

## NOTE TO USERS

PREVIEW

This reproduction is the best copy available.

**UMI**<sup>®</sup>

PREVIEW

UNIVERSITY OF NEBRASKA LIBRARIES

MANUSCRIPT THESIS

Permission to use this thesis has been given by the author or department under whose direction it was written.

Approved by author Ronald B. Thompson

Approved by department .....

It is expected that proper credit will be given for any quotations taken from this work. Extensive copying or publication of the thesis in whole or in part requires the written consent of the author or department.

This thesis has been used by the following persons, whose signatures attest their acceptance of the above restrictions.

A library which borrows this thesis for use by its patrons is expected to secure the signature of each user.

NAME AND ADDRESS	DATE
Larry Herman 550 Cross St Westbury NY	6/25/75

PREVIEW

PREVIEW

**THE ADMINISTRATION OF A PROGRAM OF DIAGNOSIS AND REMEDIAL INSTRUCTION  
IN ARITHMETIC, READING, AND LANGUAGE USAGE IN THE SECONDARY SCHOOL**

**By**

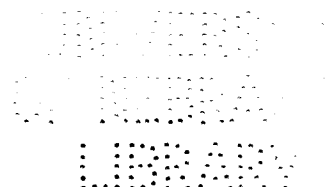
**Ronald B. Thompson**

**A THESIS**

**Presented to the Faculty of  
The Graduate College in the University of Nebraska  
in Partial Fulfillment of Requirements  
for the Degree of Doctor of Philosophy  
Department of School Administration**

**Lincoln, Nebraska**

**June, 1939**



UMI Number: DP13981

### INFORMATION TO USERS

The quality of this reproduction is dependent upon the quality of the copy submitted. Broken or indistinct print, colored or poor quality illustrations and photographs, print bleed-through, substandard margins, and improper alignment can adversely affect reproduction.

In the unlikely event that the author did not send a complete manuscript and there are missing pages, these will be noted. Also, if unauthorized copyright material had to be removed, a note will indicate the deletion.

**UMI<sup>®</sup>**

---

UMI Microform DP13981

Copyright 2006 by ProQuest Information and Learning Company.

All rights reserved. This microform edition is protected against unauthorized copying under Title 17, United States Code.

ProQuest Information and Learning Company  
300 North Zeeb Road  
P.O. Box 1346  
Ann Arbor, MI 48106-1346

#### **ACKNOWLEDGEMENTS**

This study has been made possible through the willing cooperation of more than two hundred individuals to whom the writer is greatly indebted. His first and greatest indebtedness is to Dr. E. O. Bready, Professor of School Administration, Teachers College, University of Nebraska. Dr. Bready has been a constant guide and counselor since the inception of the study more than four years ago. The writer is also indebted to Dr. A. R. Congdon for statistical advice, and to Dean F. E. Humlik and Professor T. A. Pierce for constant interest and encouragement.

In addition, the writer would like to thank more than fifty superintendents and teachers who cooperated in the controlled experiments and more than one hundred and fifty individuals who wrote personal letters concerning the problem.

An expression of grateful appreciation is extended to Miss Ruby Hoffwalker who typed the manuscript.

For sacrifice, encouragement, and cooperation, the writer is indebted to his wife, Mrs. Alice Price Thompson.

E. E. T.

359760

## CONTENTS

Chapter	Page
<b>I. THE PROBLEM. . . . .</b>	<b>1</b>
An Historical Background. . . . .	1
The Purpose of the Study. . . . .	5
The Need for the Study. . . . .	4
The Method Employed . . . . .	8
Definition of Terms . . . . .	10
<b>II. THE PROGRAM OF DIAGNOSTIC AND REMEDIAL INSTRUCTION AT THE     SECONDARY LEVEL. . . . .</b>	<b>11</b>
Outline of the Program and Materials Used . . . . .	11
The Experimental Program of 1933-1934 . . . . .	15
The Experimental Program of 1935-1937 . . . . .	19
An Experiment in Remedial Arithmetic. . . . .	25
Replications of Data. . . . .	45
<b>XII. THE DEVELOPMENT OF ADMINISTRATIVE PLANS FOR DIAGNOSTIC AND     REMEDIAL TEACHING. . . . .</b>	<b>50</b>
Administrative Problems in Remedial Instruction . . . . .	50
Practices Regarding Significant Administrative Problems . . . . .	51
Judgments of Leaders in the Field Concerning Significant Administrative Problems. . . . .	52
Pupil and Teacher Reactions to Courses in Remedial In- struction. . . . .	59
Proposed Plans for the Administration of a Diagnostic and Remedial Program at the Secondary Level. . . . .	74
<b>IV. GENERAL SUMMARY AND RECOMMENDATIONS. . . . .</b>	<b>77</b>
The Value of Diagnostic and Remedial Teaching . . . . .	77
The Administration of Diagnostic and Remedial Teaching. . . . .	78
<b>ANNOTATED BIBLIOGRAPHY. . . . .</b>	<b>81</b>
<b>APPENDIX. . . . .</b>	<b>81</b>



# **TABING**

<b>Table</b>	<b>Page</b>
I. Improvement Made by the 107 Matched Pupils in the Experimental Group, January to May, 1936 . . . . .	15
II. Improvement Made by the 107 Matched Pupils in the Control Group, January to May, 1936. . . . .	16
III. Improvement Made by the 107 Matched Pupils in the Experimental Group . . . . .	16
IV. Improvement Made by the 107 Matched Pupils in the Control Group, January to May, 1936. . . . .	17
V. Improvement Made by Pupils in the Control Group, January to May, 1936, Arranged by Schools. . . . .	17
VI. Improvement Made by Pupils in the Experimental Group, January to May, 1936, Arranged by Schools . . . . .	18
VII. Improvement Made by 126 Matched Pupils in the Experimental Group, January to May, 1937. . . . .	20
VIII. Average Improvement Made by the 126 Matched Pupils in Both the Experimental and Control Groups, January to May, 1937. . . . .	21
IX. Improvement Made by Pupils in the Experimental Group, January to May, 1937, Grouped by Schools . . . . .	21
X. Improvement Made by Pupils in the Control Group, January to May, 1937, Arranged by Schools. . . . .	22
XI. The Average and Median Grade Levels of the Two Groups, October 1, December 10, and March 11, 1936-1937. . . . .	23
XII. Report of Questionnaire Sent to Pupils Who Took the Remedial Work, 1936. . . . .	70

# GRAPH

Graph	Page
I. Improvement Made by Classes in a Remedial Arithmetic Experiment at the Training School, University of Utah, Salt Lake City, Utah, October 1, 1933 to December 10, 1933. . .	29
II. The Grade Levels of the Two Groups, October 1, 1933. . . .	30
III. The Grade Levels of the Two Groups, December 10, 1933. . .	31
IV. The Grade Levels of the Two Groups, March 11, 1934 . . . .	32
V. Grade Improvement Made by Pupils in the Two Classes, October 1, 1933, to December 10, 1933. . . . .	33
VI. Average Grade Improvement Made by the Two Classes Under Each Type of Instruction . . . . .	34
VII. Improvement Made by Seventh Grade Class, Stewart Training School, University of Utah, September 26, 1937-December 18, 1937, New Standard Achievement Tests, Forms I and Y. . . .	41
VIII. Grade Levels of Thirty-Five Pupils, April 19, 1938 and June 6, 1938 . . . . .	43
IX. Grade Improvement Made by Thirty-Five Pupils, April 19, 1938-June 6, 1938. . . . .	44
X. Grade Levels of Pupils in Training School, University of Utah, Metropolitan Arithmetic Test, Form A, April, 1938. .	45
XI. Grade Levels of Pupils in Training School, University of Utah, Metropolitan Arithmetic Test, Form B, May, 1938. . .	47

## CHAPTER I

### THE PROBLEM

#### An Historical Background

One of the puzzling situations which confronted early thinkers was the fact that various individuals reacted differently to the same situation. In the beginning these observed variations were considered negligible quantities or errors due to carelessness. An interesting incident is recorded in this connection concerning an observer who was at work in the Greenwich Astronomical Observatory in England in 1795. He was discharged because he was found to differ from his colleagues in his estimate of the time of transit of a star. It was assumed that there were no individual differences in the reaction time of observers and that thus he was inefficient. Some time later psychologists recognized that these differences in reaction time were real and significant.

The identification of these individual differences attracted the attention of psychologists and finally led to the conviction among a few men that such differences might be measured. Early attempts at measurement were in the nature of oral questioning. Weaknesses in this type of examination were soon recognized and Horace Mann, writing in 1845, advocated the use of written examinations as a measure of individual differences.

There are not very complete records concerning the early use of examinations. The only definitely reported use of written tests before 1875 seems to concern the work of Reverend George Fisher,<sup>1</sup> who constructed

---

<sup>1</sup> C. W. Odell, Educational Measurement in High School, p. 51.

a "scale book" about 1864. The book contained samples of typical questions with answers to the questions.

Wilhelm Wundt<sup>2</sup> is credited with the establishing of the first psychological laboratory at Leipzig in the year 1879. In America, Dr. J. M. Rice,<sup>3</sup> who began work with tests in 1894, is credited with being the real inventor of comparative tests. At about this time Sir Francis Galton began to recognize the need for more exact statistical tools, and these were later developed by Pearson, Spearman, and others.

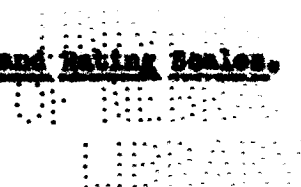
Since approximately 1880, the development in the field of educational testing has been nothing short of phenomenal. Weaknesses have been recognized in the old essay type of written examination, and recent attempts have been made to improve our method of testing. The result has been the emergence of the objective examination. This short answer, easily scored test has come largely to replace the old essay type of written examination. A special type of objective examination is the standardized test. The amount of work which has been done in this special field may be realized when we note that Hildreth<sup>4</sup> lists 4,378 published tests and scales in her 1959 bibliography. The most recent development in the field of objective testing is the diagnostic test which has for its purpose the location of specific individual weaknesses.

Thus it has come about that the culmination of the testing movement has resulted in the development of objective diagnostic tests with resulting corrective measures in the field of remedial instruction.

<sup>2</sup> Ernest W. Figgs, Tests and Measurements in the Improvement of Learning, p. 8.

<sup>3</sup> H. A. Greene and A. W. Jorgensen, The Use and Interpretation of High School Tests, p. 3.

<sup>4</sup> Gertrude H. Hildreth, A Bibliography of Mental Tests and Rating Scales.



## The Purpose of the Study

The purpose of this study has been to develop a program of diagnostic and remedial instruction at the secondary level in the test subjects of reading, arithmetic, and language, and to propose a plan for the administration of this program.

In the development of this study it has become evident that the administration of this program of remedial teaching is one of the most important aspects of the whole problem. Even though there is a need for remedial work in the secondary school and programs have been developed through which we may expect much of the desired improvement in the achievement of students, there still remains the problem of the administration of such a program in the secondary school.

The solution of this problem involves consideration of many other questions. How much time shall be spent on a course in remedial instruction at the secondary level in the test subjects of reading, arithmetic, and language? Shall class attendance be on a voluntary or compulsory basis? Shall high school credit be given for remedial work? Shall students be selected for enrollment in the course, and if so, upon what basis shall the selection be made? Shall there be group instruction, or shall all instruction be individualized? What instructional materials shall be used? What shall be the length of the periods, and how many shall there be per week? How shall teachers be chosen for the course, and what training shall they have? What shall be the relationship of this course to the students' other courses? Shall the program be locally administered, or shall some state-wide program be initiated?

On the basis of experimental research and by the use of available data, an attempt will then be made to propose an educationally sound,

easily administered remedial program at the secondary level in the tool subjects of reading, arithmetic, and language.

### **The Need for the Study**

If all children developed mentally at the same rate as they grow older in chronological age, there would be no need for diagnostic and remedial teaching at any level. Unfortunately, this is not the situation. There are all varying degrees of mental development from the idiot to the genius. Not only are pupils of unequal ability, but the quality of teaching varies with individual teachers. It is obvious that the public school does not adjust readily to those of extremely low ability and equally obvious that those of extremely high ability present a constant challenge to our educational system.

Because of widespread recognition of individual differences, schools have attempted to modify their teaching procedure. The result has been the emergence of programs of diagnostic and remedial teaching. In explaining the causes of this recent development of diagnostic and remedial programs, Cole<sup>5</sup> says:

The basic cause is the failure of schools to adjust the curriculum to the current promotion policy. As noted above, children are at the present time promoted mainly by age rather than by achievement. As a result, the average intelligence per grade has become at least a year lower than it was twenty years ago. The average achievement per grade has also been considerably reduced. Remedial reading classes are necessary because pupils of low achievement are promoted into the upper grades as soon as they are old enough to be there; this policy produces the wide range of abilities demonstrated in the previous table. Remedial classes were not necessary until recently because the children who did not learn to read reasonably well were retained in the lower grades and left school without ever reaching either junior or senior high school.

---

<sup>5</sup> Luella Cole, The Improvement of Reading, p. 23.

Some schools are making curricular adjustments to the abilities of pupils, but the changes in the curriculum are much slower than the changes in promotion policy. Diagnostic and remedial methods of a corrective nature will be necessary until our curriculums are completely and absolutely individualized and until the schools require of pupils only such abilities as they possess.

In order to bring out into bold relief the need for a diagnostic and remedial program at the secondary level, a few studies in the field will be cited.

Marion Monroe<sup>6</sup> reported discrepancies between chronological age and reading achievement. The reading achievement of 215 clinic reading cases was 3.49 years below their chronological age. The reading achievement of 155 special reading cases and 45 defective reading cases was 2.94 years and 5.86 years respectively below the chronological age. The same author reported discrepancies of 2.20 years, 2.95 years, and 2.88 years respectively between mental age and reading achievement.

Betts<sup>7</sup> reported that 25 per cent of the retarded readers tested in one study were found to have intelligence quotients above 110, while only 9 per cent of the group with I. Q.'s below 80 were retarded. Fifteen per cent of the reading cases were found with normal intelligence. Thus, about 80 per cent of the pupils who were retarded in reading had either normal or superior intelligence.

Grover<sup>8</sup> reported the results of the Stanford Reading Examination

<sup>6</sup> Marion Monroe, Children Who Cannot Read, pp. 9-11.

<sup>7</sup> Emmett Betts, The Prevention and Correction of Reading Difficulties, pp. 3-5.

<sup>8</sup> C. C. Grover, "A Survey of the Reading Achievement of Pupils in Low-Tenth Grade," School Review, Vol. XI (October, 1932) pp. 537-594.

given to 1,991 low-tenth grade students in the Oakland schools. It will be noted that even though not one of these students had a chronological age below 12 years and 4 months, 300 of them, slightly more than 10 per cent, had reading ages from below 9 years up to 12 years and 4 months.

Center and Parsons<sup>9</sup> found that 25.8 per cent of the 3,349 students who entered Theodore Roosevelt High School, New York City, 1934-1935, had a reading ability of sixth grade or below as measured by the New Stanford Reading Test and the Haggerty Reading Examination. The same study<sup>10</sup> revealed that among the 615 students entering the tenth grade, 35.4 per cent of them were reading at or below the eighth grade level. This high school as a whole is not far below the average level of reading ability as evidenced by the fact that when all 7,174 pupils were tested it was found that 51 per cent of them were reading below their grade level, while 49 per cent were reading at or above their grade level.

Strang<sup>11</sup> reported a survey of 6,000 ninth grade students in a suburb of Chicago showing that 4 per cent of them read at second or third grade level, 6 per cent at fifth grade level, and 7 per cent at sixth grade level. Twenty-two per cent were reading below a grade score of seven, which has been shown experimentally<sup>12</sup> to be the minimum grade level of reading achievement at which pupils may read with ease materials assigned in high school.

These studies cited are representative of numerous investigations

<sup>9</sup> S. S. Center and G. L. Parsons, Teaching High School Students to Read, p. 6.

<sup>10</sup> Ibid., p. 8.

<sup>11</sup> Ruth Strang, Problems in the Improvement of Reading, p. 21.

<sup>12</sup> James M. McCallister, Remedial and Corrective Instruction in Reading, pp. 3-4.



in the field of remedial reading. In fact, the problem is receiving so much attention that hundreds of articles, pamphlets, and books appear each year. Such states as New York, Iowa, Ohio, and Washington have undertaken state-wide remedial programs.

The need for remedial arithmetic and remedial language is also evidenced by many studies in the field. An examination of university and college catalogs reveals that about one-half of these universities and colleges give non-credit English courses. At the University of Utah, approximately 22 to 25 per cent of all freshmen take this non-credit English course.

Much the same situation is found in the field of mathematics. Murt<sup>13</sup> reports that as many as two-thirds of all students registered in certain algebra classes failed. The author visited a certain city and studied the records of 1,000 high school mathematics students. It was found that 15 per cent of them had failed in their mathematics classes. At the University of Nebraska<sup>14</sup> 30.3 per cent of the freshmen mathematics students failed in 1930-31 and 23.2 per cent of them failed in 1931-32. During the second semester of 1930-31, 45 per cent of the freshmen taking college algebra failed.

Thus it is evident from such studies as those just cited that there is a need for effective diagnostic and remedial instruction. Strong<sup>15</sup> gives ample evidence of the existence of such programs at the secondary level, especially in the field of remedial reading. However, there is

<sup>13</sup> Paul R. Murt, The Individual Pupil, p. 181.

<sup>14</sup> Statement of Grades, 1930-31, 1931-32.

<sup>15</sup> Ruth Strong, op. cit., pp. 129-142.

one phase of the development of these programs which has been neglected. In practice there is but little agreement concerning the administrative details of such a program. An attempt will then be made through this study to determine the best administrative procedures for use in a diagnostic and remedial program at the secondary level.

### The Method Employed

Various research procedures have been used in the pursuit of this study. In the first place, the available literature in the field was surveyed in order to determine what diagnostic and remedial programs were in use by the schools in the United States. In the fall of 1935, a questionnaire was sent to every state department of education, many colleges and universities, and public schools, where it was found by this survey of the literature that some attempt was being made to carry on a remedial program. An effort was made to locate remedial materials to be placed in the hands of the pupils. It was found that there was much material in the field of reading but that little work had been done in the preparation of diagnostic and remedial pupil materials in language and arithmetic.

The author had written a Remedial Arithmetic for High School Pupils which had been published by the University of Nebraska through the cooperation of the Extension Division and the Teachers College. In the same manner, Dr. Stephen Corey and Mr. Earl T. Wiltse had published a Remedial Reading text, and Dr. D. A. Worcester and Miss Grace M. Marley had published A Course in Remedial Language Usage. It was decided to use these texts as basic materials for a two-year controlled experiment in selected high schools in Nebraska.

During the two-year experiment, 24 schools cooperated in the study making it possible to work with 933 students. All classes were closely supervised, teacher conferences were held, and conditions controlled as far as possible. Four hundred sixty-six pupils were matched according to I. Q., grade, and as far as possible according to sex. The records of these pupils have been studied in detail. The effect of remedial instruction upon success in high school has been studied. It has been possible to note the record of students who were in the experiment the first year for the two years following. The marks received by experimental groups in their regular high school courses before and after remedial instruction have been compared with marks received at the same time by the matched control groups. A rather close statistical study has been made of a three-year experiment in the Training School at the University of Utah.

In the spring of 1939 a survey was again made of the status of diagnostic and remedial teaching in the United States. Every state department was sent a questionnaire and asked for information concerning programs in their state. In like manner, many colleges and universities were contacted and leading specialists in remedial teaching were sent questionnaires and asked for suggestions and materials. The schools which had cooperated in the two-year experiment were asked for suggestions concerning the administration of the program. All through the experiment pupils and teachers have been asked to give suggestions for the improvement of the courses.

Again in the spring of 1939, the literature in the field was surveyed, and an attempt was made to gather all available materials dealing with the problem of diagnostic and remedial teaching.

State departments of education, nationally recognized specialists in the field of remedial teaching, and many schools and individuals interested in the problem have been very cooperative in this study. Through the interest and effort of all concerned, it is hoped that a worthwhile contribution to education will be made by this investigation.

#### Definitions of Terms

Diagnostic is the term used to describe that phase of the educational process which is designed to locate specific learning and instructional difficulties and as far as possible to determine the causes of these difficulties.

Remedial is the general term applied to that type of instruction designed to eliminate or reduce individual deficiencies in academic achievement which hinder normal school progress.

Administration is the term applied to the procedures used in the organization and management of a program. It is primarily concerned with those particular phases and procedures which make the program most effective.

Secondary school is the term used in reference to that portion of our school system which provides instruction for pupils who have completed the elementary school. It is commonly used to designate grades 7 to 12 of our educational system.

## CHAPTER II

### THE PROGRAM OF DIAGNOSTIC AND REMEDIAL INSTRUCTION AT THE SECONDARY LEVEL

#### Outline of the Program and Materials Used

2  
i  
To In the development of an administrative plan for diagnostic and remedial instruction, it was felt that the most direct approach to the problem was by actual experimentation with different administrative plans in a group of selected high schools.

The study began in Nebraska where certain schools were chosen for experimentation. Boards of education, superintendents, and teachers were asked to cooperate, and various plans of administration were tried during the years 1935-1936 and 1936-1937. In some cases separate classes were organized for those of very low ability and students from all years of high school were placed in the classes. In other instances the work was given to ninth grade students only. Some schools preferred to give the work to all ninth grade pupils, while others selected those ninth grade students of low ability and organized a special class for them. It was the opinion of some that no special classes should be organized, but that the remedial arithmetic would best be taught in the algebra course and the remedial reading and language taught in connection with the regular English courses. Some schools gave the remedial arithmetic in place of the regular algebra course and the remedial reading and language in place of the regular English courses. In this case one teacher taught arithmetic while another taught reading and language. In some schools pupils of low ability were selected and one teacher taught remedial reading, arithmetic, and language in the same room at the same time. Thus

359760

one student would be working on arithmetic while his neighbor would be working on reading or language. In all cases the pupils were encouraged to use the instructional materials as individually as possible.

The amount of time spent on the course varied. In some cases pupils were kept in the course only until it was felt that they had gained enough to continue with the regular high school work. In this case no high school credit was given for the course. In other cases all pupils were kept a full semester in the course and for some pupils the course assumed the nature of an improvement program rather than strictly remedial instruction. Some superintendents and teachers preferred to condense the instruction into a comparatively short period of six or eight weeks in each subject, while others preferred to take portions of the work at intervals during the year. In general, it may be said that each school adapted the courses in remedial reading, arithmetic, and language to the local situation, and identical procedures were used in no two situations.

Even though various administrative plans were intentionally different in the cooperating schools, certain factors were very carefully controlled and objective data gathered in an attempt to empirically evaluate these administrative procedures. Pupils in all cooperating schools were given achievement tests<sup>1</sup> at the beginning and end of the experimental period. All pupils were given an intelligence test.<sup>2</sup> Through questionnaires and conferences, pupils, teachers, and administrators were asked to offer suggestions for the improvement of the courses. Marks received by pupils before and after remedial instruction have been studied in detail and

---

<sup>1</sup> Modern School Achievement Tests--Short Form, Forms 1 and 2.

<sup>2</sup> Otis Self-Administering Tests of Mental Ability--Higher Examination.

compared with marks received at the same time by pupils in the control groups. The remedial materials<sup>3</sup> used by the experimental schools were the same in all cases.

The study was continued in the field of arithmetic at the Training School of the University of Utah. During the three years, 1936-1937, 1937-1938, and 1938-1939, a program of diagnostic and remedial instruction in this subject was carried on and objective data gathered concerning the experiment.

#### **The Experimental Program of 1935-1936**

During the second semester of the school year 1935-1936, ten Nebraska high schools located near Lincoln, Nebraska, participated in one of the controlled experiments in diagnostic and remedial instruction to which reference has already been made. Schools which the writer wished to include in the experiment were visited in order to secure the cooperation of the superintendent and the board of education. Each of the eight experimental schools was asked to purchase the remedial courses prepared by the University of Nebraska. Achievement tests and intelligence tests were furnished both the experimental and the control schools without cost in order that some objective data might be gathered concerning progress made during the course of the experiment.

The Modern School Achievement Test, Form I, was given in all ten schools in January, 1936, to the pupils included in the experiment. In the experimental schools the general practice was to devote approximately six weeks each to remedial arithmetic, remedial reading, and remedial

<sup>3</sup> A. R. Congdon and E. B. Thompson, Remedial Arithmetic for High School Pupils.  
Stephen Corey and E. T. Wilton, Remedial Reading.  
D. A. Worcester and Grace E. Morley, A Course in Remedial Language Usage.

language. During April, 1936, the Otis Self-Administering Test of Mental Ability, Form A, was given to all pupils included. At the end of the school year the Modern School Achievement Test, Form II, was given to the same pupils. Complete records were obtained from a total of 580 pupils. A group of 251 pupils in eight schools comprised the experimental sections, and the control group consisted of 149 pupils in four schools. It will be noted that in two schools there were both control and experimental groups.

Since the students who were assigned to remedial work were in general of lower ability than those in the control group, it would hardly be fair to compare the improvement of the two groups as a whole. In order to study the improvement of comparable groups, 214 pupils were matched according to their I. Q. ratings and as far as possible according to grade and sex.

In some cases where students made scores higher than those for which grade equivalents had been developed, these scores were averaged with the other scores to obtain a grade mean. In a few instances, grade levels were determined by extrapolation. However, in most cases grade levels above those standardized on the test were not used or were found unnecessary.

Table I shows the improvement made by the 107 matched pupils in the experimental group. Pupils were grouped according to I. Q. levels. Pupils with I. Q. ratings from 97 to 108 made the most improvement. It should be borne in mind that each subject except spelling was given for six weeks or .16 of one school year. No remedial instruction was given in spelling.