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ABSTRACT

The long-term effects (after 3 to 5 years) of remedial reading instruction were examined. Comparison was made on reading achievement scores and on achievement ratios between a group of 16 former remedial reading clinic students, aged 12 to 20, and a matched group which did not receive remedial instruction. In addition, 45 former remedial readers answered a questionnaire concerning their evaluation of remedial reading instruction. Subjects were administered the Gates-MacGinitie Reading Test and the Iowa Basic Skills Achievement Test, and the results showed that (1) there was no significant difference between the groups' achievement scores in vocabulary and comprehension or between the achievement ratios in comprehension and (2) there was a significant difference in the achievement ratios on vocabulary in favor of the control group. Because of the bias of the sample population and because of the use of different tests for the two groups, no conclusions concerning the long-term effects of remedial reading were made. The majority of the respondents to the questionnaire felt that remedial reading instruction was beneficial over both the short-term and the long-term period. References and appendixes are included. (VJ)

ABSTRACT

In order to test the long-term effect of remedial reading instruction, two groups of 16 retarded readers were matched on the basis of age, sex, IQ, and degree of retardation in reading in the pre-remedial period.

One group had received remedial reading instruction 3 to 5 years previously, and the other group had never received remedial reading instruction. They were tested for achievement in vocabulary and comprehension, and achievement ratios were computed for both groups for the long-term post-remedial period. These were compared for statistical significance. Forty-five of the former remedial readers also answered a questionnaire concerning their evaluation of remedial reading instruction and their educational attainments.

There was no significant difference between the groups' achievement scores in vocabulary and comprehension or between the achievement ratios in comprehension. There was a significant difference between the achievement ratios in vocabulary at the 0.05 level of confidence in favor of the control group. However, because of the bias of the sample population (they were not representative of the original group because they had less than normal gains during remedial reading) and because of the use of different tests for the two groups, no conclusions concerning

the long-term effects of remedial reading could be made.

The majority of the 45 respondents to the questionnaire believed that remedial reading instruction was beneficial over both the short-term and the long-term period. The majority of the respondents were still in junior high or high school, but, of the eight who were not, all had graduated from high school, six were receiving higher education, and two were employed.

THE LONG-TERM EFFECTS OF REMEDIAL READING INSTRUCTION

A THESIS

SUBMITTED TO THE FACULTY

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CHAPTER I

THE PROBLEM

Most teachers of remedial or corrective reading have deep feelings of satisfaction about their work. They can usually see dramatic improvement in the reading ability of their students, and, indeed, many studies have shown that the actual gains made during a remedial reading program have been twice the normal gain for the same period of time (Bond & Fay, 1950; Dunham, 1960; Fry, 1959; Mouly & Grant, 1956; Still, 1961).

However, researchers have not agreed on the kind of evaluation needed for long-term remedial programs (Bliesmer, 1962; Maginnis, 1970). They believe the pre- and post-achievement tests, although impressive, show nothing about the permanence of the gains made. Also, the use of achievement ratios or expectancy levels, while they can demonstrate the effectiveness of the program, contribute little toward identifying the long-term effects.

Those studies of long-term effects that have been done can be divided into two main types: (1) those which study the permanence of the gains over a period of time ranging from 3 months to 5 or 6 years and (2) those which

study emotional adjustment, occupational level, educational success, and reading achievement of former remedial students after they became adults.

The present study combined elements of both types of research. It made a long-term comparison of two groups of students who were below grade level in reading achievement 3 to 5 years ago. One group had received remedial reading instruction and the other had not. This study also investigated the former remedial students' evaluation of the remedial program and their present educational levels.

The Problem

The major question posed by this study was: After 3 to 5 years is there a significant difference in reading achievement and in achievement ratios between a group of 12- to 20-year-old former remedial reading students and a matched group which did not receive remedial instruction?

The study further considered these two minor questions:

1. How did the former remedial group evaluate their remedial instruction over the long-term period?

2. What levels of education were attained by the former remedial group?

Hypotheses

On the basis of past research it is hypothesized that:

1. Remedial reading instruction for retarded readers does not make a significant difference in reading achievement over a long-term period.

2. Remedial reading instruction for retarded readers does not make a significant difference in achievement ratios over a long-term period.

Definition of Terms

The following definitions apply in this study:

Reading achievement: The grade levels scored in vocabulary and comprehension sub-tests of the Gates-MacGinitie Reading Test and the Iowa Basic Skills Achievement Test will indicate reading achievement levels.

Achievement ratio: The ratio is computed by dividing the grade level scored in an achievement test by the amount of time the student has spent in school, including kindergarten. The reading scores used in this study are grade levels, with the first number indicating the grade and the second number indicating the month, e.g., a score of 3.6 would mean the third grade, sixth month.

Retarded reader: A student whose reading level is at least one year below his expected level is a retarded reader. This term does not mean that the reader is

mentally deficient in any way. The IQ's of those in the study ranged from 85 to 127. There does not seem to be a universally accepted term for describing readers who read below their expected levels, but the use of retarded has precedents (Buerger, 1968; Carter, 1967, Walker, 1966).

The remedial reading program: The university-affiliated clinic whose former clients were used in this study advertises its services in local newspapers and charges a fee for testing and for instruction. The students who are selected for remedial instruction must have at least normal IQ's and be at least 1 year retarded in reading achievement according to grade expectancy formula. For the fall and spring semester they receive 2 hours of remedial instruction once a week in groups of three for 14 weeks. For the summer session the remedial instruction lasts 1 hour every day, 5 days a week, for a 6-week period. The instructors are fully certified teachers who are enrolled in the Master's degree program for reading. The actual program of remedial work is developed by the teacher according to the deficiencies he discovers in diagnostic work with each case. The clinic has a wide variety of remedial materials and aids from which the teacher may choose.

Limitations

There is no good substitute for planning long-term studies in advance with precautions taken by randomization of subjects, careful control of testing situations, and careful recording of data. For the present study, data were collected 3 to 5 years after the end of the remedial program, with the inevitable loss of subjects. There was no randomization of subjects because so few agreed to take the final test. Of 146 subjects, only 16 would come for testing. There are also the questions of what prompted those who consented to take the test to do so and of whether they were representative of the original population. The testing situations for the two groups differed in place, tests, and instructors. There is also the question of why the parents and students of the remedial group chose to take a remedial course in reading and why the parents and students of the non-remedial group did not do so. While these limitations may affect the results of the study, a comparison of achievement levels and achievement ratios appeared beneficial.

Overview

Past research on the long-term effects of remedial reading will be reviewed in Chapter II. Both the achievement-gain type of research and the type that considers the attitudes, interests, and educational achievements of

former remedial students will be included.

This study combined both types of research with a comparison of the achievement levels and achievement ratios of two groups of retarded readers after 3 to 5 years since the end of the remedial program. The group which had received remedial reading instruction was composed of former students at a university-affiliated reading clinic. They were requested to return 3 to 5 years after the end of their remedial help to take a reading achievement test. They were also asked to answer a questionnaire about their evaluation of the remedial program and about their present education. They were matched with a group of public school students who had not received remedial help in reading. The procedure used in this study will be discussed in Chapter III.

The results with discussion will be presented in Chapter IV, and a summary of the whole study will be found in Chapter V.

CHAPTER II

REVIEW OF THE LITERATURE

The research dealing with the long-term effects of remedial reading instruction on retarded readers can be divided into two types of studies: (1) those which consider the amount of gain in reading achievement after a period of a few months to a few years has elapsed since the termination of the training, and (2) those which are concerned with the adjustment of the adult life of the former remedial student. The first type of study frequently uses methods as a variable in relation to the permanence of the gains. The longer-term studies usually are interviews or questionnaires which consider the educational attainments, employment, and reading interests of those who received the remedial reading instruction 10 to 15 years previously.

Research on Long-Term Gains in Reading Achievement

Tufvander and Zintz. A follow-up study of 42 pupils with reading difficulties who had received remedial help at the Iowa State Reading Clinic found that 49% were making normal or greater than normal growth in reading achievement and 61% were making better school progress at

follow-up (Tufvander & Zintz, 1967). They were compared with a group of 40 students who had been diagnosed at the same time but who did not receive remedial training at the clinic. The researchers reported the growth as normal, less than normal, and greater than normal. Of the remedial group, 7 had less than normal growth, 21 had normal growth, and 12 had greater than normal growth. The diagnosed-only group had 14 with less than normal growth, 19 with normal growth, and 9 with greater than normal growth. The totals for both groups had 21 with less than normal growth, 40 with normal growth, and 21 with greater than normal growth. There was no significant difference between the gains of the groups at the time of the follow-up, which varied. Some of the diagnosed-only group did receive later remedial help, and the authors state they did better than those who were diagnosed only. The authors suggest that all the parents should receive diagnostic reports in order to get help for their children.

Lovell, Johnson, and Platts. During 1961 and 1962 a group of researchers in England made a large survey of the progress of students who had received remedial reading training. The first study (Lovell, Johnson, & Platts, 1962) concerned 74 students who received 45 minutes of remedial help once a week, during which their gains were "comparable" to other studies. At the time of the

follow-up the remedial training had stopped for at least 1 year. During the period of remedial training, the group made average gains of 2.0 grades. In the year following remedial reading, their gains averaged 1.3 grades. The authors found a tendency for the gains to fall off after remediation by 35%. Their second study (Lovell, Byrne, & Richardson, 1963) was more extensive and used 240 students with a carefully matched control group who had been referred for remedial training at the same time but had been unable to receive it. Those who had received remedial help were removed from their regular classrooms and sent full time to remedial centers. They had returned to their regular schools at least 16 months before the follow-up study was made. Three and one-half years after the original referral there was no difference between the groups in reading achievement scores. The average improvement during remedial instruction was 2.0 years for the experimental group and 1.8 years for the control group. The average improvement since remedial instruction ceased was 1.6 years for the experimental group and 1.4 years for the control group. The researchers also found that the original gains fell between the end of treatment and the follow-up. Depressingly, they also discovered that most were in the lowest "stream" of three stream schools, and none were in grammar schools although they were of age.

Balow. A follow-up study of 131 students who had been diagnosed as severely disabled readers at the University of Minnesota Psychological-Educational Clinic compared ratios of growth among the three groups (two received training at the clinic; one did not) before, during, and after the remedial training (Balow, 1965). The researcher computed reading achievement ratios for his subjects based upon their reading grade scores and the number of years they had attended school. The first group, which received remedial instruction but no additional help when the remedial period was concluded, had an average ratio of 0.56 for the pre-remedial period, 6.61 for the remedial period, and -0.01 for the post-remedial period of 9 months. The second group, which did receive additional remedial help in the post-remedial period, had an average ratio of 0.53 for the pre-remedial period, 4.79 for the remedial period, and 0.75 for the post-remedial period of 13 months. Group III, which had no remedial help in the clinic but did have some remedial aid during the 36 months of the whole study, had a pre-remedial ratio of 0.55 and a post-remedial ratio of 0.75. Balow bases his computations of achievement ratios on a growth per 20 days of instruction of 2 to 3 hours daily reading activity. He does not report how long instruction lasted for his groups, but he does say that while

instruction takes place all year at the clinic, the bulk of remedial work is done in the summer session at 2- to 3-hour classes, 5 days a week for 10 weeks in the summer. This would amount to a 0.25 year period, and an average member of his Group I learning at a 6.61 rate would have a gain of 1.66 for the period, a substantial gain as Balow himself states. He concluded that severe reading disability is not corrected by a short-term intensive course of treatment. However, his data, which show a gain of six times the normal rate during remedial training, are impressive. Balow suggested,

> The implication which follows naturally from these conclusions is that severe reading disability is probably best considered a relatively chronic illness needing long-term treatment rather than the short course typically organized in current programs [Balow, p. 586].

Cawley, Chaffin, and Brunning. A study by a group of researchers of a junior high school reading improvement program compared two groups of below-average seventh grade readers (Cawley, Chaffin, & Brunning, 1965). One group of 72 was individually diagnosed and taught specific skills in groups of 10 to 12 for 4 months. The other group of 77 subjects received general reading instruction together for the same period of time. Both were tested at the end of the 4 months and tested again 4 months later. The individually-diagnosed group had average gains of 1.61 grades during the remedial period of 4 months and 0.82 grades for the

4 months following the remedial instruction. The group which received general reading instruction averaged 1.49 grades during the remedial period and 0.82 grades for the post-remedial period. There was no significant difference between the groups.

Walker. A follow-up study by Walker of 41 students which compared two methods of treating retarded readers and used a control group matched for IQ, sex, and degree of retardation found no significant differences among the groups (Walker, 1966).

Schab. Schab attempted to determine the permanence of the effect of remedial training on two groups of disabled readers that were taught by two different methods for a period of 4 months (Schab, 1967). The follow-up testing occurred 5 months later. The group which used the teacher-planned program scored an average of 3.8 years on the Stanford Achievement Test in the pre-remedial period, 4.5 at the end of the remedial program, and 4.7 five months later. The group which used the teacher-pupil-planned approach scored an average of 4.0 in the pre-remedial period, 4.7 immediately after the remedial program, and 4.7 five months later. Only one sub-group, boys taught by the teacher-planned program, showed an actual loss over the 5-month period. The author concluded that the teacher-pupil-planned was better for boys, and that

further exploration was needed.

Shearer. Another British study considered the gains of 46 children who were in adjustment classes for one school year, during which they received special remedial training (Shearer, 1967). Their average gain during the year of remedial help was 2.44 years on the Schonell Word Recognition Test. Their average gain for the year following remedial instruction was 0.49 years. The researcher suggests that one reason for the generally large gains while receiving remedial reading might be the practice effect of frequent testing. He also comments that perhaps the factors which were originally responsible for the reading difficulty are less important in the remedial situation but appear again when the student returns to the regular school program. He further suggests that the dismissal from remedial reading is too early to make the advances permanent.

Buerger. Seventy-two pupils who received at least 50 hours of remedial reading treatment were matched with a control group of 72 disabled readers who did not receive any remedial help for a follow-up study on reading achievement, academic progress, and social attitudes in Lakewood, Ohio (Buerger, 1968). There was no significant difference in reading achievement between the groups after a time lapse of 0.3 to 5.6 years. The author used the

SRA Youth Inventory, which is an indicator of student problems, and found that the remedial students reported fewer problems during the post-remedial period. Eighty-seven percent of the remedial students also declared that the remedial reading training had helped them. However, the study further showed that their academic achievement was not superior to that of the control group.

Heckerl and Sansbury. A recent study of six severely retarded readers (minimum 4 years) who received extensive remedial reading training daily for 3 years (summer included) while their regular school subjects were curtailed found an actual loss 5 years after the remedial period (Heckerl & Sansbury, 1968). The initial oral reading score average was 1.8 years; after 3 years of remedial instruction it was 5.0; and 5 years later it was 4.7 years. The silent reading score average was 2.6 years initially, 4.5 after remedial instruction, and 5.3 after 5 years. The authors concluded that there is a need for small homogeneous groups and long-term extensive remedial reading treatment for severely disabled readers (apparently longer-term than they had provided).

While it is expected that remedial training should produce above-average results, it is disappointing to see that in most cases the remedial readers revert to their original below-average growth rate in the post-remedial

period. In the studies that used control groups of retarded readers who did not receive remedial reading training (Balow, 1965; Buerger, 1968; Lovell et al., 1963; Tufvander & Zintz, 1957; Walker, 1966), there was not one that could show a significant difference between the control and remedial groups during the follow-up study. Besides the decline in growth following the remediation period, it is disheartening to see that in only one study (Lovell et al., 1962) did the subjects make a greater than average gain in the post-remedial period.

Research on Long-Term Education, Employment, and Reading Interests of Former Remedial Readers

Robinson and Smith. In a study of 44 subjects who had been diagnosed as disabled readers in the University of Chicago Reading Clinic 10 years previously, the researchers found through interviews and questionnaires that nearly all had completed high school, more than 50% had completed college, 11 were in college at the time of the study, 3 had received M.A. degrees, 2 were working on their doctorates, and 1 was unemployed (Robinson & Smith, 1962). Of the 44 subjects, 11 had been diagnosed only, 17 received their remediation at the university's clinic, and the other 16 had received other remedial help. Those who received the remediation at the university's clinic became avid readers, according to the interviews. However, they

also attended the demonstration school on campus and were usually the children of university personnel or graduate students. Also, the researchers did not state how serious the retardation was. The parents of the non-clinic readers (the clinic parents generally did not know that their children received remedial help) were usually enthusiastic about the remedial aid their children had received.

Silver and Hagin. At the time of the previous study, 1958, the authors stated that they could not find any other report of that kind in the literature. Since, then, however, several studies of this long-term nature have been done. Twelve years after 25 severely disabled readers had been treated at the Bellevue Hospital Mental Hygiene Clinic, researchers found that those who were adequate adult readers were those who had been less seriously disabled as children (Silver & Hagin, 1963). They do not cite any standards for "adequate" or "less seriously disabled." Their study centered on neurological difficulties of the subjects, so perhaps that explains their lack of specificity about reading. Reassuringly, they did state that their former clients showed a significant decrease in their neurological difficulties, although they still did exhibit some visual and tactile perceptual problems.

Balow and Blomquist. A more careful study of 32 males who had attended the University of Minnesota

Psychological-Educational Clinic was made 10 to 15 years after they had left (Balow & Blomquist, 1965). The authors selected those with normal IQ, without emotional disturbances, who were retarded 2 to 5 years below their expectation level in reading. The subjects, who were 20 to 25 years old at the time of the study, were interviewed in person when possible and asked to take a reading test (nine consented). The authors concluded that middle-class males who live in the metropolitan area and who are severely retarded readers will attain average adult reading proficiency and graduate from high school. They also found that a higher proportion will have semiskilled and unskilled jobs than that in the general population. Seventeen percent did not graduate from high school; 20% were college graduates; and all were employed. Most of them reported that they did very little reading and felt that their remedial instruction did not help them. They believed that they had learned to read on their own. The average score for the nine tested on reading achievement was 10.9 in vocabulary and 10.2 in comprehension.

Preston and Yarington. Another study compared the educational and vocational achievements of 50 retarded readers 8 years after they had been diagnosed only at the University of Pennsylvania Clinic (Preston & Yarington, 1967). Their ages at the time of the diagnosis ranged

from 6 to 17, their IQ's from 53 to 123. There were 13 non-readers among them and they had received varied remediation. The only categories in which they differed from the national norm were in repetition of grades; two-thirds had repeated one to three grades while only 16% of the general population had, and no one had attended graduate or professional schools and no one planned to. Otherwise, the authors' hypothesis that retarded readers after 8 years fulfill educational and vocational roles comparable to those fulfilled by their age peers in the general population was verified.

Carter. Another study compared the social adjustment of 23 males, 19 years old or older, who had been at least 1 year below reading level at grade 9, with 12 males, 19 years old or older, who had scored at or above grade level at grade 9 (Carter, 1967). They all had comparable IQ's and had been out of school at least 1 year at the time of the study. The author used 11 items drawn from the California Test of Personality and the Vineland Social Maturity Scale. If the subjects scored on 8 of the 11 items, they were considered to be well adjusted. He found that those who had been disabled readers were socially withdrawn, no longer integrated with or cognizant of their environment. He concluded that disabled readers should be made to feel part of the school environment and assisted

in acquiring communication skills necessary for participation in school and adult life.

Three of these studies (Balow & Blomquist, 1965; Preston & Yarington, 1967; Robinson & Smith, 1962) centered on the educational and vocational achievement of previously retarded readers. Remedial reading teachers should perhaps feel reassured that the results of those studies show that their clients seem to succeed at an ordinary rate in our society. However, the subjects in the Robinson and Smith study were in a favorable position, apparently upper middle class with well-educated parents. Since these parents were not aware that their children received remedial reading, the retardation in reading could not have been too serious. The researchers never said what the levels were.

The Preston and Yarington study, which compared the disabled readers with the general population, was more useful. However, nothing was known about any remedial help that was given to the readers, and the subjects were compared with their age peers and not with their IQ peers.

An examination of the 8- to 15-year follow-up studies shows that the former retarded readers do seem to find employment and attain educational goals comparable to the general population. The only fault with this conclusion is the question of whether the achievement is

commensurate with the individual capacity of the disabled reader. Also, one author (Carter, 1967) found the former students to be socially withdrawn and attributed it to their poor communication skills. The studies are summarized in Table 1.

Research that Combines Both Aspects of Long-Term Studies

Because remedial reading needs more than a comparison of scores or gains as a basis for evaluation, the present study used features of both types of research in its design. Balow, in his earlier study, also attempted to combine a questionnaire or interview with an objective achievement test of his former remedial students (Balow, 1965). He found, as did this researcher, that it is difficult to get the former students to return for a test. Only nine took his test and he merely reported their average scores (10.9 in vocabulary and 10.2 in comprehension). For the present study, the former remedial students were tested for achievement levels in reading, and achievement ratios were computed so that their learning rates could be compared for both before and after remedial instruction with a matched group. The former remedial students were also questioned on their evaluation of the long-term effects of remedial instruction, their educational attainments, and the amount of their present reading.

TABLE 1

RESEARCHERS, NUMBER OF SUBJECTS, LENGTH OF TIME, TYPE OF RESEARCH, AND MAJOR FINDINGS OF LONG-TERM RESEARCH OF REMEDIAL READING PROGRAMS

Researcher	Number of subjects	Years since remediation	Type of research	Major findings
Robinson & Smith, 1962	44	10	Educational achievement	Nearly all had completed high school--More than 50% completed college--11 in college--3 M.A. degrees--2 in doctoral program
Silver & Hagin, 1963	25	12	Neurological difficulties	Those who were adequate adult readers were less disabled as children
Balow & Blomquist, 1965	32	10-15	Reading achievement, educational achievement	Middle-class males who are severely retarded readers will attain average adult reading proficiency and graduate from high school
Preston & Yarington, 1967	50	8	Educational & vocabulary achievement	Retarded readers fulfill educational and vocational roles comparable to those fulfilled by age peers in general population
Carter, 1967	23	5	Emotional adjustment	Disabled readers were socially withdrawn, no longer integrated with or cognizant of their environment at the time of the study

CHAPTER III

PROCEDURE

This study attempted to answer the question: Is there a difference in reading achievement after 3 to 5 years between a group of retarded readers who received remedial reading instruction and a group of retarded readers who did not receive remedial reading instruction? The procedure for gathering data to answer the question involved these steps: (1) planning a research design, (2) securing an experimental population and a control population, (3) gathering background data on both populations, (4) testing both populations, and (5) analyzing the data statistically.

Research Design

A diagram that represents the research design for this experiment is shown in Figure 1. The O signifies the measurement of reading achievement level and the X represents the remedial instruction for the experimental group.

There was an unexpected difficulty in securing a suitable population for study. The first choice for a population was a public school remedial group which would still be intact in senior high school in order to

	Pretest	Remedial training	Posttest	Present time
Experimental	0	X	0	0
Control	0			0

0 = Observation (test)

X = Treatment

FIGURE 1

Research design.

Source: Campbell, D. T., & Stanley, J. C. Experimental and quasi-experimental designs for research. Chicago: Rand McNally, 1963.

facilitate testing. Seven local school districts were contacted for aid in the study; however, none of them kept specific records of their remedial students, and it was impossible to identify them 3 to 5 years after they had received remedial help in reading. Therefore, it was decided to use the records of the Rutgers Reading Center, with the foreknowledge that it would be difficult to locate many of the former students.

It was also decided to match this group on the basis of age, sex, IQ, and degree of retardation in reading with a group that had not received remedial reading instruction and compare their present achievement scores in vocabulary and comprehension and their long-term achievement ratios for significant differences. The former remedial students were also asked to answer a questionnaire on their evaluation of the remedial program and their present educational levels.

Population

One hundred forty-six former remedial reading students from the clinic were contacted by the researcher 3 to 5 years after the end of their remedial instruction and asked to take a reading test at the clinic. Sixteen (14 boys and 2 girls from 12 to 20 years old) agreed and took the appropriate level Gates-MacGinitie Reading Test. These 16 students constitute the subjects of the remedial

group. The clinic's clients are drawn mostly from middle-class suburban populations. The remedial help they received consisted of testing, diagnosis, and instruction at the clinic.

The 16 subjects of the control group were drawn from a public school population in a nearby middle-class suburban community. They were matched with the remedial group on the basis of age, sex, IQ, and degree of retardation in reading for the pre-remedial period. The control group did not receive remedial reading instruction. Both groups received regular reading instruction in their classrooms.

The comparison of the two groups is shown in Table 2. The ages of both groups ranged from 12 to 20 years at the time of the study, with an average of 14.38 for the remedial group and 14.22 for the control group. The IQ's ranged from 80 to 127, with an average of 101.38 for the remedial group and 99.88 for the control group. The average degree of retardation in reading at the beginning of the study for the remedial group was 1.44 years in vocabulary and 1.30 years in comprehension. For the control group, the average years of retardation in reading achievement at the beginning of the study was 1.44 years in vocabulary and 1.55 years in comprehension. The time since the remedial instruction had ended for the remedial group

TABLE 2

MEAN AGE, IQ, READING GRADE LEVELS, DEGREE OF RETARDATION, AND ACHIEVEMENT RATIOS FOR THE PRE-REMEDIAL PERIOD FOR REMEDIAL AND CONTROL GROUPS

	No.	Mean age	Mean IQ	Pre-remedial mean grade level		Mean years retarded		Pre-remedial achievement ratio	
				Vocab-ulary	Compre-hension	Vocab-ulary	Compre-hension	Vocab-ulary	Compre-hension
Remedial	16	14.38	101.38	3.84	3.92	1.44	1.30	0.75	0.76
Control	16	14.22	99.88	4.03	4.01	1.44	1.55	0.76	0.78
Differences between groups		0.16	1.50	0.19	0.09	0.00	0.25	0.01	0.02

Note: Differences tested for statistical significance and none found to be significant at the 0.05 level.

varied from 3 to 5 years, with an average of 3.64 years. A t test was done to determine if there were significant differences between the groups' pre-remedial reading levels. For vocabulary the result was $t = 0.43$ and for comprehension the result was $t = 0.16$. Neither was statistically significant at 0.05 level. See Appendix A for raw data on matching of cases.

Questionnaire

When the original 146 former clinic students were contacted by the researcher, they were asked to fill out a brief questionnaire on their evaluation of the remedial aid they had received (see Appendix F). They were asked what the immediate effect of the remedial instruction had been upon their school work, with a choice of answers ranging from a decline in performance to marked improvement. Then they were asked what their judgment of the long-term effects was, with a range of answers from a worsening of ability to highly beneficial. They were also asked how often they read for pleasure at the present time and if they had received additional remedial reading. There was a place for them to indicate the highest level of education they had attained and what their occupation was if they were not students. Forty-five subjects responded to the questionnaire.

This was an original questionnaire designed for

the study. The answers are the subjective views of those who responded and should not be generalized to other populations.

Tests

Because data were collected 3 to 5 years after the groups were initially tested, there was no choice but to use the same tests for the long-term achievement levels. The reading achievement levels in vocabulary and comprehension for the remedial group were taken from the Gates-MacGinitie Reading Tests, Surveys D and E. The remedial group's IQ's were tested with the Science Research Associates Tests of General Ability. The pre-remedial testing of IQ and reading achievement for the remedial group was done at the university by graduate students who had completed the Remedial Reading Laboratory course. The post-remedial testing was done in the clinic by the remedial instructors at the end of the remedial program. The long-term testing was done at the clinic by the researcher.

The control group's reading achievement levels were tested by the Iowa Basic Skills Achievement Test. Their IQ scores were from the Kuhlmann-Anderson Test of Mental Development. Both the pre-remedial and the long-term testing of reading achievement for the control group were done in October of the appropriate years in their regular classrooms by their classroom teacher as part of

the school's testing program. Their IQ's were tested in the sixth grade as part of the school's testing program, also. The only exception was the 20-year-old subject whose long-term achievement level was tested by the researcher. See Appendix G for samples of the tests.

Treatment of Data

To compare the rate of reading growth as well as actual grade levels, achievement ratios were computed for both groups for the pre-remedial and long-term periods. In order to see if the differences between the final reading achievement scores in vocabulary and comprehension for the control and remedial groups were statistically significant, a *t* test was used. Because the number of subjects was small and the data were uncorrelated, the differences in achievement ratios were tested for statistical significance by the Mann-Whitney *U* test.

Summary

In order to test the hypothesis that there are no long-term differences in reading achievement scores and in achievement ratios between a group of retarded readers which received remedial instruction and a group which did not, a group of former remedial reading students was tested for reading achievement in vocabulary and comprehension 3 to 5 years after the end of their remedial help.

The results of this test were compared for statistical significance with the results of a similar testing for a matched group which had never received remedial aid. Achievement ratios were computed for both groups for the pre-remedial period and for the long-term period, and were also compared for statistical significance.

CHAPTER IV

FINDINGS AND DISCUSSION

This study attempted to investigate the long-term effects of remedial reading instruction. The method of seeking an answer was to compare students who had received remedial reading instruction 3 to 5 years previously with a matched group of retarded readers from a public school system who had not received remedial reading instruction. The question asked was: Would there be significant differences between the groups in reading achievement and in achievement ratios over the long-term period? Because of the size and bias of the sample of remedial students who agreed to the final testing, we were unable to answer the question.

The situation which caused the study to fail was the selectivity of the sample. Only 16 subjects, or 11% of the remedial population, returned for the final test, and this sample was deemed to be not representative of the typical remedial reading student. Normal progress in a clinic situation is twice the normal gain for the same period of time (Bond & Fay, 1950; Dunham, 1960; Fry, 1959; Mouly & Grant, 1956; Still, 1961). The sample who responded made a gain of 0.33 grade levels in vocabulary

and 0.54 grade levels in comprehension, or well below the gain of 0.51 grade levels in vocabulary and 0.71 grade levels in comprehension for the original group. These students were the losers, or those who had not been very positively affected by the treatment during remedial reading. Since these students did not respond normally during treatment, there is a strong doubt that their subsequent progress would be representative of a remedial reading population. In fact, it might be argued that they could be expected to do worse than an unselected group of retarded readers who were not proven to be unresponsive to remedial reading treatment.

Subject to these severe limitations, the data obtained from the 16 cases were compared with the matched group, and the results showed very little difference between the reading achievement and achievement ratios between the two groups.

Test Results

The remedial group's average grade level in vocabulary was 3.84 and their post-remedial average was 4.17, for an average gain of 0.33 years. Their present average grade level in vocabulary is 6.83, for a gain of 2.99 years for the period from the pre-remedial test until the present, which averaged 3.64 years.

The control group's pre-remedial average grade

level in vocabulary was 4.03 and their average grade level in vocabulary at present is 7.95, for a gain of 3.92 years for the period of 3.64 years from the pre-remedial test until the present.

The remedial group's average achievement ratio (growth divided by years in school) in vocabulary for the pre-remedial period (this includes the time from kindergarten entrance until the pre-remedial test) was a ratio of 0.75. For the period of time from the pre-remedial test until the present (this includes the remedial period itself), the remedial group's mean achievement in vocabulary was a ratio of 0.83.

The control group's average achievement in vocabulary for the pre-remedial period was a ratio of 0.76. For the period of time from the pre-remedial test until the present, their average achievement in vocabulary was a ratio of 1.19.

The remedial group's pre-remedial average grade level in comprehension was 3.92 and the post-remedial average grade level in comprehension was 4.46, for an average gain of 0.54 years in the remedial period. Their present average grade level in comprehension is 7.96, for a gain of 4.04 years for the period of time from the pre-remedial test until the present.

The control group's pre-remedial average grade

level in comprehension was 4.01 and their average grade level in comprehension at present is 7.51, for a gain of 3.50 years for the period from the pre-remedial test until the present.

The remedial group's average achievement in comprehension for the pre-remedial period was a ratio of 0.76. For the period of time from the pre-remedial test until the present the remedial group's average achievement in comprehension was a ratio of 1.11.

The control group's average achievement in comprehension for the pre-remedial period was a ratio of 0.78. For the period of time from the pre-remedial test until the present their average achievement in comprehension was a ratio of 1.08.

The test results in grade levels and actual gains are reported in Tables 3, 4, 5, and 6. The achievement ratios are reported in Table 7. See Appendixes B, C, D, and E for achievement scores and ratios.

Through the use of a t test, no significant differences at the 0.05 level of confidence were found between the long-term grade levels in either vocabulary or comprehension. Through the use of the Mann-Whitney U test, no significant difference at the 0.05 level of confidence was shown between the long-term achievement ratios in comprehension. However, the Mann-Whitney U

TABLE 3

MEAN YEARS IN SCHOOL, READING LEVELS, AND GAINS IN VOCABULARY FOR REMEDIAL AND CONTROL GROUPS

	No.	Years in school at pre-remedial	Reading level at pre-remedial	Reading level at post-remedial	Remedial period gain	Years in school at present[a]	Reading level at present	Pre-remedial--present difference
Remedial	16	5.27	3.84	4.17	0.33	8.44	6.83	2.99
Control	16	5.19	4.03	-	-	8.44	7.95	3.92
Difference between groups		0.08	0.19			0.00	1.12	0.93

[a]Adult counted as twelfth grade.

Note: Differences tested for statistical significance and none found to be significant at the 0.05 level.

Remedial group used Gates-MacGinitie Reading Test and control group used Iowa Basic Skills Achievement Test.

TABLE 4

AMOUNT OF RETARDATION IN VOCABULARY FOR REMEDIAL AND CONTROL GROUPS

	Average years retarded (pre-remedial)	Average years retarded (present)
Remedial	1.43	1.61
Control	1.16	0.49

TABLE 5

MEAN YEARS IN SCHOOL, READING LEVELS, AND GAINS IN COMPREHENSION FOR REMEDIAL AND CONTROL GROUPS

	No.	Years in school at pre-remedial	Reading level at pre-remedial	Reading level at post-remedial	Remedial period gain	Years in school at present[a]	Reading level at present	Pre-remedial--present difference
Remedial	16	5.27	3.92	4.46	0.54	8.44	7.96	4.04
Control	16	5.19	4.01	-	-	8.44	7.51	3.50
Difference between groups		0.08	0.09			0.00	0.45	0.54

[a]Adult counted as twelfth grade.

Note: Differences tested for statistical significance and none found to be significant at the 0.05 level.

Remedial group used Gates-MacGinitie Reading Test and control group used Iowa Basic Skills Achievement Test.

TABLE 6

AMOUNT OF RETARDATION IN COMPREHENSION FOR REMEDIAL AND CONTROL GROUPS

	Average years retarded (pre-remedial)	Average years retarded (present)
Remedial	1.35	0.38
Control	1.18	0.93

TABLE 7

MEAN ACHIEVEMENT RATIOS FOR VOCABULARY AND COMPREHENSION FOR REMEDIAL AND CONTROL GROUPS

	No.	Vocabulary achievement ratio		Comprehension achievement ratio	
		Pre-remedial period	Pre-remedial to present	Pre-remedial period[a]	Pre-remedial to present[b]
Remedial	16	0.75	0.83	0.76	1.11
Control	16	0.76	1.19	0.78	1.08
Difference between groups		0.01	0.36*	0.02	0.03

[a]Period from kindergarten entrance until pre-remedial test.

[b]Period from pre-remedial test until the present.

*Significant at 0.05 level. All other differences not significant.

test did show a significant difference at the 0.05 level of confidence between the long-term achievement ratios in vocabulary. This difference favors the control group over the remedial group. See Appendix H for samples of computations.

It is interesting to note that the remedial group was 1.35 years retarded in comprehension at the time of the pre-remedial test, while the control group was 1.18 years retarded. At present, 3.64 years later, the remedial group is only 0.38 years retarded and the control group is 0.93 years retarded. This tendency was reversed on the vocabulary scores. At the time of the pre-remedial test the remedial group was 1.43 years retarded in vocabulary, while the control group was 1.16 years retarded. At the present the remedial group is 1.61 years retarded in vocabulary and the control group is 0.49 years retarded (see Tables 4 and 6).

Discussion

According to the data for this study, remedial reading instruction did not make a significant difference in achievement scores for vocabulary and comprehension or in achievement ratios for comprehension over a 3- to 5-year period for a group of 16 former remedial students when compared with a matched group which did not have remedial reading. However, the 16 former remedial

students were less than normally successful at remedial reading and not representative of the original group of 146 former remedial reading students from which they were drawn.

The significant difference between the groups in achievement ratios for vocabulary favors the control group over the remedial group. A look at the actual data (Tables 3 and 7) shows that the control group learned at a 0.76 and a 0.78 rate in vocabulary and comprehension, respectively, in the pre-remedial period. Since an average achievement rate would be 1.00 (a month's progress for every month in school), these students were progressing at slightly more than three-quarter speed prior to the remedial period. Their achievement rates for the period of time since the pre-remedial test, 1.19 in vocabulary and 1.08 in comprehension, show that they are now progressing at better than average rate, although they had no remedial instruction at all.

The remedial group had pre-remedial achievement ratios of 0.75 in vocabulary and 0.76 in comprehension, which means that they, also, were learning at about three-quarters of the average rate. Since that time their achievement ratio in comprehension has increased to 1.11, or better than average. However, their achievement ratio in vocabulary for the time since the pre-remedial test

is only 0.83.

One reason for the significant difference in achievement ratios for vocabulary could lie in the use of different tests and different testing situations, although both vocabulary and comprehension should have been affected. The Iowa Basic Skills Test (used by the control group) presents the vocabulary word in a phrase, while in the Gates-MacGinitie Test (used by the remedial group) the word is presented alone. Each then presents a list of five words from which the synonym is selected. For testing comprehension, the Iowa uses paragraphs followed by questions relating to what was read in the paragraph. The Gates-MacGinitie has words deleted from a paragraph, and the student must select the correct words from a list of five below.

The control group was tested each October as a part of the school program with the Iowa test. The test booklet for grades 3 to 9 is the same. The student is instructed to begin and finish the tests at specified places for his grade level. In vocabulary there is an overlapping of ten words from one level to the next, so that the last ten words a seventh-grade student works on are the first ten for the eighth-grade student. While this does not seem to be exactly like Shearer's comment on the practice effect of frequent testing (Shearer,

1967), the students are certainly familiar with the test format and the testing situation. The experimental group was tested with an unfamiliar test, by strange testers, in the clinic which they probably had not visited in at least 3 years, and on a Saturday afternoon.

The only study in the past research which used learning ratios as a measure for comparison also found one remedial group to have an actual loss in the post-remedial period (Balow, 1965). His non-remedial group, which had been diagnosed as severely retarded in reading at the same time as his two experimental groups, did as well in the post-remedial period as his other remedial group, a .75 learning ratio. Our results are similar in that the remedial-trained groups did not do significantly better over the long-term period than the non-remedial groups. From this Balow makes his previously cited conclusion that severe reading disability needs long-term treatment. Our analyses differ in that he did not include the remedial period itself in his long-term study. He does not report actual scores or gains, but, presumably, his diagnosed-only group did not achieve as high a score as his remedial groups. This is why he could conclude that the remedial instruction was effective but not intensive or long enough.

When actual gains are considered, this study

agrees with the earlier research which compared remedial-trained groups with control groups (Buerger, 1968; Cawley et al., 1965; Lovel et al., 1963; Tufvander & Zintz, 1957; Walker, 1966). None of these studies could find significant differences between the experimental and control groups after the long-term period.

Some authorities might argue that the vocabulary part of a reading test is more nearly related to a general intelligence test, while the comprehension section is more representative of a reading task. If this is so, then the amount of reading retardation tables (Tables 4 and 6) show more improvement for the remedial group on the reading-related task, reading comprehension. However, this study should be considered a valiant attempt to answer a difficult question rather than an answer to the question of how remedial instruction itself affects long-term gains. Abraham Maslow states that too much research is done on only easily answered questions, whereas important questions are neglected because of methodological problems (Maslow, 1954). Perhaps in reading this study one can see why some questions have been neglected.

Questionnaire Results

Of the 146 questionnaires originally mailed by the researcher, 45 were returned. Sixteen of these 45 were the subjects of the experimental group. The questionnaire

itself is in Appendix C. Table 8 presents the actual results and percentages.

Most (65%) believed that the immediate effect of the remedial instruction was improvement in reading ability, either slight (49%) or marked (16%). Over the long term, 70% believed that the aid was beneficial. Only 35% believed that there was no immediate change in reading achievement, and this percentage drops to 30 when the long-term period is considered. No one believed that the instruction was harmful, either immediately or over the long-term period.

Most of those who answered (66%) said that they seldom read for pleasure at the present time, while 32% reported that they read frequently or very often for pleasure. Only one person (2%) never read for pleasure.

Of these 45 subjects, 59% had received additional remedial reading instruction since the end of their training at the clinic. Eleven of the 16 subjects of the remedial group used in the study were among those who had received additional remedial help.

At the time of the follow-up, 22 (49%) were still in eighth grade or lower, 15 (33%) were in high school, 5 (11%) were in college, and 1 was in graduate school. Two were working after completing high school, one as a Sears serviceman and the other as a freight handler.

TABLE 8

QUESTIONNAIRE RESULTS IN ACTUAL NUMBERS AND IN PERCENTAGES

Questions/Answers	No.	%
What was the immediate effect of the remedial reading instruction upon your schoolwork?		
Marked improvement	7	16
Slight improvement	21	49
No change	15	35
Decline in performance	-	-
What would you judge were the long-term effects of the remedial instruction upon your schoolwork?		
Highly beneficial	13	30
Slightly beneficial	18	40
No effect	13	30
Worsening of ability	-	-
How often do you read for pleasure at the present?		
Very often	3	7
Frequently	11	25
Seldom	29	66
Never	1	2
Did you have additional remedial reading elsewhere?		
Yes	24	59
No	17	41
What is the highest level of education attained at present?		
8th Grade or under	22	49
9th Grade	6	13
10th Grade	3	7
11th Grade	3	7
12th Grade	5	10
College undergraduate	5	10
Bachelor's Degree	-	-
Graduate student	1	2

Discussion

Only two of the studies in past research asked for opinions of the effect of the remedial instruction (Balow & Blomquist, 1965; Robinson & Smith, 1962). In the Robinson and Smith study, the former clients or their parents were satisfied with remedial aid, but Balow and Blomquist found the opposite to be so. Their subjects (32) believed that remedial instruction had not helped them. In the present study, the overwhelming majority (70%) believed remedial instruction to be beneficial over the long term.

The same two studies (Balow & Blomquist, 1965; Robinson & Smith, 1962) were the only ones to ask about reading habits at the time of the follow-up. Robinson and Smith's subjects who had received remedial instruction were reported to be avid readers. Balow and Blomquist's subjects read infrequently. Most of the subjects in the present study seldom read (66%) or never read (2%) for pleasure.

Three of the previous studies considered the educational achievements of former remedial reading cases (Balow & Blomquist, 1965; Preston & Yarington, 1967; Robinson & Smith, 1962). Of Robinson and Smith's 44 subjects, 22 had completed college, 11 were in college, and 5 had received graduate training. Only 1 was unemployed. Their subjects were from a university-affiliated demonstration

school. Balow and Blomquist reported that 17% of their 32 subjects did not finish high school and 20% were college graduates. All were employed, but they found a higher proportion in semiskilled or unskilled positions than in the general population.

Preston and Yarington compared their 50 retarded readers with the general population statistics released by the Census Bureau. They found that the retarded readers had the same educational achievements as the general population with the exception of graduate and professional schools. None of their subjects attended or planned to attend such schools. In the present study, 37 (82%) are still in junior high or high school. Of the eight who are high school graduates, two are working and the other six are receiving higher education. From these admittedly subjective evaluations based on the questions of the questionnaire, it can be assumed that the former remedial students were generally satisfied with their remedial instruction, and that, while they seldom read for pleasure, they are making satisfactory academic achievements.

CHAPTER V

SUMMARY AND SUGGESTIONS

The major question posed by this study was: After 3 to 5 years, is there a significant difference in reading achievement and in achievement ratios between a group of 12- to 20-year-old former remedial reading students and a matched group which did not receive remedial instruction?

It was hypothesized that:

1. Remedial reading instruction for retarded readers does not make a significant difference in reading achievement over a long-term period.

2. Remedial reading instruction for retarded readers does not make a significant difference in achievement ratios over a long-term period.

The study also considered these minor questions:

1. How did the former remedial group evaluate their remedial instruction over the long-term period?

2. What levels of education were attained by the former remedial group?

In order to answer the major question, a study was designed which would test the reading achievement levels in vocabulary and comprehension of a group of 16 former

remedial students 3 to 5 years after the termination of their remedial aid at a clinic. Achievement ratios (grade levels divided by the length of time of instruction) were also computed for each subject for the pre-remedial period and for the long-term period. The remedial group was then matched on the basis of age, sex, IQ, and degree of retardation in reading development in the pre-remedial period with a group of public school students. This group, the control group, did not receive any remedial help. Achievement ratios were computed for the control group for the pre-remedial period and for the long-term period. Both groups were compared on the basis of their achievement scores in vocabulary and comprehension and on the basis of their achievement ratios for the period of time from the pre-remedial test to the present.

Major Question

Unfortunately, only a small percentage of the remedial population returned for further testing. Sixteen out of a total population of 146 (all students whose present addresses could be located) returned for the test. This group was not considered representative because they were the least successful students during the remedial period. They had achieved 0.33 years in vocabulary and 0.54 years in comprehension for a semester compared with an expected achievement of 1.00 or higher for the same period.

A further limitation on the ability to answer the question is seen in the difficulty of obtaining equivalent testing for the remedial and control group. The remedial group was tested with the Gates-MacGinitie Reading Test, and the control group was tested with the Iowa Basic Skills Achievement Test.

However, when the returning sample of 16 students was compared with the control group there were no significant differences between the achievement levels in vocabulary and comprehension and between the achievement ratios for comprehension. There was a significant difference between the achievement ratios for vocabulary in favor of the control group.

To further cloud the results, the remedial group was 1.35 years below expectancy at the beginning of the test period in reading comprehension and only 0.38 years behind at the end of the experiment (an average of 3 years later), while the control group was 1.18 years behind at the beginning and 0.93 years behind at the end. A nearly reverse situation was seen in vocabulary scores, with the control group 1.16 years retarded at the beginning and 0.49 years at the end. The remedial group was 1.43 years behind in vocabulary at the beginning and 1.61 at the end. In the discussion, the question was raised that the comprehension scores might more nearly reflect the type of

training done in remedial reading than would vocabulary test scores.

Because of the size and bias of the sample, the major question of this study could not be answered and no conclusions regarding the hypotheses could be made.

Minor Questions

In order to answer the minor questions, a questionnaire was sent to 146 former students at a remedial clinic. From the 45 responses received, it was learned that 65% believed that there was an immediate beneficial effect of remedial reading instruction and 70% believed that there was a long-term beneficial result of remedial aid. The majority of those who answered (66%) seldom read for pleasure at the present time. Eighty-two percent were still in junior high or high school when they answered the questionnaire. Of the eight remaining, all had completed high school, five were in college, one in graduate school, and two were working, one at a semiskilled job and the other at unskilled labor.

From this it can be concluded that former remedial students believe that the remedial aid was worthwhile both over a short- and long-term period. The small number of respondents had attained adequate educational goals and found employment.

Suggestions for Further Research

While attempting to get long-term data for this study, it was discovered that, although remedial reading instruction in the public schools has been expanded considerably in recent years, records of such instruction are very scarce. It is strongly recommended that school districts begin to keep records of remedial reading instruction and also plan long-term evaluations of their programs.

The control group was retarded in reading in the early grades but by seventh and eighth grade they were reading near their grade level, according to their standardized test result. Research might investigate when and how the improvement took place.

Research of the long-term effects of remedial reading is inadequate at present. Reading teachers, parents, and even students are convinced that it is beneficial, yet no one can show exactly how and why it is. Perhaps patterns of development would emerge if researchers could examine long-term records of remedial cases, and there would be a greater understanding of reading improvement for retarded readers.

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APPENDIX A

DATA FOR MATCHING

APPENDIX A

MATCHING DATA OF SEX, AGE, IQ, PRE-REMEDIAL GRADE LEVELS IN VOCABULARY AND COMPREHENSION, YEARS IN SCHOOL, AND TIME IN THE POST-REMEDIAL PERIOD FOR ALL SUBJECTS

Remedial group							
Subject	Sex	Age years and months	IQ	Pre-remedial vocabulary grade level	Pre-remedial comprehension grade level	Years in school at pre-test	Time pre-test to present
1.	M	14-0	96	2.7	2.0	5-0	4-0
2.	M	20-0	89	3.9	3.3	9-0	5-0
3.	M	15-10	103	6.2	5.8	6-0	4-0
4.	M	13-9	101	2.3	2.6	3-0	5-0
5.	F	14-10	105	5.6	7.6	6-0	3-0
6.	F	14-10	89	5.0	6.2	6-0	3-0
7.	M	14-11	85	2.5	2.5	6-0	3-4
8.	M	13-9	101	3.4	2.8	4-5	3-6
9.	M	13-9	94	3.4	3.1	5-0	3-4
10.	M	12-10	122	3.3	2.9	4-0	3-4
11.	M	12-11	101	2.6	2.6	4-0	3-0
12.	M	13-2	89	4.4	3.3	5-0	3-0
13.	M	12-10	107	4.3	2.9	4-0	3-4
14.	M	13-3	127	4.5	5.6	5-0	3-4
15.	M	12-6	111	2.8	3.5	4-0	3-0
16.	M	16-10	102	4.5	5.0	7-5	3-6
Average		14.38	101.38	3.84	3.92	5.77	3.64

APPENDIX A (continued)

Control group							
Subject	Sex	Age years and months	IQ	Pre-remedial vocabulary	Pre-remedial comprehension	Years in school at pre-test	Time pre-test to present
1.	M	14-0	94	3.4	2.2	5-0	4-0
2.	M	20-3	98	4.5	4.3	9-0	5-0
3.	M	14-7	104	6.6	6.9	6-0	4-0
4.	M	13-7	103	2.0	2.7	3-0	5-0
5.	F	14-0	107	6.0	6.8	6-0	3-0
6.	F	13-6	103	5.6	5.7	6-0	3-0
7.	M	14-5	80	1.7	2.6	6-0	3-0
8.	M	14-4	91	3.8	2.7	4-0	3-0
9.	M	13-4	94	3.0	3.1	5-0	3-0
10.	M	12-9	118	3.0	3.1	4-0	3-0
11.	M	14-7	95	3.0	3.6	4-0	3-0
12.	M	14-4	87	3.8	3.3	5-0	3-0
13.	M	13-9	104	4.7	3.3	4-0	3-0
14.	M	13-1	117	4.7	5.7	5-0	3-0
15.	M	12-10	110	3.9	3.9	4-0	3-0
16.	M	14-3	93	4.7	5.1	7-0	3-0
Average		14.22	99.88	4.03	4.01	5.19	3.38

APPENDIX B

REMEDIAL GROUP'S VOCABULARY SCORES AND RATIOS

APPENDIX B

VOCABULARY GRADE LEVELS, GAINS, AND ACHIEVEMENT RATIOS FOR REMEDIAL GROUP

Subject	Pre-remedial grade level	Post-remedial grade level	Present grade level	Post-remedial gain	Gain pre-remedial to present	Pre-remedial achievement ratio	Achievement ratio pre-remedial to present
1.	2.7	5.0	9.1	2.3	6.4	0.54	1.60
2.	3.9	3.8	5.6	-0.1	1.7	0.43	0.34
3.	6.2	5.5	10.0	-0.7	3.8	1.04	0.95
4.	2.3	2.6	6.6	0.3	4.3	0.76	0.86
5.	5.6	5.2	8.0	-0.4	2.4	0.93	0.80
6.	5.0	5.8	7.3	0.8	2.3	0.83	0.77
7.	2.5	2.5	4.4	0.0	1.9	0.42	0.56
8.	3.4	4.5	6.2	1.1	2.8	0.75	0.78
9.	3.4	4.5	5.5	1.1	2.0	0.68	0.62
10.	3.3	2.9	6.2	-0.4	2.9	0.83	0.85
11.	2.6	4.3	4.6	1.7	2.0	0.65	0.67
12.	4.4	4.3	4.9	-0.1	0.5	0.88	0.17
13.	4.3	2.9	6.2	-1.4	1.9	1.08	0.56
14.	4.5	3.4	11.3	-1.1	6.8	0.90	2.00
15.	2.8	3.5	3.5	0.7	0.7	0.70	0.23
16.	4.5	6.0	9.8	1.5	5.3	0.60	1.47
Average	3.84	4.17	6.83	0.33	2.99	0.75	0.83

APPENDIX C

REMEDIAL GROUP'S COMPREHENSION SCORES AND RATIOS

APPENDIX C

COMPREHENSION GRADE LEVELS, GAINS, AND ACHIEVEMENT RATIOS FOR REMEDIAL GROUP

Subject	Pre-remedial grade level	Post-remedial grade level	Present grade level	Post-remedial gain	Gain pre-remedial to present	Pre-remedial achievement ratio	Achievement ratio pre-remedial to present
1.	2.0	3.5	10.0	1.5	8.0	0.40	2.00
2.	3.3	5.0	6.9	1.7	3.6	0.37	0.72
3.	5.8	6.2	12.6	0.4	6.8	0.97	1.70
4.	2.6	2.6	7.4	0.0	4.8	0.86	0.96
5.	7.6	6.2	8.8	-1.4	1.2	1.26	0.40
6.	6.2	6.9	9.2	0.7	2.6	1.03	0.87
7.	2.5	2.8	4.9	0.3	2.4	0.42	0.71
8.	2.8	4.3	8.2	1.5	5.4	0.62	1.50
9.	3.1	3.6	7.1	0.5	4.0	0.62	1.18
10.	2.9	3.4	6.5	0.5	3.6	0.73	1.06
11.	3.6	4.8	5.3	1.2	1.7	0.90	0.57
12.	3.3	4.4	7.4	1.1	4.1	0.66	1.37
13.	2.9	2.7	5.6	-0.2	2.7	0.73	0.79
14.	5.6	4.2	11.6	-1.4	6.0	1.12	1.76
15.	3.5	3.2	4.2	-0.3	0.7	0.88	0.73
16.	5.0	7.6	11.7	2.6	6.7	0.66	1.86
Average	3.92	4.46	7.96	0.54	4.02	0.76	1.11

APPENDIX D

CONTROL GROUP'S VOCABULARY SCORES AND RATIOS

APPENDIX D

VOCABULARY GRADE LEVELS, GAINS, AND ACHIEVEMENT RATIOS FOR CONTROL GROUP

Subject	Pre-remedial grade level	Long-term grade level	Long-term gain	Pre-remedial achievement ratio	Long-term achievement ratio
1.	3.4	6.5	3.1	0.68	0.78
2.	4.5	8.4	3.9	0.56	0.78
3.	6.6	8.7	2.1	1.32	0.53
4.	2.0	8.4	6.4	0.67	1.28
5.	6.0	9.2	3.2	1.00	1.07
6.	5.6	9.3	3.7	1.12	1.23
7.	1.7	7.0	5.3	0.28	1.77
8.	3.8	7.7	3.9	0.63	1.30
9.	3.0	7.0	4.0	0.60	1.33
10.	3.0	8.2	5.2	1.00	1.73
11.	3.0	5.3	2.3	0.50	0.77
12.	3.8	7.8	4.0	0.63	1.33
13.	4.7	7.8	3.1	0.67	1.03
14.	4.7	8.5	3.7	0.94	1.23
15.	3.9	8.7	4.8	0.78	1.60
16.	4.7	8.7	4.0	0.78	1.33
Average	4.03	7.95	3.92	0.76	1.19

APPENDIX E

CONTROL GROUP'S COMPREHENSION SCORES AND RATIOS

APPENDIX E

COMPREHENSION GRADE LEVELS, GAINS, AND ACHIEVEMENT RATIOS FOR CONTROL GROUP

Subject	Pre-remedial grade level	Long-term grade level	Long-term gain	Pre-remedial achievement ratio	Long-term achievement ratio
1.	2.2	5.4	3.2	0.44	0.80
2.	4.3	9.2	4.9	0.54	0.98
3.	6.9	7.3	0.4	1.38	0.50
4.	2.7	9.3	6.6	0.90	1.32
5.	6.8	9.2	2.4	1.23	0.80
6.	5.7	9.1	3.4	1.14	1.13
7.	2.6	5.5	2.9	0.43	0.97
8.	2.7	6.8	4.1	0.45	1.70
9.	3.1	5.7	2.6	0.62	0.87
10.	3.1	7.5	4.4	1.03	1.46
11.	3.6	6.4	2.8	0.60	0.93
12.	3.3	7.8	4.5	0.55	1.50
13.	3.3	6.2	2.9	0.47	0.97
14.	5.7	8.7	3.0	1.14	1.00
15.	3.9	7.5	3.6	0.78	1.20
16.	5.1	8.6	3.5	0.85	1.17
Average	4.01	7.51	3.44	0.78	1.08

APPENDIX F

QUESTIONNAIRE

6 Theodora Drive
Somerville, N. J.
November 20, 1970

Dear

I am conducting a study at the Rutgers Reading Clinic to determine the long-term effects of remedial reading instruction. As a former student at the clinic, you are able to understand the importance of this subject and to help in our assessment of it.

There is a brief questionnaire enclosed asking your estimate of the amount of help you received in your school work by receiving the remedial reading instruction. Since it is also necessary to have a recent reading score for an accurate evaluation to be made, provision has been made for a free testing of former students at the Reading Center (basement of the Graduate School of Education, 10 Seminary Place, New Brunswick, N. J.) on Saturday, December 5, at 1:00 P.M. The test will take one hour. Results of this evaluation will be available to you.

Please indicate on the bottom of the questionnaire if you will be able to participate in the study, and return it in the enclosed envelope. Thank you very much for your help.

Sincerely,

Mary b. ghtbill

Questionnaire for Long-Term Effects of
Remedial Reading Study

What was the immediate effect of the remedial reading instruction upon your school work?

Marked improvement_____
Slight improvement_____
No change_____
Decline in performance_____

What would you judge were the long-term effects of the remedial instruction upon your schoolwork?

Highly beneficial_____
Slightly beneficial_____
No effect_____
Worsening of ability_____

How often do you read for pleasure at the present?

Very often_____
Frequently_____
Seldom_____
Never_____

Check the highest level of education attained at the present.

8th grade or under____ 9th____ 10th____ 11th____ 12th____
College undergraduate____ Bachelor's Degree____ Graduate student____ Master's Degree____ Other____

Did you have additional remedial reading instruction elsewhere?

Yes____ No____

Occupation if not a student at the present time_____

Name_____

I will attend on December 5_____

I cannot attend on this date but I am interested in a future date_____

APPENDIX H

COMPUTATIONS

t Test for Long-Term Vocabulary Scores
Experimental Group Vs. Control Group

X_1	X_2	X_1^2	X_2^2
9.1	6.5	82.81	42.25
5.6	8.4	31.36	70.56
10.0	7.0	100.00	49.00
6.6	7.7	43.56	59.29
8.0	7.0	64.00	49.00
7.3	8.2	53.29	67.24
4.4	5.3	19.36	28.09
6.2	7.8	38.44	60.84
5.5	7.8	30.25	60.84
6.2	8.5	38.44	72.25
4.6	8.7	21.16	75.69
4.9	8.7	24.01	75.69
6.2	8.7	38.44	75.69
11.3	8.4	127.69	70.56
3.5	9.2	12.25	84.64
9.8	9.3	96.04	86.49
$\Sigma = 109.2$	$\Sigma = 127.2$	$\Sigma = 821.10$	$\Sigma = 1028.12$

$\bar{X} = 6.83$ $\quad \bar{X} = 7.95$ $\quad S_1 = 2.25$ $\quad S_2 = 1.06$

$$\Sigma x^2 = \Sigma X^2 - \frac{(\Sigma X)^2}{N}$$

$$\Sigma x_1^2 = 821.10 - \frac{(109.2)^2}{16} \qquad \Sigma x_2^2 = 1028.12 - \frac{(127.2)^2}{16}$$

$$\Sigma x_1^2 = 821.10 - 745.29 \qquad \Sigma x_2^2 = 1028.12 - 1011.24$$

$$\Sigma x_1^2 = 75.81 \qquad \Sigma x_2^2 = 16.88$$

$$s_x^2 = \frac{X^2}{N-1}$$

$$s_{x_1}^2 = \frac{75.81}{15} \qquad s_{x_2}^2 = \frac{16.88}{15} \qquad F = \frac{S_1^2}{S_2^2}$$

$$s_{x_1}^2 = 5.05 \qquad s_{x_2}^2 = 1.13 \qquad F = \frac{5.05}{1.13}$$

$F = 4.47$
too large

$$S_{\bar{x}_1} = \frac{S_1}{\sqrt{N}} \qquad S_{\bar{x}_2} = \frac{1.06}{16}$$

$$S_{\bar{x}_1} = \frac{2.25}{\sqrt{16}} \qquad S_{\bar{x}_2} = 0.27$$

$$S_{\bar{x}_1} = 0.56$$

$$S_{D_x} = \sqrt{S_{x_1}^2 + S_{x_2}^2}$$

$$S_{D_x} = \sqrt{(56)^2 + (0.27)^2}$$

$$S_{D_x} = \sqrt{0.3865}$$

$$S_{D_x} = 0.62$$

$$t = \frac{\bar{X}_1 - \bar{X}_2}{S_{D_{\bar{x}}}}$$

$$t = \frac{7.95 - 6.83}{0.62}$$

$$t = \frac{1.12}{0.62}$$

$t = 1.81$ not significant at 0.05 or 0.01.

Mann Whitney U Test for Long-Term Achievement Ratios for Vocabulary--Experimental Group Vs. Control Group

X	y	R_x	R_y
1.60	0.78	4.5	21.0
0.34	1.28	30.0	1.0
0.95	1.77	16.0	2.0
0.86	1.30	17.0	10.0
0.80	1.33	19.0	8.0
0.77	1.73	23.5	3.0
0.56	0.77	27.5	23.5
0.78	1.33	21.0	8.0
0.62	1.03	26.0	15.0
0.85	1.23	18.0	12.5
0.67	1.60	25.0	4.5
0.17	1.33	32.0	8.0
0.56	0.53	27.5	29.0
2.00	0.78	1.0	21.0
0.23	1.07	31.0	14.0
1.47	1.23	6.0	12.5
		$\Sigma = 325.0$	$\Sigma = 203.0$

$$U = N_1N_2 + \frac{N_1(N_1 + 1)}{2} - R_x$$

$$U = 256 + 136 - 325.0$$

$$U = 67$$

$$\tilde{z} = \frac{U - \frac{N_1N_2}{2}}{\sqrt{\frac{N_1N_2(N_1 + N_2 + 1)}{12}}}$$

$$\tilde{z} = \frac{67 - 128}{26.5}$$

$$\tilde{z} = \frac{-61}{26.5}$$

$\tilde{z} = 2.30$ (significant at 0.05).