A STATISTICAL EXAMINATION OF IMMEDIATE GAINS AND RETAINED GAINS OF STUDENTS IN THE OKLAHOMA STATE UNIVERSITY READING IMPROVEMENT PROGRAM

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in partial fulfillment of the requirements
for the degree of
DOCTOR OF EDUCATION
August, 1962

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ACKNOWLEDGMENT

The writer wishes to express his thanks to Dr. W. Ware Marsden and Dr. Bernard R. Belden, Co-chairmen of his Advisory Committee, for their guidance and encouragement during all phases of this study. He also wishes to express appreciation to the other members of his committee, Mrs. Mavis Martin and Dr. Richard Rankin.

Indebtedness is acknowledged to the staff of the Oklahoma State University Reading Clinic and the staff of the office of Dean of Men for their assistance in the later stages of this study.

Special gratitude is expressed to the Henke family, Clete and Fred, for their kindness and forbearance during the preparation of the manuscript, and to Virginia who typed the final copy.

This study is dedicated to my wife, Ruby, and to my children, Virginia, Kay and Billi, who have sacrificed some degree of comfort throughout the past three years.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF ILLUSTRATIONS

CHAPTER I

PRESENTATION OF THE PROBLEM

Introduction

Are college students in need of a developmental reading program? Will an intensive period of training materially change the reading performance of college students? Will increased performance be permanent? Are courses designed to teach reading skills needed in college successful in fulfilling their stated purpose? This study will attempt to add to the knowledge needed to answer these questions. It will attempt to do this by making an examination of the changes in test performance of college students successfully completing the reading improvement program now offered at the Oklahoma State University.

There are three factors contributing to the present wide acceptance of college reading programs:

1. The demands of college reading differ from those of elementary and secondary school in that less direct guidance is provided the student and skills must be adapted to the demands of college reading.

2. Public support for mass college education has precluded the use of screening methods by many colleges that

would eliminate students who are inadequately prepared for the greater reading demands of college.

3. Recent research findings, notably Gray and Rogers (1956), reveal a general immature level of development of adult reading skills.

The college reading improvement program at the Oklahoma State University is an accepted service of the university, where it was initiated in 1954. This program was designed to promote reading improvement for all students, regardless of initial reading ability, who wished to utilize the program, and has operated to this time as a voluntary self improvement program. In the eight years in which this service has been offered, it has attracted students who have needed help in adjusting their reading skills to college reading, students who were inadequately prepared in basic reading skills, and students who were generally immature as readers. No extensive evaluation of the program has been made. Evaluation is a vital part of curriculum development, and through research, identification of strengths and weaknesses can be made which will assist in this evaluation.

Statement of the Problem

The purpose of the study was to evaluate the benefits derived from participation in the reading improvement program offered by the Oklahoma State University. To facilitate the analysis of this problem the investigation has considered

four main questions, the answers to each giving insight into the value of the college reading program.

A. Does the college reading improvement program materially improve the reading performance of college students, i.e., will participation in the program bring about an immediate increase in performance on reading tests designed to measure speed, comprehension, vocabulary, and total reading ability? Stated in null hypotheses, the questions are as follows:

1. There is no significant difference between the mean pre-training vocabulary scores and the mean post-training vocabulary scores.

2. There is no significant difference between the mean pre-training comprehension scores and the mean post-training comprehension scores.

3. There is no significant difference between the mean pre-training rate of reading scores and the mean post-training rate of reading scores.

4. There is no significant difference between the mean pre-training total reading scores and the mean post-training total reading scores.

B. If there is an increase in measured reading performance upon completion of the improvement program, will this improvement be retained after a period of three months? Stated in null hypotheses the questions are as follows:

1. There is no significant difference between the mean post-training vocabulary score and the mean vocabulary score after a period of three months.

2. There is no significant difference between the mean post-training comprehension score and the mean comprehension score after a period of three months.

3. There is no significant difference between the mean post-training rate of reading score and the mean rate of reading score after a period of three months.

4. There is no significant difference between the mean post-training total score and the mean total score after a period of three months.

C. If there is an increase in measured reading performance upon completion of the improvement program, will this improvement be retained after a period of six months? Stated in null hypotheses the questions are as follows:

1. There is no significant difference between the mean post-training vocabulary score and the mean vocabulary score after a period of six months.

2. There is no significant difference between the mean post-training comprehension score and the mean comprehension score after a period of six months.

3. There is no significant difference between the mean post-training rate of reading score and the mean rate of reading score after a period of six months.

4. There is no significant difference between the mean post-training total score and the mean total score after a period of six months.

D. What level of student will gain most from the reading improvement program as measured by gain in performance? Is there a difference in gain made by a low performance group and a high performance group? Stated in null hypotheses the questions are as follows:

1. There is no significant difference between the mean gain in vocabulary made by students falling below the median and the mean gain in vocabulary made by students falling above the median.

2. There is no significant difference between the mean gain in comprehension made by students falling below the median and the mean gain in comprehension made by students falling above the median.

3. There is no significant difference between the mean gain in total reading performance made by students falling below the median and the mean gain in total reading performance made by students falling above the median.

4. There is no significant difference between the mean gain in reading rate made by students falling below the median and the mean gain in reading rate made by students falling above the median.

Need for the Study

American colleges and universities have been slow in recognizing the need for reading instruction beyond the elementary and secondary levels. In a survey by Parr (1930) only seven institutions were found that offered some type of reading instruction to college students. Fulker (1956) stated that ". . . very little was done in developmental reading at the college and adult levels prior to 1945." Barbe (1951) found 36 of 95 major colleges offering a program. Shaw (1960) reported 242 of 350 colleges returning a questionnaire had ". . . some kind of formal instruction on reading improvement." This growth in number of college reading improvement programs reflected Gray's belief (1956) that "One of the major responsibilities of schools, colleges, and adult agencies is to prepare the present and oncoming generation of citizens to meet, at a high level of efficiency, the reading demands that current life makes upon them."

A college reading improvement program was initiated at the Oklahoma State University by the College of Education in the fall of 1954 to meet the needs of students enrolled at the university. From the beginning the program has been a voluntary non-credit course open to any student wishing to improve his reading ability. A laboratory fee of $10.00 is charged for this service.

Many methods have been used by the Oklahoma State University Reading Improvement Program to encourage

improvement of reading performance. These approaches have included utilization of mechanical aids, films, workbooks, timed exercises, reading pacers, and lectures used separately and in combination for both motivation and training. Evaluation of the program through the use of pre-training and post-training tests indicate that the intensified training provided by the reading improvement program produces significant immediate increases in reading performance. Student acceptance of the college reading improvement program was evidenced by the continued growth and expansion of the program, which in 1961-62 provided reading improvement opportunity to more than 300 students. Continued acceptance and growth provides a subjective evaluation of the program and together with the immediate gains resulting from the program have provided the justification for its continuation.

However, there is a need for an objective appraisal of the present program to indicate the residual effects of the program on the student and to identify the type of student who will profit most from this training. This type of study will provide guidance for future emphasis and direction of the college reading improvement program.

American colleges and universities in general tend to accept reading services solely upon the basis of providing immediate gains in reading performance, and evaluations reported in the literature tend to support immediate gains as justification for the programs. Of the 75 studies reported by Bliesmer and Lowe (1960) only one dealt with retention of

gains made in a college reading improvement program, while 14 dealt with evaluation of immediate gain. A review of the literature since 1950 revealed only 14 studies dealing with the retention of gains. Gray (1944) stated in his summary of reading investigations that one of the limitations that greatly interfere with definite conclusions concerning reading improvement programs is the lack of information concerning permanency of gain.

Many of the reading improvement programs offered by American colleges and universities are described as remedial and are composed of students among whom the drop out rate is greater and the adjustment to the demands of college reading is greater; therefore, much instruction time is consumed which may be of little benefit potentially to the institution in terms of service to those students who will complete college training. This is particularly true of non-voluntary low ability groups as reported by Entwisle (1960). There is a need for more research to determine at what initial reading performance level there is a greater potential for gain through participation in a reading improvement program.

This study attempts to fulfill these needs: (1) the need for guidance in emphasis and direction for future reading improvement courses at the Oklahoma State University, (2) the need for more information concerning permanency of gains, and (3) the need to determine the comparative value of college reading improvement programs with groups of different initial ability levels.

Definition of Terms

Oklahoma State University Reading Improvement Program is described in the Oklahoma State University Catalog (1961-63) as "Laboratory experience for the improvement of reading rate and comprehension. Includes controlled or visually guided reading and application reading using reading improvement text materials and devices." The objectives set by the Reading Improvement Center were as follows:

1. To appraise the reading skills of the student and to develop an awareness within the student of individual weaknesses and to build a program to strengthen those weaknesses.

2. To develop general reading skills through various training methods, including vocabulary, comprehension, and speed improvement.

3. To encourage good reading and study habits through lecture, demonstrations, and student laboratory experiences.

4. To offer counseling services as requested by the student to help solve unique reading problems.

5. To develop flexibility of approach to reading materials.

6. To make periodic evaluations of each student's progress and to make recommendations in light of these evaluations.

7. To make a post-training evaluation of reading growth and make recommendations for continued improvement.

Reading skills will refer to those skills measured by the Nelson-Denny Reading Test (Forms A and B) and are as follows: (1) rate of reading, (2) vocabulary, (3) comprehension, and (4) total reading score.

Satisfactory completion of the program: To satisfactorily complete the program at Oklahoma State University the following steps must be taken: (1) pre-testing, (2) participation in the training sessions, (3) post-testing, (4) instructor verification. It is not necessary for the student to show a particular gain on reading tests used.

Retention of gains will refer to the measured performance on the reading test of the student after a period of time has elapsed since completion of the course.

Delimitations

Scope of the study: This investigation includes an analysis of test scores of students who successfully completed the Oklahoma State University College Reading Improvement Program and who are currently enrolled at the University. The sample was randomly selected from this population. The number of students meeting the above criteria includes:

(1) 98 students enrolling in the college reading improvement program in September 1961 and completing the program in November 1961.

(2) 79 students enrolling in the college reading improvement program in November 1961 and completing in December 1961.

(3) 33 students completing the reading improvement program in November and retested after a period of six months.

(4) 32 students completing the reading improvement program in December and retested after a period of three months.

This study is concerned also with the relative gains made in the reading improvement program of two sub-groups of the sample divided at the median on initial test performance.

This investigation is not concerned with methods of teaching reading, the psychology of reading, or the sociology of reading.

Limitations of the study: An investigation in the area of the social sciences includes difficulties not encountered in other sciences, i.e., attempting to identify and control the factors operating upon people and affecting their behavior. This becomes particularly difficult when dealing with a college population where the environment is not highly structured. An investigation which attempts to control the social, emotional, and psychological factors affecting the reading of college students can easily confound the results by placing too much emphasis on the measured factor while ignoring equally important but obscure factors. This investigation does not attempt to control the intervening variables or to identify or control factors affecting the reading performance of college students.

The group utilized for this study were typical of enrollees in the Oklahoma State University College Reading Improvement Program.

Assumptions:

1. The reading test (Nelson-Denny Reading Test, Form A) used in the college reading improvement program is a reliable and valid measurement of the reading ability of the enrollees in the course.

2. The reading test (Nelson-Denny Reading Test, Form B) used upon completion of the college reading improvement program is a reliable and valid measurement of the gain in reading ability made in the college reading improvement program.

3. The reading test (Nelson-Denny Reading Test, Form A) used at the end of three months is a reliable and valid measure of reading performance and can therefore be used to determine significance of retention of gains.

4. The reading test (Nelson-Denny Reading Test, Form A) used at the end of six months is a reliable and valid measure of reading performance and can therefore be used to determine significance of retention of gains.

5. The sample is representative of the type of student enrolling in the Oklahoma State University College Reading Improvement Program and can be utilized in the evaluation of the program.

Organization of the Study

Chapter I has given an introduction to the problem to be studied. It has included the need for the study, the statement of the problem, the delimitations of the study, and the definition of terms used in the study.

Chapter II will present a review of the literature as it pertains to the hypotheses being tested.

Chapter III will describe the population used, the program being evaluated, the tests used to measure reading achievement, and the statistical methods used to test the significance of any change in reading performance.

Chapter IV will contain a statistical analysis of the data. This chapter will indicate the degree to which the hypotheses are found to be correct within recognized limitations.

Chapter V will present a discussion of the results of this study and will include recommendations regarding future studies in this area.

CHAPTER II

REVIEW OF THE LITERATURE

Introduction

The literature concerning college reading programs abounds in descriptions of courses, comparison of methods, essays on underlying philosophy, reviews, and instructions for initiating a college reading improvement program. The review of the literature for this study has been restricted to research designed to answer some of the questions raised by this study, and will be discussed under the following areas of interest: (1) studies dealing with immediate gains resulting from participation in college reading improvement programs, (2) studies dealing with retained, or residual, gains from college reading improvement programs, and (3) studies dealing with the relative gains made by groups of differing performance levels in college reading improvement programs.

The Immediate Gains Resulting From College Reading Improvement Programs

There have been many studies reported in the literature concerning immediate gains resulting from a college reading

improvement program. Bliesmer (1953), in a review of research in college reading, reported on 19 evaluations of programs and found ". . . positive results have been reported, almost without fail." Bliesmer (1954) reported on five college programs, all showing that immediate gains resulted from the program. Kinne (1954) reported on five semesters of reading improvement courses at Purdue University and reported consistent gains in reading speed with occasional increases in comprehension.

Bliesmer (1955), in his review of research, stated "Gains in reading abilities or skills were claimed by practically all who reported on, or referred to, actual programs . . ." Acker (1960), in a survey of adult reading improvement programs, found that 98 per cent of the respondents evaluated their courses and ". . . standardized test results indicated that reading proficiency improved in all but a few individual cases." Entwisle (1960), in a very careful review of evaluations of college reading skills programs, concluded that ". . . some kind of improvement following a study-skills course seems to be the rule, although improvement varies from a very slight amount to a considerable amount." Tuckey (1960) reported on the combined results of seven years of reading improvement programs at Purdue Calumet Center where 703 students, under 25 years of age, made a mean gain of 394 words per minute with an increase of eight per cent in comprehension and a group of 234 students, age 25 or over, made a mean gain of 200 words per minute with an increase of 4.5 per cent in comprehension.

TABLE I

SUMMARY OF INVESTIGATIONS EVALUATING COLLEGE READING IMPROVEMENT PROGRAMS

Study	Number, Kind of Students	Methods	Measure of Reading Performance	Length of Course	Results				Remarks
					Rate	Comprehension	Vocabulary	Total	
Brown (1948)	College freshmen (55)	Exercises in speed, vocabulary training, comprehension exercises, Harvard Reading Film	Nelson Denny Reading Test		Not reported	10 raw point score gain	8 raw point score gain	18 raw point score gain	No statistical test of significance given
Burfield (1949)	College students (22)	Vocabulary drills, exercises to increase speed of comprehension, comprehension exercises	American Council Reading Comprehension, C_2, Test	One semester	Median gain of 18 standard score points	Median gain of 15 standard score points	Median gain of 5 standard score points	Not reported	No statistical test of significance given
Jones (1951)	High school students (26)	Reading accelerator, Reading Rate controller, paced reading, magazine reading, workbook exercises	Iowa Silent Reading Test (ISR)	Approximately 54 hours	Median rate gain 152 WPM	Not reported	Not reported	3 years' reading growth	No statistical test of significance given
Causey (1952)	College students (325)	Integration of 5 basic reading skills: comprehension, rate, reading in thought units, vocabulary, and directed reading	Not reported	36 hours				102 per cent average gain	Combined comprehension and rate for a composite score; comparisons based on this score. "None of the 325 students have failed to improve reading ability." No statistical test of significance reported.
Witty, Stolarz, Cooper (1952)	College students (42 freshmen, 48 upper classmen)	Reading accelerators, workbooks, speeded reading practice, vocabulary exercises, flexibility of approach	Iowa Silent Reading Test	27 hours	"every student gained"	"tended to improve"	"some improvement"	Mean gain of 11 points	No statistical test of significance given

TABLE I (Continued)

Study	Number, Kind of Students	Methods	Measure of Reading Performance	Length of Course	Results				Remarks
					Rate	Comprehension	Vocabulary	Total	
Bennett (1953)	College students (number not reported)	Reading exercises, to increase speed and comprehension; part of a freshman English class	DRT	One semester	24.231 WPM gain	1.6923 raw score gain	-3.5385 raw score loss	-1.8462 raw score loss	This group was compared with two other regular sections of Freshman English with better results in all areas except vocabulary. No test of significance given
Cosper and Mills (1953)	College students (number not reported)	Reading films, accelerator reading, tachistoscopic practice, and mature essays, free reading	Harvard Reading Test	30 hours	62 per cent gain	2 per cent gain	6 per cent gain	Not reported	No test of significance given
Thompson (1954)	Students at Air University								This experiment included a randomly selected control group with which both (a) and (b) groups were compared
	(a) 146	(a) Machine centered instruction	Harvard University Reading Test	21 50 minute periods	58 WPM gain over control	No gain	Not measured	Not measured	
	(b) 146	(b) Book centered instruction	Harvard University Reading Test	21 50 minute periods	108 WPM gain over control	No gain	Not measured	Not measured	
Cardwell (1955)	Adult (20)	Lectures, discussions, practice exercises in comprehension, speed and vocabulary	Cooperative English Test, Reading Section, Higher level	24 hours	120 WPM mean gain	Mean gain of 18.75 per cent	Not reported	Not reported	A t test indicated that the class gain was significant at the .01 level in both rate and comprehension

TABLE I (Continued)

Study	Number, Kind of Students	Methods	Measure of Reading Performance	Length of Course	Results				Remarks
					Rate	Comprehension	Vocabulary	Total	
Westover and Anderson (1956)	College students (353)	Reading films, reading selections, comprehension exercises	DRT	6 weeks	Mean gain 140 WPM t value - 21.54	No significant changes	Not reported	Not reported	t value of 21.54
Willey and Thomson (1956)	College freshmen (48)	Workbooks, Standard Test Lessons in Reading, Reader's Digest	Iowa Silent Reading Test	One semester				Not reported	Gain reflects performance of seven ISR subtests: reading rate, comprehension, word meaning, sentence meaning, paragraph comprehension, index usage, selecting key words. t value of 4.07
Beasley (1959)	College freshmen (144)	SRA reading accelerator, timed exercises, vocabulary exercises	DRT	36 hours	Not reported	Not reported	Not reported	Not reported	Examined total test score to determine shift of position, chi-square significant beyond .01 level of confidence
Brown and Lauer (1959)	College students (64)	Discussion of specific problems, Harvard Reading Film, mimeographed exercise material	Pressey Reading Speed and Comprehension Tests	12 hours	56.22 WPM gain significant	.63 gain not significant	Not reported	Not reported	t value for rate 4.75 t value for comprehension 1.13
Kenworthy (1959)	Adult (57)	Lectures, technical material, SRA Book 3, Reading accelerator	DRT	18 hours	Median 44 per cent higher	No gain	No gain		No statistical test of significance given

TABLE I (Continued)

Study	Number Kind of Students	Methods	Measure of Reading Performance	Length of Course	Remarks				
					Rate	Comprehension	Vocabulary	Total	Remarks
McDonald, Zolick, Byrne (1959)	College students (number not reported)	Samll group and individual instruction in reading plus 10 hours of "psycho-analytically oriented group therapy"	DRT	50 hours	Gain significant beyond the .001 level of confidence	Improvement but not statistically significant	Not reported	Not reported	This study was designed primarily to investigate reading deficiencies and personality factors
Sandberg (1959)	College freshmen (243)	Purdue Reading Film timed reading, vocabulary drills	DRT	18 hours	Mean gain of 78 WPM	Mean gain of 20 per cent	Mean gain of 21 per cent	Not reported	No statistical test of significance given
Weeks (1959)	College students (27)	Workbook (How to Read Better and Faster), required reading of novels and nonfiction, plus regular composition assignments	DRT	One semester	105 WPM gain	Gain of 3 raw score points	No change	No change	No statistical test of significance given
Legere and Tracey (1960)	Student officers (number not reported)	Tachistoscope, reading pacers, tape recorders, individual-ized instruction	ETS Cooperative Reading Test	20 hours	Median gain of 283 WPM on locally prepared material	Median gain 4 points	Median gain 7 points	Median gain 7 points	No statistical test of significance given
Spache, Standlee, Neville (1960)	(a) College students (15)	Individualized read-ing instruction; locally prepared, and workbook	DRT	3 hrs. wkly. for semester	5.44 mean standard score gain	5.70 mean standard score gain	6.80 mean standard score gain	Not reported	"The three instructional procedures were found to be equally effective in terms of reading, vocab-ulary, and reading comprehension." Significance of pre-post test not reported.
	(b) College students (30)	Workbook oriented	DRT	3 hrs. wkly. for semester	8.61 mean standard score gain	1.61 mean standard score gain	7.89 mean standard score gain	Not reported	
	(c) College students (53)	Audio-visual oriented	DRT	3 hrs. wkly. for semester	7.72 mean standard score gain	3.08 mean standard score gain	8.16 mean standard score gain	Not reported	

Table I is a summary of 19 studies representative of those found in the literature since 1945 and has been organized to show number and kinds of students, instructional methods used, types of reading performance measures used, length of courses, and results of the studies organized in areas pertinent to this study. An examination of Table I reveals the following:

1. Each program evaluated reported gains of some kind as the result of a reading improvement program although few studies reported the statistical significance of the reported gains.

2. The most consistent area of gain reported is in rate of reading where all but one reported a gain, with many very large gains reported.

3. Eight studies reported gains made in comprehension ranging from ". . . tended to improve" reported by Witty, Stolarz, and Cooper (1952) to Burfield's (1949) reported gain of 15 standard score points. Where gains are reported in comprehension most are small insignificant gains, e.g., 1.6923 raw score gain, two per cent gain, and gain of three raw score points. Six studies reported no change in performance in comprehension.

4. Six studies reported gains made in vocabulary ranging from ". . . some improvement" reported by Witty, Stolarz, and Cooper (1952) to a gain of 21 per cent (Sandberg, 1959). Where gains are reported in vocabulary most are small insignificant gains, e.g., six per cent gain, median gain of seven

points, and median gain of five standard score points. One report, Bennett (1953), reported a loss in vocabulary score between pre-training and post-training test. Eight studies failed to report on any change of performance in vocabulary.

5. A composite, or total, reading score is not given for some of the measuring instruments used in the studies in Table I, but of the seven studies reporting a total score, five indicated a gain, with one reporting a loss and one reporting no change.

6. The increase in reading performance does not appear to be either a function of the utilization of a particular method of instruction or the length of the improvement course.

7. The lack of gain in reading performance does not appear to be either a function of the utilization of a particular method of instruction or the length of the improvement course.

Retention of Gains Made in a College Reading Improvement Program

The major problem in making an adequate appraisal of the retention of gains is in getting a sample population for retesting a period of time after completion of the course. This problem is reflected in the small number of studies to be found in the literature concerning retention of gains. Prior to 1950 few studies attempted to evaluate the permanent effect of a reading improvement program although the need for such evaluation was great. Deal (1934), using comprehension

material which had not been standardized, reported on a group of 42 subjects who were retested one year after completion of the program and found that the gain made during the program was still significant. Deal recognized the limitations of this study but recommended that more studies should be made concerning the permanence of gains.

Weber (1939) reported on a study to determine per cent of retention involving 41 as an experimental group who had completed a remedial reading program one year earlier and 42 as a control group who had not enrolled in the remedial reading program. Both groups showed gain over the initial test but the experimental group showed the greatest gain and were usually higher than the post-training test scores. Weber concluded that "Retest of the controls and experimentals after a lapse of a year indicate that the gains made due to remedial reading are substantially retained for a period of one year."

Staton (1950) used a group of 12 Air Force Officers who had completed a reading improvement laboratory course and had, after a period of four to 12 months, enrolled in a second reading improvement course. Gains in rate and comprehension made during the first course were compared with scores made upon enrollment in the second course. He found that following termination of the course a decline in reading may be anticipated, but not extending to the low point marking the initial test of the original course. He also found that there was no loss in comprehension accompanying the increase in speed.

No statistical treatment of the data was presented but percentage of retention was given. The size of the group participating and the differential in time between post-training and retest for the subjects made it difficult to draw any conclusions from this study.

Barbe (1952) used 50 subjects ranging in classification from college freshmen to senior law students. The subjects were volunteers who had expressed a desire to increase their reading proficiency. The experimental group consisted of the first 25 volunteers who were able to attend the reading improvement program and the control group consisted of the first 25 volunteers who were not able to attend the reading improvement program.

The purpose of the second, or control, group was to demonstrate whether the gains made by the experimental group were due to the remedial work or merely to the time spent in college. The experimental group actually acted as its own control, the results of the first test being compared with the results of the second and final tests.

The experimental and control groups were tested for reading rate and comprehension before the training sessions and were retested after completion of the twelve week training period. To determine if the results of the reading improvement were still significant six months later, both groups were again retested. Barbe concluded that the experimental group made a significant gain in rate during the training session (t 6.02) and retained the gain made after a period of six months (t 4.89). The gains made by the control group were not significant (t .20 and .36). No

data was presented concerning comprehension increases for either the control group or the experimental group.

Potter (1954) reported on a study conducted with first year students at the United States Naval Academy. He selected 161 students to be given reading training as the experimental group and used an equal number of non-participating students as the control group. Using the United States Naval Academy norms all students in these groups had a rate of reading below the 40th percentile, a vocabulary score at, or above, the 50th percentile, a comprehension score at, or above, the 30th percentile. The groups were compared on a pre-training test, post-training test, after 20 sessions, and retested five months after the end of the training period. It is significant to point out that while the two groups were comparable on initial rate of reading the experimental group was significantly superior in both vocabulary and comprehension. Potter found that the gains made in reading rate by the experimental group during training were significantly greater than those made by the control group and that five months after training this significant difference was still present.

Any comparisons between groups made beyond rate of reading in Potter's experiment have little meaning because of the initial differences between the groups on vocabulary and comprehension. Actually the greater potential of the experimental groups makes a comparison of any kind open to question. However, just considering the growth made by the experimental

group and not considering the control group, Potter's experiment tended to confirm that reading rate improves in a college reading improvement program and that this skill is retained with an insignificant loss after a period of time.

Smith and Wood (1955), in a study to determine effect of a reading improvement program on academic achievement, included in their design a study of permanency of gain. A randomly selected sample of 27 was retested 60 weeks after completion of the program and it was found that significant gains were maintained on the level of comprehension test (level of significance .05) and the speed of comprehension test (level of significance .01) from the Cooperative Reading Test C2, but the gains for the vocabulary portion of the test were negligible.

These results were verified by a second comparison made with the same group using the Traxler High School Reading Test where difference in reading rate between pre-training test and retest was significant and no significant gain was reported for per cent of comprehension. In this experiment, not only did the increased performance remain but the actual rate of reading increased between the post-training test and the retest 60 weeks later.

Cosper and Kephart (1955) reported on a study in which an experimental group of 204 students who had completed a reading improvement program was compared with a control group of 208 regularly enrolled students. At the end of the program the experimental group was found to be significantly

higher in mean speed (level of significance .01) and in vocabulary (level of significance .05). Fourteen months after completion of the course representative samples containing 38 subjects of the experimental group and 28 subjects of the control group were retested. At this time the experimental group was still significantly superior in the speed of reading (t 5.45) but no difference existed in comprehension or vocabulary scores. The experimental group retained 60 per cent of the speed acquired during the training sessions.

Reed (1956) reported on an experiment using student nurses, in which he matched two groups of 18 student nurses each on three variables. The experimental group was given 27 hours of reading training and the groups were compared again on alternate forms of the same test. At the end of the training period the experimental group had significantly higher scores on both rate (t 2.44, significant at the .02 level of confidence) and vocabulary (t 3.61, significant beyond the .01 level of confidence) but there was still no significant difference on comprehension scores. Both groups were retested seven months after the end of the training period, with only 14 left in each group. At this time the experimental group still maintained its superiority over the control group in rate of reading (t 4.07, significant beyond the .01 level of confidence) but there was no difference between the groups on either vocabulary or comprehension scores.

The size of the groups involved and the specialization of the groups involved makes it difficult to interpret the data presented in terms of application to college reading improvement programs.

Schwartz (1957) reported a study in which three groups of United States Naval School pre-flight cadets were tested for retention 12 weeks after completion of a reading improvement program. A comparison of pre-test and post-test scores on speed of reading showed a mean increase of 104 per cent improvement for the total population. The retention test after 12 weeks showed a 92 per cent increase over the initial test. A similar comparison was made for the comprehension test where a 7.5 per cent loss was made between pre-test and post-test and a 5.0 per cent loss was registered on the retention test.

Schwartz further reported that although the training utilized non-technical material, the increased reading efficiency was transferred to technical material.

Kingston and George (1957) reported a study using 160 randomly selected male students who were classified as juniors, 73 of whom had participated in a college reading improvement program, and 87 who had not participated in a college reading improvement program. These third year students were tested during the spring semester on rate and comprehension and these results were compared with the college entrance scores. They found that both groups made significant gains on reading rate and the students who had

participated in the college reading improvement program had made significant increases in comprehension. They conclude that:

> The results of this study would seem to indicate that regardless of whether they secure special training or not, students tend to develop faster rates of reading during their first two years of college. It seems likely that increased experience and practice in reading under the pressure of time may be a factor in this improvement. Special reading training seems to result in more effective gains in reading rate. These results also seem to indicate that students make little or no gain in reading comprehension between their freshman and junior years unless they receive special training which is designed to develop this skill.

This study by Kingston and George does not include data concerning the immediate effectiveness of the college reading improvement program, i.e., no comparison was made between the pre-training and post-training scores of the participating students.

Cole (1957) reported on a group of 19 adult non-college subjects who were invited for retesting three to 18 months after completion of a voluntary reading improvement program provided as part of the services of a library. He reported that four showed continued improvement, two showed no increase since the end of their clinics, 11 dropped slightly from post-training test level, but were still above the pre-training test level, and two retrogressed to pre-training scores or below. No attempt at statistical analysis was made and no size of gain was reported in this study.

Dumler (1958) reported on the amount and permanency of gains in reading skills as a part of a factor study of reading. The reading speed of 50 students from college freshmen

to graduate students increased after a reading improvement program from a mean speed of 253.9 words per minute to 326.5 words per minute. Of these 50 students 22 subjects were given a follow-up test an average of 170.9 days after the conclusion of the training program to measure retention of reading skills. Dumler reported some loss of speed but not a significant loss from the post-training test.

The changes in comprehension scores between pre-training, post-training and follow-up tests were not significant although the follow-up test results indicated a slight gain in comprehension.

Lee (1958) reported on the evaluation of a freshman non-voluntary reading improvement program in which he found that the students profited from the program. A random sample of 53 students was tested upon completion of the reading improvement program using an alternate form of the Cooperative Reading Comprehension Test and a significant gain (CR 5.1) was reported. From the total freshman group, 71 who had achieved or exceeded the percentile rank of 50 by mid-semester and therefore withdrew from the course were retested at the end of six months and the average gain still persisted. No statistical treatment beyond examination of the median was reported. Lee concluded that large average gains were made and that these gains tend to be of a permanent nature.

Kenworthy (1959) reported on 57 non-college adult subjects who had been pre-tested, given an 18 hour reading improvement program, post-tested and retested at the end of

one year. No statistical treatment of the data was presented but examination of the test results indicate an average gain at the end of the program in rate, followed by a small loss in rate after one year. The program seemed to have little effect on either comprehension or vocabulary scores and at the end of one year these scores were lower than the pre-training scores.

Fauls (1959), using a group of 150 female college students who had completed a reading improvement program, retested at the end of six months and found that in speed of reading the group mean was still significantly higher than the pre-training test performance scores. Comprehension scores remained statistically the same at the end of the course and at the six months follow-up study.

Siegel (1962), in a longitudinal five year study of an adult volunteer non-college reading improvement program, reported on 1197 cases who had improved reading skills. A follow-up test was given six months after completion of the program and Siegel reported "Gains in reading comprehension and speed are retained after a six month interval following the end of the course, with continued improvement noted." Siegel did not include (1) number of subjects returning for the follow-up or (2) statistical significance of the gain.

Of the 16 studies reported above, eight indicated a retention of gain in reading rate, while five studies reported a decline in rate from the post-training peak and three

reported that gains made in the reading improvement program continued and increased beyond the post-training peak.

Only three of the studies indicated that gains in comprehension were retained while four studies reported a loss in comprehension performance and two studies indicated there was a slight gain beyond the post-training test performance. Three studies indicated that no gain had been made in the reading improvement program for comprehension skills.

One study reported that increased vocabulary performance was retained. Three studies reported that vocabulary performance declined between the post-training test and the retest. Smith and Wood (1955) reported that no gain in vocabulary performance was made during the course. The remainder of the studies either did not report results or did not measure retention of vocabulary performance.

The length of time following the completion of a reading improvement program and retest varied from 60 days to approximately two years, and seems to have no bearing on retention or lack of retention of gains.

Relative Gains Made by Groups of Different Initial Performance Levels

Only two studies were found in the literature pertaining to relative gains made by groups of different initial performance levels. Beasley (1959), in evaluating a reading improvement program, divided an experimental sample of 144 college freshmen into three groups based upon placement on

the initial reading test, used chi-square to determine post-training gain, and found the gain to be significant beyond the .01 level of confidence (26.71). The sample was retested at the end of three months when chi-square was again calculated for the change in placement. Chi-square was significant beyond the .01 level of confidence (23.31) and he concluded that ". . . the residual gain in over-all reading ability after a lapse of three months following course instruction in reading was significant."

An examination of the tables presented by Beasley indicates that 27 per cent of those students testing in the lower 25 per cent moved to the middle 50 per cent and 27 per cent of those testing in the middle 50 per cent moved to the upper 25 per cent at the end of the training period. When the sample was retested at the end of three months 24 per cent of those students originally testing in the lower 25 per cent were still in the middle 50 per cent while 54 per cent of those originally testing in the middle 50 per cent had moved to the upper 25 per cent. The results of this study indicate that a reading improvement program is of most permanent value to those students who originally test in the middle 50 per cent of the group. The following implications were suggested by this study:

It is possible that those who scored in the upper 25 per cent prior to the course instruction continued to improve the basic reading skills acquired during the course instruction, while those in the lower 25 per cent exhibited a tendency to decline in these skills after a lapse of three months following course instruction. Those in the middle 50 per cent

tended to hold the initial gain or to advance in the group comprising the upper 25 per cent.

Heftel (1961) reported on a study involving 24 college students who had completed a college reading improvement program. The sample was divided into three groups, the initially fastest 25 per cent, the middle 50 per cent, and the initially slowest 25 per cent. He found that:

> Those who were initially the fastest readers made an average gain of 845 words per minute, the middle group showed an average gain of 476 words per minute, while those who were initially the slowest readers made an average gain of only 199 words per minute.

Using a predictive index, ". . . a combination of weighted scores from the freshman guidance examinations which correlate highest with academic success", he found significant correlations between gain in narrative speed (.65, level of significance .01), gain in study speed (.46, level of significance .05) and the predictive index. His tentative conclusions were that ". . . the students who show the greatest aptitude are also initially fastest readers and will probably profit most from rate training."

These studies by Beasley (1959) and Heftel (1961) would suggest that those students who come to the reading improvement programs with initially higher performance derive more benefit from the course than students who come to the course with low performance.

Summary

This chapter has been a review of the literature of college reading improvement programs examined from the standpoints of (1) studies dealing with immediate gains resulting from participation in college reading improvement programs, (2) studies dealing with retained, or residual, gains from a college reading improvement program, and (3) studies dealing with the relative gains made by groups of differing ability levels in college reading improvement programs.

This review shows that there are consistent reports of gains made in college reading improvement programs in terms of rate of reading and that these gains are retained for periods of time. There is a strong indication, however, that reading improvement programs are not as successful in increasing performance in either vocabulary or comprehension, and that gains made are not retained as often as are gains made in rate. This would suggest that (1) increasing speed is the simplest task of the college reading program and (2) the emphasis of many programs has been on speed.

If college reading is to be considered as developmental then studies should reflect patterns of growth in reading skills. There is no pattern of growth in the reading skills either in the programs evaluated or in the examinations of permanency of gain.

Many of the studies are weak in design in that statistical tests of significance were not applied and where

experimental groups were compared with control groups the matching techniques were not refined.

There are far too few studies concerning groups of different initial performance level to draw any conclusions beyond the suggestion that students who come to the reading improvement program with greater potential may profit most from the course.

CHAPTER III

PERSONNEL AND PROCEDURES

Introduction

This chapter will describe the Oklahoma State University reading program, the population selected for the study, the tests used to measure reading performance and the statistical methods used to test the significance of any change in reading performance.

The Reading Improvement Program

The reading improvement program at the Oklahoma State University consists of 30 clock hours of testing and instruction. One hour of formal testing precedes the instruction for the purpose of diagnosis and one hour of formal testing follows the instruction for the purpose of evaluating progress made. Multiple sections of the reading improvement course are offered two times each semester to provide maximum utilization of the facilities available.

In the fall 1961 semester, sections one through six started September 25, and ended November 3. There was a total of 196 enrollees in these sections. Ninety eight enrollees completed the instruction and 98 dropped out or did

not appear for instruction. Sections seven through thirteen started November 8, and ended December 15. There was a total of 129 enrollees in these sections. Seventy nine completed the instruction and 50 dropped out or did not appear for instruction.

In accordance with the purposes set for the course, as outlined in Chapter I, the program is designed to improve all types of reading proficiency and includes lectures devoted to types of reading, (i.e., study, skimming, reqreational), and to the development of a flexible approach to reading material. Intensive practice is given in speed of reading, vocabulary building, and comprehension.

The following aids are used:

A. The Controlled Reader which projects an image of material to be read on a screen and can be pre-set at the desired speed for pacing.

B. The Shadowscope which casts a light bar on material to be read and can be pre-set at the desired speed for pacing.

C. The SRA Laboratory IV (College Prep Edition), a graded set of materials designed to strengthen comprehension, improve vocabulary skills, and increase speed.

D. Various workbooks which are available for use in the program.

In addition to published material, many exercises prepared by the Reading Improvement Center are utilized and are designed to develop study skills, flexibility of approach, comprehension skills, vocabulary, and speed of reading.

On the basis of the pre-training tests and initial questionnaire responses, the enrollees are divided into small groups for instruction. Each small group is supervised and guided to provide the type of instruction needed. Periodic informal evaluations are made of the progress of each enrollee.

The Population

The population of this study was drawn from Education 120 enrollees who had completed the instruction provided by the Reading Improvement Center during the fall 1961 semester. The subjects were divided into the following groups for testing the hypotheses stated in Chapter I.

Immediate gains: Group A consisted of those enrollees who began reading instruction on September 25, 1961 and completed the instruction on November 3, 1961. Table II shows the composition of this group according to sex and college classification.

TABLE II

DISTRIBUTION OF GROUP A BY COLLEGE CLASSIFICATION AND SEX

Classification	Male	Female	Totals
Freshman	59	27	86
Sophomore	4	2	6
Junior	4	0	4
Senior	1	0	1
Graduate	1	0	1
Total	69	29	98

The enrollment by colleges is shown in Table III below:

TABLE III

DISTRIBUTION OF GROUP A
BY COLLEGE ENROLLMENT

College	Male	Female	Totals
Agriculture	11	0	11
Arts and Sciences	8	6	14
Business	18	8	26
Education	0	7	7
Engineering	30	0	30
Graduate	1	0	1
Home Economics	1	8	9
Total	69	29	98

Average daily attendance for this group was 25.5 clock hours.

Group B consisted of those enrollees who began reading instruction on November 8, 1961 and completed the instruction on December 15, 1961. Table IV shows the composition of the group according to sex and college classification.

TABLE IV

DISTRIBUTION OF GROUP B BY COLLEGE CLASSIFICATION AND SEX

Classification	Male	Female	Totals
Freshman	45	31	76
Sophomore	1	0	1
Junior	0	1	1
Senior	0	0	0
Graduate	1	0	1
Total	47	32	79

The enrollment by college is shown in Table V below:

TABLE V

DISTRIBUTION OF GROUP B
BY COLLEGE ENROLLMENT

College	Male	Female	Totals
Agriculture	12	0	12
Arts and Sciences	7	2	9
Business	8	14	22
Education	2	9	11
Engineering	17	0	17
Graduate	1	0	1
Home Economics	0	7	7
Total	47	32	79

Average daily attendance for this group was 21.3 clock hours.

Retention of Gains: Each student completing the college reading improvement program in the fall 1961 semester, Group A and Group B, above, was asked to return to the reading center for a follow-up test of reading performance. Each student was contacted (1) by letter, (2) through his adviser, and (3) by telephone. A copy of the letter sent to each student is attached as Appendix A.

Group A_1 consisted of 33 students who returned for testing six months after completion of the course and represent 33.5 per cent of the total Group A. Table VI shows the composition of this group according to sex and college classification.

TABLE VI

DISTRIBUTION OF GROUP A_1 BY COLLEGE CLASSIFICATION AND SEX

Classification	Male	Female	Totals
Freshman	20	6	26
Sophomore	1	0	1
Junior	3	0	3
Senior	2	0	2
Graduate	1	0	1
Total	27	6	33

The enrollment by college is shown in Table VII.

TABLE VII

DISTRIBUTION OF GROUP A_1
BY COLLEGE ENROLLMENT

College	Male	Female	Totals
Agriculture	7	0	7
Arts and Sciences	4	0	4
Business	5	1	6
Education	0	2	2
Engineering	9	0	9
Graduate	1	0	1
Home Economics	1	3	4
Total	27	6	33

Group B_1 consisted of 32 students who returned for testing three months after completion of the course and represent 40 per cent of the total Group B. Table VIII shows the composition of this group according to sex and college classification.

TABLE VIII

DISTRIBUTION OF GROUP B_1 BY COLLEGE CLASSIFICATION AND SEX

Classification	Male	Female	Totals
Freshman	17	12	29
Sophomore	1	0	1
Junior	0	0	0
Senior	0	1	1
Graduate	1	0	1
Total	19	13	32

The enrollment by college is shown in Table IX.

TABLE IX

DISTRIBUTION OF GROUP B_1
BY COLLEGE ENROLLMENT

College	Male	Female	Totals
Agriculture	6	0	6
Arts and Sciences	3	1	4
Business	1	3	4
Education	2	7	9
Engineering	6	0	6
Graduate	1	0	1
Home Economics	0	2	2
Total	19	13	32

Instrument Used in Study

The Nelson-Denny Reading Test (Form A and Form B), was used in this study for the following reasons: (1) it is the measuring device used in the Oklahoma State University College Reading Improvement Program, (2) the tests were standardized using a large sample, and (3) the total correlation for these tests is .92 which signifies a rather high reliability between Form A and Form B of the test.

The Nelson-Denny Reading Test was revised by James I. Brown, University of Minnesota, and was published in 1960 by Houghton Mifflin Company. The test consists of 100 vocabulary

items, 44 comprehension items with one longer passage designed to measure rate of reading.

The normative population of the revised form of the Nelson-Denny Reading Test included a total of 7497 subjects in grades 13, 14, 15 and 16 who were enrolled in Junior Colleges, Universities, Liberal Arts Colleges, Technical Schools, and State Teachers Colleges selected from all sections of the United States.

The mean validity index for Form A is 47.5 and for Form B is 47.4. Garrett (1958) states that ". . . items with validity indices of .20 or more are regarded as satisfactory." In Form A (revised) and Form B (revised) all items with validity indices below .31 were discarded.

To measure the consistency, or reliability, of the Nelson-Denny Reading Test the equivalent form method was used. This is particularly appropriate since this test utilizes speed as a factor. The reliability coefficient for vocabulary is .93, for comprehension .81, for total .92, for rate (initial) .93, and for rate (after training) .82. These reliability coefficients are sufficiently high to indicate a rather high reliability between the revised forms of the Nelson-Denny Reading Test.

Form A of the Nelson-Denny Reading Test was administered to the sample population before training to determine the initial performance level. Form B of the Nelson-Denny Reading Test was administered to the sample population after training to measure growth in reading performance. Form A of the

Nelson-Denny Reading Test was administered three and six months after completion to the sample population to measure residual effects of the course.

Statistical Design

The statistical method selected for testing the significance of the change in reading performance was the *t* test.

The data collected for this study is from a representative sample of students completing the Oklahoma State University College Reading Improvement Program. The unrestricted nature of the enrollment procedure allows randomness within the limitations of the population from which the sample was drawn.

The *t* test used in this study to test the hypotheses dealing with immediate and retained gains is the test described by Tate (1955), Guilford (1958), and Garrett (1958) as the *t* test of difference between means of two correlated samples, and by Steele and Torrie (1960) as the *t* test of paired observations and was calculated using the following formula:

$$t = \frac{(\bar{D} - D_p)}{\sqrt{\frac{N\Sigma D^2 - (\Sigma D)^2}{N^2(N-1)}}}$$

in which $\bar{D}$ is the difference between the sample means, D_p is the population mean, ΣD^2 is the sum of the differences squared, $(\Sigma D)^2$ is the sum of the difference squared, and N is the number.

Using this formula it is unnecessary to test for homogeneity of variance, since, as stated by Tate (1955), "The only assumption needed to validate the procedure is that the sample of differences is randomly taken from a normal population of differences."

The t test used in this study to test the hypotheses dealing with the relative gains due to initial performance level was the test described by Tate (1955).

Raw score data was used for all portions of the study. The computations were based on the distribution of differences of performance between the pre-training test, the post-training test, and the retest.

The t test was used to test the hypotheses dealing with immediate gains in the college reading improvement program, the retained gains, and the relative gains due to initial performance levels.

Summary

This chapter has described the Oklahoma State University College Reading Improvement Program, the sample selected for the study, the tests used to measure reading performance and the statistical methods used to test the significance of any change in reading performance.

The Oklahoma State University College Reading Improvement Program was developmental in nature using various methods and materials to promote better reading.

The sample was made up of undergraduate and graduate students with a high proportion of male freshman students and represent a cross-campus selection. The drop out rate approached 50 per cent which is typical for college reading improvement programs. The attendance as reported by average daily attendance records was good.

The measuring instrument was the revised Nelson-Denny Reading Test (Form A and Form B), which was chosen because (1) it is the measuring device used in the Oklahoma State University College Reading Improvement Program, (2) the tests were standardized using a large sample, and (3) the total correlation for these tests is .92 which signifies a rather high reliability between Form A and Form B of the test.

The statistical methods were the *t* test of correlated means and the *t* test of independent samples which were calculated from scores obtained in a pre-training, post-training, and retest situation to determine change in reading performance due to the college reading improvement program, the residual effects of the course, and the relative gains made by students of different initial performance levels.

CHAPTER IV

TREATMENT OF DATA AND ANALYSIS OF RESULTS

Introduction

The following chapter is composed of a detailed account of the statistical treatment of the data and the analysis of the results. This chapter will indicate the degree to which the hypotheses are found to be correct within recognized limitations.

The data will be discussed under the following headings: (1) the immediate gains resulting from the college reading improvement program, (2) the retention of gains in a college reading improvement program, and (3) relative gains made by groups of different initial performance levels.

The Immediate Gains Resulting From a College Reading Improvement Program

The mean pre-training test scores, the mean post-training test scores, the mean difference, the standard deviation of the mean difference, the *t* values and the levels of significance between the pre-training test scores and the post-training test scores for Group A are presented in Table X.

TABLE X

STATISTICAL COMPARISON OF PRE-TRAINING AND POST-TRAINING SCORES (GROUP A)

Test	Pre-training mean	Post-training mean	Mean difference	*s*	*t* value
Vocab.	27.673	32.061	4.388	5.5498	8.048 ***
Comp.	34.65	38.88	4.23	8.7350	4.771 ***
Total	62.33	70.95	8.62	11.1355	7.6198***
Rate	237.15	291.55	54.40	61.1555	8.7558***

***With 97 df significant beyond the .001 level of confidence

Tabulated *t* .05 for 97 degrees of freedom and a two-tailed test is 1.986. The observed differences were presented in Table X and are hard to explain on the basis of random sampling from the population associated with the null hypotheses. The null hypotheses can be rejected on the basis of the evidence presented for Group A.

The mean pre-training test scores, the mean post-training test scores, the mean difference, the standard deviation of the mean difference, the t values, and the levels of significance between the pre-training test scores and the post-training test scores for Group B are presented in Table XI.

TABLE XI

STATISTICAL COMPARISON OF PRE-TRAINING AND POST-TRAINING SCORES (GROUP B)

Test	Pre-training mean	Post-training mean	Mean difference	s	t value
Vocab.	25.45	30.7088	5.25	6.7749	8.9511***
Comp.	34.86	37.22	2.36	6.9426	2.9092**
Total	60.32	67.92	7.60	8.9443	7.5254***
Rate	204.08	269.16	65.08	64.2651	8.9555***

** With 78 df significant beyond the .01 level of confidence
***With 78 df significant beyond the .001 level of confidence

Tabulated t .05 for 78 degrees of freedom and a two-tailed test is 1.993. The observed differences were presented in Table XI and are hard to explain on the basis of random sampling from the population associated with the null hypotheses. The null hypotheses can be rejected on the basis of the evidence presented for Group B.

Retention of Gains Made in a College Reading Improvement Program

The mean pre-training test scores, the mean post-training test scores, the mean difference, the standard deviation of the mean difference, the *t* values, and the level of significance for the sample group retested three months after completion of the program (Group B_1) are presented in Table XII.

TABLE XII

STATISTICAL COMPARISON OF PRE-TRAINING AND POST-TRAINING SCORES (GROUP B_1)

Test	Pre-training mean	Post-training mean	Mean difference	*s*	*t* value
Vocab.	27.87	32.59	4.719	6.107	4.302 ***
Comp.	36.50	39.25	2.75	5.5964	2.003
Total	64.375	71.844	7.468	10.7889	3.850 ***
Rate	216.379	298.156	81.781	63.0872	7.347 ***

***With 31 df significant beyond the .001 level of confidence In Table XII through Table XIX unmarked *t* values represent non-significant differences.

Table XII indicates that the sample made significant gains in vocabulary test performance, total test performance, and rate of reading during the training period with no significant gain in comprehension test performance.

The mean post-training scores, the mean retest scores, the mean difference, the standard deviation of the mean difference, the *t* values, and the level of significance for the sample group retested three months after completion of the program (Group B_1) are presented in Table XIII.

TABLE XIII

STATISTICAL COMPARISON OF POST-TRAINING AND RETEST SCORES (GROUP B_1)

Test	Post-training mean	Retest mean	Mean difference	*s*	*t* value
Vocab.	32.594	33.561	.9687	6.164	.874
Comp.	39.250	41.312	2.062	7.253	1.582
Total	71.844	75.750	3.906	17.161	1.894
Rate	298.156	309.750	11.594	54.083	1.132

Number in Group: 32

Table XIII indicates that there was no loss in mean performance between the post-training test and the retest three months later with an observed but not significant gain over the post-training test scores.

The mean pre-training test scores, the mean retest test scores, the mean difference, the standard deviation of the mean difference, the *t* values, and the level of significance for the sample group retested three months after completion of the program (Group B_1) are presented in Table XIV.

TABLE XIV

STATISTICAL COMPARISON OF PRE-TRAINING AND RETEST SCORES (GROUP B_1)

Test	Pre-training mean	Retest mean	Mean difference	*s*	*t* value
Vocab.	27.87	33.562	5.688	4.604	6.878 ***
Comp.	36.50	41.312	4.812	6.686	4.007 ***
Total	64.375	75.750	11.375	10.344	6.099 ***
Rate	216.379	309.75	93.37	69.28	7.463 ***

***With 31 df significant beyond the .001 level of confidence

Tabulated *t* .05 for 31 degrees of freedom and a two-tailed test is 2.039. The observed differences and the calculated *t* values for the vocabulary sub-test, comprehension sub-test, the total test performance, and the rate of reading performance were presented in Table XIII and do not exceed the tabulated *t* values and the null hypotheses cannot be rejected for the sample group retested three months after completion of the program on the basis of the evidence presented.

The mean pre-training vocabulary scores and the mean post-training vocabulary scores and the mean retest vocabulary scores are presented in Figure 1.

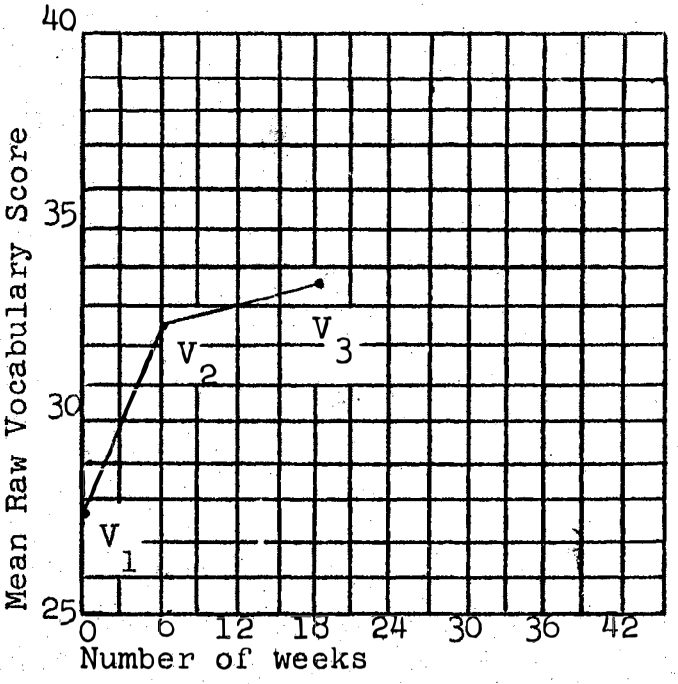

Figure 1. Pre-training, post-training and retest vocabulary test scores (Group B_1).

The mean pre-training comprehension scores, the mean post-training comprehension scores and the mean retest comprehension scores are presented in Figure 2.

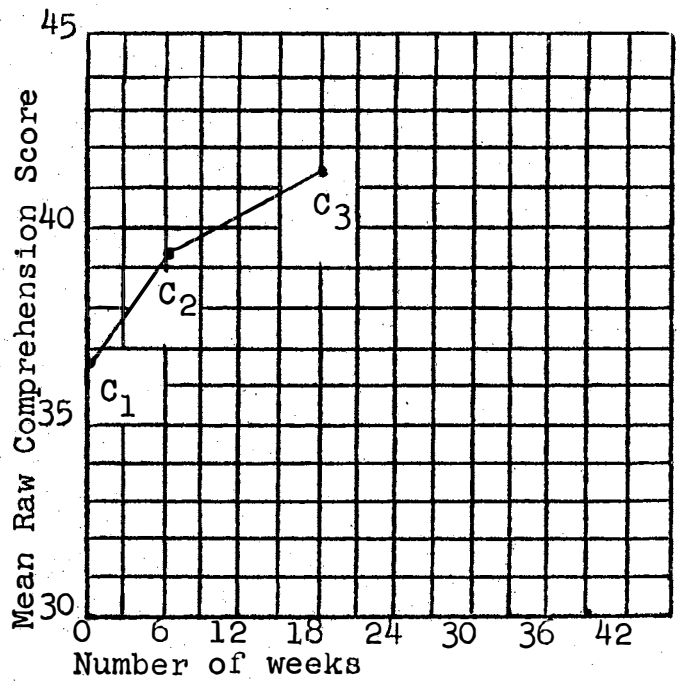

Figure 2. Pre-training, post-training, and retest comprehension scores (Group B_1)

The mean pre-training total scores, the mean post-training total scores and the mean retest total scores are presented in Figure 3.

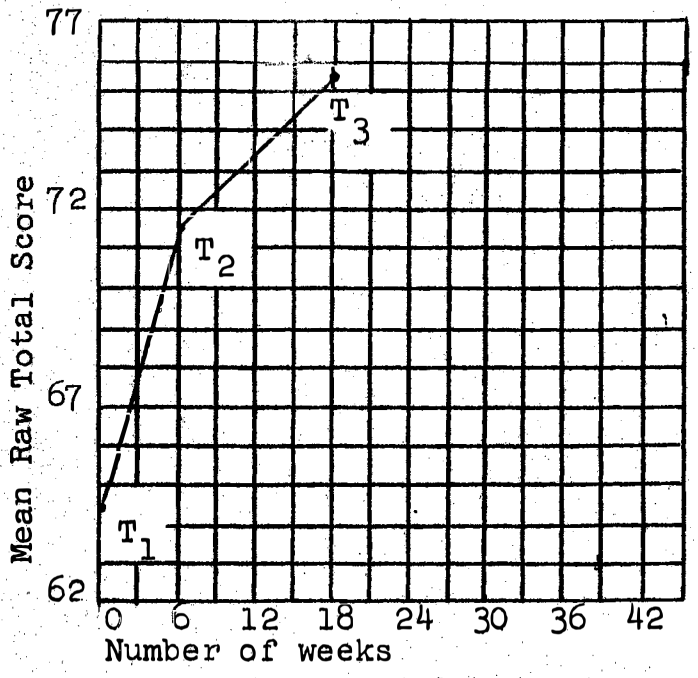

Figure 3. Pre-training, post-training and retest total scores (Group B_1)

The mean pre-training rate scores, the mean post-training rate scores and the mean retest rate scores are presented in Figure 4.

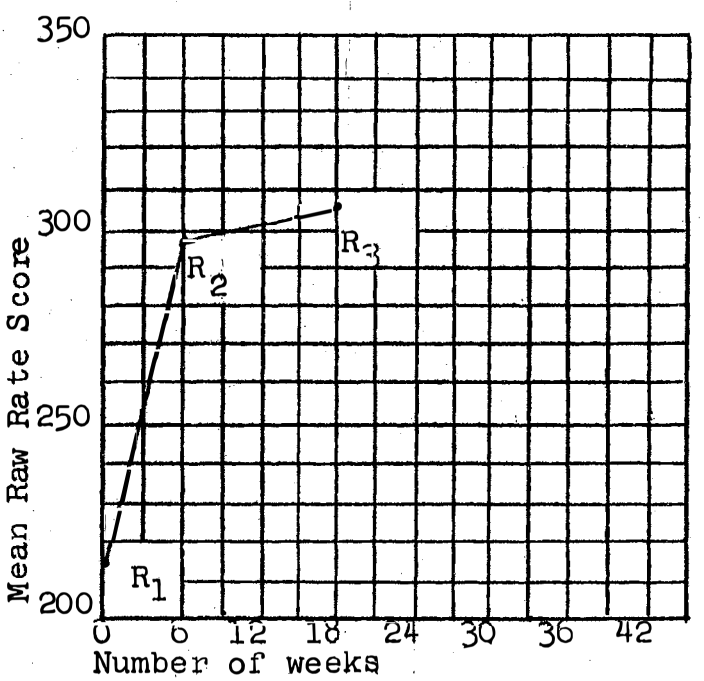

Figure 4. Pre-training, post-training and retest rate scores (Group B_1)

The mean pre-training test scores, the mean post-training test scores, the mean difference, the standard deviation of the mean difference, the *t* values, and the level of significance for the sample group retested six months after completion of the program (Group A_1) are presented in Table XV.

TABLE XV

STATISTICAL COMPARISON OF PRE-TRAINING AND POST-TRAINING SCORES (GROUP A_1)

Test	Pre-training mean	Post-training mean	Mean difference	*s*	*t* value
Vocab.	28.73	31.82	3.0909	5.49	3.1898 **
Comp.	33.45	40.00	6.55	10.06	3.4864 **
Total	62.18	71.82	9.64	13.25	4.1165***
Rate	248.30	295.06	46.76	64.73	4.085 ***

** With 32 df significant beyond the .01 level of confidence
***With 32 df significant beyond the .001 level of confidence

The mean post-training test scores, the mean retest test scores, the mean difference, the standard deviation of the mean difference, the t values, and the level of significance for the sample group retested six months after completion of the program (Group A_1) are presented in Table XVI.

TABLE XVI

STATISTICAL COMPARISON OF POST-TRAINING AND RETEST SCORES (GROUP A_1)

Test	Post-training mean	Retest mean	Mean difference	s	t value
Vocab.	31.82	34.788	2.9696	5.196	3.2327 **
Comp.	40.00	39.52	.48	8.0312	.3415
Total	71.82	74.30	2.4848	9.654	1.4563
Rate	295.06	315.91	20.8484	54.405	2.2326 *

* With 32 df significant beyond the .05 level of confidence
**With 32 df significant beyond the .01 level of confidence

The mean pre-training vocabulary scores, the mean post-training vocabulary scores and the mean retest vocabulary scores are presented in Figure 5.

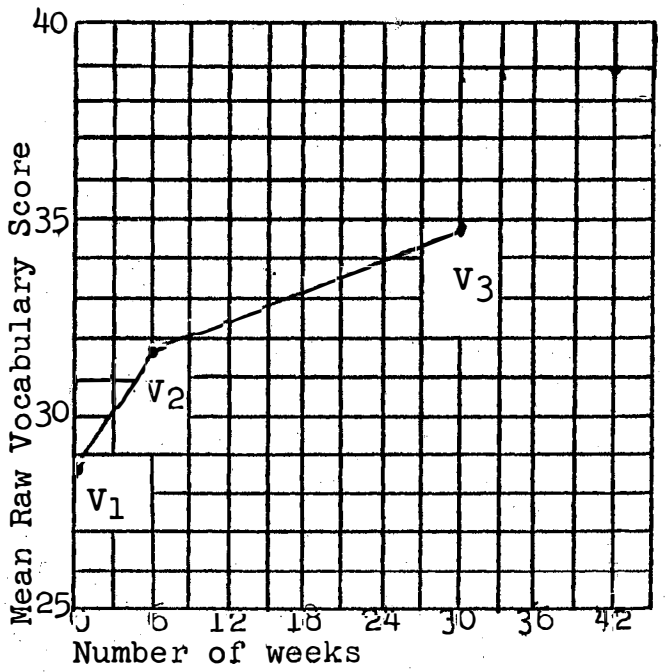

Figure 5. Pre-training, post-training, and retest vocabulary scores (Group A_1)

The mean pre-training comprehension scores, the mean post-training comprehension scores and the mean retest comprehension scores are presented in Figure 6.

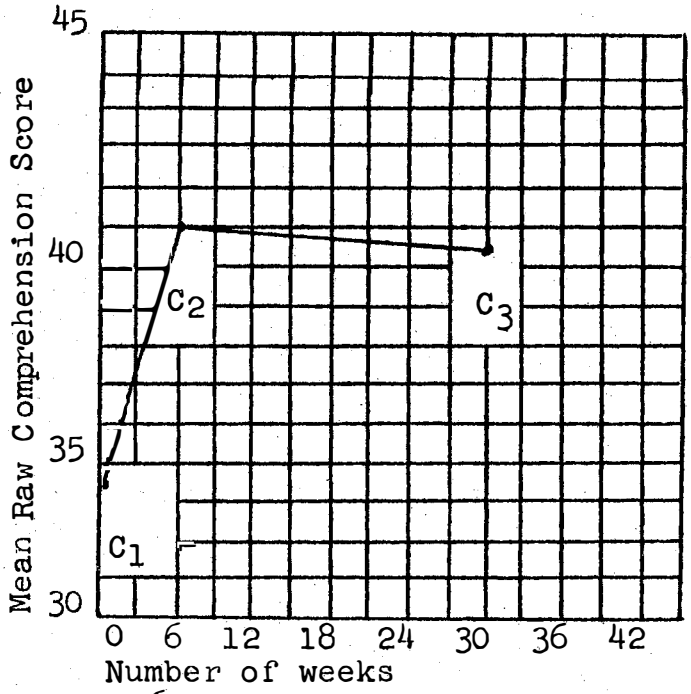

Figure 6. Pre-training, post- training and retest comprehension scores (Group A_1).

The mean pre-training total scores, the mean post-training total scores and the mean retest total scores are presented in Figure 7.

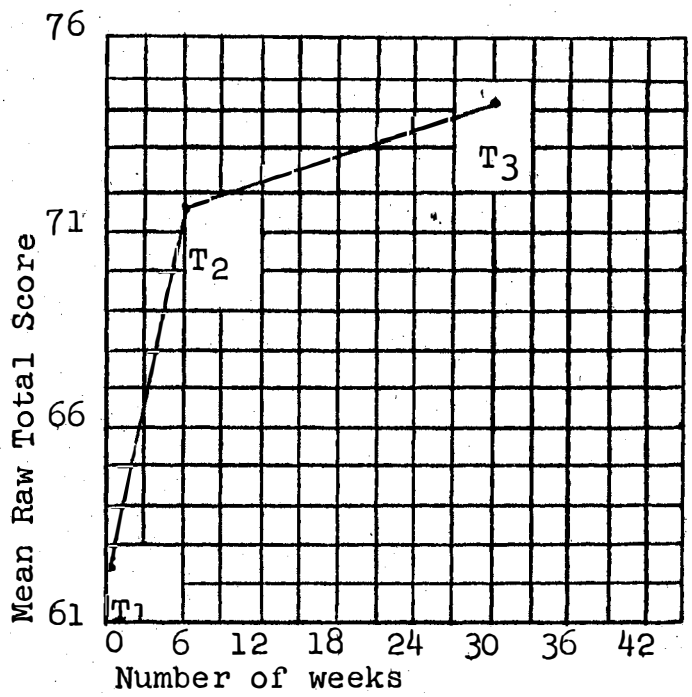

Figure 7. Pre-training, post-training and retest total scores (Group A_1)

The mean pre-training rate scores, the mean post-training rate scores and the mean retest rate scores are presented in Figure 8.

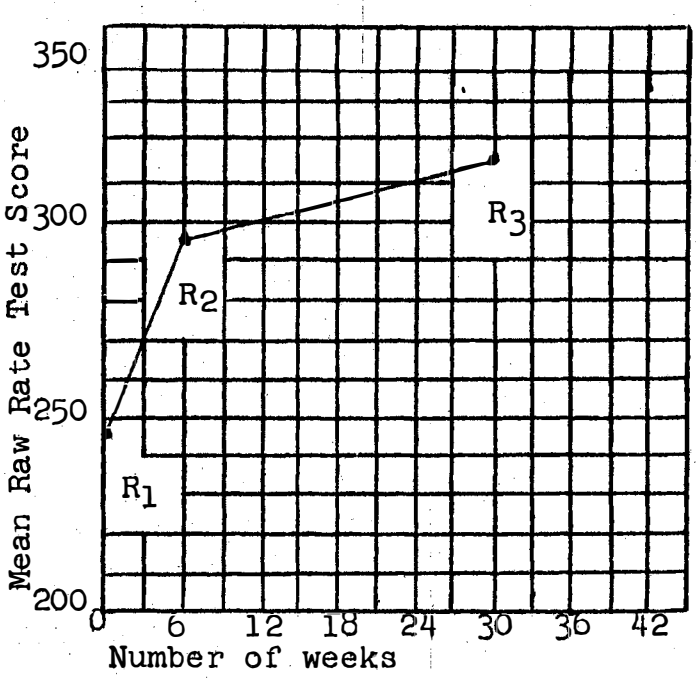

Figure 8. Pre-training, post-training and retest rate scores (Group A_1).

The mean pre-training test scores, the mean retest test scores, the mean difference, the standard deviation of the mean difference, the t values, and the level of significance for the sample group retested six months after completion of the program (Group A_1) are presented in Table XVII.

TABLE XVII

STATISTICAL COMPARISON OF PRE-TRAINING AND RETEST SCORES (GROUP A_1)

Test	Pre-training mean	Retest mean	Mean difference	s	t value
Vocab.	28.73	34.79	6.0606	5.418	6.3368***
Comp.	33.45	39.52	6.0606	6.058	3.7247***
Total	62.18	74.30	12.1212	10.609	6.7227***
Rate	248.30	315.91	67.61	67.082	5.6938***

***With 32 df significant beyond the .001 level of confidence

Tabulated t .05 for 32 degrees of freedom and a two-tailed test is 2.0372. The observed differences, the calculated t values for the vocabulary sub-test and the rate of reading performance were presented in Table XVI, and are hard to explain on the basis of random sampling from the population associated with the null hypotheses. The null hypotheses can be rejected on the basis of the evidence presented for the sample group retested six months after completion of the program. The calculated t values for the comprehension sub-test

and the total test performance do not exceed the tabulated t values and the null hypotheses cannot be rejected on the basis of the evidence presented.

Relative Gains Made by Groups of Different Initial Performance Levels

The mean difference between the pre-training test score and the mean post-training test score, the standard deviation of the mean difference, the t values, and the levels of significance between the pre-training and post-training test score difference for test performance above the median and test performance below the median of Group A are presented in Table XVIII.

TABLE XVIII

STATISTICAL COMPARISON OF BELOW THE MEDIAN DIFFERENCES AND ABOVE THE MEDIAN DIFFERENCES (GROUP A)

	Below Median		Above Median		
Test	Mean difference	s	Mean difference	s	t value
Vocab.	3.898	4.477	4.3875	6.488	.3420
Comp.	5.979	9.187	2.489	7.880	1.757
Total	9.877	10.9545	7.367	11.1803	1.090
Rate	50.020	51.9615	58.714	68.9202	.5204

Number in Group: 98

Tabulated t .05 for 96 degrees of freedom and a two-tailed test is 1.988. The observed differences were presented

in Table XVIII and the calculated t values for the vocabulary sub-test, the comprehension sub-test, the total test performance and the rate of reading performance did not exceed the tabulated t value and the null hypotheses cannot be rejected on the basis of the evidence presented.

The mean difference between the pre-training test score and the mean post-training test score, the standard deviation of the mean difference, the t values, and the levels of significance between the pre-training and post-training test score difference for test performance above the median and test performance below the median of Group B are presented in Table XIX.

TABLE XIX

STATISTICAL COMPARISON OF BELOW THE MEDIAN DIFFERENCES AND ABOVE THE MEDIAN DIFFERENCES (GROUP B)

	Below Median		Above Median		
Test	Mean difference	s	Mean difference	s	t value
Vocab.	4.1842	4.58258	6.244	5.49545	1.1533
Comp.	2.263	6.54217	2.439	7.69415	.108
Total	6.447	8.87130	8.683	8.86565	1.105
Rate	54.89	59.4138	74.51	69.932	.9727

Number in Group: 79

Tabulated t .05 for 77 degrees of freedom and a two-tailed test is 1.994. The observed differences were presented

in Table XIX and the calculated t values for the vocabulary sub-test, the comprehension sub-test, the total test performance and the rate of reading performance did not exceed the tabulated t value and the null hypotheses cannot be rejected on the basis of the evidence presented.

Summary

This chapter has presented a detailed analysis of the statistical treatment of the data. The following hypotheses were rejected:

1. There is no significant difference between the mean pre-training vocabulary scores and the mean post-training vocabulary scores. This hypothesis was rejected for both Group A and Group B.

2. There is no significant difference between the mean pre-training comprehension scores and the mean post-training comprehension scores. This hypothesis was rejected for both Group A and Group B.

3. There is no significant difference between the mean pre-training rate of reading scores and the mean post-training rate of reading scores. This hypothesis was rejected for both Group A and Group B.

4. There is no significant difference between the mean total pre-training reading scores and the mean total post-training reading scores. This hypothesis was rejected for both Group A and Group B.

5. There is no significant difference between the mean post-training vocabulary scores and the mean vocabulary score after a period of six months.

6. There is no significant difference between the mean post-training rate of reading score and the mean rate of reading score after a period of six months.

The following hypotheses could not be rejected.

1. There is no significant difference between the mean post-training vocabulary score and the mean vocabulary score after a period of three months.

2. There is no significant difference between the mean post-training comprehension score and the mean comprehension score after a period of three months.

3. There is no significant difference between the mean post-training total score and the mean total score after a period of three months.

4. There is no significant difference between the mean post-training comprehension score and the mean comprehension score after a period of six months.

5. There is no significant difference between the mean post-training rate of reading score and the mean rate of reading score after a period of three months.

6. There is no significant difference between the mean post-training total score and the mean total score after a period of six months.

7. There is no significant difference between the mean gain in vocabulary made by students falling below the median

and the mean gain in vocabulary made by students falling above the median.

8. There is no significant difference between the mean gain in comprehension made by students falling below the median and the mean gain in comprehension made by students falling above the median.

9. There is no significant difference between the mean gain in total reading performance made by students falling below the median and total reading performance made by students falling above the median.

10. There is no significant difference between mean gain in reading rate made by students falling below the median and the mean gain in reading rate made by students falling above the median.

CHAPTER V

SUMMARY AND CONCLUSIONS

General Summary of the Investigation

This investigation examined the change in reading test performance of students successfully completing the Oklahoma State University College Reading Improvement Program. Four areas of concern were investigated: (1) the change in performance from pre-training to post-training tests, (2) the change in reading performance three months after completion of the college reading improvement program, (3) the change in reading test performance six months after completion of the college reading improvement program, and (4) the relative change in reading test performance of students who initially tested below the median and students who initially tested above the median. Null hypotheses that no differences existed between pre-training, post-training and retesting were used.

All students who successfully completed the Oklahoma State University College Reading Improvement Program in the fall 1961 semester were used for the initial portion of this investigation. Group A consisted of 98 students. Group B consisted of 79 students. These groups were given pre-training and post-training reading tests. Each group was

then divided at the median to examine relative gains due to initial test performance.

Thirty three students from Group A were retested six months after completion of the college reading improvement program to determine if gains made in the program were retained.

Thirty two students from Group B were retested three months after completion of the college reading improvement program to determine if gains made in the program were retained.

The testing instruments used were the Nelson-Denny Reading Test (Form A) and the Nelson-Denny Reading Test (Form B) with an examination being made of each sub-test, the total test, and the rate of reading.

The data were treated statistically by the methods of t test of correlated means and the t test of independent means.

Summary of Results

The results of the portion of the study concerning immediate gains are impressive in that there was a significant gain in test performance in vocabulary, comprehension, total reading, and the rate of reading for both Group A and Group B. The calculated t values for the vocabulary sub-test (8.048 for Group A, 10.517 for Group B), the comprehension sub-test (5.173 for Group A, 3.067 for Group B), the total test (8.119 for Group A, 7.518 for Group B), and rate of

reading (9.037 for Group A, 8.881 for Group B) far exceeded the tabulated t values at the .05 level of confidence. The significance of the calculated t values and the consistency of gain between groups make it feasible to conclude that the Oklahoma State University College Reading Improvement Program materially changes the reading performance of those completing the training. These results tend to confirm the findings of other studies reported in Chapter II; however, the gains reported here are more consistent in all measured areas of reading than are those reported in Chapter II.

The results of this investigation concerning retention of gain indicate that where significant gains are made in the Oklahoma State University College Reading Improvement Program these gains are retained without significant loss for the period of time covered by this study. The gains in performance and the retention of those gains could be due, in part, to the increased demands of college reading and to the maturation of the college students involved as was suggested by Kingston and George (1957).

Table XX gives a summary of significance found for retention of gains for Group B_1 (retested three months after completion of the program) and Group A_1 (retested six months after completion of the program).

TABLE XX

SUMMARY OF SIGNIFICANCE FOR RETENTION OF GAIN

	Vocabulary		Comprehension		Total		Rate of Reading	
	B_1	A_1	B_1	A_1	B_1	A_1	B_1	A_1
End of training	.001	.001	NS	.001	.001	.001	.001	.001
Post-training Retest	NS	.01	NS	NS	NS	NS	NS	.05
Pre-training Retest	.001	.001	.001	.001	.001	.001	.001	.001

The group retested three months after completion of the course showed no significant difference in performance between post-training test scores and retest scores. The group retested six months after completion of the course showed significant positive differences in performance between post-training vocabulary and rate of reading and retest scores. No significant differences for the comprehension sub-test and total test were found between post-training performance and the retest performance.

The hypothesis concerning retention of gain made on the comprehension sub-test could not be tested for Group B_1 (retested three months after completion of the program) as

there was no significant gain reported between the pre-training and the post-training tests. The tabulated t value for .05 level of confidence was 2.039 and the calculated t value was 2.003. It is noteworthy, however, that a significant difference did exist between the pre-training comprehension sub-test score and the retest as it did for all measured aspects of reading for both groups.

The observed but not significant gains reported for both groups lend support to the theory that skills developed in a reading improvement program will continue to develop after completion of the program. The one exception to this continued growth was found for the comprehension sub-test of Group A_1 (retested six months after completion of the program) where a non-significant decline in performance was observed.

It can be concluded, from the evidence presented here, that gains are made in a reading improvement program and that these gains are retained after a period of three months and after a period of six months, and there appears to be continuation of gain for the sample examined.

The results of this investigation were only in partial agreement with the studies reported in Chapter II. This investigation indicated consistent retention of skills in four areas, i.e., vocabulary, comprehension, total reading score, and rate of reading score, while no study found in the literature reported significant gains in all areas studied. This introduces the possibility that the eclectic approach to instruction utilized by the Oklahoma State University Reading

Center is more successful in changing reading performance than other more specialized approaches, e.g., machine oriented approach, lecture oriented approach, study skills approach.

The third major area of concern of this paper was the relative gains made by groups whose initial performance level was below the median and by groups whose initial performance level was above the median. The null hypothesis could not be rejected at the .05 level of confidence. This finding appears to contradict the findings reported in Chapter II that those of initially higher performance level will make the most significant changes as a result of the college reading improvement program. This experiment showed that there was as much within group variance as there was between group variance for the sample groups above the median and below the median respectively.

The design of this study precluded the isolation of possible causal factors associated with the prediction of gain in performance and any conclusions drawn would be purely speculative. It can be concluded, however, that for the sample tested there was no difference in amount of gain as the result of either initially high or initially low performance in any area of reading ability measured.

Continued evaluation of a program is important and this investigation suggests the need for further research in college reading in the following areas:

1. Studies designed to isolate factors related to the change in performance in comprehension skills should be made.

This measured skill was the only skill in this study failing to show any consistency concerning change in performance.

2. Studies designed to study retention of skills over longer periods of time should be made.

3. Studies designed to show comparative change in performance in enrollees and non-enrollees should be made.

4. More studies designed to investigate the relative gains of groups of different initial performance level should be made. The college reading improvement program now attracts students of lesser ability and the demonstration of the worth of developmental college reading will tend to lead to the recognition that all college students would profit from such training.

Concluding Statement

The results of this study are offered as an attempt to aid in the evaluation of the Oklahoma State University College Reading Improvement Program which may lead to the ability to predict student success in the program. It is hoped that the results may be useful in guiding the future direction of the Oklahoma State University College Reading Improvement Program.

The demonstrated success of the methods used in the Oklahoma State University College Reading Improvement Program, as reported in all areas of this investigation, could provide insight to others in establishing or evaluating a college reading program. In this way it is hoped that this investigation will serve a useful purpose.

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A P P E N D I X A

LETTER SENT TO ALL STUDENTS COMPLETING THE OKLAHOMA STATE UNIVERSITY COLLEGE READING IMPROVEMENT PROGRAM IN THE FALL 1961 SEMESTER

March 30, 1962

Dear Student:

The Reading Center of Oklahoma State University is in the process of evaluating the reading improvement program as it is now being offered. This evaluation includes a statistical analysis of scores made on the reading tests given by the Center.

We need your help in this evaluation. You can help us by returning to the Reading Center for one additional reading test to be given during the week of April 16-20, 1962.

The test will take approximately one hour and may be taken at any time during the week. An effort has been made to schedule enough testing hours to eliminate conflicts with regularly scheduled classes. If a conflict still exists, please call Darrel Ray, Extension 7135, or FR 2-7648, and other testing arrangements will be made to suit your convenience. The schedule is as follows:

Gu. 212, C	Monday, April 16	8:00 A.M.	through 5:00 P.M.
" "	Tuesday, April 17	8:00 A.M.	" "
" "		6:00 P.M.	" 9:00 P.M.
" "	Wednesday, April 18	8:00 A.M.	
" "		6:00 A.M.	
" "	Thursday, April 19	8:00 A.M.	
" "		6:00 P.M.	
" "	Friday, April 20	8:00 A.M.	
" "		6:00 P.M.	

Yours truly

Darrel D. Ray, Instructor
Department of Education
Extension 7135

A P P E N D I X B

DISTRIBUTION OF TEST SCORES FOR THE GROUP WHO BEGAN READING INSTRUCTION ON SEPTEMBER 25, 1961 AND COMPLETED INSTRUCTION ON NOVEMBER 3, 1961

TABLE B-I
DISTRIBUTION OF PRE-TRAINING AND POST-TRAINING RAW SCORES
GROUP A, SEPT. 25, 1961 - NOV. 3, 1961

Nelson-Denny, Form A				Nelson-Denny, Form B			
V	C	T	R	V	C	T	R
12	8	20	338	18	12	30	226
14	12	26	174	25	20	45	195
13	14	27	174	20	20	40	290
12	16	28	128	16	28	44	203
10	18	28	195	7	16	23	235
12	16	28	140	13	20	33	153
16	14	30	104	21	24	45	165
13	18	31	161	12	26	38	226
12	20	32	161	22	14	36	195
15	18	33	262	25	46	71	327
11	12	23	161	9	20	29	188
16	18	34	238	24	32	56	368
18	18	36	140	22	24	46	153
12	26	38	195	14	34	48	245
27	12	39	275	27	38	65	203
17	22	39	185	33	30	63	203
20	22	42	349	27	36	63	403
16	26	42	250	20	30	50	290
18	24	42	161	23	34	57	235
20	22	42	161	20	30	50	226
21	22	43	185	21	24	45	203
16	28	44	195	28	42	70	257
24	20	44	161	23	20	43	379
25	20	45	174	28	32	60	195
17	28	45	150	29	28	57	257
15	32	47	161	18	28	46	195
16	32	48	250	17	42	59	279
16	32	48	174	20	34	54	195
18	30	48	338	23	30	53	379
25	24	49	150	29	34	63	177
22	30	52	207	36	32	68	290
26	26	52	226	30	24	54	344
21	32	53	207	28	50	78	235
21	32	53	216	32	38	70	299
23	30	53	207	24	32	56	279
34	20	54	104	34	21	55	188
18	36	54	216	22	26	48	269
20	34	54	185	14	20	34	257
26	28	54	161	28	32	60	226
22	32	54	207	20	32	52	269
35	20	55	287	38	56	94	269
22	34	56	275	25	40	65	333
22	34	56	161	33	34	67	290
20	36	56	275	18	28	46	379
23	34	57	238	24	34	58	257
26	32	58	262	31	36	67	269
34	26	60	318	30	48	78	290
32	28	60	226	31	30	61	327
27	34	61	250	30	34	64	257

TABLE B-I (Continued)

Nelson-Denny, Form A				Nelson-Denny, Form B			
V	C	T	R	V	C	T	R
24	38	62	262	28	42	70	269
20	42	62	327	26	40	66	319
35	28	63	115	40	34	74	129
23	40	63	275	21	44	65	327
31	32	63	226	28	30	58	257
28	36	64	226	37	52	89	226
32	32	64	185	38	42	80	188
28	36	64	262	38	28	66	403
31	34	65	262	39	46	85	356
31	34	65	250	38	34	72	245
30	36	66	185	31	34	65	235
27	40	67	275	35	38	73	257
30	40	70	318	26	56	82	403
30	40	70	174	32	42	74	269
29	42	71	216	30	48	78	195
31	40	71	275	31	36	67	245
31	42	73	318	26	38	64	309
36	38	74	262	44	38	82	245
36	38	74	216	40	38	78	309
31	44	75	298	35	52	87	299
26	50	76	287	27	46	73	356
33	44	77	318	38	58	96	344
37	40	77	174	37	44	81	290
39	38	77	446	44	48	92	615
31	46	77	238	32	40	72	309
32	46	78	359	42	42	84	245
31	48	79	275	36	40	76	319
32	48	80	226	37	46	83	379
40	40	80	195	52	60	112	327
30	50	80	207	28	42	70	226
37	46	83	195	39	52	91	299
31	52	83	298	48	48	96	403
35	48	83	226	47	56	103	257
39	44	83	298	44	36	80	413
36	48	84	161	36	58	94	327
34	50	84	185	40	38	78	214
37	48	85	262	40	40	80	235
35	52	87	480	43	54	97	615
36	52	88	207	51	66	117	195
32	56	88	318	54	62	116	488
34	58	92	338	31	50	81	475
41	54	95	298	55	60	115	257
53	44	97	275	72	64	136	379
52	46	98	238	53	50	103	327
44	56	100	359	47	54	101	511
53	52	105	359	60	56	116	573
61	56	117	287	51	60	111	309
62	64	126	349	65	68	133	425
64	66	130	338	68	66	134	403

A P P E N D I X C

DISTRIBUTION OF TEST SCORES FOR THE GROUP WHO BEGAN READING INSTRUCTION ON NOVEMBER 8, 1961 AND COMPLETED INSTRUCTION ON DECEMBER 15, 1961

TABLE C-I
DISTRIBUTION OF PRE-TRAINING AND POST-TRAINING RAW SCORES
GROUP B, NOV. 8, 1961 - DEC. 15, 1961

Nelson-Denny, Form A				Nelson-Denny, Form B			
V	C	T	R	V	C	T	R
2	4	6	57	4	10	14	65
5	4	9	57	7	8	15	95
3	6	9	94	6	12	18	95
6	12	18	140	7	10	17	214
9	14	23	216	16	18	34	257
11	12	23	140	11	26	37	203
13	16	29	174	16	26	42	257
11	22	33	275	12	22	34	279
11	22	33	150	9	20	29	379
16	20	36	128	23	26	49	188
22	14	36	140	22	32	54	177
13	24	37	161	9	30	39	235
15	22	37	185	16	20	36	245
16	22	38	207	24	32	56	257
20	18	38	185	24	28	52	309
15	24	39	128	21	24	45	153
16	24	40	161	25	26	51	245
15	26	41	82	12	14	26	117
12	30	42	216	13	28	41	214
16	26	42	216	17	28	45	344
14	30	44	185	24	32	56	299
16	28	44	174	23	26	49	165
13	34	47	185	23	32	55	177
19	28	47	338	31	32	63	413
21	26	47	195	25	34	59	226
15	32	47	250	20	32	52	188
25	24	49	226	25	26	51	379
22	28	50	207	34	32	66	235
22	32	54	174	26	32	58	141
18	36	54	226	32	48	80	319
28	30	58	318	39	38	77	438
21	34	55	150	25	34	59	141
13	42	55	161	19	36	55	226
19	36	55	174	19	26	45	165
24	32	56	262	28	20	48	450
25	32	57	216	34	34	68	290
28	30	58	185	33	34	67	195
28	30	58	104	23	24	47	153

TABLE C-I (Continued)

Nelson-Denny, Form A			
V	C	T	R
26	34	60	174
30	30	60	238
26	34	60	140
29	32	61	195
19	42	61	262
33	28	61	262
23	40	63	150
23	40	63	104
19	44	63	216
28	36	64	150
29	38	67	161
30	38	68	287
28	40	68	226
32	36	68	216
23	46	69	250
30	40	70	174
30	40	70	226
28	44	72	226
33	42	75	327
27	48	75	327
34	42	76	195
40	36	76	216
34	44	78	359
33	46	79	174
34	46	80	185
35	48	83	287
40	44	84	185
37	48	85	207
40	48	88	250
36	52	88	226
43	48	91	318
43	48	91	226
42	50	92	207
38	54	92	216
42	54	96	195
46	54	100	226
41	60	101	250
38	64	102	359
47	56	103	207
52	56	108	207
52	58	110	275

Nelson-Denny, Form B			
V	C	T	R
35	40	75	309
33	56	89	344
18	38	56	177
42	34	76	309
26	38	64	344
34	38	72	290
40	28	68	188
28	36	64	195
25	40	65	257
33	40	73	309
40	48	88	279
44	54	98	290
35	58	93	226
28	42	70	245
36	44	80	379
30	42	72	195
38	36	74	245
31	42	73	319
45	36	81	344
29	44	73	450
34	50	84	195
38	28	66	309
45	42	87	511
42	40	82	235
44	50	94	226
39	46	85	245
46	42	88	214
39	56	95	195
45	46	91	425
34	52	86	257
45	56	101	319
53	50	103	279
50	62	112	214
47	64	111	468
51	62	113	290
51	54	105	299
46	60	106	450
44	56	100	413
51	62	113	257
65	64	129	438
70	52	122	403

A P P E N D I X D

DISTRIBUTION OF TEST SCORES FOR THE GROUP RETESTED THREE MONTHS AFTER COMPLETION OF THE OKLAHOMA STATE UNIVERSITY COLLEGE READING IMPROVEMENT PROGRAM

TABLE D-I
DISTRIBUTION OF PRE-TRAINING, POST-TRAINING, AND RETEST RAW SCORE, GROUP A_1, SEPT. 25, NOV. 3, 1961, AND APRIL 16, 1962

Pre-Training Nelson-Denny Form A				Post-Training Nelson-Denny Form B				Retest Nelson-Denny Form A			
V	C	T	R	V	C	T	R	V	C	T	R
34	26	60	318	30	48	78	290	38	48	86	338
39	38	77	446	44	48	92	615	38	48	86	639
35	20	55	287	38	56	94	269	41	40	81	327
61	56	117	287	51	60	111	309	64	58	122	407
35	52	87	480	43	54	97	615	52	40	92	639
20	22	42	161	20	30	50	226	20	18	38	195
31	40	71	275	31	36	67	245	30	34	64	298
31	34	65	262	39	46	85	356	34	44	78	298
29	42	71	216	30	48	78	195	34	38	72	216
41	54	95	298	55	60	115	257	59	54	113	456
53	44	97	275	72	64	136	379	70	56	126	371
16	14	30	104	21	24	45	165	17	22	39	140
20	36	56	275	18	28	46	379	25	34	59	309
30	50	80	207	28	42	70	226	29	56	85	298
11	12	23	161	9	20	29	188	14	14	28	238
16	32	48	250	17	42	59	279	19	36	55	275
24	20	44	161	23	20	43	379	31	22	53	426
34	58	92	338	31	50	81	475	40	52	92	501
13	14	27	174	20	20	40	290	20	28	48	238
26	28	54	161	28	32	60	226	24	44	68	238
26	50	76	287	27	46	73	356	37	60	97	396
23	40	63	275	21	44	65	327	33	48	81	349
31	44	75	298	35	52	87	299	42	58	100	396
15	18	33	262	25	46	71	327	19	46	65	359
31	48	79	275	36	40	76	319	43	44	87	238
35	28	63	115	40	34	74	129	36	34	70	161
32	32	64	185	38	42	80	188	42	34	76	185
27	34	61	250	30	34	64	257	27	38	65	287
14	12	26	174	25	20	45	195	28	30	58	216
25	20	45	174	28	32	60	195	31	32	63	262
27	12	39	275	27	38	65	203	31	22	53	216
37	48	85	262	40	40	80	235	46	38	84	226
26	26	52	226	30	24	54	344	34	34	68	287

A P P E N D I X E

DISTRIBUTION OF TEST SCORES FOR THE GROUP RETESTED SIX MONTHS AFTER COMPLETION OF THE OKLAHOMA STATE UNIVERSITY COLLEGE READING IMPROVEMENT PROGRAM

TABLE E-I
DISTRIBUTION OF PRE-TRAINING, POST-TRAINING, AND RETEST RAW SCORE, GROUP B_1, NOV. 8, DEC. 15, 1961, AND APRIL 16, 1962

Pre-Training Nelson-Denny Form A				Post-Training Nelson-Denny Form B				Retest Nelson-Denny Form A			
V	C	T	R	V	C	T	R	V	C	T	R
34	44	78	359	45	42	87	511	39	40	79	600
29	32	61	195	42	34	76	309	34	32	64	226
33	28	61	262	34	38	72	290	39	30	69	318
52	56	108	207	65	64	129	438	68	60	128	318
6	12	18	140	7	10	17	214	5	12	17	195
26	34	60	140	18	38	56	177	27	38	65	174
15	22	37	185	16	20	36	245	21	26	47	195
13	24	37	161	9	30	39	235	14	32	46	195
43	48	91	318	45	56	101	319	48	60	108	371
28	36	64	150	33	40	73	309	38	42	80	407
16	24	40	161	25	26	51	245	25	24	49	250
28	30	58	104	23	24	47	153	35	38	73	174
41	60	101	250	46	60	106	450	42	50	92	436
28	30	58	185	33	34	67	195	32	28	60	298
11	22	33	275	12	22	34	279	11	24	35	275
11	22	33	150	9	20	29	379	12	26	38	338
27	48	75	327	29	44	73	450	31	62	93	468
30	38	68	287	44	54	98	290	38	54	92	359
23	40	63	104	28	36	64	195	31	46	77	262
25	24	49	226	25	26	51	379	28	30	58	396
38	54	92	216	47	64	111	468	51	56	107	359
7	0	7	195	20	34	54	333	15	22	37	327
52	58	110	275	70	52	122	403	62	60	122	407
30	40	70	174	30	42	72	195	36	32	68	318
46	54	100	226	51	54	105	299	40	60	100	338
19	44	63	216	25	40	65	257	31	44	75	238
35	48	83	287	39	46	85	245	37	48	85	250
36	52	88	226	34	52	86	257	48	56	104	287
9	14	23	216	16	18	34	257	13	24	37	309
34	46	80	185	44	50	94	226	42	60	102	238
33	42	75	327	45	36	81	344	36	52	118	318
34	42	76	195	34	50	84	195	45	54	99	268

VITA

Darrel Dean Ray

Candidate for the Degree of

Doctor of Education

Dissertation: A STATISTICAL EXAMINATION OF IMMEDIATE GAINS AND RETAINED GAINS OF STUDENTS IN THE OKLAHOMA STATE UNIVERSITY READING IMPROVEMENT PROGRAM

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Biographical:

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Professional Experience: Entered the United States Army in 1950 and was discharged in 1953 with the rank of Sergeant First Class; taught 5th and 6th grades at Kyle Day School, Kyle, South Dakota, 1953-1954; taught speech and English at the South Haven High School, South Haven, Kansas, during fall of 1955; taught the ungraded remedial room at Oglalla Community School, Pine Ridge, South Dakota, 1956-1958; served as Principal-Teacher at Northeast Segment Day School, Parshall, North Dakota, 1958-1959; served as a graduate assistant at the Oklahoma State University, 1959-1961; served as an instructor at the Oklahoma State University, 1961-1962.

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