled |
| 6. commendation bow
commencement bow | 13. applicant blunk
applicant blank |
| 7. attache carrying case
attashe carrying case | 14. zigzagging entanglement
zigzagging entanglement |

- | | |
|--|--|
| 15. financial compliment
financial judgment | 21. embroidered upholstery
embroidered upholstery |
| 16. immediate illustration
immediote illustration | 22. beat bears
beat beast |
| 17. temporary blade
temporary blade | 23. interrogating nuisances
interrogating nuisances |
| 18. galvanized celwap
falvanized celwaq | 24. intriguing configuration
intriguing configuration |
| 19. unavailable boots
available boots | 25. unfortunately clear
unfortunately clear |
| 20. booked tournament
booking tournament | |

Visual Memory Tests

Directions: Our third activity is to see how well you can remember what you have seen. I am going to show you some words on this screen. Some of the words will be real words. Some will not be real words, but they will look like real words. You need to look at each word quickly and carefully because I am going to show it for only a short time. Then I will take it away. After I take it away, you are to write the word on paper.

Ready, Number 1 . . . (1 second exposure)

Write the word.

Ready, Number 2 . . .

Write the word.

Visual Memory Pretest

- | | |
|------------|------------|
| 1. CROQUET | 4. COLONEL |
| 2. AISLES | 5. ZUMAP |
| 3. BUREAU | 6. EPISTLE |

- | | |
|--------------|-------------|
| 7. CORDIAL | 17. MEARDON |
| 8. ACQUAINT | 18. ACQUIRE |
| 9. SAGROLE | 19. REIGN |
| 10. HYGIENE | 20. IMMENSE |
| 11. GOKEM | 21. WROUGHT |
| 12. CYLINDER | 22. OCCURS |
| 13. COUNSEL | 23. DEBTOR |
| 14. NOURISH | 24. LICENSE |
| 15. VIRTUES | 25. ACADEMY |
| 16. DESCEND | |

Visual Memory Posttest

- | | |
|--------------|--------------|
| 1. CRISIS | 12. BYSSUS |
| 2. APOLOGY | 13. WELKIN |
| 3. FLOURISH | 14. BENEFIT |
| 4. BULLETIN | 15. MINIMUM |
| 5. QUIPSON | 16. UTILIZE |
| 6. MORTGAGE | 17. NEGLAN |
| 7. TRAGEDY | 18. CIRCUIT |
| 8. NOSTAW | 19. CONDEMN |
| 9. SORORITY | 20. ELIGIBLE |
| 10. THOROUGH | 21. FOLIAGE |
| 11. DESPAIR | 22. PAGEANT |

23. INTIMATE

25. POLEF

24. PARTIAL

Syllabication Tests

Directions: The next test is to see how well you can divide words into syllables. The words are not real words, but they look like real words. In order to say the words you have to divide them into parts, or syllables. Look at this word. See how it has been divided.

on thom o gy
onth omo gy

The first one, or the one that is above, can be pronounced as it is written. The one at the bottom cannot be pronounced as it is written; the second syllable in it is om/o or o/mo and needs to be divided into parts. So we will put a circle around (A) on our answer sheets, for the first one--or the one that is above.

Let us look at another example.

bug wum
bu gwum

Of these two, which one can you pronounce?
(Ask students. Confirm answer.)

All right. We are ready for the test. You need to look at each word quickly and carefully because I am going to show it for only a short time. Then I will take it away. After I take it away, put a circle around the correct answer on your paper. Ready,
Number 1 . . . (one second exposure).

Syllabication Pretest

1. ac pre act
acp rea ct

2. ty sus fec
tys usf ec

- | | |
|--|---|
| 3. firn enti on
fir nen tion | 15. tiv cil ly mat
ti vcil lym at |
| 4. fac ble
fa cble | 16. erpr om
erp rom |
| 5. a dorn phil
ad or nphil | 17. tifi fas
ti fi fas |
| 6. sionm ap re can
sion ma pre can | 18. sis daist an
sis da is tan |
| 7. sisa li
si sal i | 19. cir rate
cir ra te |
| 8. cepp roms at
cep prom sat | 20. os fac com
osf ac com |
| 9. ma tip ol com
mat ipo lcom | 21. ble at thul
blea tth ul |
| 10. el dan fec tion
el danf ect ion | 22. lu ant sub tin
lu ants ub tin |
| 11. cert orf i
cer tor fi | 23. sub er ta in mon
sub er tain mon |
| 12. ment cig i fec
men tcig ifec | 24. ore xce pda
or ex cep da |
| 13. de bo phy sas
de bop hys as | 25. pol cer or mat
po lce ror mat |
| 14. cri os com
cr ios com | |

Syllabication Posttest

- | | |
|------------------------------------|-----------------------------|
| 1. la te lis
lat e li s | 3. sa .ts ta
sat sta |
| 2. ti ist can pre
tiist canp re | 4. nen te sad
ne nte sad |

- | | |
|---|--|
| 5. un cep fir af sent
un cepf ira fs ent | 16. lab ble co mor
lab bl eco mor |
| 6. cem ker
cemk er | 17. a cer sub dis ance
a cers ubd is ance |
| 7. co mis tpor
com ist por | 18. priv ma
pri vma |
| 8. acp il um
ac pi lum | 19. de co mpe vil la
de com pe vil la |
| 9. ist lat
is tl at | 20. warp rivt e mar
war priv te mar |
| 10. ly or el
lyo rel | 21. cir ble
ci rble |
| 11. lat cep mis
la tcep mis | 22. a war prom ist
awa rpr om ist |
| 12. el lye r mo ny
el ly er mo ny | 23. ap fas vi tor
ap fa svi tor |
| 13. tem a svit
te mas vit | 24. gyv izt ra
gy viz tra |
| 14. moc iti vo
mo cit ivo | 25. stan ble al
sta nbl eal |
| 15. prox fa
pro xfa | |

II. TEACHING MATERIALS

A. DAILY WORD LISTS

List of Study Words by Treatment Days and Categories

Category 1	Category 2	Category 3
Treatment Day I		
Oldsmobile	apple	mechanic
Pontiac	banana	secretary
Cadillac	pineapple	carpenter
Thunderbird	watermelon	electrician
Studebaker	grapefruit	engineer
Treatment Day II		
Michigan	farmer	speedometer
California	teacher	thermometer
Florida	pitcher	barometer
Washington	painter	odometer
Indiana	gardener	ruler
Treatment Day III		
biology	maple	chairman
geometry	marble	superintendent
geography	circle	manager
mathematics	shingle	president
literature	kettle	representative
Treatment Day IV		
vanilla	pennant	camera
strawberry	glitter	television
chocolate	glossy	telescope
peppermint	brilliant	projector
butternut	ribbon	microscope
Treatment Day V		
stratosphere	number	library
atmosphere	mustard	cafeteria
astronaut	catsup	auditorium
cosmonaut	hamburg	gymnasium
launch	napkin	office

B. MATERIALS FOR THE PRACTICE GROUP

1. Words in Category 1 were presented to the group on transparencies. One word, written in whole form, was on each transparency.
2. Words in Category 2 were presented on dittoed sheets of paper. The words were spaced on ruled answer sheets to expedite the recording of the letter counts (number of vowels, number of consonants, number of tall letters, and number of letters with "tails" below the lines) and the writing of the words.
3. Words in Category 3 were presented in individual packets of 1" X 4" slips of paper. The words were dittoed, cut apart, and packaged for distribution.

C. MATERIALS FOR THE STRATEGY GROUP

1. Words in Category 1 were presented in individual packets which contained the syllable cards needed for constructing the five words in the category. Pupils checked their responses against a list of the words presented on a transparency.
2. The syllables needed for constructing the five words in Category 2 were randomly arranged on one transparency for presentation to the group. Pupils scanned the array of syllables, wrote their responses on paper, and later checked their spellings against a list of the words presented on a second transparency.
3. Words in Category 3 were presented singly on transparencies to show both the syllabicated and whole forms of each word. A sixth transparency presented the list of words for comparison of forms, structures, and meanings.

III. MASTER DATA SHEETS

A. SPELLING ACHIEVEMENT TEST SCORES

1. Spelling Screening Test Raw Scores (Number of Words Correctly Spelled)

Student Number	Control Group	Practice Group	Strategy Group
1	15	6	4
2	28	16	20
3	5	17	16
4	20	18	7
5	30	20	20
6	30	27	17
7	22	19	8
8	23	20	30
9	17	28	25
10	24	30	18
11	18	18	9
12	14	9	29
13	16	14	26
14	21	10	30
15	25	29	18
16	9	12	16
17	30	9	27
18	10	12	17
19	26	11	22
20	29	27	14
21	11	5	10
22	9	20	25
23	12	30	21
24	30	28	2
25	10	14	29
26	27	4	12
27	21	27	5
28	9	29	13
29	27	9	24
30	20	21	28

1. Spelling Screening Test Raw Scores
(Number of Words Correctly Spelled) (con't)

Stu- dent Num- ber	Control Group	Practice Group	Strategy Group
31	17	2	29
32	14	25	
33	8	26	
34	19	23	
35	29	21	
36	11	8	
37	28		
38	18		
39	3		
40	20		
41	5		
42	24		

2. Spelling Pre- and Posttest Raw Scores
(Number of Words Correctly Spelled)

Student Number	Control Group		Practice Group		Strategy Group	
	Pre- test	Post- test	Pre- test	Post- test	Pre- test	Post- test
1	23	30	5	11	9	17
2	29	32	16	22	26	29
3	19	19	22	28	20	27
4	23	21	21	33	7	18
5	14	13	10	14	36	30
6	39	39	41	38	19	27
7	27	33	22	18	18	14
8	25	28	23	22	28	31
9	24	28	35	27	17	23
10	19	24	30	33	23	29
11	14	21	25	27	19	29
12	15	17	7	15	30	32
13	17	26	19	19	32	24
14	17	22	14	18	41	43
15	27	30	31	34	22	15
16	13	20	20	14	20	27
17	33	37	17	15	22	21
18	19	9	12	15	22	29
19	36	29	16	15	30	35
20	26	28	29	33	18	24
21	12	13	14	16	14	17
22	16	19	20	23	32	31
23	16	25	34	31	29	31
24	36	38	36	35	8	12
25	14	17	18	12	32	28
26	32	23	11	9	18	24
27	28	21	33	29	15	9
28	13	12	34	28	16	20
29	34	32	17	22	29	37
30	23	31	23	22	29	31
31	21	30	6	15	35	28
32	17	23	34	30		
33	17	19	31	27		
34	24	21	26	29		
35	32	29	24	24		

2. Spelling Pre- and Posttest Raw Scores
(Number of Words Correctly Spelled) (con't)

Student Number	Control Group		Practice Group		Strategy Group	
	Pre- test	Post- test	Pre- test	Post- test	Pre- test	Post- test
36	15	13	15	13		
37	33	35				
38	23	21				
39	7	11				
40	20	27				
41	12	15				
42	29	25				

3. Spelling Pre- and Posttest Raw Scores
(Number of Syllables and Words Correctly
Spelled)

Student number	Control Group		Practice Group		Strategy Group	
	Pre- Test	Post- Test	Pre- Test	Post- Test	Pre- Test	Post- Test
1	80	109	30	59	36	71
2	86	108	59	75	88	105
3	72	73	82	104	70	95
4	76	86	74	111	31	74
5	71	55	45	72	98	114
6	50	132	122	118	78	112
7	88	118	75	71	59	72
8	84	96	78	82	93	128
9	78	101	103	98	67	107
10	71	87	100	119	89	109
11	50	71	88	108	70	104
12	55	71	37	68	102	122
13	62	86	67	79	108	114
14	64	85	56	76	120	152
15	88	106	99	114	64	54
16	44	76	63	39	76	107
17	104	119	53	64	81	89
18	58	48	40	57	80	111
19	108	106	55	75	92	113
20	86	107	99	119	67	88
21	35	41	55	75	43	70
22	55	67	75	94	107	122
23	62	87	106	115	98	111
24	116	131	114	130	29	52
25	59	72	75	65	101	104
26	104	91	35	42	52	83
27	93	93	107	104	45	42
28	50	52	105	106	57	69
29	114	124	61	80	95	123
30	76	110	86	93	85	112
31	65	95	23	45	107	107
32	62	87	114	114		
33	57	70	103	113		
34	86	86	87	109		
35	105	119	78	87		
36	61	55	54	65		
37	104	125				

3. Spelling Pre- and Posttest Raw Scores
 (Number of Syllables and Words Correctly
 Spelled) (con't)

Student Number	Control Group		Practice Group		Strategy Group	
	Pre- Test	Post- Test	Pre- Test	Post- Test	Pre- Test	Post- Test
38	75	88				
39	25	42				
40	77	104				
41	40	60				
42	92	104				

B. DAILY SPELLING TEST SCORES

1. Practice Group Daily Spelling Test Raw Scores
(Number of Syllables and Words Correctly Spelled)

Student Num- ber	Treatment Days				
	Day I	Day II	Day III	Day IV	Day V
1	31	32	25	35	27
2	38	49	41	41	36
3	41	48	43	44	33
4	39	60	40	44	46
5	37	39	44	41	28
6	47	62	41	48	50
7	42	54	44	53	48
8	42	54	39	48	43
9	46	52	56	55	51
10	38	60	48	57	51
11	40	52	48	44	40
12	30	40	45	47	44
13	42	56	51	53	42
14	37	44	22	26	43
15	50	57	37	55	45
16	48	47	51	16	34
17	39	56	38	49	45
18	37	34	17	23	24
19	37	55	35	57	45
20	47	59	56	47	43
21	32	51	40	39	18
22	32	54	48	42	47
23	49	58	55	50	44
24	51	57	54	57	49
25	34	54	58	51	37
26	23	43	30	31	33
27	47	57	59	51	55
28	47	60	57	55	52
29	37	33	*	20	27
30	34	50	28	43	*
31	23	39	*	35	31
32	*	51	49	52	43
33	40	47	*	35	41
34	40	58	*	34	44
35	*	60	57	57	47
36	36	56	53	57	*

* Absent

2. Strategy Group Daily Spelling Test Raw Scores
(Number of Syllables and Words Correctly Spelled)

Student Number	Treatment Days				
	Day I	Day II	Day III	Day IV	Day V
1	33	46	47	40	37
2	54	59	59	52	50
3	29	55	40	44	47
4	41	52	39	35	39
5	58	60	61	53	50
6	40	48	40	43	35
7	40	53	37	45	36
8	44	58	53	53	52
9	45	35	33	34	40
10	46	43	45	46	35
11	36	40	40	40	33
12	46	53	35	43	36
13	53	62	55	55	53
14	50	56	52	45	51
15	29	36	35	24	29
16	51	60	54	53	44
17	32	55	29	33	34
18	36	46	52	48	49
19	54	62	61	53	55
20	46	51	47	48	40
21	39	52	52	50	47
22	51	58	55	51	53
23	53	58	58	53	51
24	25	51	28	18	35
25	50	56	46	48	45
26	46	59	39	51	43
27	25	29	26	17	*
28	*	53	43	35	35
29	39	54	*	51	50
30	46	59	61	57	*
31	*	62	57	49	39

* Absent

3. Practice Group Daily Spelling Test Standard Scores
(M set at 50 and S.D. at 10)

Student Num- ber	Treatment Days				
	Day I	Day II	Day III	Day IV	Day V
1	38	26	31	41	32
2	47	47	46	47	43
3	50	46	48	50	40
4	48	60	45	50	55
5	45	35	49	47	33
6	58	63	46	54	60
7	52	53	49	58	58
8	52	53	44	54	52
9	56	50	60	60	61
10	47	60	53	62	61
11	49	50	53	50	48
12	37	36	50	53	53
13	52	55	56	58	50
14	45	41	29	33	52
15	61	57	43	60	54
16	59	44	56	24	41
17	48	55	44	54	54
18	45	28	24	30	29
19	45	54	41	62	54
20	58	59	60	53	52
21	39	49	45	45	21
22	39	53	53	48	56
23	60	58	59	56	53
24	62	57	58	62	59
25	42	53	62	56	44
26	28	40	36	38	40
27	58	57	63	56	66
28	58	60	61	60	62
29	45	27	*	27	32
30	42	48	34	49	*
31	28	35	*	41	37
32	*	49	54	57	52
33	49	44	*	41	49
34	49	58	*	40	53
35	*	60	61	62	56
36	44	55	58	62	*

* Absent

4. Strategy Group Daily Spelling Test Standard Scores
(M set at 50 and S.D. at 10)

Stu- dent Num- ber	Treatment Days				
	Day I	Day II	Day III	Day IV	Day V
1	40	43	52	46	44
2	66	59	63	57	60
3	36	54	45	50	56
4	50	50	45	41	47
5	71	60	65	58	60
6	49	46	45	51	42
7	49	52	43	49	43
8	54	58	58	58	62
9	55	30	39	40	48
10	56	40	50	52	42
11	44	36	45	46	40
12	56	52	41	49	43
13	65	63	59	60	64
14	61	55	57	51	61
15	36	31	41	31	35
16	62	60	58	58	53
17	39	54	35	40	41
18	44	43	56	54	59
19	66	63	65	58	66
20	56	49	52	54	48
21	48	50	56	56	56
22	62	58	59	56	64
23	65	58	62	58	61
24	31	49	34	26	42
25	61	55	51	54	54
26	56	59	44	56	52
27	31	22	32	25	*
28	*	52	48	41	42
29	48	53	*	56	60
30	56	59	65	62	*
31	*	63	61	54	47

* Absent

5. Daily Spelling Test Mean Standard Scores
(M set at 50 and S.D. at 10)

Student Number	Practice Group	Strategy Group
1	34	45
2	46	61
3	47	48
4	52	47
5	42	63
6	56	47
7	54	47
8	51	58
9	58	42
10	57	48
11	50	42
12	46	48
13	54	62
14	40	57
15	55	35
16	45	58
17	51	42
18	31	51
19	51	64
20	56	52
21	40	53
22	50	60
23	57	61
24	60	36
25	51	55
26	36	54
27	60	28
28	60	46
29	33	54
30	43	61
31	35	56
32	53	
33	46	
34	50	
35	60	
36	55	

C. VISUAL PERCEPTION TEST SCORES

1. Word Discrimination Test Scores

Student Number	Control Group		Practice Group		Strategy Group	
	Pre- test	Post- test	Pre- test	Post- test	Pre- test	Post- test
1	27	26	25	22	24	25
2	23	20	31	27	27	31
3	25	23	28	27	22	23
4	25	29	28	28	32	26
5	21	24	26	26	33	28
6	27	25	31	29	23	30
7	30	30	29	33	20	26
8	29	26	21	26	27	27
9	20	26	30	26	25	21
10	28	29	26	29	28	27
11	28	26	25	28	26	29
12	29	24	20	18	29	26
13	26	29	23	28	23	25
14	29	27	23	31	27	27
15	26	26	28	28	30	26
16	27	29	30	22	26	29
17	29	26	25	23	29	26
18	24	19	26	21	20	23
19	29	27	25	22	34	32
20	28	27	22	27	31	28
21	26	21	29	24	26	31
22	24	27	27	27	29	22
23	26	27	34	26	28	33
24	34	23	29	24	27	30
25	32	22	27	22	30	26
26	26	21	22	29	33	27
27	25	21	30	31	11	19
28	20	20	27	26	27	23
29	28	33	30	25	29	31
30	25	25	22	27	32	30
31	27	28	28	21	27	23
32	26	26	32	27		
33	27	29	26	24		

1. Word Discrimination Test Scores (con't)

Student Number	Control Group		Practice Group		Strategy Group	
	Pre- test	Post- test	Pre- test	Post- test	Pre- test	Post- test
34	24	26	30	27		
35	26	22	29	20		
36	18	20	28	28		
37	29	29				
38	27	23				
39	22	23				
40	17	26				
41	23	26				
42	27	21				

2. Phrase Discrimination Test Scores

Student Number	Control Group		Practice Group		Strategy Group	
	Pre- test	Post- test	Pre- test	Post- test	Pre- test	Post- test
1	18	14	15	12	14	15
2	18	21	14	19	12	16
3	14	16	17	15	15	17
4	16	15	17	17	19	19
5	13	16	14	15	19	17
6	15	16	11	20	16	20
7	13	20	17	18	18	18
8	19	19	18	15	18	21
9	12	18	20	19	16	15
10	15	19	20	15	16	14
11	14	17	18	16	13	15
12	16	18	15	15	17	16
13	14	18	16	14	20	17
14	15	18	15	16	19	15
15	17	12	18	18	18	16
16	10	16	13	15	15	17
17	16	20	16	13	18	11
18	17	10	16	20	14	16
19	17	17	13	17	19	17
20	11	16	19	14	20	16
21	14	16	14	14	13	19
22	17	13	15	17	21	18
23	18	14	17	15	16	17
24	18	17	18	16	11	18
25	15	12	14	16	18	18
26	15	15	13	14	17	19
27	15	16	15	19	13	13
28	10	14	14	19	17	14
29	17	15	16	14	20	20
30	19	13	16	16	18	15
31	13	16	13	16	16	14
32	17	15	19	19		
33	14	18	14	19		
34	17	13	20	20		
35	14	17	15	13		
36	10	14	20	17		

2. Phrase Discrimination Test Scores (con't)

Student Number	Control Group		Practice Group		Strategy Group	
	Pre- test	Post- test	Pre- test	Post- test	Pre- test	Post- test
37	16	16				
38	18	15				
39	13	19				
40	13	11				
41	16	14				
42	15	15				

3. Visual Memory Test Scores

Student Number	Control Group		Practice Group		Strategy Group	
	Pre- test	Post- test	Pre- test	Post- test	Pre- test	Post- test
1	6	4	3	1	9	9
2	14	7	17	11	13	15
3	5	8	15	7	10	16
4	7	9	14	12	11	13
5	8	10	11	11	15	18
6	19	15	15	14	10	10
7	10	12	16	16	2	6
8	19	16	14	14	13	16
9	5	5	12	14	12	14
10	11	9	18	19	9	12
11	8	9	7	2	19	4
12	13	13	6	6	10	14
13	8	11	11	15	7	7
14	11	13	15	5	11	12
15	8	7	19	15	1	2
16	2	6	5	2	20	12
17	20	17	4	9	6	5
18	5	4	3	7	9	15
19	11	11	2	6	19	19
20	7	2	11	15	12	16
21	0	2	1	3	7	14
22	2	5	8	13	10	11
23	9	6	13	14	14	9
24	23	14	5	18	10	7
25	2	9	11	13	11	11
26	11	9	4	9	18	14
27	13	9	14	11	0	1
28	0	1	10	13	11	5
29	14	9	10	11	13	22
30	17	15	8	5	10	13
31	5	1	8	6	11	10
32	4	6	18	14		
33	8	11	11	9		
34	5	9	16	11		
35	16	15	15	12		
36	7	7	6	11		
37	22	17				
38	5	12				
39	3	1				
40	9	5				
41	4	5				
42	8	9				

4. Syllabication Test Scores

Student Number	Control Group		Practice Group		Strategy Group	
	Pre- test	Post- test	Pre- test	Post- test	Pre- test	Post- test
1	17	15	23	10	17	19
2	22	15	13	19	11	18
3	13	15	22	19	8	17
4	20	14	16	14	18	16
5	14	15	18	15	18	17
6	18	24	16	14	22	19
7	20	17	21	16	15	14
8	18	17	15	19	20	16
9	16	9	17	17	15	13
10	16	17	22	19	11	17
11	16	19	17	13	19	14
12	13	18	20	15	14	15
13	18	19	20	10	17	18
14	18	17	20	16	22	21
15	13	14	18	13	13	15
16	19	17	19	14	22	20
17	15	18	12	11	21	11
18	15	14	13	13	10	13
19	17	19	16	15	17	19
20	10	10	19	21	19	17
21	18	22	14	18	11	15
22	11	16	14	17	17	15
23	17	17	18	18	16	19
24	18	20	14	18	22	15
25	11	19	11	15	16	14
26	13	15	14	16	15	9
27	14	20	15	14	12	12
28	18	12	18	14	11	18
29	16	17	13	9	12	16
30	18	14	17	17	13	16
31	19	17	18	15	13	11
32	12	17	19	17		
33	20	12	18	15		
34	15	17	15	12		
35	21	15	15	15		
36	14	12	17	15		
37	22	16				
38	15	20				
39	11	13				
40	15	17				
41	13	12				
42	15	14				



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