DOCUMENT RESUME

ED 078 373 CS 000 590

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TITLE The Effectiveness of Reading Speed Instruction in Grades Two, Four, Six, and Eight.
PUB DATE May 73
NOTE 174p.; Ed.D. Dissertation, Rutgers University, The State University of New Jersey

EDRS PRICE MF-$0.65 HC-$6.58
DESCRIPTORS *Elementary Education; Grade 2; Grade 4; Grade 6; Grade 8; Reading Comprehension; *Reading Development; *Reading Research; *Reading Speed; Reading Tests; Sex Differences

ABSTRACT

To determine the effectiveness of one method of rate training in grades two, four, six, and eight, four classes of pupils in each of the four grades studied were assigned randomly to experimental or control treatments: two classes were given 20 lessons each of rate training, one control class was given instruction emphasizing comprehension, and the other control class at each grade level was given only the appropriate level of the Gates-MacGinitie Speed and Accuracy and Comprehension Tests and an informal test of rate in words per minute followed by a ten-question comprehension quiz. The latter tests were based on selections and quizzes from the "Controlled Reader Study Guides," which were also the principal materials used for instruction, each grade using the booklet intended for one grade below its level. Results showed significant differences in the post-test mean raw scores on the Gates-MacGinitie Speed and Accuracy Tests at the eighth grade level only. On the informal speed test, however, significant differences appeared at all four grade levels, indicating effectiveness of the rate instruction as measured by a test similar to the instruction. All of the experimental groups more than doubled their reading speed, while control groups showed little or not increase in speed. (Author/MF)

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THE EFFECTIVENESS OF READING SPEED INSTRUCTION IN GRADES TWO, FOUR, SIX, AND EIGHT

ED 078373

A DISSERTATION

SUBMITTED TO THE FACULTY

OF THE GRADUATE SCHOOL OF EDUCATION

OF

RUTGERS UNIVERSITY

THE STATE UNIVERSITY OF NEW JERSEY

BY

MARION C. KIMBERLY

IN PARTIAL FULFILLMENT OF THE

REQUIREMENTS FOR THE DEGREE

OF

DOCTOR OF EDUCATION

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ACKNOWLEDGMENTS

The writer wishes to acknowledge her indebtedness to Dr. John Geyer, whose encouragements and professional guidance helped make this study possible. As chairman of the writer's doctoral committee, he helped to refine the problem and directed the writing of this manuscript.

Sincere appreciation is also expressed to the other members of the writer's doctoral committee, Dr. Eleanor Delaney, Dr. George Pallrand, and Dr. Jane Raph, for their suggestions on the direction, procedures, and reporting of this study. Grateful appreciation is also expressed to Dr. Edward Fry, the writer's advisor and committee chairman before he left on a year of sabbatical leave.

The writer wishes to acknowledge the cooperation and help of many individuals in the Princeton Regional Schools. School principals Mr. Eugene Biringer, Mrs. Edith Francis, Mr. Thornton Grove, and Mr. Lloyd Taylor allowed the investigator to use their buildings and interact with the teachers and students. More than 20 teachers and 400 students cooperated with the investigator in both the pilot study and the major investigation. To all of them, the writer is grateful.

Special thanks are extended to Mrs. Gloria Lukacs, secretary in the Reading Center, for countless acts of help and encouragement during seven years of friendship.

Finally, the writer wishes to pay special tribute to her husband, Shepard, without whom the study would never have been accomplished. His constant support, patience, and help throughout many years of academic study are responsible for the completion of the investigation. It is to him that this study is dedicated.

ABSTRACT

The purpose of this study was to determine the effectiveness of one method of rate training in grades two, four, six, and eight. Research was noted that pointed out the need for helping children to increase reading speed. It was anticipated that the method of timed rate drills using easy reading materials would demonstrate effectiveness of instruction when compared with control groups.

The sample population was composed of 350 students in the Princeton Regional schools. Four classes of pupils in each of the four grades studied were assigned randomly to experimental or control treatments. Two classes were given 20 lessons each of rate training by the investigator. One control class was given instruction by the investigator emphasizing comprehension. The fourth class at each grade level was given no instruction from the investigator, but received the pre- and posttests only.

Measurement instruments for the investigation were the appropriate level of the Gates-MacGinitie Speed and Accuracy and Comprehension Tests and an informal test of rate in words per minute followed by a 10-question comprehension quiz. The latter tests were based on

selections and quizzes from the Controlled Reader Study Guides, which were also the principal materials used for instruction, each grade using the booklet intended for one grade below its level.

One-way analysis of variance was used to determine most of the treatment effects. Two-way analysis of variance was used to compare the effects of treatment on fourth- and sixth-graders as measured by the Gates-MacGinitie Tests. The significance level of the investigation was established at .01.

Results for the main hypotheses showed significant differences in the posttest mean raw scores on the Gates-MacGinitie Speed and Accuracy Tests at the eighth-grade level only. On the informal speed test, however, significant differences appeared at all four grade levels indicating effectiveness of the rate instruction as measured by a test similar to the instruction. All of the experimental groups more than doubled their reading speed, while control groups showed little or no increase in speed.

The increased reading rate resulted in significantly reduced comprehension at the sixth-grade level only. The sixth-grade rate increase, far larger than at any other grade level, might have accounted for the significant loss of comprehension in the grade.

Secondary treatment effects were as follows:

1. Girls performed significantly better than boys on one or more of the tests in second, fourth, and sixth grades, but no differences appeared between the sexes by eighth grade.

2. "Good" readers scored significantly higher than "poor" readers on all tests except the informal speed test. Increased rate was apparently not related primarily to reading ability.

3. In the second grades satisfactory-unsatisfactory comprehension was not compared because only one pupil had a score of less then six. In the fourth, sixth, and eighth grades, those with satisfactory informal comprehension scored significantly higher on the Gates-MacGinitie Tests. No differences occurred between the groups on the informal speed test except in sixth grade, where those with unsatisfactory comprehension read significantly faster than those with satisfactory comprehension.

4. Analysis of the Gates-MacGinitie Level D test' results of fourth- and sixth-graders indicated that sixth-graders scored generally higher than fourth-graders, but with considerable overlapping between the grade levels.

Results of the investigation indicated that the instruction in reading rate was effective in grades two, four, six, and eight. The only trend which seemed to

indicate a greater effectiveness at one grade was indicated by the high informal comprehension scores of the second-graders. They seemed better able to maintain adequate comprehension while increasing rate than students in fourth, sixth, and eighth grades.

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CHAPTER I

INTRODUCTION

Results of the recent National Assessment of Educational Progress (1972) revealed that America is a nation of slow readers. Reading comprehension, according to the report, is surprisingly high, but the rates measured for the sample of almost 100,000 young people were much lower than had been expected. The median rate for 9-year-olds was 120 words per minute, for 13-year-olds 169 words per minute. Put another way, the median reading rate of the eighth-graders in our country is no faster than a normal speaking rate. And yet

> . . . there is so much to read today that the ability to read quickly has become an important asset. . . . A literate adult in today's hectic world goes through more reading material in a week than his great-grandfather probably covered in a year [Harris, 1970, p. 480].

If young people need to learn to read at more efficient rates, the schools ought to start helping them as early as possible. Most colleges offer reading improvement courses for students weak in reading skills. Many high schools give elective courses in reading and study skills in addition to remedial reading courses. Elementary schools, on the other hand, seldom provide

such opportunities. Reading instruction in American elementary schools typically ends after sixth grade and very seldom includes rate training in the developmental programs.

Despite these taken-for-granted curriculums, the National Assessment results show us that the 9- and 13-year-olds are reading slowly, as reading experts have noted in the past. Huey (1908) spoke of the dead level plodding of school children in their reading. Buswell (1957) felt that the habits of slow reading became ingrained at some place in the school experience. And Huus (1968) pointed out that even elementary school children need to develop enough speed to see reading passages as wholes. Other experts have suggested that rate training should commence as soon as word recognition skills have been mastered.

Assuming that children need rate instruction and that the regular educational system has the responsibility, then the only questions are when and how to provide the instruction. At what grade level can it best be started, and which methods of instruction should be used? One method of instruction that has proven virtually without merit is the use of machines. Berger (1966), Karlin (1958), and other experts have agreed that what can be done with machines can be done just as well without them.

Rate instruction should be accomplished with books or other narrative material. The question of when rate training should begin is not so easily answered. Opinions differ and research has been scanty. The thrust of this investigation is directed toward finding answers in this area.

The Problem

This study will investigate the following question: Are timed rate drills, using easy reading materials, effective in the elementary grades? More specifically, will groups that have had instruction with emphasis on speed read faster than groups that have had similar instruction but with comprehension emphasized? This question will be asked for grades two, four, six, and eight.

The study is also concerned with three variables and their relation to the effectiveness of rate training at each grade level. What will happen to the comprehension scores of subjects in the experimental and control groups at each level? Will the effect of instruction be different for good readers as compared to poor readers in the experimental groups at each grade level? Finally, is the sex of the subjects in the experimental groups at each grade level related to their rate gains?

The study also involves a search for trends. Are

there any indications that rate training is more effective at one grade level than another? Do children in any one of the four grades studied seem to benefit more from the instruction than children in the other grades?

Importance of the Study

Most people, with training, can improve their reading speed while losing little or no comprehension. Nearly everyone acknowledges the benefit of being able to read rapidly. "The large volume of reading required in most academic and vocational endeavors is reason enough for the development of speed reading programs [Farr, 1969, p. 44]."

In spite of the tremendous interest in speed reading instruction and the various methods employed, only one study (Koziey, 1967) has been found that investigated the optimal grade level for rate training, and that study was conducted with junior and senior high school pupils. The present investigation is the first to span seven grade levels of elementary school or to investigate at each of four grade levels the effectiveness of rate training for children in that grade.

The study of rate training at the second- and fourth-grade levels is of special importance. Only a few studies have been found concerning speed reading at fourth grade and below, and several of those are

controversial. Rate training studies in the lower grades are needed to determine effectiveness as compared to control groups receiving some other specific instruction.

Unfortunately, the rate training results in this study cannot be directly compared between grades since the tests and materials were different for each grade level. But one can start at the top and ask if the rate training was effective for eighth grade. Was it effective for sixth grade, for fourth grade, for second grade? An increasing number of students, parents, and teachers may ask in the near future for rate training as early as is feasible. All these questions need answers.

Definition of Terms

Elementary school. School systems with junior high schools often consider the first six grades as elementary schools. Other systems include all grades through eight in the elementary school. For this investigation, the latter definition is the rule.

Reading. Reading is the meaningful interpretation of written or printed symbols (Harris, 1970). Without meaning or comprehension there is no reading. When the word "reading" is used in this study, it always assumes some modicum of understanding.

Reading rate. For this investigation reading rate has been measured in two ways. The Gates-MacGinitie

Speed and Accuracy Tests require the testee to select correct completion answers during the timed reading. Scores are reported as the number of items correct. Since comprehension is tested within the timed testing period, the tests really measure rate of comprehension.

The informal test, on the other hand, measures the words read per minute on a continuous-narrative with an untimed comprehension check coming later. Results are given as average number of words read per minute. Only the reading rate is measured in this manner, but the subject knows that his comprehension will be checked immediately after the reading.

Summary

The need for improvement of reading skills, and of rate in particular, has been generally agreed upon by educators and laymen (Buswell, 1957; Huey, 1908; Huus, 1968). Many investigations have been carried out at the secondary, college, and adult levels. Few studies have been concerned with the elementary school grades.

Authorities (Berger, 1966; Karlin, 1958) agree that machines are unnecessary for rate training. But the authorities have not reached agreement about the most effective placement of rate training, i.e., where in the educational ladder students should have the opportunity to increase their reading rate. In particular, few

experts have even considered whether the training should be given below upper elementary school levels.

This investigation is designed to determine the effectiveness of timed rate drills with narrative materials in grades two, four, six, and eight. It will also study how comprehension scores are affected by rate increases, and whether there are significant differences in performances of good and poor readers or boys and girls. Finally, the investigator will examine the results for trends which might suggest that the rate training is more or less effective at any one of the four grade levels.

CHAPTER II

REVIEW OF THE LITERATURE

Introduction

So much has been written about reading rate that it has been necessary to be very selective in choosing materials for review. The chief criterion has been relevance for elementary grades. Many of the most outstanding studies concerning rate have taken place with high school and college students, but they have been included only insofar as they are directly relevant to the concerns of reading rate in the first eight grades. Since the thrust of this investigation has been to determine effectiveness of rate training in grades two, four, six, and eight, the literature that deals with those grades is most pertinent.

First, the controversial question of the optimal placement of rate training will be discussed. Many reading experts have made their positions clear and have given reasons to support their opinions.

Next, and most important, the rate studies using subjects in the elementary grades, or with elementary grade reading ability, will be discussed. Over fifty

investigations have been found dealing in some way with rate and children. About half of the studies involved testing only, while the other half contained some sort of training program. All of them will be reviewed with particular emphasis on the similarities and dissimilarities in relation to the author's investigation.

Placement of Rate Training

Several authorities have stated strongly that rate training should not be given at the elementary school level. Witty (1969) felt that elementary schools should offer developmental reading instruction emphasizing attention to individual needs and interests. Wilson and Hall (1972), in their textbook on elementary reading, stated that for young children, fast reading means careless reading, and that "speed is of minor importance in the elementary grades and is best reserved for attention in junior and senior high school programs [p. 191]."

Koziey (1967) compared reading gains in grades seven, nine, and twelve, and found that ninth grade was the optimal level for rate training, that students in seventh grade were too immature to cope with the psychological pressures of rate drills. Carver (1971) also expressed negative feelings about rate training in the elementary grades. He felt that children still learning to read would suffer detrimental effects from efforts to

speed up their reading. According to his definition, speed reading was 95% nonsense, but skimming was a useful skill which could be taught beginning at high school levels.

In spite of the relative lack of research in speed reading at the elementary school levels, quite a few authorities have recommended that some sort of rate training be initiated in those grades. Some of them based their recommendations on research, some on the nature of the reading process. Huey (1908), for example, wrote about the unnecessary "deadlevel plodding" of school children in their reading habits and the need to lessen such waste and increase effectiveness of children's reading skills. Buswell (1957) also showed similar concern about the children who develop slow reading habits:

> Some place in their school experience they have crystallized their perceptual reading habits at a point far below their capacity. . . . I can think of no greater contribution that the elementary school could make to the college than to stimulate an increase of, say, 25 percent in rate of reading for that portion of its pupils who have the kind of ability that could lead to college [p. 103].

Huus (1968) emphasized that even elementary school children need to read with enough speed that sentences and paragraphs hang together and can be seen as wholes rather than piecemeal. Singer (1965a) demonstrated his belief in rate training for lower grades by developing a model for

speed reading in grades three through six, providing teachers with guidelines consistent with the Substrata-factor Theory of Reading for planning developmental instruction in speed.

The majority of authorities who have expressed opinions about the best grade for initiating rate training have named the upper elementary grades. Carillo (1965) believed that early grade reading instruction should be concerned with general comprehension and reading for specific purposes, and that rate training was "within the province of the junior and senior high school rather than the elementary school [p. 323]."

Spache and Spache (1969), in their textbook for elementary reading, emphasized the need for careful instruction in skimming and scanning skills in the upper elementary grades. Harris (1970) described a method for giving rate drills beginning at about fifth or sixth grade. In a new textbook for elementary reading, the authors (Hafner & Jolly, 1972) have devoted an entire chapter to patterns for developing rate, stating specifically that efficient rates can usually be accomplished with upper-level elementary students.

Finally, several researchers (McCracken, 1960; Schale, 1968; Swalm, 1969) carried out successful studies in rate training for fifth and sixth grades, and have

consequently recommended these grades for initiating rate training in general.

Only three studies were found where the authors specifically recommended rate training for primary grades. Brickner and Senter (1969) reported success using the Listen Look Learn machine program of Education Developmental Laboratories in bringing reading rate of first-graders up to their rate of listening and speaking. Beckley (1963) compared a group through second and third grades using the controlled reader with a control group and also reported large gains because of the machine. Finally, McBride (1969) reported several of his studies with first-graders to back up his belief that "the very best time to teach children rapid reading is when they learn to read their first word, whether it be at one year of age or at six [p. 76]."

To summarize, many authorities believe that speed reading instruction should begin no earlier than high school. An increasing number of researchers and textbook authors, however, have recommended upper elementary grades as the logical starting point for rate training. Only three individuals have urged that primary-grade reading programs should include rate instruction, based on their own individual studies.

Elementary Studies

The separation of studies according to whether or not some sort of training was involved may be arbitrary, but it seems to the investigator that the difference is important. Looking at subjects as they are in order to determine what has made them that way is quite different from looking at them as they are, then administering training, then observing again. Valuable information has been obtained through both methods.

Testing Studies

First, the elementary studies where testing only occurred will be discussed. They involve physical factors, measurement of rate, flexibility, and the relation between rate and comprehension.

Studies testing physical factors and rate. Three of the elementary testing studies have concerned visual factors. Stroud (1945) administered six visual perception tests and the Chapman-Cook Speed of Reading Test to 570 pupils in grades four, five, and six. Correlations obtained between the visual perception tests of word, letter, and number selection and the Chapman-Cook Test were fairly substantial, indicating that rate of visual perception of words, letters, and digits and rate of reading are highly related.

Two interesting studies tested reading abilities

in relation to the size of the visual field. Tu (1930) attempted to determine the relative efficiency of reading matter printed in the vertical as against equivalent material arranged horizontally. Geometric figures were used to test eight Chinese students, 30 American university students, and 74 fourth-, fifth-, and sixth-grade children. The results were uniformly in favor of the horizontal arrangement even for the Chinese students used to vertical reading. Tu accounted for the results by explaining that the field of vision is much wider on the horizontal than in the vertical plane, and that upward and downward movements of eye muscles are more fatiguing than lateral movements.

The other testing study (Ong, Schneider, & Moray, 1960) of the visual field compared the size of the visual field with different factors. A total of 155 sixth-graders had their visual fields measured by the perimeter and were given the California Reading Achievement Test. Results indicated that boys had significantly larger visual fields, but there were no significant relationships between size of visual field and reading ability or IQ.

Another physical factor tested at the elementary level in relation to rate was implicit speech. Anderson (1970) tested 92 fourth-, fifth-, and sixth-grade students

for implicit speech using electrodes attached to their lips and mouth as each one read orally. The students were also given tests of visual perception, auditory discrimination, listening, and reading speed. No significant differences were found between mean implicit speech scores and the other test scores. Anderson explained the results in terms of a need for more sensitive criteria. Other studies at higher levels (Stauffer, 1962; Stevens & Orem, 1963) found that rapid reading was highly related to the ability to bypass subvocalization and inner speech.

The last of the testing studies at elementary level concerned sex differences in speed of reading. Moore (1940) administered the Iowa Silent Reading Tests and the Otis Intelligence Test to about 100 students in each grade: six, eight, ten, and twelve. There were no consistent differences favoring either the boys or girls in speed of reading. An earlier study by Moore (1939) using students in all grades from eighth through college had shown consistent superiority of the girls in reading speed as measured by the Van Wagenen Rate of Comprehension Test until junior year in college. The different results from the two studies may be due to the use of different measuring instruments. Certainly the superior reading skills of girls in the lower grades is acknowledged generally. The question remains at exactly what

point do boys catch up to the girls.

Studies testing psychological factors and rate. The problem of test anxiety has been studied by Gifford and Marston (1966). The Test Anxiety Scale and an author-made reading test were administered to 31 fourth-grade boys. One group was given practice in the kind of test to be used. The other was not. Results showed that the boys did not vary their reading speeds when the purpose changed, and that the high anxiety group had slower reading speed if they received the reading test without the practice session. The authors emphasized that reading efficiency "is a function of a complex interaction of personality and test situation variables [p. 306]."

Closely related to test anxiety is the factor of motivation. One study (Marvel, 1959) with tenth-graders showed that the verbal set or motivation of students is more important than the method, an important finding for classroom teachers wishing to try rate instruction.

Another psychological component of reading speed, the need for achievement, was studied by Botha and Close (1964). McClelland's test for need-achievement and a test for speed of perception were given to 18 eight- and nine-year-old children. The same tests and a measure of reading speed improvement were also given to 16 students attending a reading improvement course. The only

difference was a significant positive correlation between need-achievement and improvement in reading speed.

Samuels (1968) hypothesized that paragraphs with strong word associative relationships would read faster than paragraphs with weaker word associations. Ninety-four fifth-graders were randomly assigned to one of three groups: strong word association, weak word association, or questions only. Results bore out the hypothesis: the paragraphs with strong word associations were read faster than those with weak associations. Samuels felt that the word associations must affect seeing time, central processing time, and number of regressions.

In an effort to pinpoint some of the differences between good and poor readers, Katz and Wicklund (1971) presented 25 poor readers and 19 good readers in the fifth grade with a series of scanning trials. The subjects were to say yes or no if a word that was on the first slide was also on the second slide. Both groups had equivalent scanning rates leading the investigator to conclude that good and poor readers do not differ in scanning ability.

The last of the testing studies of psychological factors compared the reading abilities of children with comparable mental ages but widely divergent chronological ages. Bliesmer (1954) matched 28 bright children with 28

dull children, all with mental ages between 10 and 12. Nine different tests were administered including reading rate. The bright group performed better on all tests except word meaning. Remembering that the bright-group students were all five or six years younger than their partners, Bliesmer concluded that their superiority in reading skills involved superiority in intellectual function rather than in more mechanical skills.

Studies involving measurement of reading rate. Over 12,000 subjects participated in a study of eye movements by Taylor, Frackenpohl, and Pettee (1960). More than a thousand students at every grade level from first through college had their eye movements surveyed by the Reading Eye camera. From this research, a table of grade level norms for the various components of oculo-motor activity during reading was established. The norms for rate with comprehension were based on words per minute with at least 70% comprehension. In a later report on eye movements, Taylor (1965) emphasized that eye movements are not consciously controlled, that eye movement training is generally useless, and that "the eyes do not dictate to the mind what it shall understand; neither does the mind dictate to the eyes where they shall look [p. 13]."

Another large measurement study of a different

nature has been carried out recently. The National Assessment of Educational Progress (1972) has collected data about the educational achievements of various groups of young Americans, a total of nearly 100,000 subjects. The aim of the Reading Assessment was to collect information that would inform others about the reading abilities of American youth. One of the nine areas of reading surveyed was rate.

> Included in the last theme were two reading passages at each grade level used as measures of the rate at which individuals read, and how well they comprehend what they read. The exercise at each age level (9, 13, 17, young adult) was made up of two reading passages, one more difficult than the other and five comprehension questions for each passage [p. 5].

Results of the data showed that Americans read better than was expected, but they also read slower than expected. At all four levels, the rates on both selections were considerably below Taylor's norms.

Another ambitious study aimed at assessing the literacy of young people in 15 countries was reported by Thorndike (1972). Reading comprehension tests were administered to students aged 10, 14, and to those in the last year in secondary school. The scores for children from the three underdeveloped countries included in the study were far below those of students in the other twelve countries. Speed tests were given to the 10- and 14-year-olds. According to the Fry Readability Graph

(1968, 1969), the reading level of the speed test was second grade. In the United States, almost 13% of the 10-year-olds scored at the chance level, indicating that the test was a power rather than a speed test for them. In contrast, more than half of the 10-year-olds in two of the underdeveloped countries made chance scores, or to state it differently, could not really understand second-grade material. At the 14-year-old level, about 3% of Americans scored at the chance level on the same test. Almost half of the students from the three underdeveloped countries had chance scores, dramatizing sharply the reading problem that developing nations face.

A fourth large study testing for rate of reading was carried out as part of a larger study investigating methods and research about beginning reading (Chall, 1967). Rate was one of eight measures used in comparing different studies. Often there had been no measure of rate reported. However, Chall was able to report that in comparing look-say and phonics approaches, all but one study found that the look-say or meaning approach resulted in faster reading. She still, however, favored the phonics approach feeling that the rates of both groups would equalize at about third or fourth grade. When she compared systematic versus intrinsic phonics approaches, no definite trend appeared in rate. But in examining

modified alphabet methods, she found that groups using the Initial Teaching Alphabet (ITA) were considerably faster in reading rate than those using traditional orthography.

A much smaller but very recent study concerning measurement of reading rate was done by Applebee (1973). He felt that rate should be measured as four separate components. Applebee constructed a test to measure the first component: speed of reading known vocabulary. Using digits both as words and numerals he administered the test to 84 boys between the ages of 6 and 14. They were also given the Gray Oral Reading Test, the Wide Range Achievement Spelling Test, and the appropriate level of the Gates-MacGinitie Reading Tests. Results indicated that the experimental test was highly related to perceptual speed and independent of other reading abilities.

One of the most important measures of reading rate was carried out by Singer (1965a). He administered a battery of 28 tests to 927 pupils in grades three, four, five, and six in order to construct a developmental model for speed and power of reading in grades three through six. Substrata analyses of the resulting correlation matrices confirmed the hypothesis that quantitative and organizational changes in substrata factors are

associated with development in speed of reading. Recognition of affixes, for example, accounts for 9% in speed of reading at third grade, but does not account for any of the explained variance in grades four, five, or six. Speed and span of word perception, however, were first-level predictors of speed of reading at all four grade levels.

In another study of substrata-factor evaluation, Singer (1965b) investigated the subskills and capabilities mobilized by a 5-1/2-year-old girl who could read at about fourth-grade level. He administered a battery of tests to the child and then compared the results with the fourth-grade model. Her speed of reading was attained to a large extent through her superior ability in speed and span of phrase perception. Singer pointed out implications for teaching to specific readiness skills instead of general levels of readiness for reading.

Studies testing flexibility of rate. Three studies testing for flexibility of rate in elementary grades have been found. Herculane (1961) used a questionnaire, a tape-recorded group interview, and a reading test of three selections at varying difficulty levels in her investigation of 102 eighth-grade pupils. She found that they showed very little variation on speed according to different purposes, that they were not even able to

define flexibility, and that they had very little understanding of their own reading rates. The need for development of flexibility in elementary school was emphasized.

Two other studies investigated flexibility in sixth grade. Laycock (1958) classified 34 students as flexible or inflexible readers according to test results. Then he used the groups to test three hypotheses: (1) Flexible readers would show superior eye movement patterns, and would change the patterns quickly when shifting from ordinary to fast reading. (2) Flexible readers would read a simple passage more quickly than a more difficult one even when not reminded to. (3) In taking the Luchins Water Jar Test, the flexible readers would resist the Einstellung effect and try a direct solution. Results showed no significant variation in eye movement patterns between the two groups. The flexible readers were able to vary their speed when told to, but did not do so without being told. In the Water Jar Test, the flexible groups showed a little more resistance to the Einstellung effect than the inflexible group. Laycock concluded that study of lower-grade readers would be necessary in order to determine where flexibility and rigidity begin to develop.

For her doctoral dissertation, Metsker (1966) studied the relationship between reading versatility and

other reading and mental abilities. She administered to 87 sixth-graders the Iowa Tests of Basic Skills, the Gates Basic Reading Tests, the EDL Reading Versatility Tests, the Kuhlmann-Anderson Test, and a questionnaire about out-of-school activities. Test results indicated a slight relationship between mental age, reading rate, and versatility. Participation in outside activities was similar for both versatile and nonversatile readers.

Studies testing the relation between rate and comprehension. A great deal of research has been undertaken concerning rate and comprehension, much of it at the college level. Letson (1958) summarized the research, stating:

> There seems to be disagreement on the following:
> 1. The relationship of speed and comprehension.
> 2. The terminology associated with speed and comprehension.
> 3. The methods of measuring speed and comprehension.
>
> There seems to be general agreement among authorities on the following:
> 1. The degree of relationship between speed and comprehension varies with the methods used in measuring these two factors.
> 2. Correlations between speed and comprehension to be reliable should be based on the same or similar material.
> 3. Time taken for answering questions should not be included in the rate of reading scores.
> 4. Continuous text is preferred to short passages for measuring rate of reading scores.
> 5. The relationship between reading speed and comprehension is small when these two factors are measured independently with the comprehension being untimed.
> 6. The fastest readers are not necessarily the best readers [p. 50].

The present investigation found similar agreement with Letson's six items of positive findings, and measured speed and comprehension in the recommended manner.

Studies of rate and comprehension at the elementary level have resulted in generally similar conclusions with some specific differences related to the developmental aspects of children's learning to read. Fleming (1968), for example, tested 60 fifth-grade children for the ability to discriminate quickly between easy and difficult paragraphs. He found no significant relationship between overall reading achievement and success in the rate task. He emphasized the need to discover exactly how a fifth-grader attacks a skimming task, and he suggested that possibly many children have been so indoctrinated with the need for careful expressive reading that they are constitutionally unable to shift from slow to rapid reading.

Stroud and Henderson (1943) measured the rate and comprehension of 288 students in grades five through eight, using the same methods as in the present investigation: timed continuous text reading, followed by untimed comprehension questions with no reference to the text. Resulting correlation coefficients indicated that the reading rate and comprehension scores were unrelated. In another similar experiment with 625 fifth-grade pupils,

Stroud and Henderson administered four reading selections and comprehension checks of varying difficulty in order to determine if the relation of rate and comprehension varied according to difficulty of material and to determine whether students were flexible readers. Again the obtained coefficients between reading time and learning scores suggested a zero relationship between the two variables.

In a similar study, Shores (1950) tested 88 fourth-, fifth-, and sixth-graders in order to determine if fast readers were the best readers. Before reading, his subjects were presented with a problem that set the purpose for reading. The results again indicated little or no relationship between rate and comprehension in the middle grades. Implications from the study, however, suggested that the relationship was dependent to a large extent upon the purpose set for reading and the nature of the reading material.

In a later study, Shores (1968) explored the differences between the reading skills of sixth-graders and adults in relation to rate and comprehension. His two general conclusions were:

> First, children have not achieved the flexibility of rate and comprehension adjustments that characterizes the able adult reader when he reads for rather different purposes. . . .
> Second, children's goal orientation with respect to purposeful reading is unclear and confused [p. 26].

Carlson (1949) did find some very qualified relationships between the speed and comprehension of fifth-grade pupils. The Gates Silent Reading Tests, the California Test of Mental Maturity, and three author-made tests were administered to 330 pupils. Findings were reported in terms of three levels of intelligence, rapid and slow reading, and the purpose for reading. Carlson found that at the upper levels of intelligence, the rapid readers were more efficient. At the middle and lower levels of intelligence, the slow readers tended to be the better readers. "This tendency was accentuated when the purposes for reading were more exacting and as the difficulty of the material increased [p. 507]." As a result, Carlson concluded that any program of instruction in reading speed in elementary school would be disastrous for some of the less able individuals.

In conclusion, many of the researchers who studied rate factors in the elementary grades were unable to find relationships or significant differences to account for differing abilities. Others substantiated what had already been examined on older individuals, while a few found outcomes of relevance peculiar to elementary students.

Treatment Studies

The elementary rate studies which included treatment have been divided into two main categories: those using primarily machines, and those using primarily books or other written material. Of the 25 studies found, 13 used machines and 12 used books in the treatment.

Treatment studies with machines. In his summary of research on the use of machines for reading, Karlin (1958) reported that practically all investigations with machines had been done on the secondary, college, and adult levels. He found only one study (Cason, 1943) at the elementary level. Fifteen years later, this investigator has unearthed 13 studies with machines at the elementary level. Most of them have shown results similar to those of Berger (1969): "when teaching groups of students, what can be done with machines can be done as well, if not better, without [p. 60]."

Tachistoscopic-type phrase reading training was investigated by Amble (1966) in order to assess the usefulness of the program for 145 fifth- and sixth-graders. Motion picture films were developed and projected at sound speed with 16-mm equipment. Each phrase was projected on the screen for one-eighth second, followed by a pause of one and a half seconds. Children were grouped by reading ability according to a reading achievement

test, then divided into two groups, one of which was shown 5,200 phrases, the other 420 phrases. Results favored the group shown the large number of phrases. There was, however, no control group to compare normal developmental reading growth.

A similar study was carried out a short time later by Amble (1967). This time 375 fifth-grade subjects were divided into three groups, one of which was a control group remaining in the regular school program. Amble reported that the group that received the 5,200-phrase training not only did much better in later phrase tests, but also made significantly greater gains on the Iowa Silent Reading Tests than the control group. The following year Amble and Butler (1967) studied the phrase-reading training with 59 slow learners. Results indicated no significant differences between training groups, but the authors claimed that "changes in reading rate were obtained without loss of reading comprehension over the same materials [p. 125]."

Another investigator (Fangman, 1968) used the same phrase-reading films working with 317 mentally retarded students. Gates-MacGinitie Reading Tests were administered before and after treatment. The gains in reading rate were reported to be significant, with no relation between increased rate and intelligence.

One other elementary study used phrase reading. Cason (1943) compared the reading rates of two classes of third-graders using the Metron-O-Scope with two other third-grade classes using narrative material marked to emphasize phrasing. Rate training was done for four 20-minute periods over four weeks. At the conclusion of the study, no significant differences were noted between the groups.

Another machine which has been used in many rate studies is the controlled reader. It was used by Berger (1966) in comparing the effectiveness of four methods of rate training at the college level. He found that paper-back scanning was the most effective of the four methods. Handelman (1967) also found that the use of the controlled reader did not result in greater effectiveness than the book-centered approach in teaching reading improvement to high school students.

In an attempt to substantiate the company claims regarding the controlled reader, McDowell (1964) compared the comprehension, rate, and vocabulary gains of two classes of fifth-graders, one group using the controlled reader, the other reading with basal readers. According to the Gates Reading Tests, there were no statistical differences between groups at the end of the program. McDowell concluded that the value of the controlled

reader had been overrated.

Witham (1966), on the other hand, reported success with the use of the controlled reader. He assigned three classes of eighth-graders to controlled reading lessons, three classes to teacher-motivated rate drills, and three classes to a regular developmental language arts program. At the conclusion of the 10-week study, both experimental groups were significantly ahead of the control group, the controlled-reader group slightly ahead of the motivated-rate drill group. He also noted that the better readers made the greatest gains in rate.

A final study using the controlled reader (Beckley, 1963) has to be viewed with caution. He introduced controlled reading lessons into the programs of two second grades, carrying the lessons through third grade. He attributed the success of the program to the controlled reader, neglecting to state in his conclusions that other changes had also been made in the reading program such as the use of more and higher level supplementary reading materials.

Only one study has been found at the elementary level using the tachistoscope as the only experimental device. Bormuth and Aker (1961) assigned two classes of sixth-graders to motivated rate drills using the SRA Better Reading Series, Book I. Two other classes received

tachistoscopic training with word phrases during the 20-week program. The Iowa Silent Reading Tests were administered before and after the training, and results showed no significant difference between the experimental and control groups, although a slight trend favored the tachistoscopic training. The authors, however, doubted that there was sufficient reason to warrant expenditure of funds to include tachistoscopic training as a regular part of a reading program.

The tachistoscope was also used, along with the controlled reader, in a study reported by Brickner and Senter (1969). Results must be studied with caution, however, because no control group was used. The authors reported only on the large gains made by the first-graders who participated in the Listen Look Learn program of Educational Developmental Laboratories. The length of the program was not mentioned, only the number of cycles completed. Reading rate was reported to have gone from about 80 to 170 words per minute, or from first-grade to fifth-grade average reading speed.

Another machine that has been used recently in three studies concerning reading rate is the compressed speech machine. It has permitted research into reading skills when oral material is presented at different rates. All of the studies were completed during the

same year and all with sixth-graders (Barnard, 1970; Reiland, 1970; Walker, 1970). Barnard's 92 subjects listened to stories from the SRA Better Reading, Book I at speeds of 125, 200, or 275 words per minute. Results were measured by the Gates-MacGinitie Reading Tests, the STEP Listening Test, and the Durrell-Sullivan Reading Capacity Test. Greater rate gains were reported for the group which heard the stories at 125 words per minute. Rate was more important than intelligence level.

Reiland's study, using the same machine and sixth-graders, was quite different. She compared three kinds of training: listening and reading simultaneously, listening only, and reading only. The materials were stories from the Reader's Digest Skillbuilders, Book Five. The compressed speech was presented to two groups at gradually increasing rates from 175 to 300 words per minute. No significant differences resulted between any of the treatments, although there was a tendency for the group that read and listened simultaneously to perform slightly better.

Unlike the two previous studies cited, Walker's compared compressed speech training with two other methods of rate training. His compressed-speech group simultaneously listened to and read from the Landmark book series, at different speeds according to ability. His

second group read the same material, timing themselves and keeping visual graphs. The third group continued with normal developmental reading seatwork activities. Gates-MacGinitie posttest results indicated that both experimental methods produced gains and helped children increase their rate of reading. Neither method, however, appeared to have a lasting effect as measured by the delayed posttest given six weeks later. In this experiment girls consistently outperformed boys.

The final treatment study using a machine (Schutz, Sullivan, & Baker, 1968) was really a test of the effectiveness of reinforcement schedules. The machine was a filmstrip projector, but the important aspect of the study was the schedule of reinforcement. The behavior of 22 fourth-grade children was observed as they read easy science material on a screen for 30 minutes a day over 10 days. Four different reinforcement schedules were examined. A fixed-interval schedule resulted in highly stable reading rates; the other schedules resulted in steadily accelerating rates. Individualized rate training, whether by machine or not, may indeed be the most effective way to increase the reading speed of elementary students.

Treatment studies with books. Twelve studies have been found similar to the present investigation in

that they examined rate training in elementary grades using books rather than machines. None of them spanned as many grade levels, however, as the author's study.

Three studies investigated reading rates in the primary grades. Two of them (McBride, 1969a, 1969b) are of a questionable nature. As part of a government sponsored remedial reading program in North Carolina, 76 first-graders were given nine weeks of rapid reading instruction. The average reading rate at the beginning was 36 words per minute with 51% comprehension. McBride reported that at the conclusion of the program the average speed was 503 words per minute with 74% comprehension. Through a program called "Panoramic Reading," involving reading several books at once and holding them at certain angles, McBride claimed tremendous rate gains were achieved. In a second study with children from third through eighth grade, the average reading speeds after five weeks of instruction increased from 254 to 13,244 words per minute. McBride did say that only top students were recommended for the program, and that the greatest gains were made by the older children.

More modest claims were made by the authors of the other primary-grade study (Morrison & Oakes, 1970). Children in second, third, and fourth grades participated in a four-month study. Control groups continued with the

basal reader program. Experimental groups devoted 15 minutes a day to guided skimming. Rate gains were explained in terms of months: second grade gained five months, third grade gained seven, and fourth gained nine. Differences between experimental and control groups were significant at the .001 level. Again, it was pointed out, the older children made greater gains.

Continuing upward through grade levels, two studies with fourth-grade children involved training for rate and flexibility. Schnicke (1970) divided 60 average and above-average pupils into five groups with different 10-day treatments, one of which was self-selection. Training was aimed at varying ability for three purposes: to find the main idea, to remember sequence, and to find a specific fact. No significant differences in training methods resulted, although all five groups gained in ability to adjust reading rate to purpose.

Harris, Barrett, and Otto (1966), having trained children in grades four, five, and six to adjust reading speeds to three different purposes, sought to determine if the pupils could be taught to transfer this skill to longer and less structured passages typical of elementary classrooms. At each of the three grade levels, 12 boys and 12 girls with STEP reading scores between the 40th and 90th percentiles were assigned to two treatment

groups. During the seven-day training period one group worked with materials in which a main idea was explicitly stated, the other group worked with materials from the Reader's Digest Skillbuilders. Results showed no differences between the two groups in ability to transfer the variability skill, either by training group, sex, or grade level. Whatever reading rate variability existed at the end of the training period was transferred by both groups to the longer, more school-like material. Fourth grade, they therefore suggest, was not too early to begin helping children to develop a flexible rate of reading.

Another treatment study with grades four, five, and six (Bridges, 1941) compared three groups: one trained for speed, one for comprehension, and one for reading in whatever way the pupils chose. Each group of 43 children worked with basal readers for 20 minutes a day for 40 days. Results of the Iowa Silent Reading Test indicated that the comprehension group made twice the growth in comprehension that would normally be expected in that time interval. The control group made the expected growth for that time, and the speed group actually lost about half a month's growth. In speed, the group given training in comprehension gained more than the group trained for speed. "The poor showing of the

Speed Group indicates that at this level forced speeding up of reading may inhibit the growth in comprehension that would otherwise take place [p. 191]."

Completely different results were found by Schale (1968). She wished to determine if fifth-graders could benefit from an adult rapid-reading method. Fifteen pupils were chosen and trained for five weeks with the Reinforced Reading Method involving rereading of each story. Speed gains increased from 157 to 622 words per minute with only a slight loss of comprehension. Unlike Bridges, Schale found that training for speed increased speed and did not harm comprehension.

Another middle-grade treatment study reporting success with rate training was done by Swalm (1969). Fifth- and sixth-grade pupils, 76 in all, were divided equally into groups of free reading or timed reading using basal reader materials. Instruction continued for 10 weeks, with three 30-minute periods each week. Pre- and posttests included the Diagnostic Reading Test, the Von Wagenen Rate of Comprehension Scale, and an informal test using selections from the basal reader. Results showed that the timed-rate drill group gained significantly more in rate than the free-reading group. According to the Diagnostic Test, the experimental group made a very slight gain in comprehension, but on the informal

test, the comprehension decreased significantly, while still maintaining a respectable level well over 70%.

A much shorter and more selective study of rate training with sixth-grade gifted pupils was carried out by McCracken (1960). Eight pupils received three 45-minute training sessions for three weeks, working with the Reader's Digest Skillbuilders. Reading speed increased from 202 to 792 words per minute with a slight gain in comprehension also. McCracken pointed out that apparently speed reading and mature study habits can be taught much earlier than college, that "increased amount of reading that sixth-grade pupils could be freed to do in junior and senior high school is yet to be realized [p. 28]."

Skarbek (1965) assigned 80 sixth-graders to the regular developmental reading program while another 80 pupils participated in a 30-week program of training for rate of comprehension using the Standard Test Lessons in Reading, Book D. Diagnostic Reading Test results showed that the rate training group did achieve greater rate increase than the control group. Those in the developmental program, however, made greater increases in comprehension.

Focusing on seventh and eighth grade, Carlson (1967) investigated the value of a one-semester

developmental reading course for these grades. More than 400 students participated in the course while another 400 were in science class. According to the results of the Gates Reading Survey and the Iowa Tests of Educational Development, general reading achievement was significantly higher for the group that had had the developmental reading course. They surpassed the science class group in speed, vocabulary, and level of comprehension. Other results suggested that the better readers gained more, and that there were no differences between performance of boys and girls.

The final treatment study was carried out in grades seven, nine, and twelve. Koziey (1967) investigated the optimum grade level for a course in developmental reading. He stressed reading efficiency, i.e., the balance between rate and comprehension. Timed rate drills and drills for increasing eye span were used as well as a developmental reading workbook. Pretests, posttests, and tests after six months were administered. Results showed that the seventh-grade pupils showed the most improvement immediately after treatment, but they also had lost the most six months later. Koziey concluded that students in seventh grade were not mature enough to cope with the high degree of psychological pressure used for motivational purposes. The

twelfth-grade students, he decided, were too set in their reading habits. Ninth grade, consequently, seemed to be the most productive level for a developmental reading course. He suggested that the training might be effective for seventh-graders if certain modifications were made in the training.

Of the twelve elementary treatment studies discussed, only one reported that rate training was not successful. Bridges found that a group trained in comprehension did better even in speed than a group trained for speed. All of the others reported success within the limits of their investigations.

Summary

The review of literature dealing with reading rate was limited for the most part to that which dealt with elementary grades. Only a few of the most outstanding and relevant studies from secondary, college, and adult levels were included here. The first subject discussed was the proper starting place for rate training according to different authorities. While many different opinions were stated, the majority of the experts have felt, in general, that junior high or possibly sixth grade was the earliest profitable grade level to initiate any sort of rate instruction.

Studies of elementary rate training which involved

testing only were next reviewed. Rate was investigated in relation to several physical and psychological factors. A few of the prominent measurement studies were covered. Appraisals of flexibility were also discussed, and finally, investigations of the relationship between rate and comprehension were included.

The third category of rate studies included those that involved a training period as well as measurements. First discussed were the studies that emphasized the use of machines for the training. Some of the machines used for rate instruction have been movie projectors, the Metron-O-Scope, the tachistoscope, the controlled reader, and the compressed speech machine. Most of the experts have gradually come to agreement that these machines may be valuable for motivational purposes, but that rate training can be accomplished successfully without them.

The final group of studies most closely resembled the author's investigation. They all administered rate training to elementary school children using as the principal materials books or other narrative materials. The studies ranged from first grade through eighth, but mostly with a range of not more than two grades. All but one of them reported effectiveness of rate training.

CHAPTER III

PROCEDURES

The purpose of this chapter is to present a report of the pilot study and to describe the major investigation. Included is a discussion of the pilot study and a description of the subjects, tests, materials, and procedures of the major investigation. The statistical design is also described.

Pilot Study

During the spring semester of 1971, the writer designed and carried out a pilot study in order to evaluate the methods and materials planned for the major investigation. Two second-grade and two sixth-grade classes were randomly selected for participation, one class at each grade level serving as the experimental group, the other class as the control group. All four classes were given the appropriate level of the Gates-MacGinitie Comprehension Test and the Gates-MacGinitie Speed and Accuracy Test. Results indicated that the control and experimental groups were approximately matched in ability at each grade level. The classes were also given a timed reading assignment in the Controlled

Reading Study Guide (Taylor, Frackenpohl, & White, 1964) intended for one grade below their class level. After the timed reading the pupils answered 10 questions about the selection.

The two experimental classes received 20 lessons of rate training from the investigator, using the Controlled Reading Study Guides and motivational lectures. The control-group classes received 20 lessons of comprehension training from the investigator using the same Controlled Reading Study Guides. Following the training, all four classes were given different forms of the four tests they had had originally. Table 1 shows that the experimental groups in both second and sixth grades did indeed more than double their reading speed with only a slight loss in comprehension. The control groups made small gains in both speed and comprehension.

A few minor problems arose during the pilot study indicating the need for slight changes in procedure for the major investigation. Answer sheets, for example, had to be removed from the back of the Study Guides to prevent cheating on the comprehension tests. Directions for the informal testing were made uniform for all groups. Classroom teachers were encouraged to leave the rooms because of their distracting influence. The investigator

TABLE 1

PILOT STUDY MEAN RAW SCORES ON THE INFORMAL TESTS OF SPEED AND COMPREHENSION

Grade		Speed, words per minute		Comprehension, 10 questions	
		Pre-test	Post-test	Pre-test	Post-test
Second	Experimental	240.7	778.9	8.8	8.6
	Control	175.2	181.4	9.3	9.5
Sixth	Experimental	268.0	2189.7	6.7	6.6
	Control	295.3	374.9	7.1	8.3

also gained practice in teaching with similar materials at different grade levels.

Major Study

Subjects

The Princeton Regional School system serves a community which consists largely of middle and upper-middle-class citizens, strongly committed to superior education. Many of the parents are active in education, research, or other professional fields. The area has a number of disadvantaged children, but they represent less than 8% of the population. The generally high socioeconomic status is reflected in the test scores of the pupils in this study.

The students selected for the major study all attended one of the Princeton Regional Schools. The system includes four elementary schools, one middle school, and one high school, with a total enrollment of 4,516 as of October 1971, at the beginning of the investigation. Classes from three of the four elementary schools were used in the study: four second grades and four fourth grades. Four sixth grades and four eighth grades were used from the middle school. Classes were selected randomly and assigned randomly to experimental or control groups.

The district philosophy is strongly in favor of

heterogeneous grouping, and considerable effort is put forth to achieve heterogeneity in every classroom. Consequently, the investigator had to assume that the pupils had been randomly selected for individual rooms within a school building and that there was no difference between classes. With the exception of four students new to the country who could not speak or understand English, every child from the selected classrooms participated in the study.

The 16 classes in the study, four at each of the four levels investigated, had from 18 to 30 pupils each. School policy states that the primary grades should have less pupils per class than other elementary grades. Consequently, after a few pupils at each grade level were omitted due to absence or moving, the population of the study consisted of 74 second-graders, 87 fourth-graders, 97 sixth-graders, and 92 eighth-graders, a total of 350 pupils.

Table 2 shows some of the characteristics of the students: sex, reading ability, and informal comprehension. Raw scores were ranked for each class. Then the entire grade was divided into the top 27%, the middle 46%, and the lower 27%. These groupings became respectively the above average, average, and below average readers for analysis of test results and reading ability.

TABLE 2

CHARACTERISTICS OF THE SUBJECTS IN THE INVESTIGATION BY GRADE LEVEL

	Grade two	Grade four	Grade six	Grade eight	Total N=350
Sex					
Boys	29	40	48	52	169
Girls	45	47	49	40	181
Reading ability[a]					
At or above grade level	57	69	68	73	267
Below grade level	17	18	29	19	83
Informal comprehension[b]					
Satisfactory	73	61	59	52	245
Unsatisfactory	1	26	38	40	105

[a]Determined by Gates-MacGinitie Comprehension Pretest and the grade level norms for that test.

[b]Determined by the 10-question Informal Comprehension Test. Scores of 6 or above were considered satisfactory.

The word "average," however, meant average for the Princeton schools, not related to national norms. Less than a third of the students at each of the four grade levels studied scored below grade level according to the norms published in the Gates-MacGinitie Teacher's Manual (1965).

The pupils were also divided into two groups: those who scored 60% or better on both the pre- and post-test informal comprehension tests, and those who did not. It was considered important to determine the relation between satisfactory or unsatisfactory comprehension and performance on the remaining tests.

The pupils in two classes at each grade level were given 20 lessons of rate training using timed rate drills as the major device. A third class was given 20 lessons emphasizing comprehension, and the fourth class at each grade level was given the pre- and posttests only. Table 3 shows the raw score grand means on the four pretests and compares those means with national norms for the Gates-MacGinitie Tests and the informal speed test.

Materials

The chief materials used during the training sessions for both experimental groups and the control group that received training were the Controlled Reading Study

TABLE 3

RAW SCORE GRAND MEANS AND STANDARD DEVIATIONS ON THE PRETESTS, WITH GRADE LEVEL AND RATE NORM COMPARISON

Test		Grade 2 N-74	Grade 4 N=87	Grade 6 N=97	Grade 8 N=92
GMSP[a]	Mean	15.8	17.4	19.6	16.5
	S.D.	7.0	6.1	6.4	5.4
	Grade level[e]	3.5	5.9	7.8	11.2
GMCM[b]	Mean	26.5	35.4	39.8	40.5
	S.D.	6.5	10.3	10.6	10.2
	Grade level[e]	3.7	5.6	6.5	10.0
INSP[c]	Mean	147.9	210.1	299.1	531.7
	S.D.	100.5	120.6	90.	659.0
	Expected WPM[f]	115	158	185	204
INCM[d]	Mean	9.0	7.4	6.9	6.1
	S.D.	1.2	2.1	2.4	2.0

[a]Gates-MacGinitie Speed and Accuracy Test.

[b]Gates-MacGinitie Comprehension Test.

[c]Informal Speed Test.

[d]Informal Comprehension Test.

[e]Gates-MacGinitie grade level placement for the mean score.

[f]Taylor's rate of comprehension norms for each grade level.

Guides (Taylor, Frackenpohl, & White, 1964). The Guides, paperback workbook-type booklets, contained 25 stories or passages each, with 10-question multiple-choice tests to be completed after reading each story. Booklets were available for all reading levels from first grade through college level. At the primary levels, two booklets were made, one for the first half of the year, one for the second half. At all other grade levels, two booklets were published that were of equal readability. These Guides had never before been used in the Princeton schools.

For each of the four grade levels tested, a Study Guide was chosen that was one grade below the students in the investigation. Reading levels were stated by the publishers and vocabulary control explained and listed in a research and information bulletin (Taylor, Frackenpohl, & White, 1964). The guides chosen by the investigator were also checked for readability levels using Fry's (1968) readability graph. Three stories were checked in each Study Guide, and all of them fit within the required limits of the graph for the level designated by the publisher. Table 4 shows the relevant information about the Study Guides used in the investigation.

Another important instructional tool used in every training session was a graph. In the experimental

TABLE 4

INFORMATION ABOUT THE CONTROLLED READER STUDY GUIDES, PRIMARY MATERIALS IN THE INVESTIGATION

	Grade 2	Grade 4	Grade 6	Grade 8
Title	CRST, A lessons 26-50	CRST, C lessons 26-50	CRST, E	CRST, HG
Reading level	First grade	Third grade	Fifth grade	Seventh grade
Range of words per passage	347-416	643-711	835-920	1203-1396
Number of alternatives on multiple-choice quiz	2	4	4	4

The timed rate drills, the major training method of the investigation, were based on the Study Guides. The control group that received training also used the Study Guides for the comprehension lessons.

classes each pupil received a graph on which to chart his reading rate and his comprehension scores. Students in the control class with training received a graph on which to chart their comprehension scores. Examples of both the speed and comprehension graphs can be found in Appendix A.

Filling in the comprehension graphs was quite easy for all students. When their quizzes had been corrected, they simply put a dot on the graph beside the number they had correct and over the number of the story. Then they joined the dot to the previous score. The rate graphs, however, were more complicated.

The investigator wished to avoid burdening the students with arithmetic computation. The rate, in words per minute, was, therefore, computed ahead of time for fifteen second intervals. A large wall chart, 2 feet by 3 feet, was made for each of the four grades with large black numbers for the rate, depending on the number of words in the story. The investigator stood beside the chart during all rate sessions with a stop watch in one hand and a pointer in the other. Everyone started reading at the word "Go." Then every fifteen seconds the pointer was moved to the next lowest number on the chart. When a pupil finished reading the story, he had only to look up and notice at what number the investigator was

pointing. He wrote that number on his paper, then proceeded at his leisure, but without looking back, to take the 10-question quiz. Two charts were constructed for each of the four grade levels. The second-grade charts, for example, were constructed so that one of them was based on 375 words per minute, and was used for all stories that had from 347 to 386 words. The other second-grade chart, on the back of the first, was based on 398 words per minute and was used for stories with 387 to 416 words. One of the second-grade charts is included in Appendix A.

The stories used for eighth-graders ranged from 1,203 to 1,396 words, almost 200 words difference in length. Using two separate charts, and basing each chart on the median number for that half of the range, meant that no story was misjudged by more than 25 words.

In addition to the Study Guides and some sort of graph, the only other materials used by both experimental and control classes were pencils, paper, chalkboards, and different Study Guides. In the fourth, sixth, and eighth grades, students were given blank paper and numbered from one to ten, then answered the comprehension quizzes with an appropriate letter. In the second grade, however, most of the questions called for circling or underlining the proper choice. The whole quiz was therefore copied

on separate paper for each student's use. An example of one of the quizzes for second grade is included in Appendix A.

The investigator also used the chalkboard a great deal for vocabulary words and reinforcement of discussions. The final materials used in common for both the experimental and control groups were a few selections from Study Guides other than the ones regularly used by each group. Fortunately, two Guides had been published at every grade level. Several times stories and questions were used from the alternate Guides for specific skill lessons such as skimming for the experimental groups or finding the main idea for the control group. Outlines of the actual sequence of lessons for each group may be found in Appendix A. Since the investigator did all of the teaching and testing herself, lesson plans in detail were not needed. In general, the lessons were adapted from suggestions in Teaching Faster Reading (Fry, 1963).

The experimental groups were also introduced to three reading machines: the controlled reader, the tachistoscope, and the reading accelerator. Each machine was used two or three times for motivational purposes. Students at all four grade levels expressed tremendous interest in the machines and, consequently, became even more interested in the program as a whole. If the

machines had been used more often, the fascination would probably have worn off.

The controlled reader and its filmstrips were also made by Educational Developmental Laboratories. The filmstrips contained the same stories as the Study Guides, and were originally intended to be used with the Guides. For the investigation, filmstrips were used from the Study Guide not in regular use. Stories were projected on a screen, one line at a time, starting at a slow r and gradually working up to a very fast rate. Students were also shown how the words could be shown one at a time, but without exception they preferred the whole-line-at-a-time method. After viewing a complete story, the pupils were given copies of the corresponding quiz.

Another machine that met with enthusiasm was the tachistoscope. Filmstrips with Instant Words (Fry, 1957) and Instant Phrases (Fry, 1958) were flashed briefly on the screen. Sometimes the students wrote what they saw, sometimes they called out the words in unison, and sometimes the investigator asked for certain groups to answer, such as "Everyone who is wearing brown shoes . . ."

Classes were also shown the reading accelerator, a pacing device made by Science Research Associates, for use by one student at a time. All pupils in the experimental groups had an opportunity to use an accelerator at

least once.

The most important part of the experimental-group lessons were the timed rate drills. In order to read faster, students needed some helpful advice and lots of practice. Table 5 shows the pretest mean raw scores of the experimental groups as compared with the control groups.

Testing Procedures

Before any testing was begun the investigator first had to obtain permission from the Princeton Regional Schools Research Committee, then from the building principals involved. Finally, teachers were asked if they were willing to allow their classes to participate in the study. All gave their permission enthusiastically. Students' time would not be wasted, and teachers were especially eager when they learned that they would be spared doing any of the instruction.

Four tests were administered to each class during the pretest sessions: The Gates-MacGinitie Speed and Accuracy Test (GMSP), The Gates-MacGinitie Comprehension Test (GMCM), The Informal Speed Test (INSP), and The Informal Comprehension Test (INCM). The Gates-MacGinitie Tests were administered one day, and the Informal Tests another day. All four tests were given according to the A-B-B-A design in order to allow for differences between alternate

TABLE 5

EXPERIMENTAL AND CONTROL GROUPS PRETEST RAW SCORE MEANS, STANDARD DEVIATIONS, AND F RATIOS FOR THE GATES-MACGINITIE AND INFORMAL TESTS IN GRADES TWO, FOUR, SIX, AND EIGHT

Test group	$\bar{M}$	S.D.	F ratio	$\bar{M}$	S.D.	F ratio
	Second Grade			Fourth Grade		
GMSP						
Experimental	16.3	7.1	0.34	18.7	5.9	3.9
Control	15.4	6.9		16.2	6.2	
GMCM						
Experimental	26.5	5.9	0	34.9	10.3	0.14
Control	26.5	7.3		35.8	10.4	
INSP						
Experimental	152.4	123.7	0.15	214.2	108.2	0.10
Control	143.3	71.6		206.2	132.7	
INCM						
Experimental	9.2	1.0	1.4	7.1	1.9	2.28
Control	8.9	1.3		7.8	2.3	
	Sixth Grade			Eighth Grade		
GMSP						
Experimental	18.2	5.5	4.71	17.3	5.5	2.16
Control	20.9	6.9		15.6	5.2	
GMCM						
Experimental	37.4	11.1	4.71	40.5	9.4	0.01
Control	42.0	9.7		40.4	11.1	
INSP						
Experimental	212.1	79.1	3.17	629.2	828.4	2.13
Control	244.5	98.0		429.4	400.1	
INCM						
Experimental	6.7	2.4	0.70	6.5	2.0	5.48
Control	6.9	2.5		5.6	2.0	

Note.--None of the F ratios were significant at the .01 level.

forms of the tests. Alternate forms of the same tests were administered during the two posttest sessions. For the control group that received no instruction from the investigator, the posttests were administered nine weeks after the pretests.

The Gates-MacGinitie Tests are recent revisions of the Gates Reading Tests, and a marked improvement over their predecessors, according to Van Roekel (Buros, 1972). The tests cover a narrower grade range than previously. Comprehension questions now include some inference and abstraction. Also, the teacher's manuals for each level and the technical manuals are said to be more thorough and better organized.

The GMSP "provides an objective measure of how rapidly children can read with understanding [Gates-MacGinitie, Teacher's Manual, p. 1]." The "understanding" part of the test is included in the test timing. The student reads a short paragraph ending in either a question or an incomplete statement. At the end of the paragraph, the student circles one of four words that he believes best answers the question or completes the sentence, then he goes on to the next paragraph. His performance is based on a rate of comprehension.

The GMSP, Primary CS, is the only standardized test for rate found by the investigator that is intended

for students in second grade. The students are allowed seven minutes in which to complete as many as possible of the 32 short paragraphs of similar difficulty. All second-graders in the study took Level CS, Form 1 or 2, as a pretest.

The fourth- and sixth-grade students in the study all took Form 1 or 2 of the GMSP, Survey D, as a pretest. Eighth-graders were given Level E, Form 1 or 2, for grades seven through nine.

In a similar manner, for the Gates-MacGinitie Comprehension Test, all subjects were given Form 1 or 2 for the pretest. Second-graders received Level B. Fourth- and sixth-graders received Level D, and eighth-graders had Level E.

Table 6 gives the reliability coefficients for the Gates-MacGinitie Tests used in this investigation (Gates & MacGinitie, Technical Manual, 1965c, p. 3). Split-half reliabilities were not reported for the Speed and Accuracy subtests because such coefficients would be meaningless for high-speeded tests.

In addition to the standardized tests of speed and comprehension, every subject in the investigation also was given pre- and posttests for speed and comprehension that were not standardized. Both of these informal tests were used with the Controlled Reader Study

TABLE 6

RELIABILITY COEFFICIENTS FOR THE GATES-MACGINITIE TESTS USED FOR THIS INVESTIGATION

	Grade 2	Grade 4	Grade 6	Grade 8
Speed number correct				
Alternate form	.96	.80	.78	.76
Comprehension				
Alternate form	.81	.83	.87	.81
Split-half	.93	.94	.95	.93

Guides. Appendix A has examples of the reading passages and tests for each grade level. For the speed test, the first and second stories in each Study Guide became the tests, taken in A-B-B-A form. Students received a score which was the average number of words read per minute. The wall charts previously described were used for the timing, and students had only to look at and copy the number being pointed to when they finished reading the story.

In order to eliminate differences in testing procedures between groups as much as possible, the directions given by the investigator were the same for all groups. Students were told by the investigator, "I need to know how long it takes you to read the story, so please look up when you finish, and write the number on your paper that I am pointing at."

Unlike the Gates-MacGinitie Speed Test, the informal speed test did not involve any measure of comprehension during the timing. No special directions were given concerning the speed of reading, but all students were told about taking the 10-question quiz after the reading. They were also requested to sit quietly when they finished in order to allow other students to finish their reading and questions easily.

The validity of the informal speed test rests

upon its measuring exactly what the investigator was seeking: average number of words read per minute using easy reading material with the knowledge that some comprehension check would come later. The readability of the passages had been verified as one grade level below the grades using the book. Since at least two-thirds of every class was reading at grade level or above according to the Gates-MacGinitie Comprehension Test and its norms, less than one-third of the students would have found the Study Guide reading difficult.

The informal comprehension test had face validity similar to the speed test, measuring what the investigator was looking for: understanding of the passage just read. Each 10-question quiz included a main idea question and at least one question involving inference. The students had no opportunity to look back in the reading passage, so their answers to the 10 questions on the test presumably came from knowledge gained during the timed reading. Because of the chance factor and guessing, students with either a pretest or posttest score of less than six on the informal comprehension test were separated from those scoring at least six or more on both tests, and test results were examined.

Table 7 shows the comparison of those who had satisfactory comprehension and those who did not.

TABLE 7

MEAN PRETEST RAW SCORES OF THE GROUPS WITH SATISFACTORY INFORMAL COMPREHENSION AND THE GROUPS WITHOUT SATISFACTORY COMPREHENSION

Group	N	Gates-MacGinitie		Informal	
		Speed	Comprehension	Speed	Comprehension
		Fourth Grade			
Unsatisfactory	26	13.4	25.8	168.8	5.0
Satisfactory	61	19.1	39.4	227.8	8.4
		Sixth Grade			
Unsatisfactory	38	16.4	34.0	211.4	5.1
Satisfactory	59	21.7	43.6	240.5	8.0
		Eighth Grade			
Unsatisfactory	40	15.5	37.3	532.8	4.8
Satisfactory	52	17.2	42.9	530.9	7.1

Figures are given only for fourth, sixth, and eighth grades. Only one student out of 74 in second grade scored less than six on either the pre- or posttest informal comprehension test. With one exception, the group with satisfactory comprehension had higher mean raw scores on all the pretests. In the eighth grade, the unsatisfactory comprehension group had a slightly higher speed in words per minute.

Many experts have agreed that some cutoff point is necessary in judging comprehension tests that are separated from the reading rate measure. Pupils can move their eyes over a passage, say they have "read" it, and then answer three or four questions correctly just by chance. Davis (1962) recommended a cutoff point of 75%. In his study of the eye movements of over 12,000 students in grades one through twelve, Taylor (1965) included only students reading with at least 70% comprehension. Maxwell and Mueller (1967) eliminated students with comprehension scores below 50% in their study comparing placebo effect with the effect of giving students written materials on techniques for rapid reading. The actual percentage of right answers seems unimportant as long as it is well above the chance level. Sixty percent was chosen as the cutoff point for this investigation.

The reliability of both of the informal tests is

probably quite low. Unfortunately, no standardized tests exist as yet for measuring rate and comprehension separately at the second-grade level. For this study, the investigator controlled insofar as possible the variables that are responsible for unreliability, then proceeded with caution in drawing conclusions about tests which could not yield strongly reliable results. The very large standard deviations, as shown in Table 3, on the informal speed tests were evidence of wide variability. The informal comprehension test with only 10 questions was rather short.

Experimental Design and Statistical Procedure

The design of this study followed that of the pretest-posttest control group design described by Campbell and Stanley in Handbook of Research on Teaching (1963, p. 183). Table 8 shows the design of the study. R indicates random assignment of classes to separate treatment groups. X represents the exposure of the groups to the experimental variables, and the O refers to the process of measurement.

Sixteen classes were used for the study, four at each grade level. Two classes in each grade were given the experimental treatment, instruction in reading rate. One control group at each grade level was given similar instruction without the speed emphasis, and the other

TABLE 8

DESIGN OF THE STUDY

Grade	Experimental N = 173	Control 1 N = 85	Control 2 N = 92
2	N = 19 + 18 R O X O	N = 18 R O X O	N = 19 R O O
4	N = 22 + 21 R O X O	N = 20 R O X O	N = 24 R O O
6	N = 23 + 23 R O X O	N = 26 R O X O	N = 25 R O O
8	N = 23 + 24 R O X O	N = 21 R O X O	N = 24 R O O

control group received no treatment from the investigator. Three hundred and fifty students were involved in the study; 173 of them received rate training and the remaining 177 formed the two control groups. The organization of tests and treatments is shown in Table 9.

Equivalence of the experimental and control groups within each grade level was determined by the F ratio on the Gates-MacGinitie pretest raw score means of the experimental and control groups. Table 5 shows that the groups were statistically equal.

Analysis of variance formulas were used to evaluate the effect of treatments in each grade. Separate analyses were done at each of the four grade levels because of the use of different levels of materials and tests. The .01 level was established as the significance level of the investigation.

A one-way analysis of variance was also conducted between post-treatment raw scores for each of several variables: sex, reading ability, and satisfactory or unsatisfactory informal comprehension. This was done separately at each grade level.

A two-way analysis of variance was employed to determine equivalence of the fourth- and sixth-grade groups on posttest mean raw scores for the Gates-MacGinitie Tests, since both groups did take Level D,

TABLE 9

TEST AND TREATMENT DESIGN

	Experimental	Control 1	Control 2
Pretests	Gates-MacGinitie: Speed Comprehension Informal: Speed Comprehension	Gates-MacGinitie: Speed Comprehension Informal: Speed Comprehension	Gates-MacGinitie: Speed Comprehension Informal: Speed Comprehension
Treatment	20 lessons, Study Guide with speed emphasis	20 lessons, Study Guide without speed emphasis	No instruction from investigator
Posttests	Gates-MacGinitie: Speed Comprehension Informal: Speed Comprehension	Gates-MacGinitie: Speed Comprehension Informal: Speed Comprehension	Gates-MacGinitie: Speed Comprehension Informal: Speed Comprehension

intended for grades four through six.

Finally, a correlation matrix was run for all the test results in relation to each other. These were done separately for each grade level.

All data input cards were prepared and arranged according to the outlines in BMD: Biomedical Computer Programs (Dixon, 1965). These were done for Analysis of Variance for one-way and two-way design, Program BMDX64; and for the correlation matrices, Program BMD02D.

Data were also examined informally for indications of greater effectiveness at one grade level than another of the investigator's method of rate instruction.

CHAPTER IV

RESULTS AND DISCUSSION

The purpose of this chapter is to analyze the data derived from the study in relation to the problems presented in Chapter I. The results are presented in three parts. The first part is concerned with the main effects the experiment was designed to examine, effects that might be attributed to the investigator's instruction in reading rate. The second section is concerned with treatment effects on four specific groupings: boys and girls, "good" and "poor" readers, satisfactory and unsatisfactory comprehenders, and fourth- and sixth-graders. Finally, the results of both sections will be related to pertinent literature.

Main Treatment Effects

The First Hypothesis

The main analysis was concerned with comparisons of posttest mean raw scores between different treatment groups. The first hypothesis stated that there would be no significant differences in rate of comprehension on the Gates-MacGinitie Speed and Accuracy Test for the experimental and control groups at grades two, four, six,

and eight. Table A in Appendix B summarizes the analysis of variance of the GMSP scores. The hypothesis was rejected at the eighth-grade level only. At the second-, fourth-, and sixth-grade levels, there were no significant differences between the GMSP posttest mean scores of the experimental and the control groups. For those grades, the rate training where comprehension was separate from speed, did not appear to have any effect upon rate of comprehension as measured by the GMSP. Table 10 shows the posttest means, standard deviations, and F ratios for the experimental and control groups. Very little difference appeared between the two groups in second, fourth, and sixth grade on the GMSP. But, in eighth grade, the experimental groups completed 21 out of 36 paragraphs on the average, or 58%, while the control groups completed 15.4, or 42%, of the paragraphs. Consequently, the first hypothesis was rejected only at the eighth-grade level. At second-, fourth-, and sixth-grade levels, there were no apparent effects on the GMSP scores as a result of the rate instruction.

The Second Hypothesis

The second hypothesis stated that there would be no significant differences in words-per-minute rate on the informal speed test for the experimental and control groups at grades two, four, six, or eight. Table B in

TABLE 10

EXPERIMENTAL AND CONTROL GROUPS POSTTEST RAW SCORE MEANS, STANDARD DEVIATIONS, AND F RATIOS FOR THE GATES-MACGINITIE AND INFORMAL TESTS IN GRADES TWO, FOUR, SIX, AND EIGHT

Test group	$\bar{M}$	S.D.	F ratio	$\bar{M}$	S.D.	F ratio
	Second Grade			Fourth Grade		
GMSP						
Experimental	17.4	6.5	.09	19.7	6.7	1.92
Control	16.7	7.0		17.4	6.0	
GMCM						
Experimental	26.9	6.0	.03	34.3	10.7	1.14
Control	27.3	6.1		37.5	9.5	
INSP						
Experimental	358.7	215.2	14.58*	569.9	370.8	20.27*
Control	156.7	69.7		229.3	89.8	
INCM						
Experimental	8.8	1.0	2.22	7.0	2.0	1.34
Control	9.1	1.0		7.7	2.0	

(continued)

TABLE 10 (continued)

Test group	M	S.D.	F ratio	M	S.D.	F ratio
		Sixth Grade			Eighth Grade	
GMSP						
Experimental	20.2	6.5	.17	21.0	6.3	12.96*
Control	20.7	5.6		15.4	5.1	
GMCM						
Experimental	38.4	10.2	2.94	39.6	10.2	1.55
Control	40.8	10.6		40.4	9.6	
INSP						
Experimental	1540.0	1152.6	31.55*	1269.7	1030.7	8.89*
Control	247.5	95.3		516.6	728.6	
INCM						
Experimental	5.3	2.1	14.71*	5.7	1.8	1.12
Control	7.5	2.1		6.3	1.7	

*Significant at the .01 level.

Appendix B summarizes the analysis of variance of the INSP scores. At all four grade levels, the differences between the experimental and control groups were significant at the .01 level. The null hypothesis is therefore rejected at all four grade levels. Rate training did result in greatly increased rate for the experimental groups, when the rate was measured in the same way in which it was taught. The means shown in Table 10 show that the experimental groups read more than twice as fast as the control groups in all cases. As compared with the pretest means on the same test, shown in Table 5, all the experimental groups more than doubled their pretest mean rate on the posttest. Second-graders who had rate training increased their rate in words per minute from 152 to 358 words per minute, while the second-grade control groups gained only 13 words per minute. In fourth grade, the experimental groups increased their rate from 214 to 569 words per minute, while the control groups gained just 23 words. Sixth-graders who had rate training made the greatest gains of all. Experimental groups at second, fourth, and eighth grades more than doubled their rate, but the sixth-graders increased their rate from 212 to 1540 words per minute, or more than 700%. Sixth-grade control groups made a mean gain of just two and a half words per minute.

In eighth grade, the experimental groups increased their rate from 629 to 1269 words per minute while the control groups increased by 87 words per minute.

The Third Hypothesis

The third hypothesis stated that there would be no significant differences on the informal comprehension test for the experimental and control groups in grades two, four, six, or eight. In other words, it was hypothesized that the rate training would not affect the comprehension scores. Table C in Appendix B summarizes the analysis of variance on the INCM scores. There were significant differences at the sixth grade only. Table 10 shows that the sixth-grade experimental groups had the lowest mean informal comprehension score of any grade or group in the study. The sixth-graders with rate training, as just pointed out, made the greatest gain in rate. They also showed the greatest loss in comprehension. At all four grade levels the experimental groups lost in comprehension from pre- to posttest, while their control groups gained, but the differences were small and could have occurred by chance except at the sixth-grade level. The reliabilities of the informal comprehension tests were undoubtedly low, which might have accounted for the lack of significant differences in the INCM scores at second-, fourth-, and eighth-grade levels between

experimental and control groups. Rate training definitely affected informal comprehension in sixth grade. In the other grades comprehension suffered to an unknown degree. The hypothesis is rejected at the sixth-grade level only.

Secondary Effects

Boys and Girls

Supplementary to the main analysis, mean differences in treatment effects for various subgroups were analyzed. The first of these secondary hypotheses stated that there would be no significant differences between boys and girls on any of the tests in grades two, four, six, or eight. Tables D, E, F, and G in Appendix B summarize the analysis of variance for boys and girls on all the tests and at each grade level. Table 11 gives the posttest raw score means, standard deviations, and *F* ratios for boys and girls in grades two, four, six, and eight. On the GMSP, there were significant differences between boys and girls at the second- and sixth-grade levels. The girls had a higher mean score than the boys at all four grade levels, but in the second grade the difference was significant, and by eighth, it was not. Similarly, on the GMCM, the girls scored significantly higher than the boys in second grade, and just a little higher than the boys in fourth and sixth grades. By

TABLE 11

POSTTEST RAW SCORE MEANS, STANDARD DEVIATIONS, AND F RATIOS FOR BOYS AND GIRLS ON THE GATES-MACGINITIE AND INFORMAL TESTS IN GRADES TWO, FOUR, SIX, AND EIGHT

Test group	M	S.D.	F ratio	M	S.D.	F ratio
	Second Grade			Fourth Grade		
GMSP						
Boys	13.5	6.4	15.39*	17.1	6.3	5.31
Girls	19.2	6.0		20.2	6.1	
GMCM						
Boys	24.4	6.4	11.17*	33.9	10.9	4.16
Girls	28.8	5.1		38.3	8.8	
INSP						
Boys	221.7	179.6	1.76	360.0	262.8	2.60
Girls	280.9	192.6		471.5	379.2	
INCM						
Boys	9.0	1.0	.08	6.7	1.9	11.17
Girls	8.9	1.2		8.1	2.0	
	Sixth Grade			Eighth Grade		
GMSP						
Boys	18.6	5.6	10.70*	18.1	6.7	.04
Girls	22.4	5.8		18.4	6.4	
GMCM						
Boys	37.6	11.4	3.91	41.1	10.5	1.68
Girls	41.7	9.0		38.5	9.0	
INSP						
Boys	882.2	1112.7	.04	1024.6	1174.8	1.96
Girls	838.6	940.4		741.1	578.6	
INCM						
Boys	6.0	2.6	3.45	6.0	2.0	.09
Girls	6.9	2.0		6.1	1.5	

*Significant at the .01 level.

eighth grade, the boys' mean was slightly higher than the girls'.

The results of the INSP posttest showed no significant differences between boys and girls at any grade level. Girls did a little better in second and fourth grades, and boys read slightly faster in sixth and eighth grades. On the final test, the INCM, significant differences resulted at the fourth-grade level only, where the comprehension means of the girls were significantly higher than the boys. The hypothesis concerning differences between boys and girls, therefore, is rejected at second grade for the GMSP and the GMCM, at fourth grade for the INCM, and at sixth grade for the GMSP. The null hypothesis was not rejected for eighth grade with any test results. Also, for the test that best measured the training, the INSP, the null hypothesis was not rejected. The rate training did not appear to affect boys and girls differently.

"Good" and "Poor" Readers

The second of the secondary hypotheses stated that there would be no differences between "good" and "poor" readers on any of the posttest results in grades two, four, six, or eight. "Good" and "poor" readers have been previously described as the upper and lower 27% of each group on the GMCM pretest. Tables H, I, J, and K in

Appendix B summarize the analysis of variance on the posttest mean raw scores of the "good" and "poor" readers on the four tests and in grades two, four, six, and eight. The results show significant differences at the .01 level for all grades on the GMSP, GMCM, and the INCM. On the INSP, however, no significant differences appeared at any grade level. In other words, the "good" readers scored significantly higher than the "poor" readers at all grade levels and on all the tests except the one that best measured the rate training, the INSP. Table 12 shows the means, standard deviations, and F ratios for the "good" and "poor" readers on the four tests and in the four grades. Large differences between means are evident through all grades and tests except for the INSP. The "poor" readers actually scored a little faster wpm rate than the "good" readers at the sixth-grade level. At the other three grade levels, the "good" readers had a faster rate even though not significantly so.

The hypothesis stating that there would be no difference between "good" and "poor" readers is rejected for the Gates-MacGinitie Tests and for the informal comprehension test at all grade levels. It is not rejected for the informal speed test at any grade level. According to the results of that test, the rate training did not appear to affect "good" and "poor" readers differently.

TABLE 12

POSTTEST RAW SCORE MEANS, STANDARD DEVIATIONS, AND F RATIOS FOR "GOOD" AND "POOR" READERS ON THE GATES-MACGINITIE AND INFORMAL TESTS IN GRADES TWO, FOUR, SIX, AND EIGHT

Test group	M	S.D.	F ratio	M	S.D.	F ratio
	Second Grade			Fourth Grade		
GMSP						
Good readers	19.3	5.7	45.97*	20.2	5.7	34.98*
Poor readers	9.4	3.5		12.2	4.6	
GMCM						
Good readers	29.4	4.3	60.27*	39.7	6.6	77.49*
Poor readers	19.5	4.5		21.3	7.9	
INSP						
Good readers	266.5	186.2	1.02	423.7	331.1	2.95
Poor readers	228.5	199.4		363.7	301.3	
INCM						
Good readers	9.1	1.1	7.61*	7.8	1.8	8.03*
Poor readers	8.2	1.1		5.8	2.1	
	Sixth Grade			Eighth Grade		
GMSP						
Good readers	22.1	5.2	16.45*	19.8	5.8	18.44*
Poor readers	16.6	6.0		12.4	4.8	
GMCM						
Good readers	44.6	5.4	54.77*	44.1	4.8	68.04*
Poor readers	28.0	10.1		24.3	8.5	
INSP						
Good readers	856.0	1077.7	.13	972.7	1048.6	5.30
Poor readers	870.0	903.5		627.1	489.0	
INCM						
Good readers	7.2	2.0	11.62*	6.3	1.7	7.49*
Poor readers	4.7	2.2		4.9	1.6	

*Significant at the .01 level.

Satisfactory and Unsatisfactory Comprehension

The third of the hypotheses concerning different groups within the grades stated that there would be no differences between those with satisfactory comprehension, six or more correct answers, and those without satisfactory comprehension on the INCM p· ttest in test results for the other three tests in grades four, six, and eight. Second grade was not considered since only one pupil out of 74 had unsatisfactory comprehension. Tables L, M, and N in Appendix B summarize the analysis of variance for the satisfactory-unsatisfactory comprehension groups. For both of the Gates-MacGinitie Tests, the differences were significant in all three grades. On the INSP, however, significant differences appeared only at the sixth-grade level. Table 13 shows the means, standard deviations, and F ratios for the satisfactory and unsatisfactory comprehension groups in grades four, six, and eight. Large differences are shown between the means on the GMSP and the GMCM tests. Students who scored low on the informal comprehension test also scored low on the Gates-MacGinitie tests and vice versa. On the INSP Test, however, no differences were significant between the groups except at the sixth-grade level where those with unsatisfactory comprehension had the higher mean rate in wpm. The fourth- and eighth-grade

TABLE 13

POSTTEST RAW SCORE MEANS, STANDARD DEVIATIONS, AND F RATIOS FOR SATISFACTORY AND UNSATISFACTORY COMPREHENSION GROUPS ON THE GATES-MACGINITIE TESTS AND THE INFORMAL SPEED TEST IN GRADES FOUR, SIX, AND EIGHT

Test group	$\bar{M}$	S.D.	F ratio
	Fourth Grade		
GMSP			
Satisfactory	20.7	5.8	30.90*
Unsatisfactory	13.5	4.9	
GMCM			
Satisfactory	39.6	8.1	35.58*
Unsatisfactory	27.3	9.5	
INSP			
Satisfactory	406.9	307.7	.04
Unsatisfactory	421.5	367.1	
	Sixth Grade		
GMSP			
Satisfactory	22.3	5.6	16.68*
Unsatisfactory	17.6	5.5	
GMCM			
Satisfactory	43.1	7.3	18.95*
Unsatisfactory	34.4	12.4	
INSP			
Satisfactory	613.8	774.0	9.49*
Unsatisfactory	1242.7	1238.9	
	Eighth Grade		
GMSP			
Satisfactory	19.8	5.9	7.49*
Unsatisfactory	16.3	6.5	
GMCM			
Satisfactory	42.5	7.3	8.79*
Unsatisfactory	36.6	11.8	
INSP			
Satisfactory	861.6	805.4	.20
Unsatisfactory	953.0	1154.6	

*Significant at the .01 level.

unsatisfactory comprehension groups also had higher mean rates than their satisfactory counterparts, but not significantly higher. Thus, the hypothesis is rejected for the Gates-MacGinitie tests at all three grade levels, and for the INSP at the sixth-grade level. It is not rejected for the INSP at the fourth- and eighth-grade levels.

Fourth and Sixth Grades

The final hypothesis stated that there would be no differences between fourth- and sixth-graders on the Gates-MacGinitie tests. Level D of the Gates-MacGinitie tests were administered to both grades. This was the only time when the same test was given to two different grades and, consequently, the only place where statistical comparison could be made across the grades. The two-way analysis of variance testing equivalence of the two grade levels on the two tests is summarized in Tables O, P, and Q in Appendix B. No significant differences appeared between experimental and control groups in fourth and sixth grades. Table D, however, does show that the sixth-grade mean scored for both tests was slightly higher than the scores of the fourth-graders.

Analysis of differences between boys and girls in fourth and sixth grades revealed significant differences on both tests. The mean scores shown in Table 11 show that the highest scores were those of sixth-grade girls,

followed by fourth-grade girls, then sixth-grade boys, and finally, fourth-grade boys. In other words, fourth-grade girls had higher mean scores on both tests than sixth-grade boys. Being a girl counted more than being in sixth grade.

The same differences occurred between "good" and "poor" readers in fourth and sixth grades; "good" readers in fourth grade did better than "poor" readers in sixth grade. Group means have been shown in Table 12. No significant interaction appeared on any of the analyses.

The hypothesis, therefore, is not rejected when fourth- and sixth-graders are grouped according to experimental and control groups. The hypothesis is rejected when the analysis concerns sex or reading ability.

Correlation Matrices

Table R shows the relation of the test results to each other at all four grade levels. In all cases the Gates-MacGinitie test results showed higher correlation coefficients than the informal test results. The Gates-MacGinitie test results were all correlated with each other significantly at all four grade levels. The informal test results, however, showed no significant positive relationship with each other, but in several cases were highly related to the Gates test results. Gates-MacGinitie Comprehension pretest results, for example, were

significantly related to all of the informal pretest results at all grade levels.

The relationship between the informal speed posttests and the pre- and posttest informal comprehension tests were all negative, but significantly so only in the sixth grade. In general, the correlation matrices reflected the same results as the analysis of variance. None of the correlation coefficients were surprising when viewed with respect to the other data in the study.

Discussion

This study attempted to determine the effectiveness of rate training using timed rate drills in grades two, four, six, and eight. Test results after training and in comparison with control groups indicated that the instruction was effective. Most of the other studies using timed rate drills in elementary school also reported increased reading rate, but the other studies differed somewhat from this investigation.

Main Effects

The test that measured the treatment effects most directly was the INSP. Rate in words per minute was separate from comprehension scores. For that test, the results revealed significant differences at all four grade levels between the experimental and control groups.

All the experimental groups at least doubled their reading rate, while the control groups maintained approximately the same rates as on the pretests.

Results of the other two tests, the GMSP and the INCM, were not as perspicuous. The hypotheses were rejected at some grade levels and not at others. But it must be emphasized that, within the limitations of the study and the informal speed test, the effectiveness of the investigator's method of rate training was corroborated.

The GMCM mean pretest scores were compared initially to determine equivalence of the experimental and control groups at each grade level. F ratios showed no significant differences between the groups. Table 5 shows that the means differed by less than one item except at the sixth-grade level. The control groups in sixth grade had a mean raw score that was almost five items higher than the mean of the experimental groups. The difference was not significant, but the higher means of the sixth-grade control groups on all of the pretest results indicated a possible superiority in reading ability. The experimental groups, therefore, were at a slight disadvantage.

The GMSP tests measured rate of comprehension rather than speed of reading in words per minute.

Consequently, the lack of carryover from the rate training method where comprehension was separate from rate was understandable. The experimental groups in second, fourth, and sixth grades all more than doubled their reading rate in words per minute but showed almost no change in rate of comprehension, GMSP. Perhaps greater maturity in reading skills accounted for the eighth-grade experimental groups' significant change in rate of comprehension. The instructional method used in the training sessions allowed unlimited time for answering questions about the reading, whereas the GMSP measured rate and comprehension simultaneously. The younger students were unable to transfer the rate training to a different situation.

One of the first questions always asked in relation to rate training concerns the effect of increased speed on comprehension. Some experts claim that comprehension is improved by fast reading (Amble, 1967; Beckley, 1963; Quantz, 1897). Others claim that comprehension is reduced when speed increases (Bridges, 1941; Carver, 1971), and still others state that there is very little relation between the two (Berger, 1966; Fry, 1963; Shores, 1950; Stroud & Henderson, 1943). The latter group believes that comprehension is more related to intelligence and to the reader's purpose and the

difficulty of the material.

In this study, the results of the INCM posttests indicate that doubled reading rate did lead to slightly reduced comprehension scores. The test results were significant only at the sixth-grade level, but Table 10 shows that all the experimental groups did receive lower mean scores on the posttests than on the pretests of the INCM. The significant difference in sixth grade might be accounted for by two factors. As has already been stated, the experimental groups in sixth grade were slightly weaker in reading ability than the control groups, and it is generally acknowledged that reading ability and comprehension are related. Also, the sixth-grade experimental groups made the greatest gains in speed, increasing from 212 to 1540 wpm, even higher than the eighth-grade mean. Consequently, it is not surprising that sixth-grade comprehension suffered. In other words, doubled reading rate in grades two, four, and eight affected comprehension very little, but rate that increased seven times over for sixth grades did result in a significant reduction in comprehension.

No other studies have been found that are the same as this investigation, but several rate-training studies at the elementary level are similar enough to allow for limited comparisons. The few investigations

of rate training below third-grade level each reported effectiveness of one method. The only investigation resembling the author's was that of Morrison and Oakes (1970) who found that guided skimming lessons were effective for increasing the reading rate of second-, third-, and fourth-graders as compared to matched control groups.

Another study somewhat similar to the present investigation was carried out by Bridges (1941) with fourth-, fifth-, and sixth-graders. Both studies trained one group for comprehension, one for speed, and used a third group as a control. Bridges found, however, that the group trained for comprehension gained more in speed than the group trained for speed. She concluded that speed training was not advisable for fourth-, fifth-, and sixth-graders.

Unlike Bridges, three other studies of the effectiveness of timed rate drills with books did report success (McCracken, 1960; Skarbek, 1965; Swalm, 1969). McCracken worked with gifted pupils only, but Skarbek and Swalm, like the author, worked with complete classes. Skarbek emphasized rate of comprehension while Swalm, like the investigator, separated the reading rate from the comprehension in the timed rate drills and the informal testing.

The study that resembled the present investigation

most at the junior high level was carried out by Koziey (1967). The scores of seventh-, ninth-, and twelfth-graders were compared after 10 weeks of timed rate drills. Koziey noted that the seventh-graders gained the most at the conclusion of training, but that ninth-graders were ahead six months later.

"You get what you teach for" is an educational aphorism that is applicable for this investigation and most of the other studies of rate. If rate was emphasized, rate gains followed. If comprehension or flexibility was emphasized, those factors were most likely to change. In this investigation, increased reading rate in words per minute was stressed for the experimental groups, and all of those groups made significant progress as compared to the control groups.

Secondary Effects

Nearly all of the studies concerning reading rate include some analysis of the factors of sex, reading ability, and the effect on comprehension of changes in reading rate. Sometimes those factors are the major variables under consideration, but more often, as in this investigation, they are of secondary importance. The literature concerning reading rate in relation to sex, ability, and comprehension has been reviewed in Chapter II.

In general, investigators have found that girls read better than boys in the lower grades (National Assessment, 1972; Ong, Schneider, & Moray, 1960; Spache & Spache, 1969). The present study found similar results. Girls were significantly better readers in second grade, slightly better but not significantly so in fourth and sixth grades. The experts also generally agree that sex differences in reading disappear around the eighth grade. The eighth-grade boys in the present study had a slightly higher mean score on the Gates-MacGinitie Comprehension posttest, but there were no significant differences between the scores of the boys and girls on any of the tests in eighth grade.

At all grade levels, however, differences in reading ability or intelligence are usually reflected in posttest scores. Carlson (1949) found that the effectiveness of fast readers depended to a large degree on level of intelligence. But Letson (1958) and Shores (1950) found that fast readers were not necessarily the best readers. The present investigation found similar results. The good readers scored significantly higher than the poor readers on all the tests except the informal speed test, where the posttest scores were quite similar. Apparently other factors accounted for the speed than just ability. Botha and Close (1964) and

Gifford and Marston (1966) attributed reading speed largely to the degree of motivation or need for achievement. The present study seems to support those experts. Certainly reading ability alone did not account for effectiveness of the rate training.

Finally, the relationship between rate and comprehension was examined and compared with results of other investigations. The results of the present investigation do not indicate any clear-cut relationship between rate and satisfactory or unsatisfactory comprehension. In second grade, all subjects but one had satisfactory comprehension (six or more correct answers on the informal test). In the fourth and eighth grades, there was very little difference between the rates of those with satisfactory comprehension and those without. But in sixth grade, the unsatisfactory comprehension group read significantly faster than those with comprehension of six or more. The investigator agrees with Carlson (1949) that any program of reading instruction that emphasizes speed is apt to be disastrous to the poor comprehenders. The problem remains, however, to determine why, of those with unsatisfactory comprehension, only the sixth-graders achieved significantly faster rates than the group with good comprehension.

The final comparison of variables in this study

was between the fourth and sixth grades on the Gates-MacGinitie tests. That was the only place at which treatments could be compared across grades, because it was the only place where the same tests were used for different grades. Comparison of two grades indicated the same results many experts have found: that the higher grade pupils perform at a higher level. Morrison and Oakes (1970) found that fourth-graders gained more than second- and third-graders from skimming training. McBride (1969a) trained third- through eighth-graders in the "panoramic" method of reading and claimed that the seventh- and eighth-graders gained most. Similarly, the sixth-graders in the present investigation scored higher than the fourth-graders on the Gates-MacGinitie tests.

Examination of the secondary effects of the treatments revealed results in agreement with many other studies concerning rate training and the relation of sex, reading ability, comprehension, and grade level.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

This investigation explored the effectiveness of timed rate drills as a method of increasing reading rate in grades two, four, six, and eight. Each grade level represented a separate study. Although the training and control methods were similar at each grade level, the tests and materials were of necessity different in order to match the reading level of each grade. The major problem at all grade levels was to determine if the rate training was effective, and if the training resulted in changed comprehension scores. The variables of sex, reading ability, and comprehension level were also studied. Finally, the results of one test taken by both fourth- and sixth-graders were compared.

The 350 subjects in the investigation were all students in the Princeton Regional Schools. At each grade level, four classes were chosen randomly and assigned randomly to experimental or control groups. Random assignment to classes was assumed on the basis of school policy. Two of the classes at each grade level

received the experimental rate training. Twenty lessons of timed rate drills and motivational talks were all given by the investigator. The chief materials used were the Controlled Reading Study Guides intended for one grade level below the grade of the study. The Guides contained 25 reading selections, each followed by a 10-question comprehension quiz. The first two selections in each guide were used as the informal pre- and post-tests for speed and comprehension, taken in A-B-B-A form.

The other measuring instruments used at all grade levels were the appropriate level of the Gates-MacGinitie Speed and Accuracy Test and the Gates-MacGinitie Comprehension Test, also given in A-B-B-A form to offset any differences between forms of the tests. Pretest scores on the Gates-MacGinitie Comprehension Tests showed no significant differences in reading ability between experimental and control groups at any grade level.

One of the control-group classes at each grade level received training. Using the same Controlled Reader Study Guides, the investigator gave 20 lessons emphasizing comprehension rather than speed. The other control class received the pre- and posttests only, and no training from the investigator.

One-way analysis of variance was conducted between posttest mean raw scores to evaluate the effect

of treatment at each grade level. One-way analysis of variance was also used to study the variables of sex, reading ability, and satisfactory or unsatisfactory comprehension. A two-way analysis of variance was employed to determine equivalence of the fourth- and sixth-grade groups on the Gates-MacGinitie tests. The .01 level was established as the significance level of the investigation.

The Gates-MacGinitie Speed and Accuracy posttest mean scores revealed no significant differences between experimental and control groups in grades two, four, and six. In grade eight, however, the experimental group scored significantly higher than the control group. The GMSP measured rate of comprehension rather than separate words-per-minute rate as in the training. The results appear to show that eighth-graders transferred the rate gain to a different kind of measurement, while the younger students did not transfer their rate gains.

The Gates-MacGinitie Comprehension scores for all four grade levels were almost the same on the pre- and posttests, as might be expected with a reliable standardized test after only an eight-week interval.

The informal tests, both speed and comprehension, measured the skills as they were taught, and, not surprisingly, reflected the training results much more than

the Gates-MacGinitie tests. The rate training was significantly effective in all four of the grades. Rate was more than doubled for all experimental groups, while their control counterparts made rate gains of only a few words per minute. Standard deviations were large in all grades indicating wide variability in the individual rate changes.

One of the major concerns of the investigation was the effect of the training on the comprehension scores. Informal comprehension scores were not significantly different for the experimental and control groups in second-, fourth- and eighth-grades. In sixth grade, however, the comprehension scores of the experimental groups were significantly lower than the control group scores. The mean posttest score on the 10-question informal test was 5.3 for the experimental groups as compared to 7.5 for the control groups. The difference is perhaps not surprising when compared with the rate gain of more than 700%. In the second, fourth, and eighth grades, the informal rate gains were approximately 100%, with no significant differences in comprehension, but in sixth grade, where the rate for the experimental group changed from 212 to 1540 words per minute, the mean comprehension scores dropped about one and a half items.

To summarize the main treatment effects, rate

training was effective in all four grades as measured by the informal speed test. Rate, as measured by the GMSP, was significantly greater for experimental groups only in eighth grade. Informal comprehension decreased significantly only at the sixth-grade level where the rate gains were very great.

Four secondary hypotheses were also studied. The treatment effects for boys and girls, as measured by the Gates-MacGinitie tests, indicated results generally similar to other investigations: girls performed better in the lower grades than boys, but by eighth grade, no significant differences appeared between the sexes. On the informal tests, there were no significant differences except in fourth grade, where the girls' informal comprehension scores were significantly higher than the boys' scores.

When the mean scores of "good" and "poor" readers were compared, results were clear and uniform. As would b expected, the "good" readers scored significantly better than the "poor" readers on both of the Gates-MacGinitie tests and on the informal comprehension test. But on the informal speed test, there were no significant differences between "good" and "poor" readers at any grade levels. The rate changes in words per minute seem not to be related to ability.

Another variable studied grouped the subjects according to their informal comprehension scores. Those with either pre- or posttest INCM below six were put in the unsatisfactory-comprehension group, those with both scores of six or above were in the satisfactory-comprehension group. Second-graders were not included in the analysis because only one student in the sample scored below six on either test. The results at fourth-, sixth-, and eighth-grade levels indicate that those with satisfactory comprehension scores had significantly higher Gates-MacGinitie scores. In fourth and eighth grades there were no significant differences in informal rate between the satisfactory- and unsatisfactory-comprehension groups. In sixth grade, however, a significant decrease did occur. The poor-comprehension group read twice as fast as the satisfactory comprehension group. Apparently sixth-graders were less able than fourth- and eighth-graders to match their speed with ability to answer the 10-question tests.

Two-way analysis of variance was conducted on the Gates-MacGinitie Level D scores of the fourth- and sixth-graders. No significant differences appeared between experimental and control groups. Sex and reading ability did both show significant differences. The fourth-grade girls were better readers than the sixth-grade boys, and

the fourth-grade "good" readers were better readers than the sixth-grade "poor" readers.

Conclusions

The results of this investigation show that the rate-training method used by the investigator was effective in grades two, four, six, and eight as measured by the informal tests of speed and comprehension. In all the grades the groups with rate training scored significantly higher than those that did not have rate training.

All of the other conclusions are true for some grade levels and not for others. Examination of the variables of sex and reading ability resulted in conclusions that other investigators have also found: that girls usually are better readers in the early grades, and that better readers do better on tests. What was unusual and of great interest was how many of the expected results did not apply to the informal speed test. The training as measured by that test did not result in differences between boys and girls or "good" and "poor" readers. In fourth and eighth grades there was no difference between the rate scores of those with satisfactory comprehension and those without. But in sixth grade the group with unsatisfactory comprehension scored significantly higher on the rate test. Sixth grade seemed to be the grade that produced the most unusual results of the four grades

studied.

As Fry (1963) has said, reading rate can be doubled with little or no loss in comprehension. When rate gains are very high, much more than doubled, comprehension usually suffers as it did with the sixth-graders in this study. The reasons for the sixth-grade gains are unknown. Perhaps motivational factors account for the differences. Certainly motivation must have accounted for the informal test rate gains regardless of sex or reading ability.

The rate training was effective at all four grade levels. Consequently, it is difficult to draw any conclusions about differences between grades. As the fourth- and sixth-grade comparison of Gates-MacGinitie scores showed, older students generally read better and make greater gains, but there is much overlapping between grade levels. Another interesting comparison between the grades was shown in the uniformly high comprehension scores of the second-graders. Only one informal test score was below six in all the experimental group pre- and posttests. Perhaps the high standard of comprehension is a good argument in favor of rate training for second-graders. If they can double their reading speed while holding on to superior comprehension scores, perhaps they deserve the advantages of improved speeds.

The wide variability in rate scores at all grade levels indicated that rate training worked more effectively for some individuals than for others. A few generalizations can be made about rate gains and other variables, but the results of this investigation do not indicate when or why it is effective for one individual as compared to another individual at any one grade level. It would seem to this investigator that, as with other reading skills, reading rate training is something that some pupils are ready for by second grade, and some are not yet ready for by eighth grade. Ideally the instruction should be made available for every pupil when he is ready to handle it.

Recommendations

This investigation indicated that one method of rate training was effective in grades two, four, six, and eight. But the results were based on groups, not on individual needs. More study is needed to determine what factors are indicative of readiness for rate training. A need exists, also, to determine what accounts for sacrifice of comprehension in favor of rate such as occurred at the sixth-grade level in this investigation.

Another recommendation stems from the limited reliability of the informal tests used in this study. Although many experts have pointed out the need to

measure rate and comprehension separately and with continuous narrative, no standardized tests exist as yet that fit those qualifications. There is a real need for reliable rate tests for all grade levels that meet the above qualifications.

It is also recommended that future investigations of reading rate in the elementary grades include follow-up testing to determine how long the effects of the training last. It might give some insight into the greater effectiveness of the training at one grade level over another to test after a stated interval and study the change in rates. More investigations of reading rate, at the lower elementary grade levels especially, are needed with larger samples and follow-up after a period of time.

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APPENDIX A

INSTRUCTIONAL OUTLINES AND MATERIALS

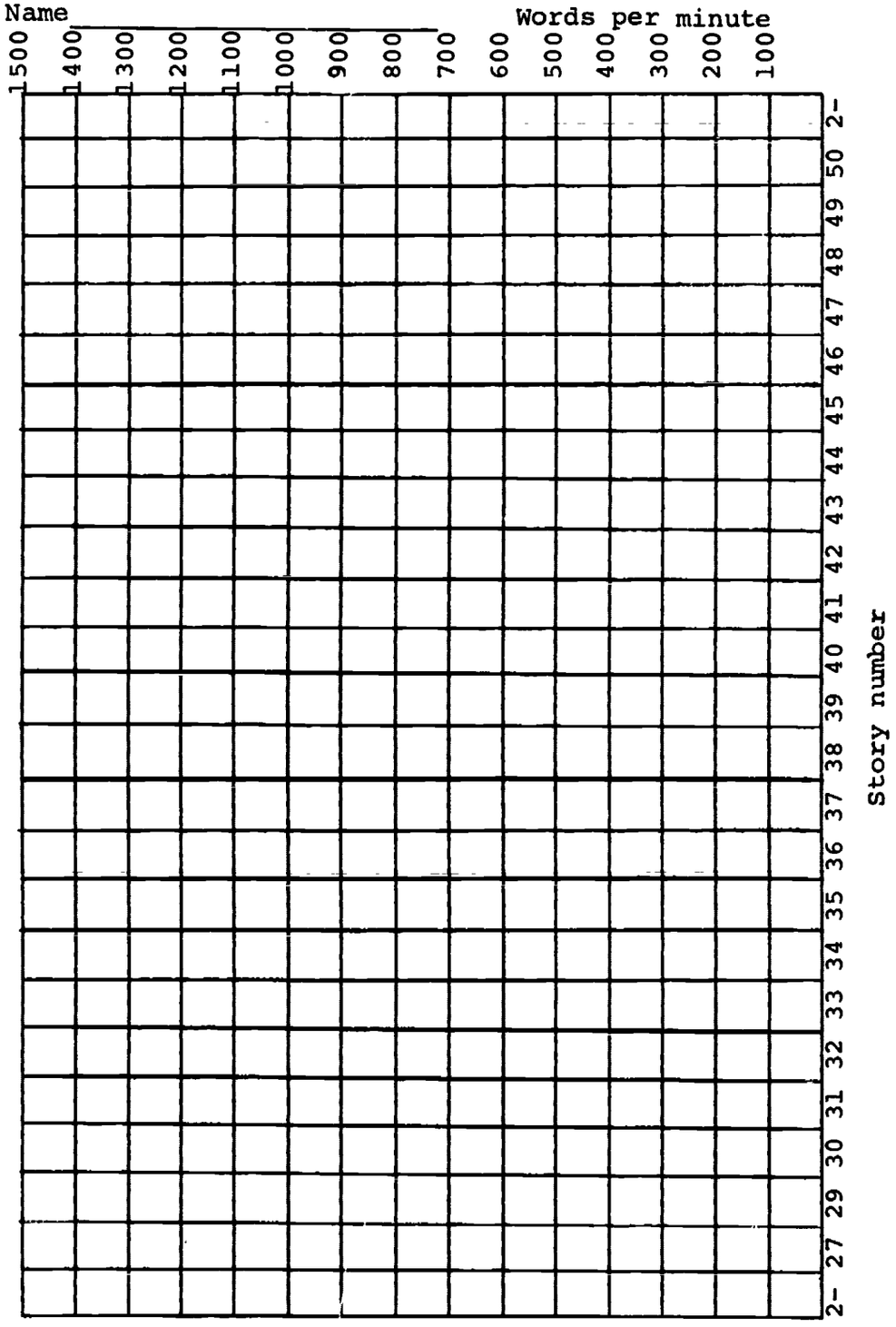
INSTRUCTIONAL OUTLINE FOR THE EXPERIMENTAL GROUPS

Week	Lesson	Instructional content
1.	1.	Timed rate drill (TRD) and explanation of procedures
	2.	TRD and reasons for reading faster
	3.	TRD and motivation for increased speed
2.	4.	TRD and eye movements
	5.	TRD and subvocalization
3.	6.	TRD and comprehension
	7.	TRD and tachistoscope: vocabulary and motivation
	8.	TRD and tachistoscope: vocabulary and motivation
4.	9.	TRD and controlled reader: motivation
	10.	TRD and skimming
5.	11.	TRD and flexibility concept
	12.	TRD and controlled reader: motivation
	13.	TRD and SQ3R
6.	14.	TRD and tachistoscope
	15.	TRD and reading accelerator and other methods
7.	16.	Two timed rate drills
	17.	Two timed rate drills
	18.	Two timed rate drills
8.	19.	TRD and review of causes of slow reading
	20.	TRD and review of instruction and motivation for future

INSTRUCTIONAL OUTLINE FOR THE CONTROL GROUPS

Week	Lesson	Instructional content
1.	1.	Reading selection (RS) and explanation of procedures
	2.	RS and definitions of comprehension
	3.	RS and motivation for high comprehension
2.	4.	RS and eye movements
	5.	RS and vocabulary work
3.	6.	RS and reading for details
	7.	RS and reading for main idea
	8.	RS and inferential questions
4.	9.	RS and patterns of learning and forgetting
	10.	RS and SQ3R
5.	11.	RS and vocabulary: context clues
	12.	RS and study skills
	13.	RS and structural analysis
6.	14.	RS and review of SQ3R
	15.	RS and vocabulary: affixes
7.	16.	Two reading selections
	17.	Two reading selections
	18.	Two reading selections
8.	19.	RS and causes of poor comprehension
	20.	RS and review

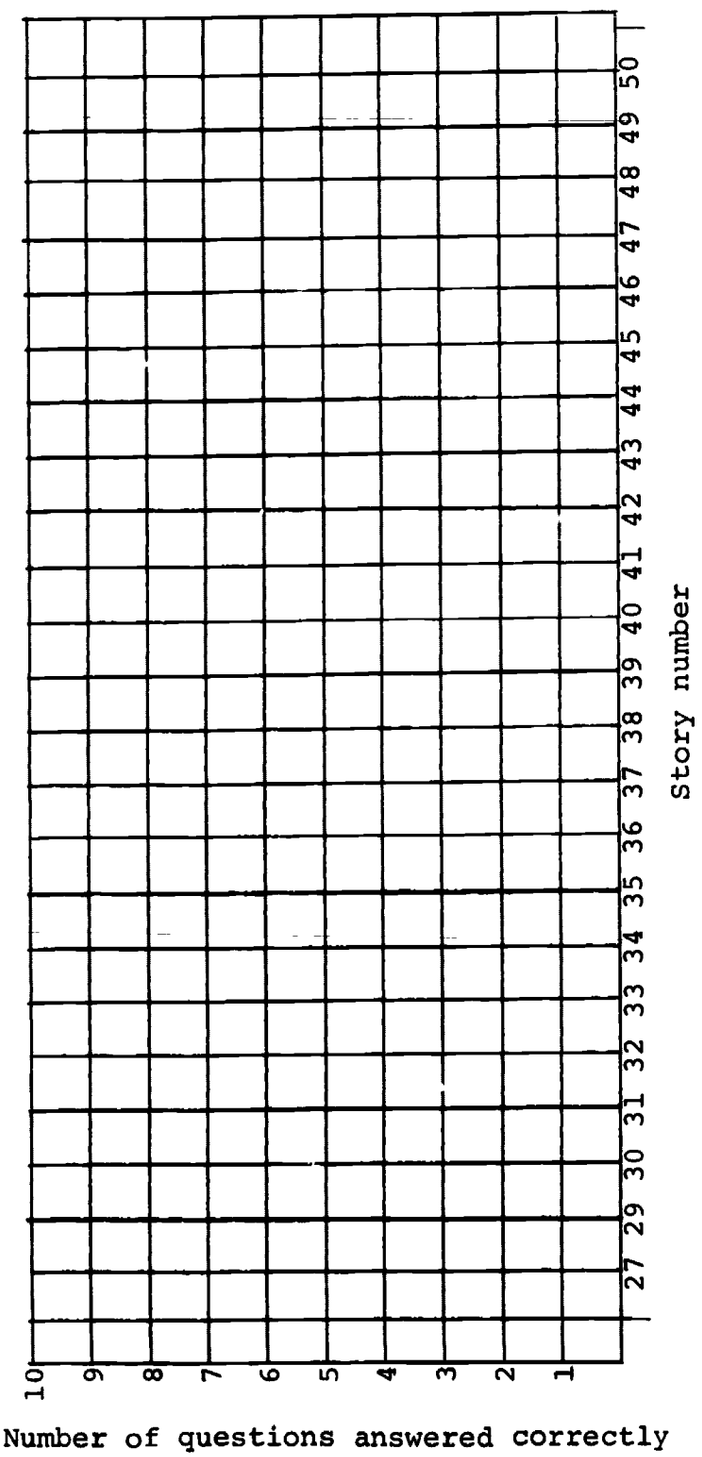
SPEED GRAPH, FOURTH GRADE



COMPREHENSION GRAPH, FOURTH GRADE

Grade_____

Name_____ Teacher_____



FACSIMILE OF TWO FOOT BY THREE FOOT WALL CHART USED FOR INFORMAL SPEED TEST AND TIMED RATE DRILLS WITH SECOND GRADE, FOR STORIES WITH 387-416 WORDS

Book A		
1585 (15 sec.)[a]	122 (3 - 15)	63 (6 - 15)
793 (30 sec.)	113 (3 - 30)	61 (6 - 30)
530 (45 sec.)	106 (3 - 45)	59 (6 - 45)
398 (1 min.)	99 (4)	57 (7)
317 (1 - 15)	93 (4 - 15)	55 (7 - 15)
264 (1 - 30)	88 (4 - 30)	53 (7 - 30)
226 (1 - 45)	83 (4 - 45)	51 (7 - 45)
198 (2)	79 (5)	49 (8)
176 (2 - 15)	76 (5 - 15)	47 (8 - 15)
158 (2 - 30)	72 (5 - 30)	45 (8 - 30)
144 (2 - 45)	69 (5 - 45)	43 (8 - 45)
132 (3)	66 (6)	41 (9)

[a]The minutes and seconds were written on the chart with small, light print as an aid to the investigator, and could not be seen by the students.

Sample Reading Selection and Informal Speed Test
from Controlled Reading Study Guide A,
for Second Grade

A-28

THE BARN BIRDS

"What a day it is!" said Peter and Edna's father. "This is a good day to do all the yard work. Will you children help me?"

"Yes," said Peter, "Edna and I will help you. It is fun to work in the yard."

"Then let's go," said the children's father. "We will get to work right away. But first I have to go to the barn and get my old coat and hat. I put them there the last time I worked in the yard."

"All right," Peter said. And the three went out to the barn.

Father put on his coat and then looked around for his old black hat. "Here is a surprise," he said. "Come here Peter and Edna. Look in my old black hat!"

The children looked in.

"Look at all the baby birds," said Peter.

Their father said, "They are so new that they are all wet. My old hat makes a very good home for them."

"But Daddy, there are two cats that live in the barn," said Peter. "And you know cats. They go after birds."

"We have to get the birds out of the barn," said Edna.

"We can take them to the house," said Peter.

"Then the mother bird could not find them, Peter," said his father. "We will have to put them where the mother bird can find them."

"We can put them in a tree by the house," said Edna.

"Yes," said Edna's father, "that will be good."

"But what about the cats?" asked Peter.

"The cats don't go up by the house," said his father. "They live in the barn and they don't go away from it."

So all three went up to the house with the baby birds in the hat. The children's father put the hat up in the tree.

"What about your hat, Father?" asked Peter.

"The little birds can have my old hat," said Peter's father. "It will make a very good home for them. I can get another hat. After all, all I can do with a hat is put it on. The birds have made it a home. Now let's get to that yard work!"

Sample Comprehension Quiz and Informal Comprehension Test from Controlled Reading Study Guide A, for Second Grade

A-28

THE BARN BIRDS

Circle the right answer.

1. Peter and Edna's father said, "This is a good day to do all the _____."	a. house work b. yard work
2. Peter said that he and Edna _____.	a. wanted to help b. wanted to play
3. In the hat were _____.	a. baby kittens b. baby birds
4. The children wanted to get the birds _____.	a. out of the barn b. away from the house
5. Peter and Edna's father put the hat _____.	a. in the house b. in the tree

---

Circle the right answer.

6. Where did Father put his old coat and hat last?	in the car	in the barn
7. How did you know that Father had not worked in the barn for some time?	His hat had birds in it.	His old coat was wet.
8. How many cats live in the barn?	three	two
9. What did Peter say that the cats do when they see birds?	run away from them	go after them
10. What did Peter and Edna find out?	All birds like to live in hats.	Birds make homes in funny places.

Sample Reading Selection and Informal Speed Test
from Controlled Reading Study Guide C,
for Fourth Grade

C-27

ALL ABOUT NAMES

It's the first day of school. You walk into your classroom and see many new faces. Your new teacher tells you her name. Soon, you know the names of all the others in your class. And they know your name, too.

Have people always had names? Yes. And have they always known the names of the people around them? No!

Many years ago, people believed there was something magic about their names. They believed that an enemy who knew their names would have power over them and could hurt them. And they also believed that a name would wear out if it was spoken too often. That is why people often kept their names a secret, or told their names to only a few people.

But people could not say "Hey, you," each time they wanted to call someone. So they called each other by "nicknames." A man might be called "Red-haired One" because of his bright red hair. Or he might be called "Light-foot" because he walked very lightly.

As time went on, most people stopped believing that there was something magic about names. Then they were not afraid to tell their names to others.

Soon there were so many people that there were not enough names to go around. John, a very common name, might be used by many men living in the same place. One might be a farmer, so he became known as John the Farmer. Another might be called John the Hunter, or John the Shoemaker. Men were usually known by the kind of work they did.

Some people used names that they read in the Bible. Even today many people give their children names taken from the Bible.

In some countries, the father of the family got a new name when his first son was born. If the child was named William, the father was known from then on as "Father of William." In other countries, the baby was

given his father's name. William's baby boy was known as William's Son.

As more and more people moved into the cities, it became harder to tell them apart because so many of them had the same name. So a new kind of name came to be used --the family name. All the people in one family used the same family name. If a man had been known as William's Son, his family might decide on "Williamson" as their last name. If a family lived on top of a hill, they might be known as the "Hill" family.

In the United States today, as in most other countries, almost everyone has at least two names. Each person has a first, or given name, and a last, or family name. Many people also have a middle name. And all these names are very important to our way of life. Without them we could not tell one person from another.

Most people like their names, but what about those who don't? Well, they can change their names, and they often do. Many people feel their names are too hard to say. They change their names to simple ones that everyone can say.

Others feel their names are too strange-sounding. There is a story about a man named Joe Frankenstein who got tired of hearing people joke about his name. So he changed it to Frank N. Stein.

Many people are called by nicknames, even though they have fine first names. These nicknames are often given to them when they are little children. As they grow up, more and more people come to know them by their nicknames, until their real names are almost forgotten.

The next time you meet someone, listen very carefully to his name. It may tell you where his family once came from or what they once did. It may be a nickname that tells you something about him. You can find out many things about a person, just by knowing his name.

Sample Comprehension Quiz and Informal Comprehension Test from Controlled Reading Study Guide C, for Fourth Grade

C-27

ALL ABOUT NAMES

Choose the best answer.

1. Knowing the names of everyone in your class makes it easier for you
   .....a. to make friends with them.
   .....b. to tell them apart.
   .....c. to know all about them.
   .....d. to give them nicknames.

2. People used to believe
   .....a. that there was something magic about their names.
   .....b. that names were not really important.
   .....c. that it was bad luck to change their names.
   .....d. that everyone should have the same name.

3. People also believed that their name would wear out
   .....a. if it was spoken too often.
   .....b. if their enemies knew it.
   .....c. if it was not used enough.
   .....d. if it was changed too often.

4. Nicknames first came about because
   .....a. nicknames are easier to remember.
   .....b. people have always made fun of others.
   .....c. people were not given names.
   .....d. people did not want to tell their real names.

5. When many men in the same place had the same name, they were known
   .....a. by the color of their hair.
   .....b. by the kind of work they did.
   .....c. by the names of their children.
   .....d. by the number of children they had.

6. In some countries, a man changed his name
   .....a. when his first daughter was born.
   .....b. when all his children grew up.
   .....c. when his first son was born.
   .....d. each time a child was born.

7. The family name came to be used
   .....a. by people who didn't like their first names.
   .....b. as more and more people moved into cities.
   .....c. because people did not have first names.
   .....d. as families grew larger and larger.

8. In the United States today, each person has
   .....a. a first, middle, and last name.
   .....b. a first name, nickname, and last name.
   .....c. a first name and a middle name.
   .....d. a first and last name.

9. Some people change their names because they
   .....a. are too common.
   .....b. do not sound strange enough.
   .....c. are too hard to say.
   .....d. are not long enough.

10. This story is mainly about
   .....a. why people long ago kept their names secret.
   .....b. how the use of names has changed through the years.
   .....c. why some people have nicknames and others do not.
   .....d. why some people change their names.

Sample Reading Selection and Informal Speed Test
from Controlled Reading Study Guide E,
for Eighth Grade

E-4

SINGING WIRE

In the summer of 1861, two crews of men were struggling to complete the first transcontinental telegraph. One crew, with shovels and wire in their hands and guns at their sides, was moving east from California. The other crew was moving west across the plains from Omaha, Nebraska. When the two crews met, the telegraph wire would stretch from coast to coast.

As mile after mile of wire crossed their buffalo hunting grounds, the prairie Indians had been growing more and more angry. Explanations that the wire carried words meant nothing to them. "What are words?" they asked. How could a person explain words when the Indian language was made up of pictures, and tribes talked to one another in sign language.

The Indians were sure of only one thing. This Iron Snake, as they called the telegraph, would destroy their hunting. Though they could not understand electricity, they knew there must be an unknown power in the wire. To them it could be nothing but evil power.

Most of the Indians saw the telegraph wire as a fence that would stop the buffalo from going to their hunting grounds. "What shall our children eat when the buffalo is gone?" was the question asked at the meetings of the chiefs. They must destroy this evil before it went any further.

The men of the westbound crew worked as fast as they could. Ten teams of two men each, armed with long shovels, dug post holes at points marked on their maps. These were followed by the pole crews. They set the poles up straight and filled in the holes with dirt and stones.

This crew, led by Ed Creighton, had gotten about fifty miles beyond Julesburg, Colorado. One morning, a scout galloped into camp with news that Indians had attacked a wagon train. The news frightened the work crew. How much longer before they would be attacked?

Ed Creighton knew he must act. He decided to invite

Chief Black Hawk to visit the camp. Perhaps if the chief saw the telegraph working he would understand it better.

Black Hawk arrived with a band of braves. They were taken to the tent where the telegraph was. The news and messages dropped off that morning by Pony Express were being sent out. The Indians gathered about the small, hand-operated instrument and listened to its click-clacking.

Again the telegraph was explained to them. Creighton told them that the sounds they heard ran along the wire faster than the deer runs. These same sounds were heard where the line ended. There in the Land of the Morning Sun, near the Great Salt Water, these sounds were again made into words. The Indians' eyes followed the hand signs of the interpreter, but their faces showed no sign that they understood.

It seemed as though trying to explain was hopeless. Then during a pause in the sending, the operator at Julesburg broke in. He click-clacked the news that Chief War Cloud of the Ogalala Sioux was in town.

Black Hawk was asked if he knew War Cloud. Black Hawk nodded. "War Cloud good friend." Asked if he would like to send a message to War Cloud, Black Hawk said, "Tell War Cloud no rain here. Grass burn. Where buffalo?"

The operator sent the message to Julesburg, asking them to reply right away. There was not long to wait. "Sky dark here," came War Cloud's message. "Clouds gather. Soon big rain. Plenty buffalo. War Cloud greets brother Sioux."

But Black Hawk looked angry. The look on his face showed that he believed this message was nothing more than a white man's trick. He stood silent for a few moments. Then suddenly, as a knowing look spread over his face, he said, "Ask War Cloud where Ogalala braves now and what they do."

He smiled and looked at his braves gathered around him. Now he would prove to them and to all that he had trapped the palefaces in their own lie. No white man could know the answer to that question.

Within minutes the reply came. "Ogalala braves do war dance at big white rock that stands high."

The look on Black Hawk's face changed to wonder. "Is big magic!" he exclaimed. His eyes looked as if the Great Spirit himself had spoken. "White man talks with wings."

For an hour the Indians remained in the tent, listening to the explanation of the telegraph, which now seemed easier to understand. Just before leaving, one brave halted and listened to the wind whistling through the wires overhead. "Why does wire cry?" he asked.

"It does not cry," came the explanation. "Wire sings. Wire sings with good news of rain and many buffalo." There was silence for a moment as this message was taken in. Then an old Indian lifted a finger toward the wire, and nodding his head, he announced, "The Singing Wire."

From then on, there was no more trouble from the Indians and at last, the crews from the East and West met. The singing wire was complete. On the evening of October 24, 1861, came the first transcontinental message. It was a telegram from the mayor of San Francisco:

"The Pacific to the Atlantic sends greetings and may both oceans be dry before a foot of all the land that lies between them belongs to any other than our country."

Sample Comprehension Quiz and Informal Comprehension Test from Controlled Reading Study Guide E, for Eighth Grade

E-4

SINGING WIRE

Check Your Comprehension

Choose the best answer.

1. When the telegraph system was completed it would go from
   .....a. California to Omaha, Nebraska.
   .....b. the Atlantic to the Pacific.
   .....c. California to Julesburg, Colorado.
   .....d. Julesburg to Omaha, Nebraska.

2. The Indians thought the telegraph was evil because
   .....a. they were afraid it would destroy their hunting.
   .....b. they believed anything the white man said was evil.
   .....c. they were afraid of the electricity in the wires.
   .....d. the poles were on the Indians' land.

3. The westbound crew was made up of
   .....a. ten teams of two men each.
   .....b. five teams of three men each.
   .....c. twenty teams of two men each.
   .....d. five teams of our men each.

4. The crew was frightened
   .....a. when they saw Chief Black Hawk.
   .....b. when they heard that the Indians were getting ready for war.
   .....c. by news that Indians had attacked a wagon train.
   .....d. by an Indian attack on their camp.

5. Creighton, in charge of the crew, decided to
   .....a. hurry the work as much as possible.
   .....b. explain to the Indians how the telegraph worked.
   .....c. try to frighten the Indians.
   .....d. stop the work for the time being.

6. The Indians came to the telegraph tent
.....a. to attack the white men.
.....b. to ask Creighton to remove the telegraph wires.
.....c. because Creighton had asked them to come.
.....d. because their chief wanted to send a message.

7. When Black Hawk received the first message from War Cloud he
.....a. was very pleased.
.....b. was angry with War Cloud.
.....c. thought it was a white man's trick.
.....d. understood the use of the telegraph.

8. The Indians realized there had been no trick when
.....a. word came from Julesburg that Chief War Cloud was there.
.....b. the message came from War Cloud about the Ogalala braves.
.....c. the message came from War Cloud about the buffalo.
.....d. word came that Chief War Cloud sent greetings to Chief Black Hawk.

9. The Indians were told, "The wire sings," to show them that
.....a. the telegraph was an evil thing.
.....b. they should be afraid of the telegraph.
.....c. the telegraph was a good thing.
.....d. the telegraph was noisy.

10. The main idea of this story is that
.....a. the Indians wanted to prevent the telegraph poles and wires from being put up because the telegraph would spoil their hunting grounds.
.....b. by showing Black Hawk how the telegraph worked, the Indians were able to learn where they could find plenty of buffalo.
.....c. by explaining how the telegraph worked, Ed Creighton was able to show the Indians that the telegraph was good, not evil.
.....d. because they were slowed down by the Indians' attack, Creighton's crew was the last to reach Salt Lake City.

Sample Reading Selection and Informal Speed Test
from Controlled Reading Study Guide HG,
for Sixth Grade

HG-5

CHASED BY THE TRAIL

The Yukon is a hard and demanding territory. Walt Masters grew up in the bleak and frigid atmosphere of the gold mining camps of the North. He learned to take some pride in himself and to be unafraid. Shame, to him, lay not in the failure to accomplish what he set out to do, but in the failure to strive. By the time he was fourteen and able to live on the ice-locked river by himself, he had learned to take the reverses of fate in his stride.

He had passed the winter on his father's claim, the Mazy May, and was now camped on an island in the Yukon River with an Indian boy, Chilkoot Jim. It was late in the spring, just before the breaking of the ice on the river. The weather was quite warm, and the days were growing marvelously long. Even Chilkoot Jim was surprised at the suddenness with which summer was coming on.

It was plain that the time was fast approaching when the Yukon would again run free. Great fissures were splitting the ice in all directions, and the water was beginning to flood through them and over the top. On this morning a frightful rumbling brought the boys hurriedly from their blankets. Standing on the bank, they soon discovered the cause. The Stewart River had broken loose and had reared up a colossal ice jam where it entered the Yukon, barely a mile above their island. While most of the ice in the Stewart had thus piled up, some of it was now flowing under the Yukon ice, pounding and thumping at the solid crust of ice above it. Chilkoot Jim was sure that the ice would break up that day.

As they stood their watching the frozen river, they saw a man and a dog team making a wild dash across the ice. Just as he seemed to have reached the safety of the island, a wild commotion of gushing water and cracking ice appeared behind him and turned the man, sled, and dogs over into a hip-deep pool of icy water and slush. The man, caught in the tangle of traces and lines, whipped out his knife and cut the dogs and himself free. Jim and Walt could only stand by and watch until the man struggled out of the water near the shore. Then they pulled him up to the fire, warmed him, and gave him food from their knapsacks.

It turned out that he was trying to get to an old prospector named Charlie Drake, who was camped on the opposite shore. Charlie's former partner was dying in Dawson, and the messenger wanted to get the news to Charlie at his camp before the man died. However, the exhausted man was in no condition to take the message the rest of the way.

The river had now risen twenty feet. All noise had ceased. Countless tons of ice and water were silently waiting for the moment when all bounds would be broken and the mad rush to the sea would begin. Suddenly, without the slightest apparent effort, everything began to move downstream. The jam had broken! The frozen water dashed past them with a mighty churning and grinding, and it wasn't until the firsh rush had passed and the water had regained its former level that Jim cried, "Look at the trail going by!"

And in truth it was the trail going by--the trail of ice upon which they had traveled and camped the previous winter. Looking up the river they saw that no more ice was coming down, although there were several more unbroken jams still to come down. They thought that there just might be time to paddle across the Yukon to get the message to Charlie so he could get to Dawson in time to see his partner before he died. Walt looked questioningly at Jim.

Jim gave his approval and without another word they carried the canoe down to the river edge. Each knew of the danger in what they were about to attempt, but they also knew of the bond of comradeship between Charlie and his partner.

With skill born of long practice, they launched the canoe and were soon making it spring ahead with each stroke of the paddles. A steady procession of half-submerged ice cakes drifted by, and it required the utmost vigilance and skill to thread them safely.

Several times they were nearly swamped, but saved themselves by quick work with the paddles. All the time the pillar of smoke from Charlie Drake's camp grew nearer and clearer. However, it was still on the opposite shore, and they knew they had to get further up the river before they attempted to shoot across.

Every moment was precious. There was no telling when the Yukon would suddenly unleash another colossal

mountain of roaring ice and water. So they held their course until they were a quarter of a mile above Charlie's camp.

Walt turned around and nodded to Jim; Jim nodded in silent agreement. The canoe turned and shot out against the current at a forty-five degree angle. As they looked up from their flashing paddles, they could see Charlie and another man come down to the shore to watch their progress.

Five hundred yards; four hundred; the canoe surged ahead. The paddles were dipping, dipping in a rapid rhythm--and then a warning shout from the opposite shore sent a chill through their hearts. Round the great bend just above them came the roar of a mighty wall of glistening white. Behind it, urging it to lightning speed were a million tons of long-pent-up water.

With two swift strokes they whirled the canoe downsteam. They had to keep ahead of the rushing flood. It was impossible to make either bank at the moment. Every ounce of their strength went into the paddles, and the frail canoe fairly rose and leaped ahead at every stroke. They said nothing. Each knew the danger and had faith in the other. The shoreline, trees, and the Stewart River flew by at an amazing rate but the two boys barely noticed.

Occasionally Chilkoot Jim stole a backward glance at the menacing ice. For a while they held their own, but when they edged toward the bank, they found the ice gaining on them. Gradually they worked their way toward the land, their failing strength warning them that it was soon or never. Flashing around a sharp point, they came upon their last chance for escape. An island lay close to the shore, upon the nose of which was a long slope of ice. They drove the canoe up on the shelf of ice and leaped out. Then, dragging the canoe along, and tripping and falling, they made their last scramble for the land.

As they cleared the top of the ice and fell behind the sheltering trees, the thunder of the ice run pounded in their ears. It held no interest for them whatsoever. All they wished to do was lie there and enjoy the great solid protection of the land.

Two hours later, when the river had again fallen to its normal level, Charlie Drake and his companion paddled up. "Well, you boys hardly deserve to have good folks out looking for you the way you've behaved," was his greeting.

"What under the sun made you leave your camp and get chased by the trail? Eh? That's what I'd like to know."

It took but a minute to expl · the real state of affairs and get Charlie hurrying o\ his way to comfort his dying partner in Dawson.

"Pretty close shave at that," Wal aid, as they prepared to paddle back to camp.

"Sure was," replied Jim, rubbing his stiffening muscles and climbing into the canoe.

Sample Comprehension Quiz and Informal Comprehension Test from Controlled Reading Study Guide HG, for Sixth Grade

HG-5

CHASED BY THE TRAIL

Choose the best answer.

1. The setting for the boys' camp was
   .....a. an island in the Yukon River.
   .....b. a mining camp called the Mazy May.
   .....c. the frozen surface of the Yukon River.
   .....d. the banks of the Stewart River.

2. The first sign that the ice was breaking up was
   .....a. a sheet of water which appeared on its surface.
   .....b. the appearance of fissures in the ice.
   .....c. the formation of pockmarks in the ice.
   .....d. the rumble of loose blocks of ice under the surface.

3. The messenger fell into the river because
   .....a. his canoe capsized when it hit an ice cake.
   .....b. the ice broke up around him.
   .....c. he fell when he jumped from an ice cake to shore.
   .....d. the ice jam broke just as he was crossing it.

4. The trail referred to in the title was
   .....a. the frozen river, used as a path in winter.
   .....b. the trail to Dawson.
   .....c. a path they had cut through the woods.
   .....d. the trail to the Mazy May.

5. The boys decided to paddle across the river because they wanted to
   .....a. see what Charley Drake was up to.
   .....b. impress Charley Drake.
   .....c. warn Charley Drake the ice was breaking up.
   .....d. tell Charley Drake that his partner was dying.

6. The boys had to cross the river above Charley Drake's camp because
   .....a. they had to avoid the ice.
   .....b. there was no spot directly across the river to land.
   .....c. the current would carry them downstream.
   .....d. the river was still frozen below it.

7. The two boys escaped being crushed by the ice by
   .....a. paddling their canoe onto a sloping pile of ice and climbing ashore.
   .....b. racing the oncoming mass of ice until it slowed down.
   .....c. paddling their canoe onto the bank when they saw the ice coming.
   .....d. jumping up on one of the floating chunks of ice.

8. Following their river adventure, the boys' attitude toward it might be described as
   .....a. light-hearted.
   .....b. matter-of-fact.
   .....c. serious and thoughtful.
   .....d. discouraged.

9. The events in this story take place in
   .....a. a few days.
   .....b. one day
   .....c. a few hours.
   .....d. a few minutes.

10. The main idea for this selection is that
   .....a. Walt Masters and Chilkoot Jim failed to cross the Yukon because they were chased by the trail.
   .....b. Walt Masters and Chilkoot Jim showed their courage and their spirit when they attempted to cross the Yukon between ice runs to bring Charley Drake news of his dying partner.
   .....c. Although Walt and Jim failed to reach Charley Drake because of the breaking up of the ice, they made a heroic attempt.
   .....d. Walt Masters and Chilkoot Jim were foolish to attempt to cross the Yukon between ice runs and they narrowly escaped with their lives.

APPENDIX B

SUMMARY OF THE ANALYSIS OF VARIANCE

TABLES FOR THE INVESTIGATION

TABLE A

SUMMARY OF ANALYSIS OF VARIANCE TO TEST EQUIVALENCE OF EXPERIMENTAL AND CONTROL GROUPS AND THE GATES-MACGINITIE SPEED AND ACCURACY POSTTEST MEAN RAW SCORES FOR GRADES TWO, FOUR, SIX, AND EIGHT

Source of variation	df	Sum of squares	Mean square	F ratio
		Second Grade		
Between treatments	2	9.147	4.573	0.09
Within treatments	71	3274.853	46.125	
Total	73	3283.000		
		Fourth Grade		
Between treatments	2	154.086	77.043	1.92
Within treatments	84	3363.592	40.043	
Total	86	3517.678		
		Sixth Grade		
Between treatments	2	12.571	6.286	0.17
Within treatments	94	3455.656	36.762	
Total	96	3467.227		
		Eighth Grade		
Between treatments	2	828.762	414.381	12.96*
Within treatments	89	2845.445	31.97	
Total	91	3674.207		

*Significant at the .01 level.

TABLE B

SUMMARY OF ANALYSIS OF VARIANCE TO TEST EQUIVALENCE OF EXPERIMENTAL AND CONTROL GROUPS AND THE INFORMAL SPEED POSTTEST MEAN RAW SCORES FOR GRADES TWO, FOUR, SIX, AND EIGHT

Source of variation	df	Sum of squares	Mean square	F ratio
		Second Grade		
Between treatments	2	756288.140	378144.063	14.58*
Within treatments	71	1841196.454	25932.336	
Total	73	2597484.594		
		Fourth Grade		
Between treatments	2	2946003.008	1473001.000	20.27*
Within treatments	84	6105059.911	72680.438	
Total	86	9051162.919		
		Sixth Grade		
Between treatments	2	40440859.427	220220416.000	31.55*
Within treatments	94	60238289.934	640832.813	
Total	96	100679149.361		
		Eighth Grade		
Between treatments	2	14192723.911	7096361.000	8.89*
Within treatments	89	71074344.306	798588.000	
Total	91	85267068.217		

*Significant at the .01 level.

TABLE C

SUMMARY OF ANALYSIS OF VARIANCE TO TEST EQUIVALENCE OF EXPERIMENTAL AND CONTROL GROUPS AND THE INFORMAL COMPREHENSION POSTTEST MEAN RAW SCORES FOR GRADES TWO, FOUR, SIX, AND EIGHT

Source of variation	df	Sum of squares	Mean square	F ratio
	Second Grade			
Between treatments	2	5.267	2.634	2.22
Within treatments	71	84.246	1.187	
Total	73	89.513		
	Fourth Grade			
Between treatments	2	10.973	5.49	1.34
Within treatments	84	343.510	4.09	
Total	86	354.483		
	Sixth Grade			
Between treatments	2	126.860	63.430	14.71*
Within treatments	94	405.263	4.311	
Total	96	532.123		
	Eighth Grade			
Between treatments	2	7.013	3.507	1.12
Within treatments	89	277.976	2.13	
Total	91	284.989		

*Significant at the .01 level.

TABLE D

SUMMARY OF ANALYSIS OF VARIANCE TO TEST EQUIVALENCE OF BOYS AND GIRLS AND THEIR POSTTEST MEAN RAW SCORES ON THE GATES-MACGINITIE SPEED TEST FOR GRADES TWO, FOUR, SIX, AND EIGHT

Source of variation	df	Sum of squares	Mean square	F ratio
		Second Grade		
Between treatments	1	578.447	578.447	15.39*
Within treatments	72	2705.552	37.577	
Total	73	3283.999		
		Fourth Grade		
Between treatments	1	206.810	206.810	5.31
Within treatments	85	3310.868	38.951	
Total	86	3517.678		
		Sixth Grade		
Between treatments	1	351.027	351.026	10.70*
Within treatments	95	3117.200	32.813	
Total	96	3468.227		
		Eighth Grade		
Between treatments	1	1.662	1.662	0.04
Within treatments	90	3672.544	40.806	
Total	91	3674.206		

*Significant at the .01 level.

TABLE E

SUMMARY OF ANALYSIS OF VARIANCE TO TEST EQUIVALENCE OF BOYS AND GIRLS AND THEIR POSTTEST MEAN RAW SCORES ON THE GATES-MACGINITIE COMPREHENSION TEST FOR GRADES TWO, FOUR, SIX, AND EIGHT

Source of variation	df	Sum of squares	Mean square	F ratio
	Second Grade			
Between treatments	1	351.599	351.599	11.17*
Within treatments	72	2266.739	31.482	
Total	73	2618.338		
	Fourth Grade			
Between treatments	1	415.527	415.527	4.16
Within treatments	85	8496.060	99.954	
Total	86	8911.587		
	Sixth Grade			
Between treatments	1	413.862	413.862	3.91
Within treatments	95	10062.221	105.918	
Total	96	10476.083		
	Eighth Grade			
Between treatments	1	162.944	162.944	1.68
Within treatments	90	8723.958	96.932	
Total	91	8886.902		

*Significant at the .01 level.

TABLE F

SUMMARY OF ANALYSIS OF VARIANCE TO TEST EQUIVALENCE OF BOYS AND GIRLS AND THEIR POSTTEST MEAN RAW SCORES ON THE INFORMAL SPEED TEST FOR GRADES TWO, FOUR, SIX, AND EIGHT

Source of variation	df	Sum of squares	Mean square	F ratio
		Second Grade		
Between treatments	1	61824.001	61824.000	1.76
Within treatments	72	2535660.593	35217.500	
Total	73	2597484.594		
		Fourth Grade		
Between treatments	1	268427.966	268427.938	2.60
Within treatments	85	8782734.954	103326.250	
Total	86	9051162.920		
		Sixth Grade		
Between treatments	1	46171.444	46171.441	0.04
Within treatments	95	100632977.917	1059294.000	
Total	96	100679149.361		
		Eighth Grade		
Between treatments	1	1816815.925	1816815.000	1.96
Within treatments	90	83450252.292	927224.875	
Total	91	85267068.217		

TABLE G

SUMMARY OF ANALYSIS OF VARIANCE TO TEST EQUIVALENCE OF BOYS AND GIRLS AND THEIR POSTTEST MEAN RAW SCORES ON THE INFORMAL COMPREHENSION TEST FOR GRADES TWO, FOUR, SIX, AND EIGHT

Source of variation	df	Sum of squares	Mean square	F ratio
	Second Grade			
Between treatments	1	0.104	0.104	0.08
Within treatments	72	89.410	1.24	
Total	73	89.514		
	Fourth Grade			
Between treatments	1	41.172	41.172	11.17*
Within treatments	85	313.311	3.686	
Total	86	354.483		
	Sixth Grade			
Between treatments	1	18.655	18.655	3.45
Within treatments	95	513.469	5.405	
Total	96	532.124		
	Eighth Grade			
Between treatments	1	0.291	0.291	0.09
Within treatments	90	284.698	3.163	
Total	91	284.989		

*Significant at the .01 level.

TABLE H

SUMMARY OF ANALYSIS OF VARIANCE TO TEST EQUIVALENCE OF GOOD AND POOR READERS AND THEIR POSTTEST MEAN RAW SCORES ON THE GATES-MACGINITIE SPEED TEST FOR GRADES TWO, FOUR, SIX, AND EIGHT

Source of variation	df	Sum of squares	Mean square	F ratio
		Second Grade		
Between treatments	2	1853.082	926.541	45.97*
Within treatments	71	1430.918	20.153	
Total	73	3284.000		
		Fourth Grade		
Between treatments	2	1598.528	799.264	34.98*
Within treatments	84	1919.151	22.847	
Total	86	3517.679		
		Sixth Grade		
Between treatments	2	899.142	449.571	16.45*
Within treatments	94	2569.085	27.331	
Total	96	3468.227		
		Eighth Grade		
Between treatments	2	1076.487	538.244	18.44*
Within treatments	89	2597.719	29.188	
Total	91	3673.206		

*Significant at the .01 level.

TABLE I

SUMMARY OF ANALYSIS OF VARIANCE TO TEST EQUIVALENCE OF GOOD AND POOR READERS AND THEIR POSTTEST MEAN RAW SCORES ON THE GATES-MACGINITIE COMPREHENSION TEST FOR GRADES TWO, FOUR, SIX, AND EIGHT

Source of variation	df	Sum of squares	Mean square	F ratio
		Second Grade		
Between treatments	2	1647.755	823.878	60.27*
Within treatments	71	970.582	13.670	
Total	73	2618.337		
		Fourth Grade		
Between treatments	2	5779.192	2889.596	77.49*
Within treatments	84	3132.394	37.290	
Total	86	8911.586		
		Sixth Grade		
Between treatments	2	5638.190	2819.094	54.77*
Within treatments	94	4837.892	51.467	
Total	96	10476.082		
		Eighth Grade		
Between treatments	2	5372.769	2686.383	68.04*
Within treatments	89	3514.133	39.485	
Total	91	8886.902		

*Significant at the .01 level.

TABLE J

SUMMARY OF ANALYSIS OF VARIANCE TO TEST EQUIVALENCE OF GOOD AND POOR READERS AND THEIR POSTTEST MEAN RAW SCORES ON THE INFORMAL SPEED TEST FOR GRADES TWO, FOUR, SIX, AND EIGHT

Source of variation	df	Sum of squares	Mean square	F ratio
		Second Grade		
Between treatments	2	72232.262	36116.125	1.02
Within treatments	71	2525252.332	35566.125	
Total	73	2597784.594		
		Fourth Grade		
Between treatments	2	594578.154	297289.063	2.95
Within treatments	84	8456584.766	100673.563	
Total	86	9051162.920		
		Sixth Grade		
Between treatments	2	279355.647	139677.813	0.13
Within treatments	94	100399793.714	1068082.000	
Total	96	100679149.361		
		Eighth Grade		
Between treatments	2	9080252.732	4540126.000	5.30
Within treatments	89	76186815.486	856031.438	
Total	91	85267068.218		

TABLE K

SUMMARY OF ANALYSIS OF VARIANCE TO TEST EQUIVALENCE OF GOOD AND POOR READERS AND THEIR POSTTEST MEAN RAW SCORES ON THE INFORMAL COMPREHENSION TEST FOR GRADES TWO, FOUR, SIX, AND EIGHT

Source of variation	df	Sum of squares	Mean square	F ratio
	Second Grade			
Between treatments	2	15.793	7.900	7.61*
Within treatments	71	73.721	1.038	
Total	73	89.514		
	Fourth Grade			
Between treatments	2	56.925	28.463	8.03*
Within treatments	84	297.558	3.542	
Total	86	354.483		
	Sixth Grade			
Between treatments	2	105.454	52.727	11.62*
Within treatments	94	426.671	4.539	
Total	96	632.125		
	Eighth Grade			
Between treatments	2	41.050	20.525	7.49*
Within treatments	89	243.939	2.741	
Total	91	284.989		

*Significant at the .01 level.

TABLE L

SUMMARY OF ANALYSIS OF VARIANCE TO TEST EQUIVALENCE OF SATISFACTORY AND UNSATISFACTORY INFORMAL COMPREHENSION GROUPS AND THEIR POSTTEST MEAN RAW SCORES ON THE GATES-MACGINITIE SPEED TEST FOR GRADES FOUR, SIX, AND EIGHT

Source of variation	df	Sum of squares	Mean square	F ratio
		Fourth Grade		
Between treatments	1	937.736	937.735	30.90*
Within treatments	85	2579.943	30.352	
Total	86	3517.679		
		Sixth Grade		
Between treatments	1	517.928	517.927	16.68*
Within treatments	95	2950.299	31.056	
Total	96	3468.227		
		Eighth Grade		
Between treatments	1	282.155	282.155	7.49*
Within treatments	90	3392.052	37.689	
Total	91	3674.207		

*Significant at the .01 level.

TABLE M

SUMMARY OF ANALYSIS OF VARIANCE TO TEST EQUIVALENCE OF SATISFACTORY AND UNSATISFACTORY INFORMAL COMPREHENSION GROUPS AND THEIR POSTTEST MEAN RAW SCORES ON THE GATES-MACGINITIE COMPREHENSION TEST FOR GRADES FOUR, SIX, AND EIGHT

Source of variation	df	Sum of squares	Mean square	F ratio
		Fourth Grade		
Between treatments	1	2782.143	2782.143	35.58*
Within treatments	85	6129.443	72.111	
Total	86	8911.586		
		Sixth Grade		
Between treatments	1	1742.393	1742.393	18.95*
Within treatments	95	8733.690	91.934	
Total	96	10476.083		
		Eighth Grade		
Between treatments	1	790.604	790.604	8.79*
Within treatments	90	8096.298	89.959	
Total	91	8886.902		

*Significant at the .01 level.

TABLE N

SUMMARY OF ANALYSIS OF VARIANCE TO TEST EQUIVALENCE OF SATISFACTORY AND UNSATISFACTORY INFORMAL COMPREHENSION GROUPS AND THEIR POSTTEST MEAN RAW SCORES ON THE INFORMAL SPEED TEST FOR GRADES FOUR, SIX, AND EIGHT

Source of variation	df	Sum of squares	Mean square	F ratio
		Fourth Grade		
Between treatments	1	3885.010	3885.010	0.04
Within treatments	85	9047277.910	106438.500	
Total	86	9051162.910		
		Sixth Grade		
Between treatments	1	9142599.409	9142599.000	9.49*
Within treatments	95	91536549.951	963542.563	
Total	96	100679149.360		
		Eighth Grade		
Between treatments	1	188967.525	188967.500	0.20
Within treatments	90	85078100.692	945312.125	
Total	91	85267068.217		

*Significant at the .01 level.

TABLE O

SUMMARY OF TWO-WAY ANALYSIS OF VARIANCE TO TEST SIGNIFICANCE OF THE DIFFERENCE BETWEEN EXPERIMENTAL AND CONTROL GROUPS IN FOURTH AND SIXTH GRADES AND THE INTERACTION BETWEEN GROUP AND GRADE ON THE GATES-MACGINITIE POSTTEST RAW SCORE MEANS

Source of variation	df	Sum of squares	Mean square	F ratio
Gates-MacGinitie Speed and Accuracy Test				
Between treatments	1	.025	.025	6.48
Within treatments	2	.005	.002	.63
Interaction	2	.013	.007	1.72
Error	178	.682	.004	
Total	183	.725		
Gates-MacGinitie Comprehension Test				
Between treatments	1	.057	.057	5.36
Within treatments	2	.042	.021	2.00
Interaction	2	.013	.006	.60
Error	178	1.884	.011	
Total	183	1.996		

TABLE P

SUMMARY OF ANALYSIS OF VARIANCE TO TEST SIGNIFICANCE OF THE DIFFERENCE BETWEEN BOYS AND GIRLS IN FOURTH AND SIXTH GRADES AND THE INTERACTION BETWEEN SEX AND GRADE ON THE GATES-MACGINITIE POSTTEST RAW SCORE MEANS

Source of variation	df	Sum of squares	Mean square	F ratio
Gates-MacGinitie Speed and Accuracy Test				
Between treatments	1	543.760	543.760	15.23*
Within treatments	1	150.020	150.020	4.20
Interaction	1	5.780	5.780	0.16
Error	180	6428.068	35.711	
Total	183	7127.628		
Gates-MacGinitie Comprehension Test				
Between treatments	1	828.749	828.749	8.04*
Within treatments	1	566.540	566.540	5.49
Interaction	1	0.736	0.736	0.01
Error	180	18558.280	103.102	
Total	183	19954.205		

*Significant at the .01 level.

TABLE Q

SUMMARY OF ANALYSIS OF VARIANCE TO TEST SIGNIFICANCE OF THE DIFFERENCE BETWEEN GOOD AND POOR READERS IN FOURTH AND SIXTH GRADES AND THE INTERACTION BETWEEN READING ABILITY AND GRADE ON THE GATES-MACGINITIE POSTTEST RAW SCORE MEANS

Source of variation	df	Sum of squares	Mean square	F ratio
Gates-MacGinitie Speed and Accuracy Test				
Between treatments	2	2431.930	1215.965	48.22*
Within treatments	1	137.562	137.562	5.46
Interaction	2	92.980	46.490	1.84
Error	178	4488.235	25.215	
Total	183	7150.707		
Gates-MacGinitie Comprehension Test				
Between treatments	2	11338.036	5669.016	126.61*
Within treatments	1	496.831	496.831	11.10*
Interaction	2	78.251	39.125	0.87
Error	178	7970.287	44.777	
Total	183	19883.405		

*Significant at the .01 level.

TABLE R

CORRELATION MATRICES OF THE GATES-MACGINITIE AND INFORMAL TEST RESULTS WITH EACH OTHER IN GRADES TWO, FOUR, SIX, AND EIGHT

	1	2	3	4	5	6	7
Second Grade N=74[a]							
1. GMSP pre-							
2. GMSP post	.90						
3. GMCM pre-	.79	.80					
4. GMCM post	.75	.76	.84				
5. INSP pre-	.71	.63	.48	.44			
6. INSP post	.25	.19	.11	.01	.27		
7. INCM pre-	.23	.32	.36	.23	.05	-.03	
8. INCM post	.35	.34	.37	.34	.23	-.21	.18
Fourth Grade N=87[b]							
1. GMSP pre-							
2. GMSP post	.87						
3. GMCM pre-	.68	.74					
4. GMCM post	.69	.71	.91				
5. INSP pre-	.50	.51	.39	.36			
6. INSP post	.26	.32	.16	.06	.24		
7. INCM pre-	.37	.39	.51	.53	.14	-.14	
8. INCM post	.31	.36	.50	.48	.06	-.18	.17
Sixth Grade N=97[c]							
1. GMSP pre-							
2. GMSP post	.76						
3. GMCM pre-	.61	.57					
4. GMCM post	.62	.60	.84				
5. INSP pre-	.61	.55	.31	.34			
6. INSP post	-.05	.04	-.11	.00	-.07		
7. INCM pre-	.41	.40	.48	.49	.07	-.05	
8. INCM post	.47	.36	.59	.55	.19	-.43	.43

(continued)

TABLE R (continued)

	1	2	3	4	5	6	7
Eighth Grade N=92[d]							
1. GMSP pre-							
2. GMSP post	.81						
3. GMCM pre-	.62	.58					
4. GMCM post	.63	.56	.91				
5. INSP pre-	.17	.11	.20	.09			
6. INSP post	.36	.40	.24	.17	.67		
7. INCM pre-	.28	.46	.36	.44	-.31	-.05	
8. INCM post	.27	.42	.32	.37	-.09	-.16	.52

[a]A correlation of greater than .29 is significant at the .01 level.

[b]A correlation of greater than .27 is significant at the .01 level.

[c]A correlation of greater than .26 is significant at the .01 level.

[d]A correlation of greater than .26 is significant at the .01 level.

GRADUATE PROGRAM OF STUDIES, RUTGERS UNIVERSITY

		Instructor
	Courses in Special Field (Reading)	
320:561	Foundations of Reading	Fry and Mountain
320:564	Remedial Reading	Fry
320:565	Remedial Reading Laboratory	Zelnick
320:566	Seminar in Reading Research	Kling
320:620	Developing Language Arts Curriculum Materials	Mountain
320:615	Teaching Reading Improvement for Secondary, College, Adults	Geyer
250:500	Thesis Research	
	Courses in Education Outside Special Field	
240:301	Principles and Practices of Elementary Education	Fox
240:311	Curriculum Materials and Activities	Cosgrove
240:504	Elementary Curriculum I	Hayward
240:509	Elementary Curriculum II	Claypool
240:506	Elementary Curriculum III	Delaney
310:401	History of Education	Eddy
310:551	Role of the School in American Society	Burns
240:487	Student Teaching, Elementary School	Delaney
260:405	Group Methods of Guidance	Brown
290:531	Statistical Methods	Taylor

		Instructor
290:532	Statistical Methods	Taylor
290:514	Developmental Psychology of the Adolescent	Raph
290:501	Educational and Psychological Measurements	Klein
290:540	Principles and Theories of Learning	Bloom
290:518	Psychology of Personality	Berger
290:522	Individual Intelligence Testing	Holowinsky
290:509	Emotional and Social Maladjustment	Clarke
230:521	Supervision of Instruction	Taylor

Courses Outside of Education

610:581	Reading Materials for Children	Gaver
610:582	Reading Materials for Youth	Edwards
615:503	Linguistic Bases of Language Teaching	Pane

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New Jersey:	Elementary, Grades K-8
New Jersey:	Reading
New Jersey:	Learning Disabilities Teacher-Consultant

Professional Experience:

1958-1959:	Second-Grade Teacher Laurel Avenue School Kingston, New Jersey
1959-1966:	Fourth-Grade Teacher Riverside School Princeton, New Jersey
1966-1967:	Teaching Assistant Curriculum and Instruction Rutgers University New Brunswick, New Jersey

1967-1971:	Reading Specialist The Middle School Princeton, New Jersey
1968-1973:	Coadjutant Instructor Rutgers Reading Center Rutgers University New Brunswick, New Jersey
1971-1973:	Sixth-Grade Teacher The Middle School Princeton, New Jersey