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A PRINTED MATERIALS-CENTERED APPROACH
COMPARED WITH A MACHINE-CENTERED AP-
PROACH FOR IMPROVING THE READING EFFICI-
ENCY OF COLLEGE STUDENTS.

The University of Oklahoma, Ph.D., 1962
Education, psychology

University Microfilms, Inc., Ann Arbor, Michigan

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THE UNIVERSITY OF OKLAHOMA
GRADUATE COLLEGE

A PRINTED MATERIALS-CENTERED APPROACH COMPARED WITH
A MACHINE-CENTERED APPROACH FOR IMPROVING THE
READING EFFICIENCY OF COLLEGE STUDENTS

A DISSERTATION
SUBMITTED TO THE GRADUATE FACULTY
in partial fulfillment of the requirements for the
degree of
DOCTOR OF PHILOSOPHY

BY
ROBERTA ANN LONG
Norman, Oklahoma

1962

A PRINTED MATERIALS-CENTERED APPROACH COMPARED WITH
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READING EFFICIENCY OF COLLEGE STUDENTS

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ACKNOWLEDGMENTS

Sincere appreciation is expressed to Dr. Gaither and Dr. King for their encouragement and guidance throughout my graduate program. To Dr. Rupiper, for his timely advice in directing the statistical treatment of this study, a special acknowledgment is extended.

For his patience, understanding, and wise counsel in all phases of this study, a most grateful acknowledgment is given to Dr. Heilman, the director of this study and chairman of my graduate committee.

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CHAPTER I

INTRODUCTION

Reading instruction in America's colleges and universities is a recognized and important adjunct of higher education. Surveys such as those by Parr,¹ Charters,² Triggs,³ and Causey⁴ have indicated an astounding growth in the number of reading improvement programs at the college level. The progressive growth of college reading programs has evolved

¹Frank W. Parr, "The Extent of Remedial Reading Work in State Universities in the United States," School and Society, XXXI (April, 1930), pp. 47-48.

²W. W. Charters, "Remedial Reading in College," The Journal of Higher Education, XII (March, 1941), pp. 117-121.

³Frances O. Triggs, "Remedial Reading Programs: Evidence of Their Development," Journal of Educational Psychology, XXXIII (December, 1942), p. 678.

⁴Oscar S. Causey, "College Reading Programs in the Nation," Exploring the Goals of College Reading Programs, The Fifth Yearbook of the Southwest Reading Conference for Colleges and Universities (Ft. Worth, Texas: Texas Christian University Press, 1956), p. 135.

largely because of the acceptance of the fact that the reading process is developmental in nature. The concept that reading is developmental implies that "any person with fair intelligence and vision and a desire to improve his reading speed and comprehension can make marked improvement, even if his reading ability is already above average."¹

It is no longer assumed that once a student has developed fundamental reading skills in grade school that he can not develop more efficient reading habits through training. In the elementary school reading is recognized as a necessary part of the curriculum, and reading skills are deliberately taught and systematically developed. At higher educational levels a continuous development of skills in reading is also possible through systematic practice and is essential to continuous academic development. In most school systems, however, reading instruction ceases at about the sixth grade level. Consequently, a student's reading skills may reach a plateau below his actual potential which will inhibit his ability to cope with more complex materials as he progresses upward through the grades. Thus, many college students, because reading skills have not been systematically developed, read in an ineffective manner. College reading improvement courses

¹Oscar S. Causey, "Some Current Aspects of Reading," What Colleges Are Doing in Reading Improvement Programs, Third Yearbook of the Southwest Reading Conference for Colleges and Universities (Ft. Worth, Texas: Texas Christian University Press, 1954), p. 93.

have been inaugurated to provide guidance and practice to help students develop more efficient reading habits.

Although it is now widely accepted that college students can improve their reading skills, there is, nevertheless, no definitive research nor uniform agreement among reading specialists as to what instructional methods and materials will best facilitate reading growth. A need exists for research to determine the effectiveness of various instructional methods and materials for improving the reading efficiency of college students and other adults. The present study is designed to compare the efficacy of two methods of instruction, one relying on printed materials and the other utilizing mechanical devices (tachistoscope and controlled reader).

Although the complex reading process is comprised of numerous skills, one reading skill which college programs invariably deal with is improving rate of comprehension. Most college reading courses utilize some type of mechanical device designed to provide practice in improving reading rate.¹ The use of such instruments as the tachistoscope, controlled reader and various reading pacers has become a standard training approach. Recently, however, reading

¹George D. Spache, "A Rationale for Mechanical Methods of Improving Reading," Significant Elements in College and Adult Reading Improvement, The Seventh Yearbook of the National Reading Conference for Colleges and Universities (Ft. Worth, Texas: Texas Christian University Press, 1959), pp. 115-132.

experts have begun to question the intrinsic value of mechanical training and are seeking other means for improving the skills related to reading rate.

Background of the Problem

A survey of the literature indicates general agreement among writers as to the reading skills which college students can and should continue to develop. These reading skills are:

1. Effective use of the eyes, i.e., reading more than one word or a small phrase with each eye fixation.
2. Shorter eye fixation time.
3. Reading by progressively larger phrases or thought units.
4. Logical phrasing of thought units.
5. Minimizing subvocalization or saying the words silently. (This does not imply complete elimination of subvocalization.)
6. Flexibility in rate of reading, i.e., reading different materials at varying rates.
7. Ability to skim or scan material when this technique is justifiable.

The above skills are those which are considered most influential in determining rate of reading, which is the main concern of this study. As indicated previously most college and adult reading improvement programs utilize mechanical

devices to improve reading rate. There are, however, certain disadvantages inherent in the use of mechanical devices:

1. The mechanical devices are expensive, which prevents some schools from initiating reading programs.

2. Mechanical devices are not ideally suited for group instruction, yet a vast majority of college and adult reading programs consist primarily of group instruction. Individual needs cannot be met when, for instance, a reading film is shown to a group, and all students are expected to read at the same rate. It is highly unlikely that a group will be sufficiently homogeneous to profit from the use of a given piece of material to be read at a given rate.

3. The use of machines, which are often heavy and bulky, is generally restricted to classrooms, precluding use at times and places other than the scheduled "improvement course."

4. Projected reading material differs from the type of reading material used in actual study. Many students are unable to transfer the skills practiced with various mechanical pacing devices. Few reading programs make any distinction between those students who can profit from mechanical training and those who cannot.

5. The use of machines often focuses the reader's attention on the mechanical device, which may result in diverting his attention from the reading process itself.

Despite the above limitations of mechanical devices, their use is widespread in college and adult reading programs.

The general rationale for the use of machines is that they have a motivational effect on the reader and also provide practice in developing the skills which influence rate of reading.

An analysis of data available indicates that reading improvement programs are in a period of flexibility with respect to methodology, materials, and procedures. As a result, questions frequently arise in recent research, "How much reading improvement is due to the mechanical devices? Are other materials and procedures equally effective?" In light of these questions and to determine if printed materials could be as effective as mechanical devices for improving rate of reading, a series of printed exercises was recently developed. These exercises consist of printed phrased materials which are designed to help students develop precisely the same skills as do the machines. The following advantages would accrue from the use of printed materials: (1) Materials could be used in situations other than the actual classroom instructional period; (2) Each student could work at his own pace; (3) Materials would resemble those used in actual study; and (4) Financial investment in a reading program would be considerably reduced.

The phrased materials were mimeographed and utilized for a pilot study during the 1961 summer term in the University of Oklahoma Reading Laboratory. Two reading classes were given practice in improving reading rate by means of

mechanical devices, the controlled reader and the tachistoscope; two other classes practiced rate improvement using only the phrased materials. The results of the pilot study indicated that mean gains in rate and comprehension for the two groups were approximately the same. Gains in rate and comprehension were based on scores received on a reading pre-test and post-test.

The results of the pilot study served to justify a more extensive study of a program which utilized printed materials as a means of improving rate of reading. After some modifications, fifty-five printed exercises were chosen to be used in the present experiment.

Statement of the Problem

The primary problem considered in this study was whether printed materials could be as effective as the tachistoscope and the controlled reader for improving the rate of reading of college students. The purpose of the study was to test the relative effectiveness of a printed materials-centered approach and a machine-centered approach for improving the reading rate of students enrolled in a college reading improvement course. Inasmuch as "the accurate and meaningful measurement of rate of reading involves the control of the comprehension level at which the reading takes place,"¹ three aspects

¹H. A. Greene, A. N. Jorgensen, and V. H. Kelley, Manual of Directions, Iowa Silent Reading Tests, New Edition (New York: World Book Co., 1943), p. 2.

of reading were considered: (1) rate, (2) level of comprehension, (3) paragraph comprehension.

The null hypotheses to be tested were:

1. There is no statistically significant difference in mean gains from pre-test to post-test scores for rate of reading between the group using printed materials and the group using the tachistoscope and the controlled reader.

2. There is no statistically significant difference in mean gains from pre-test to post-test scores for level of comprehension between the group using printed materials and the group using the tachistoscope and the controlled reader.

3. There is no statistically significant difference in mean gains from pre-test to post-test scores for paragraph comprehension between the group using printed materials and the group using the tachistoscope and the controlled reader.

Related Research

Most of the studies concerning improvement in rate of reading can be categorized as follows: (1) investigations to determine the efficacy of mechanical devices, (2) comparisons of a mechanical and a non-mechanical approach, and (3) evaluation of improvement without the use of machines. The following review of the literature is confined to categories one and two, and primarily to studies: (1) utilizing college students as subjects, and (2) including the use of either the tachistoscope or the controlled reader.

Rust investigated the use of the tachistoscope to improve the reading rate and comprehension of six groups of college students and adults. A high correlation was reported between tachistoscopic training and improved reading rate, which according to the author's conclusions justified the use of the tachistoscope for increasing rate of reading.¹

A report by Weber of an experiment which was designed to determine the efficacy of tachistoscopic exercises for the improvement of reading speed, states that significant gains in rate were found after twelve days of training. Initial and final measurements of reading rate and comprehension were obtained from an experimental and a control group of college students. The experimental subjects made a residual gain of four per cent in reading rate over the control group which was given no training with the tachistoscope.²

Witty, Stolarz, and Cooper, in a reading course at Northwestern University, used the tachistoscope for training students in faster recognition of phrases. The average gain in reading rate for the class was 202 words per minute. According to the experimenters, "Most of the students became

¹Paul J. Rust, "A Study in the Improvement of Reading at the College and Adult Levels with Special Emphasis on Tachistoscopic Training," Unpublished Ph.D. dissertation, University of Washington, 1952.

²C. O. Weber, "The Acquisition and Retention of Reading Skills by College Freshmen," The Journal of Educational Psychology, XXX (September, 1939), pp. 453-60.

very proficient at rapid recognition of phrases and made a remarkable gain in rate of reading."¹

Reach and Dotson utilized the tachistoscope and the controlled reader in a reading course for the entire freshmen class at Howard College. Significant gains in both rate and comprehension were noted. The average increase in reading rate of the group was approximately 147 per cent, with a "satisfactory" improvement in comprehension.²

Lee reports results of a reading course in which the tachistoscope and the controlled reader were used to improve rate of reading. Rate was not evaluated alone, but significant gains were made in "reading skills."³

Wooster tested the value of pacer training in a college course of effective study. Two groups received training on the reading rate controller and a third group served as controls. The three groups made gains in both rate and comprehension. The investigator concluded that the use of the rate controller was effective with most students in increasing rate of reading.⁴

¹Paul Witty, Theodore Stolarz, and William Cooper, "Some Results of a Remedial Reading Program for College Students," School and Society, LXXVI (December 13, 1952), pp. 376-380.

²Damon D. Reach and F. D. Dotson, "Developmental Reading for High School and College Students," American School Board Journal, CXXX (May, 1955), pp. 35-38, 103.

³Maurice A. Lee, "Results of a College All-Freshmen Reading Improvement Program," Journal of Developmental Reading (Autumn, 1958), pp. 20-32.

⁴George F. Wooster, "An Experimental Study of the Reading Rate Controller," Journal of Educational Psychology, XLV (November, 1954), pp. 421-26.

These investigations support the claims that the tachistoscope and controlled reader can be effectively used to improve rate of reading with a substantial increase in comprehension. However, several of the studies included other teaching procedures in the reading program, and contributions of the other techniques or of the machines alone were not determined.

One of the earlier studies attempting to compare a mechanical with a non-mechanical approach for improving reading rate was done by Weber in 1939. One experimental group was given tachistoscopic training, and a second experimental group used Pressey's Manual of Reading Exercises for Freshmen. A third group served as controls. Tests following the training period revealed no essential differences produced by the two experimental methods, but gains in both rate and comprehension were much higher for the experimental groups than for the control group.¹

Spache, Standless, and Neville investigated three approaches for improving reading at the college level. One approach involved a class using Spache and Berg's Art of Efficient Reading; another class received training using the Perceptoscope; a third group was an individualized self-improvement class in which the students worked alone with periodic checks made by the instructor. No significant

¹Weber, loc. cit.

differences in rate or comprehension scores were found for the three groups.¹

Westover carried on a controlled experiment with college freshmen to determine the relative effectiveness of three methods of improving reading performance. One instructional group was presented with exercises with a device to control eye movements; a second group practiced reading without such a device. The third group received no special training in reading. At the end of a five-week training period, the three groups showed significant improvement in all aspects of reading tested. The two instructional groups made significantly greater gains in rate of reading than the no-exercise group, but no significant differences were found between the two instructional groups.²

Using a group of college freshmen as subjects, Glock compared the effect of three methods of training upon eye movements and reading rate. Two of the methods utilized mechanically controlled reading practice techniques; the third method did not rely on mechanical aids. The same reading texts were used in all three methods. Eye movements and reading rate showed a substantial improvement under all three

¹George D. Spache, Lloyd Standless, and Donald Neville, "Results of Three College Level Remedial Reading Procedures," Journal of Developmental Reading, IV (Autumn, 1960), pp. 12-16.

²Frederick L. Westover, "Controlled Eye Movements versus Practice Exercises in Reading," Teacher's College Record, XLVII (April, 1946), pp. 463-64.

instructional methods used in the experiment. This study did not give evidence that techniques designed specifically to train eye movements were more effective than a method not utilizing mechanical aids.¹

An experiment by Glock with high school students as subjects found a non-mechanical approach to be superior to approaches employing mechanical devices. Two groups received training by means of the tachistoscope and reading films; a third group, the "determined effort" group, was encouraged to improve their reading through use of interesting reading materials, vocabulary study, and periodic talks by members of the school staff. The "determined effort" group showed a statistically more significant increase in rate than either of the other groups. There was no significant change in rate of comprehension.²

Another experiment finding significantly higher gains in reading rate with a non-mechanical approach was conducted by Thompson at the Air Command and Staff School. One experimental group participated in a book-centered course using exclusively Norman Lewis' book, How to Read Better and Faster; another experimental group participated in a machine-oriented

¹M. D. Glock, "The Effect Upon Eye Movements and Reading Rate at the College Level of Three Methods of Training," Journal of Educational Psychology, XL (February, 1949), pp. 93-106.

²John W. Glock, "The Relative Value of Three Methods of Improving Reading," Dissertation Abstracts, XV (November, 1955), pp. 2072-73.

course which was centered around a reading rate controller. Both groups showed significantly higher gains than a control group, but the reading rate of the book-centered group was significantly higher than that of the machine-centered group.¹

Wedeen found that a rate controller produced rate gains superior to those of a group trained without the machine or those in an untrained control group. The subjects were matched for intelligence and reading ability and divided into three sections. Section A read with a pacer; section B read the same material under stop-watch conditions; and section C received no training. Section A exceeded both of the other groups in rate gain, but both of the experimental groups were equal in comprehension growth.²

Mayhew and Weaver compared reading skills gained under four different instructional methods: (1) Harvard reading materials; (2) SRA Better Reading, Book 3; (3) Harvard reading films, and (4) the tachistoscope. In making comparisons of the four methods, some of the materials were used separately; and other methods involved a combination or alternation of materials. Significant gains in rate and comprehension were made with the methods utilizing the mechanical devices,

¹Warren C. Thompson, "A Book Versus Machine Experiment in Adult Reading Improvement," College English, XV (May, 1954), pp. 471-73.

²Shirley U. Wedeen, "Mechanical Versus Non-Mechanical Reading Techniques for College Freshmen," School and Society, LXXIX (April 17, 1954), pp. 121-23.

but gains were not significant for a fourth method which involved alternating work with the SRA Better Reading, Book 3 and the Harvard reading materials. Although it was not concluded that it was necessary to have a tachistoscope or reading films to improve reading skills, the investigators stated that students using the devices were the easiest to motivate.¹

The studies cited here indicated that both reading rate and comprehension were improved through various instructional procedures. While data from the various studies did not show conclusively that the use of machines was necessarily superior to non-use of machines in improving rate of reading, the use of machines appeared to be characteristic of most college and adult reading programs.

¹Jean B. Mayhew, and Carl H. Weaver, "Four Methods of Teaching Reading Improvement at the College Level," Journal of Developmental Reading, III (Winter, 1960), pp. 75-83.

CHAPTER II

PROCEDURES OF THE STUDY

This study was designed to compare two methods of improving the reading efficiency of college students: Method I utilized printed materials; Method II utilized two mechanical devices, the tachistoscope and the controlled reader. Six classes received eight weeks of instruction in reading improvement. Three classes, a total of 72 students, received instruction using printed materials specifically designed to improve skills which influence reading rate; and three classes, 70 students, received instruction using the tachistoscope and controlled reader to improve the reading skills influencing rate. The effectiveness of the two instructional methods was compared on the basis of mean gains from pre-test to post-test for reading rate and comprehension as measured by the Iowa Silent Reading Tests, Forms AM and CM.

Selection of Subjects

The subjects for this study were students enrolled in reading improvement classes at the University of Oklahoma Reading Laboratory during one of three eight-week sessions of the 1961-62 school year. Enrollment in the reading course

is on a voluntary basis and is open to all students attending the university. Students receive no college credit for the course, but pay a fee equivalent to one regular credit hour of instruction. A number of sections of the reading improvement course are offered each eight weeks between the hours of eight o'clock and three o'clock. Classes are regularly scheduled and meet twice a week for 50-minute sessions. Those students enrolled in either the nine o'clock class on Monday and Wednesday or the nine o'clock class on Tuesday and Thursday were used in this study. In an attempt to control the variable of instruction, all classes included in the experiment were taught by the same instructor.

Instructional Procedures

This study was carried on in regularly scheduled reading improvement classes conducted by the University of Oklahoma Reading Laboratory. The only variation made from the procedures regularly followed in the reading course was that in the case of Method I printed materials were used exclusively in lieu of pacing devices for improving rate of reading. For Method II, the tachistoscope and the controlled reader were utilized for developing the skills related to rate of reading.

Each reading class met two fifty-minute sessions per week for eight consecutive weeks, making a total of sixteen periods of instruction. Four of the class periods were used primarily for orientation to the course and administration

of tests. Class instruction for the remaining twelve sessions was planned so that the same amount of time was spent on the printed materials for Method I as was spent on the mechanical devices for Method II. The printed materials and the mechanical devices were the only instructional materials used to provide practice in improving rate of reading. Orientation to the course and all instruction not related to improving reading rate was exactly the same for all classes.

Materials Used for All Classes

The following materials were used in all classes for purposes of orientation and for instruction related to improving comprehension, critical reading, vocabulary and study skills:

1. Speeding Your Reading, a film illustrating fundamental principles involved in correct reading habits.¹
2. Manuals of sustained reading selections:
 - a. Efficient Reading²
 - b. Efficient Reading, Alternate Edition³
 - c. The Improvement of College Reading⁴
3. Paraphrasing exercises

¹Speeding Your Reading. Script written by John R. Humphreys, film produced by Teaching Aids Exchange.

²James I. Brown, Efficient Reading (Boston: D. C. Heath and Co., 1956).

³James I. Brown, Efficient Reading, Alternate Edition (Boston: D. C. Heath and Co., 1956).

⁴Marvin D. Glock, The Improvement of College Reading (Boston: Houghton Mifflin Co., 1954).

4. Study techniques, "Survey Q₃R" method¹

5. Mimeographed critical reading exercises.

Classroom procedures were duplicated in the use of the above materials, and time spent on them was approximately the same for all reading sections used in the experiment. The experimental practice with the materials which related to improving rate of reading was scheduled during the first half of the instructional period. The time devoted to the use of these materials was kept constant for both experimental groups. The time remaining for the use of other materials mentioned above was also kept constant.

Materials Used for Method I

The printed materials used in Method I were designed to give practice in the following reading skills:

1. Increasing span of recognition
2. Rapid recognition of phrases of different lengths
3. Logical phrasing of thought units
4. Skimming for specific information
5. Minimizing sub-vocalization

The printed materials consisted of several types of phrased exercises and were presented to the students in order of difficulty, beginning with long words or very short isolated phrases and gradually increasing the length of the

¹Francis P. Robinson, Effective Study (New York: Harper and Brother, 1946).

phrases. After practice in rapid recognition of isolated phrases, the students were given continuous reading text arranged in phrases to be read down the page and other passages to be read across the page.

Some of the phrased materials were used for group instruction, in which case all subjects spent a given number of seconds or minutes on a given set of materials. Some students may have been able to read a given passage more than once while others read it only one time. After several periods of practice, each student was permitted to choose the exercises that most closely paralleled his present ability to deal with phrases. However, the time spent in such practice was held constant for all.

Examples of the printed materials are given below. The total exercises from which these excerpts are taken, along with other types of exercises used for Method I, are presented in Appendix B. The following general directions were given to the students prior to beginning practice on the exercises:

1. Try to see each phrase as a single unit.
2. Read each phrase as a single thought unit.
3. In so far as possible read each phrase with one eye fixation.
4. Read the phrases as rapidly as possible.
5. Try to reduce sub-vocalization (saying the words to yourself).

Examples of Exercises

Directions: This exercise consists of phrases 15, 16, and 17 letter spaces in length. Practice reading both down and across the page. Aim for speed and a minimum of sub-vocalization.

a need for this	a gorgeous sight	these factors are
group of people	a predatory find	every other class
the hotel rates	about to release	away in the attic
the boys became	men of character	open to new ideas

Directions: This exercise provides practice in reading phrased material across the page. The phrases range from 11 to 21 letter spaces in length. Read the material as rapidly as possible, reading each phrase as a unit and holding sub-vocalization to a minimum.

a valuable key	not to play with fire	a low tolerance
another evil	paused only briefly	for study and advice
a wage increase	able to compete	a web of red tape
a huge factory	to make it up	took a close look

Directions: The following text has been divided into phrases and is to be read down the page as you would read a newspaper.

THE IMPORTANCE OF READING

The remark was made	Upon hasty evaluation
by Thomas Paine--	one might conclude
"Every person of learning	that this observation
becomes his own teacher."	was more appropriate. . . .

Materials Used for Method II

With the exception of those class periods used for testing, the initial 20-25 minutes of each class meeting was devoted to practice on those skills related to improving rate of reading. Method II utilized the tachistoscope and the controlled reader for this practice. The remainder of each class period (approximately 30 minutes) was spent using a variety of the exercises referred to earlier in this chapter. As noted, these consisted of materials designed to deal with the development of abilities related to comprehension, critical reading, vocabulary, and study skills.

The tachistoscope is an overhead projector equipped with a flashmeter device which permits a word, phrase or passage to be exposed for a given time interval ranging from one second to 1/100 of a second.¹ In this experiment, the tachistoscope was used for training in increasing span of recognition, rapid visual perception of words and phrases, and practice in skimming for specific purposes. Various types of slides were used for this training. One type contained single words which were flashed on the screen at 1/100 of a second. Slides containing phrases varying in length from two to six words were used for practice in increasing span of recognition. Slides containing paragraphs were used to develop skill in skimming. The length of the paragraph and the number of words included determined the rate of exposure. The students skimmed the projected paragraph to answer specific questions or to determine the main ideas presented in the reading material.

The controlled reader is a thirty-five millimeter film-strip projector equipped with a speed control which can be set from sixty to 1,000 words per minute.² The controlled reader projects one line of print on the screen at a time. The filmstrips used in this experiment contained either five,

¹The Keystone Tachistoscope (Meadville, Pa.: Keystone View Co., 1946), p. 3.

²The Evolution and Growth of Controlled Reading Techniques (Huntington, N. Y.: Educational Developmental Laboratories, Inc., 1960), p. 10-11.

six or seven words per line. The controlled reader was utilized for essentially the same purposes as the tachistoscope, except that all materials used with the controlled reader were sustained reading.

Instruments of Measure

Measuring instruments were utilized to determine verbal ability, reading rate, level of comprehension, and paragraph comprehension. Instruments used in this study were:

1. The Cooperative School and College Ability Tests (SCAT), Form 1A. This test is composed of four subtests which measure two kinds of ability: verbal and quantitative. Subtests I and III yield a measure of developed verbal ability and Subtests II and IV measure quantitative ability. The SCAT was administered early in the course, and converted scores from Parts I and III were used to determine verbal ability of the subjects.

2. The Iowa Silent Reading Tests, New Edition. This test is comprised of seven subtests: (1) Rate and Comprehension, (2) Directed Reading, (3) Poetry Comprehension, (4) Word Meaning, (5) Sentence Meaning, (6) Paragraph Comprehension, (7) Location of Information. An evaluation of the various subtests determined the use of Subtests 1 and 6 for purposes of this study.

Subtest 1, Forms AM and CM, was used to determine the reading rate and level of comprehension of the subjects. On

this test the number of sentences read are converted to percentile scores for both rate and comprehension. However, for this study the number of sentences read on Parts A and B of Subtest 1 were converted to words per minute for a measure of reading rate. Raw scores were used to express level of comprehension.

Subtest 6, Forms AM and CM, was administered to obtain scores for paragraph comprehension. Raw scores were used to express paragraph comprehension.

The pre-test, Form AM, was administered to all subjects during the first class period of the reading course. At the termination of the reading course Form CM was given. Gains in the three areas of reading were determined by subtracting the raw score obtained on the pre-test from the corresponding raw score obtained on the post-test.

CHAPTER III

PRESENTATION AND ANALYSIS OF DATA

Description of Sample

This study involved 142 college students enrolled in one of six eight-week reading improvement classes. The investigation covered a period of 24 weeks, during which time a total of three classes received eight weeks of instruction using a printed materials-centered method, and three classes received eight weeks of instruction using a machine-centered method. The distribution of subjects is shown in Table I.

TABLE I
DISTRIBUTION OF SUBJECTS ENROLLED IN READING
CLASSES SELECTED FOR THIS STUDY

		Method of Instruction		Total
Class		Printed Materials	Machines	
1st Eight Wks.	I	21	16	37
2nd Eight Wks.	II	29	30	59
3rd Eight Wks.	III	22	24	46
Totals		72	70	142

To decrease the standard error associated with the use of small samples, it was desirable to group the three classes using each method of instruction. This necessitated the determination of equivalence in pre-study factors of verbal ability, reading rate, level of comprehension and paragraph comprehension. This determination involved the utilization of the "t" test for significance of difference between uncorrelated means.¹ To utilize this technique, homogeneity was first established (see Appendix A). Results of the "t" tests for classes using printed materials and classes using mechanical devices are shown in Tables II and III, respectively.

TABLE II
ANALYSIS OF THE PRE-TEST DATA FOR THE THREE
CLASSES USING PRINTED MATERIALS

	Class					
	I (N=21)	II (N=29)	III (N=22)	Mean Diff.	S.E. Diff.	"t"
	Means					
Verbal Ability	303.90	306.62		2.72	4.39	.062
		306.62	301.23	5.39	3.78	1.426
	303.90		301.23	2.67	4.64	.058
Rate W.P.M.	271.62	241.03		30.59	16.73	1.828
		241.03	266.14	25.11	17.27	1.454
	271.62		266.14	5.48	22.94	.239
Level of Comp.	22.38	23.24		.86	1.20	.717
		23.24	23.41	.17	1.31	.130
	22.38		23.41	1.03	1.47	.702
Paragraph Comp.	26.10	26.86		.76	1.39	.547
		26.86	28.00	1.14	1.39	.821
	26.10		28.00	1.90	1.77	1.072

¹John E. Freund, Modern Elementary Statistics (Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1960), p. 270.

By inspection it may be seen that all of the "t" values were non-significant at the 0.05 level of significance. The lack of significant differences between mean scores of the three classes permitted pooling of these subjects into a larger sample to be hereafter referred to as Experimental Group I.

TABLE III
ANALYSIS OF THE PRE-TEST DATA FOR THE THREE
CLASSES USING THE MECHANICAL DEVICES

	Class			Mean Diff.	S.E. Diff.	"t"
	I (N=16)	II (N=30)	III (N=24)			
	Means					
Verbal Ability	304.50	301.50		3.00	3.57	.841
		301.50	303.58	2.08	6.27	.332
	304.50		303.58	.96	3.53	.272
Rate W.P.M.	251.19	264.20		13.01	19.52	.667
		264.20	267.63	3.43	17.07	.201
	251.19		267.63	16.44	20.62	.797
Level of Comp.	22.13	22.17		.04	1.65	.024
		22.17	25.37	3.20	1.21	2.641*
	22.13		25.37	3.24	1.38	2.348*
Paragraph Comp.	26.38	26.67		.29	1.81	.160
		26.67	28.41	1.74	1.47	1.187
	26.38		28.41	2.03	1.37	1.477

*Significant at .05 level of significance

Data for the three classes which comprised Experimental Group II revealed only two statistically significant "t" values ($P < 0.05$) among the twelve ratios shown in Table III.

According to Wilkinson, it is possible that approximately 12 times in a hundred, two significant statistics from a group of 12 could occur by chance alone.¹ The two significant "t" values were considered as chance occurrences and the pre-test data for the three classes using mechanical devices for improving reading rate were combined. Hereafter, this combined group will be referred to as Experimental Group II.

The mean scores for verbal ability and the mean pre-test reading scores for the two experimental groups were compared to determine if statistically significant differences were present before any special instruction in reading was given. No statistically significant differences were found; therefore, it was assumed that the experimental groups were comparable with respect to these variables at the onset of the experiment. These data are presented in Table IV.

TABLE IV
ANALYSIS OF THE PRE-TEST DATA FOR THE
TWO EXPERIMENTAL GROUPS

	Experimental Group		Mean Diff.	S.E. Diff.	"t"
	I (N=72)	II (N=70)			
	Means				
Verbal Ability	314.18	312.90	1.28	2.22	0.577
Rate	263.89	262.37	1.52	10.42	0.146
Level of Comp.	23.04	23.26	.22	.79	0.278
Paragraph Comp.	26.99	27.20	.21	.87	0.241

¹Bryan Wilkinson, "A Statistical Consideration in Psychological Research," Psychological Bulletin, XLVIII (March, 1951) Table II, p. 158.

Analysis of Data

The data obtained from the two experimental groups consisted of: (1) converted score for verbal ability; (2) pre- and post-test scores for rate of reading expressed in words per minute; (3) pre- and post-test scores for level of comprehension expressed in terms of the number of correct responses out of a possible score of 35 and (4) pre- and post-test scores for paragraph comprehension expressed in terms of the number of correct responses out of a possible score of 36.

To determine whether there was a significant relationship between verbal ability and gains obtained between pre-test and post-test scores for the three facets of reading, Pearson product-moment coefficients were computed. Coefficients of correlation computed for the two experimental groups between the verbal ability scores and gains made in the three facets of reading were found to be non-significant.

TABLE V

CORRELATION COEFFICIENTS BETWEEN SCAT VERBAL SCORES
AND GAIN IN RATE, LEVEL OF COMPREHENSION
AND PARAGRAPH COMPREHENSION

Variables	Experimental Group	
	I	II
<u>SCAT</u> -Rate	.042	.024
<u>SCAT</u> -Level of Comp.	.013	.000
<u>SCAT</u> -Paragraph Comp.	.229	.213

These data show that a relationship did not exist between verbal ability and gains made in reading skills, thus negating the verbal ability factor as a contributing agent.

Pearson product-moment correlations were computed between the pre- and post-test scores for rate, level of comprehension and paragraph comprehension. The coefficients of correlation between the pre- and post-test scores for the three facets of reading were consistently significant. These results showed that gains in the three facets of reading were appropriate to use as the basis for comparing the two experimental methods. These data are presented in Table VI.

TABLE VI
CORRELATION COEFFICIENTS BETWEEN THE PRE-TEST
AND POST-TEST SCORES OF THE
TWO EXPERIMENTAL GROUPS

Variables	Experimental Group	
	I	II
Rate	.65	.66
Level of Comp.	.51	.53
Paragraph Comp.	.65	.78

In order to test the three null hypotheses stated in Chapter I, the "t" test for significance of difference between uncorrelated means was utilized. Prior to computation of the "t" values, F tests for homogeneity of variances were made. The results are presented in Appendix A. Since the variances

for the two groups compared were homogeneous, any statistically significant differences between mean gains would be indicative of true performance, rather than attributable to differences which might be obtained because of differences in variance. The resulting "t" values are presented in Table VII.

The null hypotheses tested were:

Hypothesis 1: There is no statistically significant difference in mean gains from pre-test to post-test scores for rate of reading between the group using printed materials and the group using the tachistoscope and controlled reader.

The obtained value of "t" was 0.046, which was not significant at the 0.05 level of significance. The null hypothesis was accepted. This indicated that there was no significant difference in the mean gain for rate of reading between the group using printed materials for improving rate and the group using the mechanical devices for improving rate.

Hypothesis 2: There is no statistically significant difference in mean gains from pre-test to post-test scores for level of comprehension between the group using printed materials and the group using the tachistoscope and controlled reader.

The obtained "t" value of 0.383 was not significant at the 0.05 level of significance. The null hypothesis of no statistically significant difference in the mean gain for level of comprehension between the group using printed

materials for improving rate of reading and the group using mechanical devices for the improvement of reading rate was accepted.

Hypothesis 3: There is no statistically significant difference in mean gains from pre-test to post-test scores for paragraph comprehension between the group using printed materials and the group using the tachistoscope and controlled reader.

The obtained value of "t" was 2.15 and this value was significant at the 0.05 level of significance. The null hypothesis was rejected. The students who used the printed materials for improving reading rate made significantly greater gains in paragraph comprehension than students who used the mechanical devices for rate improvement.

TABLE VII
ANALYSIS OF DATA FOR THE
TWO EXPERIMENTAL GROUPS

	Experimental Group				
	I (N=72)	II (N=70)	Mean Diff.	S.E. Diff.	"t"
	Mean Gains				
Rate W.P.M.	141.08	141.50	.42	9.07	.046
Level of Comp.	6.14	5.88	.26	.70	.383
Paragraph Comp.	5.42	4.11	1.31	.61	2.151*

*Significant at the 0.05 level of significance.

Summary

Analysis of these data indicated that printed materials and mechanical devices were equally effective for improving rate of reading and level of comprehension as measured by the Iowa Silent Reading Test. On paragraph comprehension the experimental group using printed materials scored significantly higher than the group using mechanical devices.

Discussion of the Results

Significance of Gains

Several studies, such as those by Marvel,¹ O'Bear,² Kingston and George,³ have indicated that students in control groups who received no specific training in reading made gains equal to the gains of subjects who received special training. In light of the results of these studies it was considered desirable to determine if the two experimental methods utilized in this study actually resulted in gains

¹John A. Marvel, "Acquisition and Retention of Reading Performance on Two Response Dimensions as Related to 'Set' and Tachistoscopic Training," Unpublished Ed.D. dissertation, University of Oklahoma, 1955.

²O'Bear, Harry H., "Changes in the Academic Achievement of Matched Groups of Remedial Reading and Non-Remedial Reading Students at Indiana University," Dissertation Abstracts, XV (1955), p. 357.

³Albert J. Kingston and Clay E. George, "The Effectiveness of Reading Training at the College Level," Journal of Educational Research, XLVIII (February, 1955), pp. 467-71.

significantly higher than gains achieved by students receiving no special instruction in reading.

One of the provisions in establishing a true control group would be that subjects in this group should voluntarily enroll in the reading course but not receive any instruction. It would then be assumed that the variable of motivation was controlled. This procedure was not administratively feasible in the present situation since all students at the University of Oklahoma are informed that they may enroll in and receive instruction in improving reading skills. For this reason it was impossible to obtain a true control group consisting of students who voluntarily enrolled for the improvement course, but were offered no instruction. However, a control group of 54 subjects who were given the reading pre-test, no instruction in reading, and the reading post-test was used to test the effectiveness of the two experimental instructional methods. A comparison was made between each of the two experimental groups receiving instruction in reading and subjects in the control group who were enrolled in an undergraduate educational psychology course.

With the exception of the test for verbal ability, the same testing procedure was followed for the control group as for the two experimental groups. It was assumed that verbal ability of the control group was normally distributed since the students were randomly assigned to the various sections of the educational psychology course. At the onset

of the investigation, Subtests measuring rate, level of comprehension and paragraph comprehension on the Iowa Silent Reading Tests, New Edition, Form AM were administered. Following the pre-test the control group received no instruction in reading improvement. At the end of eight weeks the post-test, Form CM of the Iowa Silent Reading Tests, New Edition was administered.

The mean pre-test scores for reading rate, level of comprehension, and paragraph comprehension of the three groups were tested to determine whether or not the three groups were comparable at the onset of the experiment. The F test was used to establish homogeneity of variances. The application of the F tests and the results are presented in Appendix A. Homogeneity was established and the "t" test for pooled variances was utilized to test for significant differences in mean pre-test scores for the three experimental variables between the control group and each of the experimental groups. These data are presented in Table VIII.

Of the nine "t" values computed, only two were significant at the 0.05 level of significance. The two significant "t" values appearing may be considered as chance occurrences by use of the principle presented by Wilkinson.¹ Therefore, it was assumed that the three groups were comparable with respect to the three variables at the onset of the experiment.

¹Wilkinson, loc. cit.

TABLE VIII
ANALYSIS OF THE PRE-TEST DATA FOR
THE THREE GROUPS

	Experimental Group		Control	Mean		"t"
	I (N=72)	II (N=70)				
	Means					
Rate	263.89	262.37		1.52	10.42	.15
W.P.M.	263.89		285.33	21.44	10.57	2.03*
		262.37	285.33	22.96	10.76	2.13*
Level of	23.04	23.26		.22	.79	.28
Comp.	23.04		24.44	1.40	.83	1.68
		23.26	24.44	1.88	.89	1.33
Paragraph	26.99	27.20		.21	.87	.24
Comp.	26.99		26.87	.12	1.02	.12
		27.20	26.87	.33	1.14	.29

*Significant at the 0.05 level of significance.

To determine whether or not statistically significant differences occurred in mean gains between the pre-test and post-test scores for reading rate, level of comprehension and paragraph comprehension between the control group and each of the experimental groups, the "t" test was used. Table IX presents the resulting "t" values.

All of the "t" values shown in Table IX were significant at the 0.05 level of significance. The analysis of these data indicated that students in both experimental groups--printed materials and machine-centered approaches--made significantly greater gains in reading rate, level of

TABLE IX
ANALYSIS OF DATA FOR THE THREE GROUPS

	Experimental Groups					
	I (N=72)	II (N=70)	Control (N=54)	Mean Diff.	SE Diff.	"t"
Mean Gains						
Rate	141.33		-6.17	147.50	8.754	16.85*
W.P.M.		141.50	-6.17	147.67	9.266	15.94*
Level of	5.88		1.63	4.25	.084	50.42*
Comp.		6.14	1.63	4.51	.084	53.81*
Paragraph	5.42		1.15	4.27	.072	59.46*
Comp.		4.11	1.15	2.96	.065	45.78*

*Significant at the 0.05 level of significance.

comprehension, and paragraph comprehension than did those students who received no special instruction in reading.

CHAPTER IV

SUMMARY AND CONCLUSIONS

Summary

The primary purpose of the study was to test the relative effectiveness of a printed materials-centered approach and a machine-centered approach (tachistoscope and controlled reader) for improving the reading rate of students enrolled in a college reading improvement course. Inasmuch as reading rate is meaningful only in terms of its effect on comprehension, three facets of reading were considered: (1) rate, (2) level of comprehension, and (3) paragraph comprehension.

Three null hypotheses were tested:

1. There is no statistically significant difference in mean gains from pre-test to post-test scores for rate of reading between the group using printed materials and the group using the tachistoscope and controlled reader.

2. There is no statistically significant difference in mean gains from pre-test to post-test scores for level of comprehension between the group using printed materials and the group using the tachistoscope and controlled reader.

3. There is no statistically significant difference in mean gains from pre-test to post-test scores for paragraph comprehension between the group using printed materials and the group using the tachistoscope and controlled reader.

The sample for the two experimental groups included 142 students enrolled in six sections of an eight-week reading improvement course at the University of Oklahoma Reading Laboratory during the 1961-62 school year. Three classes comprised of a total of 72 students received instruction using printed materials, and three classes comprised of a total of 70 students used the tachistoscope and controlled reader. Each class received 50 minutes of instruction two days a week. All classes were taught by the same instructor, and only undergraduate students were included in the sample.

The Cooperative School and College Ability Test, Form 1A, was administered to obtain a score of verbal ability for the subjects. Prior to the instructional period all subjects were given, as a pre-test, Subtests I and VI of the Iowa Silent Reading Tests, New Edition, Advanced Test: Form AM. Following eight weeks of instruction, the post-test, Form CM, Subtests I and VI, of the Iowa Silent Reading Tests, New Edition, was given.

The converted scores obtained from the SCAT and raw scores obtained on the reading pre-test were used for determining the equivalence in pre-study factors of verbal ability, reading rate, level of comprehension and paragraph comprehension

for the students in the classes comprising each instructional group. The combined scores of the students utilizing each method of instruction were used in comparing the two experimental groups at the onset of the experiment.

By testing for significance of difference in mean gains from the pre-test scores to the post-test scores, the effectiveness of the two instructional procedures was determined. The "t" tests which were computed indicated no significant differences between the two groups in mean gains for reading rate and level of comprehension. However, there was a statistically significant difference at the 0.05 level between the two groups in mean gain for paragraph comprehension.

To determine if the two experimental methods utilized in the study resulted in gains significantly higher than gains achieved by students not enrolled in the reading course, the two experimental groups were compared with a control group receiving no instruction in reading. The same testing procedure was followed for the two experimental groups and the control group, and an analysis of the data showed significantly higher gains were made by the two experimental groups in all areas of reading tested.

Conclusions

On the basis of the data statistically analyzed in this study, the following conclusions were reached:

1. The two instructional methods, printed materials and the tachistoscope and controlled reader, were equally effective for improving the reading rate and level of comprehension of college students.

2. The printed materials appeared to be more effective than the tachistoscope and the controlled reader for improving paragraph comprehension of students enrolled in the reading improvement classes.

3. Students receiving reading instruction with either of the two methods demonstrated greater gains in reading rate, level of comprehension and paragraph comprehension than those students receiving no special training in reading improvement.

These conclusions indicate that: (1) Both printed materials and mechanical devices can be effectively used to improve the reading efficiency of college students; (2) Students receiving reading instruction with either of the two methods develop greater reading efficiency than students who receive no special instruction in reading improvement; (3) The use of mechanical devices is not essential for improving reading efficiency of college students when printed materials designed specifically for this purpose are utilized.

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APPENDIX A

TABLES OF DATA OBTAINED FOR STUDENTS

IN THE THREE GROUPS

TABLE X
DATA FOR STUDENTS USING PRINTED MATERIALS FOR READING IMPROVEMENT
(N=72)

SCAT	Iowa Silent Reading Test, New Edition					
	Rate		Level of Comprehension		Paragraph Comprehension	
	Words per Minute		Raw Scores		Raw Scores	
	Pre-Test	Post-Test	Pre-Test	Post-Test	Pre-Test	Post-Test
338	289	504	25	30	28	33
331	443	504	22	31	34	36
331	244	413	26	26	31	33
326	253	451	27	30	29	34
326	273	437	25	32	32	35
326	253	404	22	28	33	35
326	335	453	22	30	34	35
326	358	466	24	29	34	34
324	333	474	30	32	34	35
322	263	481	23	24	29	35
322	186	350	29	32	31	34
320	374	493	26	33	23	34
319	451	474	27	33	31	34
319	414	501	27	32	27	34
317	254	320	27	31	28	32
317	253	466	26	30	30	33
316	348	466	27	29	32	34
314	348	418	18	28	32	34
314	187	348	25	25	22	36
313	273	400	29	32	33	35
312	205	344	11	34	8	33
312	185	413	29	32	30	33
311	244	481	25	27	29	33

TABLE X--Continued

SCAT	Iowa Silent Reading Test, New Edition					
	Rate		Level of Comprehension		Paragraph Comprehension	
	Words per Minute		Raw Scores		Raw Scores	
Verbal Ability Converted Scores	Pre-Test	Post-Test	Pre-Test	Post-Test	Pre-Test	Post-Test
311	221	413	18	24	27	33
311	244	504	28	32	28	36
309	234	320	21	28	26	32
308	247	410	28	32	33	34
306	296	368	19	31	27	30
306	261	451	28	29	26	34
306	244	375	24	28	22	28
306	246	358	27	34	32	35
305	350	453	29	33	33	35
305	295	481	29	30	32	33
305	323	503	33	34	31	33
303	230	335	27	33	28	33
303	185	359	19	26	26	33
303	212	413	24	28	31	31
302	273	391	22	32	29	34
302	273	410	23	31	29	33
301	230	388	18	30	26	31
301	336	503	26	28	26	36
301	271	430	25	34	30	34
301	206	296	18	20	21	33
300	234	335	22	28	21	32
300	265	361	26	33	27	34
299	246	373	24	32	31	34
299	286	430	23	33	33	35
298	310	430	17	29	25	33
298	253	416	20	27	27	32

TABLE X--Continued

SCAT		Iowa Silent Reading Test, New Edition					
Verbal Ability Converted Scores	Rate Words per Minute		Level of Comprehension Raw Scores		Paragraph Comprehension Raw Scores		
	Pre-Test	Post-Test	Pre-Test	Post-Test	Pre-Test	Post-Test	
298	190	296	20	25	22	30	
298	224	284	15	32	29	33	
296	252	384	25	28	23	29	
296	263	473	25	27	26	35	
296	281	445	18	26	32	33	
295	202	373	23	25	27	32	
294	228	391	15	30	19	24	
294	210	295	22	33	24	30	
294	237	350	16	18	19	28	
292	202	373	23	26	22	30	
291	174	390	18	25	22	27	
290	296	413	24	32	26	32	
288	235	309	16	22	21	26	
288	258	413	22	26	25	32	
287	360	425	25	30	29	32	
286	238	345	21	26	21	30	
284	206	430	24	26	23	33	
284	335	368	27	31	30	32	
283	238	361	21	26	21	33	
281	190	308	25	32	24	35	
277	307	474	14	29	25	30	
269	168	359	15	20	23	26	
269	169	350	15	18	9	16	
Mean	304.18	263.89	405.22	23.04	28.92	26.99	33.33
S.D.	14.69	62.10	60.51	4.59	3.79	5.19	3.16

TABLE XI

DATA FOR STUDENTS USING MECHANICAL DEVICES FOR READING IMPROVEMENT
(N=70)

SCAT	Iowa Silent Reading Tests, New Edition					
	Rate		Level of Comprehension		Paragraph Comprehension	
	Words per Minute		Raw Scores		Raw Scores	
	Pre-Test	Post-Test	Pre-Test	Post-Test	Pre-Test	Post-Test
Verbal Ability Converted Scores						
331	343	463	32	32	33	35
324	373	474	25	34	32	34
324	400	504	27	29	30	34
322	178	320	22	27	29	35
322	309	410	23	29	21	34
320	390	443	30	32	33	35
320	221	368	19	29	27	34
317	237	493	28	29	33	34
317	270	503	17	26	32	33
316	345	503	28	31	33	33
316	246	388	32	34	33	35
316	185	410	26	29	31	31
316	343	443	27	30	33	35
313	238	434	28	32	31	34
313	273	373	22	26	31	33
312	253	424	28	30	32	35
311	400	504	29	30	31	32
311	266	361	30	31	32	34
311	198	310	22	29	22	28
311	296	474	18	32	32	33
309	335	434	28	35	35	36
309	235	388	19	27	23	29

TABLE XI--Continued

SCAT	Iowa Silent Reading Tests, New Edition					
	Rate		Level of Comprehension		Paragraph Comprehension	
	Words per Minute		Raw Scores		Raw Scores	
	Pre-Test	Post-Test	Pre-Test	Post-Test	Pre-Test	Post-Test
Verbal Ability Converted Scores						
309	278	463	19	34	31	35
309	202	267	16	29	28	28
306	233	434	27	30	26	33
306	158	267	16	22	17	22
306	240	361	25	29	28	29
305	190	290	25	30	27	30
305	240	438	14	32	22	29
305	350	463	25	31	24	36
305	260	466	29	30	31	35
303	245	481	27	32	31	34
302	237	481	27	32	30	33
302	287	388	23	27	22	27
302	286	463	22	28	32	32
301	253	493	27	28	31	34
301	343	418	14	30	23	26
301	228	445	25	32	26	33
301	219	388	26	29	27	34
301	222	416	16	29	25	31
300	239	434	30	31	31	33
300	364	434	30	33	31	33
299	286	300	25	28	20	30
299	333	410	23	32	34	34
298	119	216	11	23	14	17
298	219	373	22	31	25	28
298	345	424	29	30	30	32
296	238	290	24	27	23	31

TABLE XI--Continued

SCAT		Iowa Silent Reading Tests, New Edition					
Verbal Ability Converted Scores		Rate Words per Minute		Level of Comprehension Raw Scores		Paragraph Comprehension Raw Scores	
		Pre-Test	Post-Test	Pre-Test	Post-Test	Pre-Test	Post-Test
296		273	474	22	28	26	31
296		309	437	27	27	24	30
296		230	503	20	25	30	31
295		343	544	16	28	31	31
294		312	400	25	31	31	31
294		198	296	23	30	24	34
294		272	408	24	29	26	30
293		210	320	22	29	24	32
293		224	398	20	29	25	35
292		239	443	22	31	29	33
292		208	316	24	28	15	29
292		254	366	20	27	28	32
290		312	410	20	30	29	33
290		206	350	20	27	22	24
290		260	413	22	28	28	31
288		296	400	27	30	25	30
288		146	260	18	29	14	23
288		233	443	26	30	27	32
288		237	364	22	27	23	30
283		233	293	17	29	23	28
277		137	228	10	24	11	19
275		276	477	24	30	31	31
<hr/>							
Mean	302.90	262.37	403.87	23.26	29.40	27.20	31.36
S.D.	11.57	62.44	72.27	4.92	2.40	5.24	12.27

TABLE XII

DATA FOR STUDENTS RECEIVING NO INSTRUCTION IN READING IMPROVEMENT
(N=54)

Iowa Silent Reading Tests, New Edition					
Rate Words per Minute		Level of Comprehension Raw Scores		Paragraph Comprehension Raw Scores	
Pre-Test	Post-Test	Pre-Test	Post-Test	Pre-Test	Post-Test
413	328	33	27	31	34
390	424	32	29	35	35
386	385	33	31	32	31
373	352	21	30	33	32
361	265	26	31	30	33
358	320	28	27	29	30
357	303	25	28	29	35
353	369	22	32	29	36
341	273	24	18	32	31
341	350	17	9	15	11
335	297	28	32	27	34
334	312	22	26	25	27
324	327	22	25	31	31
319	265	23	17	23	20
312	214	26	28	29	33
311	268	30	28	34	31
311	345	29	31	33	28
309	252	23	26	31	28
309	244	29	22	20	31
303	297	31	31	31	31
303	284	25	26	29	32
297	246	26	24	28	28

TABLE XII--Continued

Iowa Silent Reading Tests, New Edition

Rate Words per Minute		Level of Comprehension Raw Scores		Paragraph Comprehension Raw Scores	
Pre-Test	Post-Test	Pre-Test	Post-Test	Pre-Test	Post-Test
297	286	23	18	24	21
297	253	26	31	33	32
294	244	27	25	30	31
286	335	29	31	31	35
284	290	28	29	29	30
281	308	26	24	30	30
278	266	21	26	33	34
278	281	20	29	29	34
278	228	34	32	33	32
273	202	28	29	33	33
273	286	22	32	28	32
267	273	27	29	25	29
266	328	20	28	31	32
265	300	19	21	24	30
257	253	19	24	12	21
254	244	27	29	30	28
254	253	13	27	22	23
247	202	20	23	28	29
237	249	26	23	26	22
237	254	21	24	22	24
237	284	21	19	19	20
234	216	31	27	30	24
233	244	23	27	30	27
224	185	21	27	25	27
221	202	21	25	31	30

TABLE XII--Continued

Iowa Silent Reading Tests, New Edition						
	Rate Words per Minute		Level of Comprehension Raw Scores		Paragraph Comprehension Raw Scores	
	Pre-Test	Post-Test	Pre-Test	Post-Test	Pre-Test	Post-Test
	219	222	26	28	24	20
	216	318	25	16	30	25
	206	246	22	23	25	27
	206	224	25	18	21	23
	197	224	21	25	20	26
	187	247	24	30	19	31
	185	190	9	23	19	20
Mean	285.33	276.98	24.44	25.93	27.44	28.59
S.D.	55.70	52.20	4.89	4.86	5.19	5.18

TABLE XIII

APPLICATION OF F TEST FOR HOMOGENEITY OF VARIANCE
FOR THE THREE CLASSES USING
PRINTED MATERIALS

	Variances of Samples			F
	Class I (N=21)	Class II (N=29)	Class III (N=22)	
Verbal Ability	303.89	306.62		1.01
		306.62	301.23	1.02
	303.89		301.23	1.82
Rate (W.P.M.)	5381.55	2078.68		2.59
		2078.68	6033.27	2.90
	5381.55		6033.27	1.12
Level of Comprehension	18.55	17.19		1.08
		17.19	27.97	1.63
	18.55		27.97	1.51
Paragraph Comprehension	33.69	16.77		2.01
		16.77	34.57	2.06
	33.69		34.57	1.03

TABLE XIV

APPLICATION OF F TESTS FOR HOMOGENEITY
OF VARIANCE FOR THE THREE CLASSES
USING MECHANICAL DEVICES

	Variances of Samples			F
	Class I (N=16)	Class II (N=30)	Class III (N=24)	
Verbal Ability	108.53	145.02		1.34
		145.02	143.21	1.01
	108.53		143.21	1.32
Rate (W.P.M.)	4220.56	2836.99		1.10
		3836.99	3940.85	1.03
	4220.56		3940.85	1.01
Level of Comprehension	30.48	27.11		1.12
		27.11	25.37	1.07
	30.48		25.37	1.20
Paragraph Comprehension	23.32	39.89		1.71
		39.89	14.51	2.75
	23.32		14.51	1.61

TABLE XV

APPLICATION OF THE F TESTS FOR HOMOGENEITY OF VARIANCE
FOR THE TWO EXPERIMENTAL GROUPS
RELATIVE TO MEAN GAINS

	Variances of Samples		F
	Exp. I (N=72)	Exp. II (N=70)	
Rate (W.P.M.)	2651.29	3226.66	1.22
Level of Comprehension	17.21	17.43	1.01
Paragraph Comprehension	15.63	10.80	1.45

TABLE XVI

APPLICATION OF F TEST FOR HOMOGENEITY OF VARIANCE
FOR THE THREE SAMPLE POPULATIONS

	Variances of Samples			F
	Exp. I (N=72)	Exp. II (N=70)	Control (N=54)	
Rate (W.P.M.)	3856.6084	3899.0492		1.11
	3856.6084		3003.2830	1.30
		3899.0492	3003.2830	1.29
Level of Comprehension	21.0562	24.1934		1.14
	21.0562		23.1572	1.10
		24.1934	23.1572	1.04
Paragraph Comprehension	26.8871	27.4667		1.03
	26.8871		39.6621	1.47
		27.4667	39.6621	1.44

APPENDIX B
EXAMPLES OF PRINTED MATERIALS

PHRASE READING

Here is provided a review exercise of phrases 15, 16 and 17 letter spaces in length. Aim for speed and a minimum of sub-vocalization.

a need for this
group of people
the hotel rates
the boys became
furtive glances
short and pudgy
in the long run
for the reunion
it is very busy
but to no avail
French sex bomb
soon after dusk
to be a student
ask to maintain
in the distance
yet to be noted
an easy victory
front-page news
citizens invest
is the question
tends to return
life expectancy
a meager salary
acting promptly
such added cost
enter the fight
by adding to it
in a bad crisis
consist of same
you may acquire
a great patriot
symbol of death
teasing the cat
taking the oath
chose to ignore
a supplement to

a gorgeous sight
a predatory find
about to release
men of character
until soon after
course of action
payment of money
fully as serious
is indeed humane
is a question of
seriously weaken
will be accepted
is now completed
its opening game
of the following
be just as happy
timid about life
mildly egotistic
subject to abuse
the same routine
rich blue velvet
alias the "Hawk"
lead to neuroses
two major themes
in everyday life
a strong feeling
likely to happen
as now practiced
are for instance
let 'em eat cake
no longer absorb
dregs of society
spike that rumor
a fantastic tale
a head-on debate
mark your ballot

these factors are
every other class
away in the attic
open to new ideas
the census showed
a perennial issue
may go undetected
for safe handling
observe carefully
had little effect
scores of reports
would clear it up
find it difficult
at the convention
discussion leader
no sale for signs
proved to be true
a pattern evolves
provide the means
has done anything
will be benefited
less than half of
influx of peoples
a rule of conduct
study and reflect
as well as rights
bombastic oratory
during the battle
a recent analysis
unable to placate
finding a way out
changes in values
encircle the word
unable to discern
do not get enough
forced to migrate

PHRASE READING

The phrases in these columns are 18, 21 and 24 letter spaces in length, respectively. Read down the columns as rapidly as you can.

a crowded district
has been indicated
to view with alarm
no funds available
are made available
ability to command
at length arrested
is generally known
sent as instructed
the money involved
these vast inroads
much more tolerant
for a brief period
in the years ahead
consider carefully
a false appearance
since this country
must see that laws
all funds received
result in tensions
outlet for emotion
having been taught
try to account for
the only authority
interest has waned
it can be inferred
should be outlawed
encircle the words
in other countries
cannot be tolerant
became a nonentity
a similar estimate
a successful foray
to defy the public
all were destroyed
now called by many

on the college campus
several serious riots
to study the question
justice requires that
define and illustrate
in advance of his age
is very popular today
issued a proclamation
cited figures showing
a concise formulation
are frequently copied
concern us so greatly
getting out of school
opposing all measures
is perhaps just lucky
to preserve the peace
on a very small scale
won world-wide notice
gave his firm support
outspokenly confident
some dared to believe
a weekly contribution
a smaller circulation
embarked on a program
no precise definition
if the former decides
a shortage of capital
is really the prelude
a most neglected fact
are especially suited
has not been followed
is secured by fission
growth of the economy
the absence of change
in the eastern states
upon the same subject

the great unseen reality
becomes an end in itself
columnists will tell you
contribution to humanity
an understanding of them
is impossible to compute
the exacting tasks ahead
released on nominal bail
recorded his impressions
some products for export
overlooked at the moment
no longer able to resist
at least for the present
and was further informed
encountered no hardships
extremely high standards
finally achieves victory
a very ambitious program
presented by a committee
certain new developments
met with mixed reactions
is unlikely to remain so
a whole series of events
the justice of its cause
improved in recent years
the basis for comparison
how it acts is not known
will be sent immediately
must be greatly extended
incapable of high speeds
can derive great benefit
take a decade to develop
by moving back and forth
a valuable thing to know
the consumption of goods
keeping the economy free

PHRASE READING

This exercise provides practice in reading phrased material across the page. The phrases range from 11 to 21 letter spaces in length. Read the material as rapidly as possible, reading each phrase as a unit and holding sub-vocalization to a minimum.

a valuable key	not to play with fire	in these studies	a low tolerance
another evil	a most neglected fact	is an example	for study and advice
a wage increase	paused only briefly	able to compete	a web of red tape
in huge factories	with his daily work	to make it up	took a close look
easy to measure	in spite of this	the happy prospect	reason to believe
by way of background	after a delay	through self-study	level of output
on a broad basis	seemed bored to death	a sacred taboo	the total group
half of the total	was soon added	as his ability grows	began the study
a fondness for detail	social welfare	to provide funds	was pointed out
in this century	a source of wealth	are not adequate	will soon decline
mysteriously	was made the capitol	seems all wet	should not be trusted
is always present	to be expanded	flat fields of grain	the total funds
we need schools	will be driven away	such a proposal	to such an extent
of this latest crisis	has predicted	at the local level	another answer
how we learned	paused for a moment	when you speak up	a generation ago
is based on the fact	in these states	it is inefficient	for themselves
was so small	are especially suited	limit on debt	must be diverted now
in search of work	on the surface	are better prepared	avoid each other
work closely together	now being sought	as high as ever	may be resumed
a new cabinet	no signs of change	at every opportunity	is a sacred cow
a deceptive phrase	failed to prove	agreed last year	would be shocked
plans to maintain	in large part	without exception	the wall of secrecy
an open society	a chance of success	no perfect system	if they do that
easing world tensions	here at home	is published monthly	was in effect
a grand design	in the accepted sense	to record events	was found to be
may have taken place	on the average	a test ban treaty	in recent years
if they must be	received little help	took up arms again	the world saw
on the stage before	drafting a treaty	talking to people	provided arms
a previous time	is well prepared	are provided free	visited many areas
in the news	could also be located	and many others	is a major obstacle
it should be recalled	out of jobs	borne out by events	a news dispatch
a major factor	to divert one's mind	endorsed it fully	enabled to enjoy
a decided boost	in better condition	is being weakened	it is also said
not the only symptom	it was clear	before it consumes us	was now clear
is now the case	its general policy	to stand firm	an economic blockade

RAPID READING

The exercises in this section provide practice in reading phrased material of two types — either continued text or unrelated phrases. Remember to say each phrase as a unit and minimize "saying the words" subvocally.

the most recent of these certain fundamental factors are not true explanations
 a period of conflict must not fail to indicate rarely if ever occurs in nature
 certain fundamental factors unusual climate changes the reason is to determine
 bridges the gap in terms of a struggle had been content goes beyond reason
 which is quite harmful a profound knowledge of life thinly disguised hostility
 less violent than expected those who stay behind preferred well-seasoned foods
 drawn into the business the only effective answer other groups were encouraged
 the worker and his family a broad social point of view can be bought on credit
 a popular myth was trying to establish no men bold enough it was desirable
 one of the many changes because of recent criticism to guide and direct others
 happy to invite them during the last few weeks repeated efforts were fruitless
 often find it impossible a real and present danger struggled up from the ruins
 was held in a basement on his way out other fish to fry must go on working
 progressing toward his goal a violent street fight has compressed the material
 is the likely successor something can be done about it projected a fuzzy image
 our theory all along covered with an ice sheet a small fraction of their value
 had been invited must be made clear to name only a few did an excellent job
 train competent teachers convictions on basic issues beyond a reasonable doubt
 very important in their lives a second prominent feature are reasonably active
 is realistic about life the expression of strong views there is high agreement
 are based on a study whether differences exist relatively low in social status
 to have an effect on beliefs attention to real problems goes about his own way
 very considerable improvements has set forth his ideas is by no means a leader
 performs a valuable service is reasonably intelligent somewhat more deliberate
 expressed their beliefs coupled with a suggestion adept in dealing with people
 will lift the burden always follow the same pattern allowed the usual expenses
 the outbreak of hostilities produced by each group ill-formed as to objectives
 won a decisive battle to secure an adequate picture responses to this question
 must keep his staff small indicate a high interest a limited circle of friends
 a pleasant friendly neighbor striking a proper balance overwhelmed by problems
 is quite highly regarded proved an able politician requires from every citizen
 may be able to this is not a cure to insure job security costs of printing
 a world cruising record his relationship to society taking place in many areas
 research findings indicate in the light of reason should consider at this time
 need a little extra push cannot buy consumer goods must involve local agencies
 this would not apply must begin in the schools participation in public affairs

RAPID VISUAL PERCEPTION

The first word or phrase in each line is the stimulus — if one of the following words or phrases is EXACTLY the same as the stimulus, place a check (✓) in the parentheses following that line.

- 1 see the picture: see the pitcher picture the see see the picture ()
- 2 had the power: had no power has the powers had the powder ()
- 3 fit into grooves: fits in the groove fixed the grooves fit in grooves ()
- 4 wanted to study: waited to study wanted to study went to the study ()
- 5 momentum: momentary momentous momentarily moment monarch ()
- 6 to take shape: was ship shape soon took shape take a shake ()
- 7 change his mind: changed his mind change her mind change in mind ()
- 8 narration: narrative narrowly narrate negotiation narrate ()
- 9 opened a market: opening a market on market street opened a market ()
- 10 militant: military militia militarism militant militarist ()
- 11 has been running: has been raining had been running has been reading ()
- 12 radiantly: radiation radiator radiance radiant radiate ()
- 13 agreed to leave: agreed to lend agreed in part agreed to part ()
- 14 sanction: sanctify sanctuary sanguine sanitary sanction ()
- 15 the mild climate: a milder climate a mild climate the milder climate ()
- 16 in either case: the other case in case of need in other cases ()
- 17 course of action: course in acting coarse action cause of action ()
- 18 nationally: nationality nationalist nationally national nationalism ()
- 19 always the same: always the game always in name weighs the same ()
- 20 amount of land: area of land amount of lakes amount of lead ()
- 21 on many matters: on many mantles in many manners on many matches ()
- 22 reasonably: reassemble resemble reasonable reason reassure ()
- 23 form of loans: from the loans form of homes loan on farms ()
- 24 modify the image: magnify the image modify the image project the image ()
- 25 moderation: moderate moderately modernistic modernize modern ()
- 26 set of values: set their values set the value set the valves ()
- 27 in a vain search: searched in vain a vain search the main search ()
- 28 suspense: suspense suspension suspicion suspicious suspend ()
- 29 one of many ways: of the many ways one of the ways many of the ways ()
- 30 who are working: who were working who are working they are working ()
- 31 uneventful: eventful unevenly unequaled unerringly uninvited ()
- 32 seen in advance: saw in advance seen the advance seen at a glance ()

RAPID VISUAL PERCEPTION

Read across the page. Determine if the phrase under B is **EXACTLY** the same as the one in Column A – if not, check it. Let your eyes do as much of the work as possible – minimize saying the words sub-vocally.

A	B
1 expressed some thoughts	expressed some thoughts
2 overwhelmed by problems	overwhelmed with problems
3 we have made a start	we have made a start
4 deprived of its use	deprived of its use
5 entering a new decade	entering a next decade
6 modern in every way	modern in every way
7 chairman of the board	chairman of the board
8 confusing to a foreigner	confusing to a foreigner
9 all funds received	all funds received
10 put together in haste	putting together in haste
11 much of its impetus	much of its impetus
12 small but proud states	small but proud states
13 these moral concepts	those moral concepts
14 a library of recordings	a library of recordings
15 an inexhaustible variety	an inexhaustible variety
16 a special ceremony	a special ceremony
17 in terms of his training	in terms of his training
18 one by one were reduced	one by one were reduced
19 orally or in writing	orally and in writing
20 all funds received	all funds received
21 confronted one another	confronted one another
22 to convey the impression	to convey an impression
23 is not commercial	is not commercial
24 on moving to a new home	on moving to a new home
25 far from practical	far from practical
26 provided no penalty	providing no penalty
27 was apparently opposed	was apparently opposed
28 a movement toward order	a movement toward order
29 troops on the continent	troops on the continent
30 in this great tradition	in this great tradition
31 are in this report	are in this report

SKIMMING

TASK I: The phrase – **IT HAS BEEN REASONED** – appears more than once in the exercise below. Check it each time it occurs.

A	Set I	B
1 when he had finished		1 it is not reasonable
2 it has been raining		2 would indeed be fine
3 is still not reached		3 it has been in action
4 it has been reasoned		4 given in some detail
5 decided to turn back		5 is concerned in part
6 it has been resumed		6 it has been reasoned
7 it has been reasoned		7 is concerned in part
8 it is now reasoned		8 it has been averaged
9 is a former resident		9 which do not conform
10 making a second trip		10 it has been reloaded
11 sick with exhaustion		11 providing him a role
12 it is now reasonable		12 it has been related
13 it has been reasoned		13 it is now realized
14 but he found nothing		14 it has been realized
15 a completely new set		15 it has been reasoned

Below, check the phrase: **CAN HARDLY BE EXPECTED**

A	Set II	B
1 a generalized attitude		1 can hardly be explained
2 can hardly be explored		2 can hardly be declined
3 much constant checking		3 difficult to deal with
4 when and where to look		4 can hardly be expected
5 can the emotion change		5 can hardly be provided
6 can hardly be executed		6 upon his chosen career
7 some deliberate effort		7 can hardly be expected
8 can hardly be expected		8 every human experience
9 can hardly be expected		9 can hardly be reasoned
10 never quite perceiving		10 respect for the person
11 has happily discovered		11 can hardly be on earth
12 can hardly be included		12 has happily discovered
13 renting an empty store		13 can hardly be expected
14 the balancing of power		14 finding one that works
15 a healthy growing pain		15 can hardly be replaced

TASK II: Reread the phrases as rapidly as you can.

PHRASE READING—CONTINUED TEXT

The following text has been divided into phrases and is to be read down the page as you would read a newspaper.

THE IMPORTANCE OF READING

The remark was made by Thomas Paine—"Every person of learning becomes his own teacher." Upon hasty evaluation one might conclude that this observation was more appropriate in the early 1800's than it is today. Yet, if the evidence were carefully weighed, it would be obvious that the statement is more applicable today than it was a century or two centuries ago. This despite the fact that more individuals finish high school and many more persons are attending college. This is true because more must be learned in every subject field. And there is now more material to be "mined" to remain well-informed. Regardless of the level of one's formal education, wide, extensive reading is an absolute "must" if one desires to be adequately informed in any given field.

Many individuals in responsible positions have already finished their formal education. Reading is the only way they can keep up with new developments. Persons who are still attending high school or doing college work realize that they must assume responsibility for doing a great amount of independent reading. Acquiring efficient habits, and applying these in extensive reading, is the best method for remaining informed. Research, and methods of mass communication make it inevitable that knowledge will continue to increase at a very rapid rate. In addition to factors previously mentioned which place a premium on efficient reading, automation is making competition much sharper for jobs in industry. Also, in recent years the population bulge has stiffened college

entrance requirements. And once admitted, it is more difficult to meet present day up-graded standards if one is not able to rely quite heavily on independent reading. Thus, effective reading is the key to success whether one's goal be winning a scholarship, admittance to college, advancement on the job, or self enlightenment. Related to this point, an informed citizenry is of great importance in maintaining freedom. And by the same token, citizens, if they are to remain free men, must remain informed. The badge of freedom is the right to choose. But freedom of choice becomes meaningless when it is not based on logical grounds. Wide, efficient reading is the best method for obtaining information and sampling various points of view.

PHRASE READING—CONTINUED TEXT

Read down the columns.

FLEXIBILITY IN READING

In a previous discussion it was pointed out that the facile reader will have developed different rates of reading in order to cope with various types of material. This ability to adapt is referred to as *flexibility*. A rather common weakness found among adult readers is the habit of reading practically all materials at much the same rate. This is obviously wasteful when reading easier material. A relatively large portion of the daily newspaper, the popular news magazines, fiction and feature articles can be read faster than the average textbook or scientific or literary works. Flexibility also refers to numerous other reading skills. One of these skills might be identified as a "change of pace." The reader moves through a given piece of writing speeding over those parts

which cover familiar material or provide unneeded review. He will read carefully those parts which contain the essence of meaning or which contain material which is new to him. Flexibility also involves separating wheat from chaff. Each word or each phrase in a given paragraph does not have equal weight as far as helping the reader arrive at the main idea contained in that paragraph. The eye and the mind should not give equal time and emphasis to the topic sentence, parenthetical phrases, and excursions into non-essential background. The expert reader knows that a number of words in any given passage could be ignored in reading without destroying the meaning. However it should be added—it takes considerable practice to make these discriminations while reading at top speed. The important point is—it can be done.

PHRASE READING—CONTINUED TEXT

Read across the page.

TASK I: Read this exercise as rapidly as you can, still getting the gist of the material.

TASK II: Reread as carefully as is necessary to determine the effectiveness of your previous reading.

TASK III: Reread for sheer practice in rapid reading of phrased material.

In recent years the term *rate of reading* has been widely used. Adults have become interested in their rate of reading—particularly those who do a large amount of reading. Books, college courses, films and training manuals invite the individual to “speed your reading.” Psychology texts speak of the rate of reading of the average high school student, the average college freshman, the average business executive. A concrete number, such as 375 words per minute, is sometimes cited as the rate of college students, as though this figure had some real significance. This emphasis on rate has led some individuals to confuse the reading process with the number of words one could allegedly cover in a specified period of time. In an effort to discuss rate in a more meaningful context, it became popular to talk in terms of “rate of comprehension.” In this way it was emphasized that reading is getting meaning. Some semantic confusion arises in this context also. No individual has a fixed rate of reading or a fixed rate of comprehension. There are a number of variables which influence the rate at which one can cover and assimilate reading material: the difficulty level of the material, the reader’s knowledge of the subject matter, the vocabulary load of the material being read; the reader’s motivation, his purpose for reading, the length of the reading period; certain mechanical factors, such as size of print, the length of the line, the number of figures, or illustrations and footnotes that the material contains. Consideration of these factors makes it quite obvious that no single sample of a person’s reading behavior can provide a valid basis for establishing that person’s rate of comprehension. Any figure arrived at would only be valid for the particular material read under the precise conditions which prevailed at the time it was being read. An efficient reader will not depend solely on one rate of reading. He will vary his rate to fit the terrain, or more precisely, he will adjust his rate to the material he is reading.

PHRASED TEXT

This exercise provides practice in rapid reading of phrases which vary from 14 to 31 letter spaces in length. Read across the page; read as rapidly as you can; hold sub-vocalization to a minimum.

THE MECHANIZED POST OFFICE

Construction of TURN KEY, the world's first mechanized post office, began at Providence, R. I. in April of 1959. The site comprises about fourteen acres, is a five minute drive from downtown Providence. It has facilities for rail transportation as well as access by highway and air. This multi-million dollar mechanized plant is being designed and built by Intelix Systems, Inc., a subsidiary of Internat'l Telephone & Telegraph. Upon completion it will be leased to the Post Office Department for twenty years. Building and machinery are being constructed as one unit. And the completed project will be ready to operate when the Post Office Department takes it over.

This is a pioneer project in mechanical mail handling. It will enable the department to improve mail service for Providence, Rhode Island and 100 other post offices in the area and to benefit mail service throughout southern New England. It will eliminate much drudgery for postal employees, using their skills to much better advantage. Not only will the project serve as Providence's main Post Office, but it will also be a working laboratory for developing and testing new machines for postal operations. It will thus constitute a significant element in research and development. There are plans for a second completely mechanized P.O. to be constructed in Oakland, California.

Until the Providence post office is completed the one at Washington, D.C. has the distinction of being the "world's most mechanized post office." In less than 6 months prior to its dedication on March 3, 1959, this post office was completely modernized, and mail handling methods which were in use for a century were replaced by machines and electronic devices. Many miles of power driven conveyors, tons of steel structure and hundreds of other pieces of equipment were installed without disruption of service to the public or any delays in processing letters, including the Christmas mail.*

* From *Annual Report of the Postmaster General—1959*, pp. 13-15.