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## Pilot-study use of the tachistoscope in elementary grade reading

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PILOT-STUDY USE OF THE TACHISTOSCOPE  
IN ELEMENTARY GRADE READING

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A Thesis  
Presented to  
the Faculty of the School of Education  
College of the Pacific

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In Partial Fulfillment  
of the Requirements for the Degree  
Master of Arts

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by  
Gordon Keith Wells  
June 1956

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## CHAPTER I

### INTRODUCTION

The classroom teacher in the modern elementary school faces many challenges. Among these are limited classroom facilities, large-size classes, double sessions, wide ability range of pupils, supplementary assignments, and often inadequate material resources.

In spite of these problems, the teacher strives to advance his pupils as far as their interest and ability and his skill as a teacher will permit. New ideas in teaching, additional means of motivation, and improved techniques of instruction attract his interest. Because reading plays such an important role in the elementary school program, the teacher is especially attracted to suggestions and improved techniques of teaching this basic skill.

The use of tachistoscopic devices to aid in the teaching of reading has recently been advanced. The advocates of tachistoscopic techniques propose that training in eye-movement skills, perception span, and flash recognition will aid in the development of the total reading skill of pupils. The present investigation proposed to explore this area of learning through a controlled experiment in the use of a tachistoscope in the reading program of a typical elementary school.

## I. READING, AN EDUCATIONAL PROBLEM AREA

New methods and improved techniques in the educative process are the result of research, experimentation, testing, and evaluation. Techniques worthy of serious professional consideration must be able to withstand the closest scrutiny and objective evaluation. The crucible of use in a practical everyday teaching situation is a valid test of a teaching technique. Also the essential agreement of a technique to the basic philosophy of the total program is an important factor.

No part of an extensive program such as reading should stand in isolation, but, rather, should contribute to the total purposing of that program. Consideration should be given to all aspects of the total reading program. It will then be possible to evaluate how adequately such a teaching technique will correlate with the specific aims and outcomes of that total program.

Reading has been defined by Paul McKee as:

1) the act of identifying or recognizing printed symbols quickly and accurately, 2) the act of arriving at an adequate understanding of the meaning intended by the writer, and 3) making use of the meaning arrived at from the written symbol. . . .<sup>1</sup>

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<sup>1</sup>Paul McKee, The Teaching of Reading in the Elementary School, p. 112.



Reading is accepted as a basic tool of learning because of the contribution it makes to all learning activities. The ability to read--to deal efficiently and effectively with symbols--is the fundamental educational tool and its importance cannot be overestimated.

The school administrator views reading as a primary measure of pupil success. Parents judge their children's school progress in terms of the books they have learned to read and the success the child has in reading. Therefore, reading assumes a most important role in the school program. It is a measure of both teacher and pupil success, and so becomes a determining factor in school public relations. Also, "from the social point of view, a good general level of reading ability is essential to the working of democracy," says David H. Russell.<sup>2</sup>

Consequently, reading is given an important place in every elementary school curriculum. It is included in the daily program not only as a regular skill subject, but also figures directly in other learning activities such as spelling, social studies, arithmetic, and health education. However, as Willis N. Potter says,

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<sup>2</sup>David H. Russell, Children Learn to Read, p. 4.

Reading is recognized by educators and psychologists alike as a complicated physical, intellectual and psychological performance. Development of adequate skills in reading present special difficulties to many pupils.<sup>3</sup>

Recognizing this, the teacher feels a responsibility to provide the best possible instruction in reading, and to advance each child as far as his ability permits.

That the teaching of reading is a constant challenge to both new and experienced teachers is borne out in many ways. Heavy enrollment in pre-service, extension, and graduate courses in reading, continuing popular demand for in-service workshops in reading techniques, increasing numbers of requests for instructional materials, the popularity of reading textbooks, and the emphasis placed on reading in educational periodicals and in curricular studies; each attest the professional attitude of inquiry into better methods of reading instruction. All education, and the teaching profession in particular, is constantly on the alert to discover new or modified ways to implement the on-going reading program. Research in reading, methods studies in classroom techniques, and revision of reading series to better serve the needs of the learners in the schools, are

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<sup>3</sup>Willis W. Potter, Implementing the Reading Program, p. 19.

being reported constantly. These are but a few of the available evidences that reflect the importance that is placed on the teaching of reading in the modern school program.

## II. ASPECTS OF A MODERN READING PROGRAM

A four-phase program. The modern reading program begins with the child the day he enters school. Whether this be the kindergarten or the first grade, the teacher is alert to provide an experiential environment that will promote or advance readiness for reading. Readiness is a key word and a basic concept to the teaching of reading in the modern school. The school environment and home and school experiences are drawn upon heavily to provide the experiential background for each child's readiness for the formal reading process. The language arts, social studies, art, music, and other school activities are utilized to standardize and define a common oral vocabulary. This oral vocabulary is then employed in many ways by the primary grade teacher. It contributes to initial classroom word-symbol relationships through use as room signs, name cards, object identification, and later to the chart story.

The use of a reading readiness test is common educational practice today. These tests help the teacher (1) to plan further readiness experiences, (2) to know when

to commence formal reading, and (3) how to group the students in his class. Hester lists three techniques for appraising readiness for reading:

1. Use of the standardized test of reading readiness.

2. Use of tests of auditory comprehension such as the Durrell-Sullivan, and

3. Use of the informal inventory systematic observations of the teacher, usually reported in checklist form<sup>7</sup>.<sup>4</sup>

Readiness of the child for reading includes the physical factors of visual competence, auditory skill, language skill and articulation, and general health. Social and emotional readiness for reading are factors in pupil success. Mental maturity is an important factor in reading readiness. Dolch writes: ". . . after much experience, schools generally have decided on 6½ years mental age as a requirement for beginning reading in the first grade."<sup>5</sup>

The modern school commences its formal reading program with pupils when they have reached this readiness level. Up to this time the teacher has arranged a stimulating environment, provided rich and varied experiences,

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<sup>4</sup>Kathleen B. Hester, Teaching Every Child to Read, p. 48.

<sup>5</sup>Edward William Dolch, Psychology and Teaching of Reading, p. 54.

assisted each child to develop an extensive oral vocabulary, and contributed to the social and emotional adjustment of each child through everyday interplay of group experiencing. He observes the growth of each child, and as they develop the competence, knowledge, and interest to profit by the formal reading program he will guide them into the first stages of the basal reading program.

Individualized reading instruction includes a planned developmental program with a progression of difficulty in the reading material. The student is introduced to, and progresses in easy stages through, a series of pre-primers, primers, and readers of graduated difficulty. The varied content of these materials, especially in the readers, provides opportunity to teach the child the skills of reading for all his needs.

The basal program is intended to show the child how to read. It provides a framework within which the techniques and skills of reading are introduced and the reading ability of the pupil developed.

Class activities provide a common topic for another type of reading experience for pupils. Bond and Wagner call this the "experience-unit." The topical unit is the activity which is the center of interest of the class. Many sources of information are tapped to provide a background and understanding of the topic under study.

The teacher continually encourages an interest in and appreciation for books and for reading. One of the chief ways of accomplishing this is to provide a rich classroom environment. He prepares the classroom as a storehouse of information and pleasure in book form. It is only natural for personal interest to develop in such an environment. Generally, the teacher will allow freedom of choice to the pupils, and only occasionally will teacher guidance in selection be required if the materials are adequate to the needs of the child. This phase of the reading program is termed personal and recreational reading.

The fourth phase of the reading program is planned to correct any faulty learnings, habits, or techniques that may occur. Faulty learnings are not allowed to persist, for they may cause the developing reader to become discouraged and to lose confidence in his ability to succeed.

Grouping. A significant aspect of the modern reading program is the system of grouping students according to their reading maturity or developmental level. Experience shows that reading ability of pupils in any class will cover a range approximating, in years, the grade of the class. The modern school provides for these pupils through grouping. Usually three, or at the most four, reading groups are established upon the basis of pupil ability.

In this way the developmental reading for each group can be geared to the needs of the pupils in the group. Individuals within each group obtain more individualized assistance, reading problems are more nearly ascertained, and individual growth is more adequately challenged. Provision is always made to allow for flexibility in this program. Pupils can be readily accommodated and their developmental ability challenged in a group that is in pace with their personal growth.

In summation then, the reading program of the modern elementary school is complex and challenging. Its basic purposes are not only to meet the needs of the individual child, but also to develop each child to the limits of his potentialities.

### III. THE VALUE OF EARLY TRAINING IN THE ACQUISITION OF READING SKILLS

Educators and psychologists today think of learning as growth and development. The pattern for success in school is established in the primary grades. The school is best able to do this at this early age for several reasons. Among these are the child's interests, attitudes, freedom from preceding failure, eagerness to learn, and willingness to participate in group activities.

A review of characteristic behavior and attitude patterns of primary grade children points out that from age five to eight the child progresses through a series of typical growth stages. At five years of age he is self-assured, vigorous, actively interested in everything around himself, enjoys dramatic participation, and is generally at home with himself and his world. At age six he goes through a period of transition. He becomes restless, more competitive, learns best through active participation, accepts responsibility, and is inept at small muscle activities. The seven-year-old is cautious and sensitive. He often exaggerates and is absorbed in himself and occasionally in a dream world. He may question authority but is more polite than a six-year-old. The eight-year-old may be typified as eager, careless, and noisy. His interests are broadening. He likes to explore new areas and begins to find pleasure in groups of his own sex.<sup>6</sup>

The significance of these characteristics of the primary age child are legion to the alert teacher. His entire long-range plan for group development is based on a knowledge of these standards. Knowing that maturation characteristics are slow and steady for the primary age

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<sup>6</sup>Guide to Curriculum for School Personnel of San Joaquin County (see inside cover).



child, he plans an ever-expanding developmental program.

Dolch lists the following stages in developmental reading:

1. Building sight vocabulary.
2. Developing independent word attack.
3. Expanding meaning vocabulary.
4. Developing fluency at a useful level.
5. Study, or getting more from reading.
6. Developing a lifetime reading habit.<sup>7</sup>

These steps, in regular progression and in pace with the pupil's individual rate of growth, create the firm foundation for his continuing success in school and achievement in later life. They prepare him to meet the increasingly more demanding requirements of his social and personal life.

Any program of improvement or adaptation of techniques in the developmental reading program must be in relationship to the foregoing aspects of the total reading program. They represent the firm foundation upon which individual and group growth is predicated. They will serve to provide focal points in the later chapters of this report as criteria by which to evaluate the successfulness of tachistoscopic techniques--as employed in this experiment.

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<sup>7</sup>Dolch, op. cit., p. 47.

#### IV. THE CHALLENGE OF NEWER INSTRUCTIONAL TOOLS IN THE DEVELOPMENT OF READING SKILLS

The fundamental reading program consists of "purposeful topical reading," according to Bond and Wagner.<sup>8</sup> Additional techniques and motivations are employed to supplement this broad program. In this way the teacher knows he can adjust to individual needs and avoid the problems and the danger inherent in the use of a single method.

In the reading the teacher has done in the field, such statements as the following probably have come to his attention:

Eye movements are a part of bodily adjustment involved in reading. The pupil who sees the long sweep and the short pause of the eyes of a rapid reader gets an idea of reading that way himself.<sup>9</sup>

Until mechanical movements are at least established, there is no comprehension of consecutive reading matter. As long as these movements remain inefficient, comprehension suffers.<sup>10</sup>

. . . experimental work to date shows that any method that forces the individual to apperceive word groups rather than single words will lead to more rapid reading and better comprehension of the content read.<sup>11</sup>

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<sup>8</sup>Guy L. Bond and Eve Bond Wagner, Teaching the Child to Read, passim.

<sup>9</sup>Grace M. Fernald, Remedial Techniques in Basic School Subjects, p. 66.

<sup>10</sup>Luella Cole, The Improvement of Reading, p. 49.

<sup>11</sup>Fernald, op. cit., p. 78.

Because reading by word groups is recognized as one of the effective methods for improving the rate and comprehension of reading, techniques that will develop this skill become an exciting possibility to the teacher of reading. Articles in current educational periodicals gain his attention and interest. In these articles he sees reports of experiments with new types of training devices designed to aid in the acquisition of reading skills. It might be considered a sign of the times! Mechanical devices have attained current popularity, and are being employed in manifold fields, why not in education? For this is the age of mechanization, of the mass media of communication; and industry is making rapid strides toward automation. These are self-evident facets of our modern way of life and teachers are aware of the contributions of this mechanical age.

Education has found important applications for the products of scientific development and research in some areas of learning; in the use of motion picture film, the filmstrip, and the tape recording, as a few examples.

New mechanical products have been introduced and are being promoted for use by education, especially in the area of the communicative arts. Some of these are for the purpose of studying, accelerating, or implementing learning in the area of reading.

These products have received recognition by authors of textbooks in reading. To quote David H. Russell,

. . . commercial materials have been prepared which may be used in the reading program. These include films which emphasize successive phrases in a page of reading materials, which direct eye movements across a series of lines by means of a "bouncing ball" device, a "flash meter," and a Metronoscope which flashes phrases of various sizes at controlled speeds across a space corresponding to a line of print.<sup>12</sup>

As stated by Russell, the devices and materials most commonly mentioned in the literature of reading are the tachistoscope, the metronoscope, the Harvard Reading Films, and various types of reading pacers.

Good's Dictionary of Education provides the following definitions:

Metronoscope: a mechanical flash device that exposes successive phrases and lines of print at varying speeds.

Tachistoscope: a device for the exposure of words, numbers, pictures or other visual stimuli for brief intervals of controlled duration; used in the investigation and improvement of reading, spelling, and visual perception in general.<sup>13</sup>

Investigation of these devices reveals that:

A tachistoscope may be one of several types. The type varies with the projection equipment to be used. In essence, however, a tachistoscope consists of three elements:

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<sup>12</sup>Russell, op. cit., p. 115.

<sup>13</sup>Carter V. Good (ed.), Dictionary of Education, pp. 259 and 407.

1. A suitable projector for showing still transparencies. This is usually either a standard-slide (3½ by 4) projector or a 35 mm. combination filmstrip-slide projector.
2. A "flash-meter" or timing device to fit the projection equipment and provide a means of determining the exposure time of the projected materials.
3. Prepared materials suitable for the type of timed exposure training being given. These materials may be either commercially prepared or hand made.

Tachistoscopes lend themselves to group techniques. Because they employ projection of the material, the size of the image can be adjusted to allow for adequate visibility by even large groups. The desired sequence of materials is selected and the separate items from this sequences are exposed, or "flashed," on the screen for a pre-determined length of time. Exposure time allowable with a mechanical tachistoscope ranges from 1/25 seconds to one second, or unlimited exposure time when operated manually.

The metronoscope is essentially a triple shutter tachistoscope. The material is printed on rolls which are placed in the instrument after the fashion of rolls of music in a player piano. The material unfolds line-by-line behind the shutters, which open and close in succession, so as to expose each line of print in three spaced phrases. The rate of exposure is regulated by a speed control. Pupils are encouraged by this method to read each line in only three fixations. Regressions are discouraged by the operation of the shutters which expose only one phrase at a time.<sup>14</sup>

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<sup>14</sup>Irving H. Anderson and Walter F. Dearborn, The Psychology of Teaching Reading, p. 131.

The Harvard Reading Films accomplish controlled phrase reading by a motion picture method. A page of reading material is projected on the screen with the successive phrases illuminated as the bright portion of the page. The rate at which the successive phrases are illuminated can be controlled by regulating the speed of the projector.

Reading pacers are devices designed to "pace" reading in printed materials. They are used by students individually and may be adjusted to operate at the speed desired. Pacers vary in their design. Some provide illuminated reading and expose a line of the reading at a time. Others are designed to provide for reading from an open book, magazine, or newspaper. This type of pacer has a pointer arm or shutter device that moves down the page to indicate the progression the reader should make to approximate the speed selected in advance by the reader.

The possible potentiality of these devices has not only attracted the attention of educators but has actively stirred their interest as well. Over the period of the last few years several embryonic attempts at utilization of these devices have been reported. Almost without exception, these reports record surprising gains in reading speed and comprehension following use of flash recognition techniques.

Also, members of local teaching staffs have been introduced to the theory and use of various tachistoscopic

devices. In some instances this has led to the placement of equipment in school buildings.

The paramount problem is a question of wise use of this equipment. At the present time there is an inadequate supply of reliable information available. Acceptable procedures for the use of these devices are still in the experimental stage. Consequently, it is difficult to provide teachers with guidance in their use. The conscientious school administrator is understandably concerned regarding the advisability of undertaking a program of tachistoscopic training in conjunction with the total reading program. It was for the purpose of clarifying some of the outstanding issues and defining areas of utilization and pupil achievement that this study was undertaken. It will endeavor to review and evaluate an experiment in the use of a tachistoscope in the integrated reading program of a typical elementary school. The steps taken and the findings of this study are reported in the following chapters:

Chapter II states the purposes of the study and summarizes the techniques used.

Chapter III reviews recent usage of mechanical training devices and reports research from the field of perceptual training.

Chapter IV summarizes current knowledge concerning the psychology of reading, with emphasis on the perceptual skills involved.

Chapter V describes the organization and administration of the experiment; the subjects, the group involved, and the training given.

Chapter VI reports the administration and results of the tests utilized and the statistical analyses made.

Chapter VII summarizes the study, presents conclusions, and suggests aspects of the problem that merit further study.



## CHAPTER II

### STATEMENT OF THE PROBLEM AND THE TECHNIQUES USED

This investigation was conducted to study and evaluate the use of the tachistoscope in an integrated reading program of a typical elementary school. The area of investigation was limited to the primary and intermediate grades. The purposes of the study were to:

1. Estimate the educational value of the tachistoscope and the contribution it would make to the reading program of the primary and intermediate grades.
2. Determine the effectiveness of the tachistoscope when utilized as an integral part of the over-all reading program.
3. Arrive at conclusions concerning the function of tachistoscopic training in the acquisition of reading skills.
4. Make recommendations pertinent to the use of this equipment and these techniques in the reading program of the San Joaquin County Schools.

The study was conducted in response to a felt need for first-hand information concerning the proper place of a tool such as the tachistoscope in the total reading program. Lack of agreement concerning use of flash-recognition devices by leading authorities in the field of reading has caused considerable confusion.

It has been estimated that more than three hundred colleges and universities employ tachistoscopic methods in

remedial work with their students, or in clinical experimentation. Many teacher training institutions expose their students to this equipment in pre-service or postgraduate courses in reading. Smith and Tate say:

Interest has been aroused within the past five years by reports of research and statements of theory concerning gains in both reading speed and comprehension following tachistoscopic training with digits and other materials.<sup>1</sup>

Perceptual training is a topic frequently encountered in professional literature. The following statements concerning the value of training in perception are representative quotations by recognized authorities:

Research shows that the average person uses only twenty per cent of his ability to see and that pupils develop slouchy habits of seeing. With the tachistoscope, pupils are trained to coordinate their brain with the muscles of their eyes, to see objects in wholes, and to rely upon rapid assimilation of visual images. The tachistoscope has made it possible to teach pupils to read much faster, understand what they read much better, and to develop keener eyesight.<sup>2</sup>

The fact that there are these differences between the eye movements of good and poor readers suggests the possibility of improving reading by training the poor reader to emulate the eye movements of the good reader.<sup>3</sup>

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<sup>1</sup>Henry P. Smith and Theodore R. Tate, "Improvements in Reading Rate and Comprehension of Subjects Training with the Tachistoscope," The Journal of Educational Psychology, 44:176.

<sup>2</sup>Hubert J. Davis, "Teaching Reading the A-V Way," Educational Screen, 31:434.

<sup>3</sup>Irving H. Anderson and Walter F. Dearborn, The Psychology of Teaching Reading, p. 131.

There is a great connection between eye movements and fluency in reading.<sup>4</sup>

Since the only purpose of reading is to comprehend, rate should be determined primarily in ability to comprehend. Rate of comprehension should not be restricted by inadequate perceptual processes. Improvement in the perceptual aspects of reading is still the best chance to contribute to efficiency in reading.<sup>5</sup>

And, to quote directly from a recent supplement to the Instructor Magazine,

"The tachistoscope is invaluable for remedial work, but it can also be used to help the brightest youngsters. Through this training, young people have been known to improve their reading rate by literally hundreds of words per minute. You know that perceptual skills have a close connection with brain cells. A good training in perception aids the general functioning of the brain." The two teachers left the exhibit convinced that a tachistoscope would be of great help.<sup>6</sup>

Such statements as the foregoing are relatively common in educational periodicals. They seem to imply that tachistoscopic training would have significant instructional merit. However, according to Russell, "The value of these devices has not been fully established and their use is not

<sup>4</sup>Edward William Dolch, Psychology and Teaching of Reading, p. 335.

<sup>5</sup>Guy Thomas Buswell, "Perceptual Research and Methods of Learning," Scientific Monthly, LXIV, p. 525.

<sup>6</sup>George F. Wooster, "Two Teachers Meet the Tachistoscope," The Instructor: Special Audio-Visual Supplement, 62:39.

common in different school systems."<sup>7</sup>

It seems evident that insufficient research documentation is available at this time to support or to disprove the value of tachistoscopic training at the elementary level. It was reasoned that a controlled experiment would provide information concerning educationally significant aspects of teaching and learning with a tachistoscope. This pilot study was organized to provide such an experiment and to suggest answers to the following questions:

Will the tachistoscope function adequately as a classroom teaching tool?

Does it lend itself to use at all grade levels?

Can it be used effectively by the average classroom teacher?

Is it adaptable to use in an integrated program with regular class groups?

Does it attract interest and motivate learning on the part of pupils?

What is the over-all teacher reaction to the use of the tachistoscope in developing reading skills?

The grades selected for participation in the study represented typical first-grade to fifth-grade classes. Teachers from each of these grades volunteered to utilize the tachistoscope and the filmstrip reading materials in their regular reading programs for the test period of six

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<sup>7</sup>David H. Russell, Children Learn to Read, p. 115.

consecutive weeks. Two classes from grade one to grade four and one class group at the fifth grade level were designated as experimental groups. These class groups were, by definition, the tachistoscopic training groups.

A similar number of class groups at each grade level were designated as control groups. These classes did not participate in tachistoscopic training. Their daily reading program was of the same duration as the experimental group period but consisted only of the regular developmental reading scheduled for the six-week period of the study.

Of major interest in the study was the comparative gain of pupils in reading skills. The principal areas of investigation in this respect were:

1. Pupil gain in reading comprehension.
2. Pupil growth in total reading achievement.
3. Pupil gain in oral reading speed.

In order to obtain data on these items, the Manteca Elementary School District was selected for the pilot study experiment. This district provided a test area with an established developmental reading program, and it supplied a corps of experienced teachers who would cooperate in this study.

The pilot study was integrated with the on-going developmental reading program of the district. However,

teachers were encouraged to exercise personal judgment in gearing the program of training to the needs of their class groups.

All pupils participating in the experiment were tested immediately before the initiation of the study and again following its termination. The tests administered were two forms of the California Achievement Test, published and standardized by the California Test Bureau, and oral reading speed tests administered by the school principal through use of a tape recorder. To obtain an individual reading rate for each pupil, a recording was taken of each pupil's oral reading from the same selection both before the experiment and shortly following its close.

The scores obtained in reading comprehension and total reading achievement on the standardized tests were recorded for each pupil. The score on each item for both pre- and post-test was reported in its school grade equivalent. Differences between these scores provided an indication of pupil gain in reading comprehension and total reading achievement during the interval between tests.

Oral reading, both pre- and post-experiment, were reported as words read per minute. Individual rates for the two measures taken were compared to obtain the gain in reading speed for the pupil during the period of the study.

Teacher appraisal of the learning value of tachiscopic techniques and the functional aspects of its application to classroom teaching-learning situations was also obtained. This was accomplished through a teacher questionnaire. (See Appendix, page 88)

Results from the achievement tests and reading rate recordings are reported in Tables contained in Appendix A, page 68. An analysis of these findings, and of the responses obtained through the teacher questionnaire, is included in Chapter VI.

## CHAPTER III

### STUDIES AND EXPLORATIONS IN THE USE OF MECHANICAL DEVICES IN THE TEACHING OF READING

Numerous studies have been conducted in the area of psychology of reading. Among these are several explorations into areas that are directly related to this study. These latter explorations deal with eye movements, apperception, and visual span, and flash recognition; in other words, tachistoscopic techniques.

Renshaw<sup>1</sup> and others propound theories and present supporting evidence to indicate that visual ability can be assisted by techniques of eye training. The purposes of these reported experiments in tachistoscopic training were to improve accuracy and scope of perception and to reduce perception time.

One of the first areas of exploration using tachistoscopic techniques was in aircraft recognition during World War II.<sup>2</sup> Reports of the successful use of the technique spurred activity in other areas of use. These included number skill training and visual perception in reading.

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<sup>1</sup>Samuel Renshaw, "Tachistoscope in Visual Diagnosis and Training," Optometric Weekly, 36:1189.

<sup>2</sup>Samuel Renshaw, "The Visual Perception and Reproduction of Forms by Tachistoscopic Methods," Journal Psychology, 20:317-32.



In the area of reading, several adaptations of the principle of training for speed in apperceptive ability have been employed. Beginning with the flash card, which in essence is a crude tachistoscopic device, they include the Metronoscope, the Reading Films, the tachistoscope, and reading pacers. Experimentation has been done with these devices by individual classroom teachers, in reading clinics, in psychological laboratories, and in private business.

In reading, the principle has been to achieve an ability to perceive phrases or groups of words at a single fixation. In this connection Fernald says:

Experimental work to date shows that any method that forces the individual to apperceive word groups rather than single words will lead to more rapid reading and better comprehension of the content read.<sup>3</sup>

However, authorities would appear to agree that the several methods now employed have the disadvantage of failing to reproduce the conditions of position, eye fixation, accommodation, general adjustment, and size of stimulus of ordinary reading.

Perhaps this dissimilarity of conditions helps to account for the conclusions reported by Freeburne:

Perceptual span and perceptual speed, as measured by the Flashmeter, are positively related; the coefficient is high (.758). Correlation coefficients obtained

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<sup>3</sup>Grace M. Fernald, Remedial Techniques in Basic School Subjects, p. 78.

between both Flashmeter measures of perceptual span and perceptual speed and reading test scores were positive but low.<sup>4</sup>

For this reason, Anderson says:

The more the presentation of material in a tachistoscope approximates the process of normal reading, the closer the correlation between the size of the fixations in normal reading and the span of perception in a tachistoscope.<sup>5</sup>

As a teaching tool the tachistoscope is relatively new. Barnette writes that the first reported use of the tachistoscope in systematic classroom instruction was in the Harding School in Erie, Pennsylvania, from October, 1938 to March, 1939. The results of this experiment, according to Barnette, were:

. . . that those pupils who were given tachistoscopic work reduced their errors far more and made nearly twice as much gain as the pupils in the control group who did not have the benefit of the tachistoscopic training.<sup>6</sup>

Barnette also reports several school experiments in utilization of tachistoscopic techniques. Among these are two experiments in the Norwalk, California Public Schools with remedial reading classes. With her third grade

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<sup>4</sup>Cecil Max Freeburne, "The Influence of Training in Perceptual Span and Perceptual Speed upon Reading Ability," The Journal of Educational Psychology, 40:321-52.

<sup>5</sup>Irving H. Anderson and Walter F. Dearborn, The Psychology of Teaching Reading, p. 120.

<sup>6</sup>Gaspar Cisneros Barnette, Learning Through Seeing with Tachistoscopic Teaching Techniques, p. 2.

remedial class, average I.Q. 88, Ethel Carter<sup>7</sup> reported an over-all gain of twice the expected gain in grade placement. Miss Carter also reported almost identical results for a fourth grade remedial class with an average I.Q. of 81.

Also reported was a study<sup>8</sup> conducted under the direction of Donald Durrell, Boston University, with two similar groups of first grade students. The recorded results showed the experimental group using the tachistoscope, made:

nine times the improvement in quickness of word perception,

twice the improvement in word recognition,

four times the rate in oral reading,

two and one-half times the reduction in reading errors as compared to the control group.

Another interesting experiment utilizing the tachistoscope was reported in the California Teachers Association Journal in March, 1954. The author, a teacher in Altadena, California, reported that in 1951-1952 he used the tachistoscopes as an aid in reading during a four-week

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<sup>7</sup> Ethel Carter, "Report on Remedial Reading Classes, 1947-1948." (Multilithed.)

<sup>8</sup> Geraldine Foster Smith, "An Experiment with the Flashmeter in Reading." (Multilithed.)

period with thirty-four pupils in a grade five class. Mr. Adams reports that the median gain of the class, in speed of reading, was 125 words per minute and that there was a median gain of eight months in comprehension.<sup>9</sup>

In opposition to these favorable experiments, considerable literature can be found disputing the value of tachistoscopic training in the reading program. Anderson and Dearborn raise the following criterion of value:

. . . research has not conclusively demonstrated that any lasting benefit is derived from eye-movement training as such. Children of the same age and grade differ in their eye-movement behavior. These differences are deep-seated and the individual patterns are not easily modified by outside pressures.<sup>10</sup>

One of the most precise and controlled studies on the use of the tachistoscope with an elementary school class group is that reported in the doctoral dissertation of Jean Turner Coins, University of Chicago, 1953.<sup>11</sup> She reported achievement results on two carefully matched groups, each composed of sixty first grade pupils, using chronological age, intelligence test scores, reading achievement, and the

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<sup>9</sup>Joseph J. Adams, "Does the Tachistoscope Help?" California Teachers Association Journal, 50:20.

<sup>10</sup>Anderson and Dearborn, op. cit., pp. 131-32.

<sup>11</sup>Jean Turner Coins, "Visual Perceptual Abilities and Tachistoscopic Training Related to the Reading Program."

results of fourteen experimental tests of visual perception. For a period of ten weeks, one group received tachistoscopic training while the equivalent group continued usual classroom activities. At the end of the first grade, there was no significant difference in the reading achievement of the trained group as compared with the control group.

It is apparent that wide-spread interest in the potentiality of training devices for the improvement of reading skills exists among educators. Numerous articles of authoritative conjecture, as well as reports of experiments in the use of these devices, can be found. However, when only those studies are considered that include trained control groups--that is, groups trained by one or more alternative methods--it becomes apparent that relatively little real evidence is available on the elementary level.

## CHAPTER IV

### EYE-MOVEMENT, THE FIXATION PAUSE, AND PERCEPTUAL SPAN AS FACTORS IN READING ACHIEVEMENT

Careful studies of eye-movements in reading have provided much of what is known about the psychology of reading and the skills necessary to the act of reading.

Stone writes:

. . . during the early stages in reading it is rare that a child can actually see more than a word in a single eye pause. Actually the child will make a number of eye pauses in recognizing a phrase or a word group.<sup>1</sup>

The more mature reader develops a wider recognition span and his reading becomes more rapid and more fluent.

Reading rate and the number of eye fixations made per line of typical reading material are two ways of determining reading ability. Reading rate is computed by dividing the words read by the time, usually in minutes. Measuring eye fixations is a more complicated task.

The average number of fixations and regressions per line of reading may be obtained by the teacher by either the "mirror" or the "peep-hole" method. In the well-equipped reading clinic a special recording camera called an

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<sup>1</sup>Clarence R. Stone, Progress in Primary Reading, p. 235.

Ophthalmograph may be used to make a film record of the movements of the eyes while reading.

The following stair arrangements of eye-movements, adapted from Barker<sup>2</sup> illustrate the difference between eye-movements of good and poor readers.

~~RECORD OF A GOOD READER:~~

The eye pho  
tograph ex  
plains to  
the  
patient  
his vi  
sual ef  
ficiency

~~RECORD OF A POOR READER:~~

The  
eye  
ograph  
photo  
ex  
plains  
to  
the  
pa  
tient  
his  
vis  
sual  
inef  
ficiency

The eyes of the good reader move rhythmically across the page. The stairs are even and regular and there are no backward movements.

The pattern of the poor reader is irregular and there are frequent backward movements or regressions. There are no easy, regular rhythms.

It is estimated that less than 10 per cent of the reading time of a good reader is spent moving his eyes along the lines of print. It is only during the pauses that reading is done.

The following terms help to describe the total process of eye-movements in reading:

1. Number of fixations per line  
good adult reader, three to five fixations  
poor child reader, nine to fifteen fixations.
2. Number of regressions (backward movement) per line  
good adult reader, one regression every three or four lines  
poor child reader, three regressions per line.
3. Return sweep to next line.
4. Average length of fixations when words are seen, one-eighth to one-quarter second.
5. Inter-fixation movement during which vision blurs--one twenty-fifth of a second each.
6. Reading span (distance between two fixations)  
good reader, thirteen or fourteen spaces  
poor reader, six spaces.<sup>2</sup>

Bond says:

There is much evidence to support the contention that the more rapid and effective the reading is, the fewer will be the regressions, the greater will be the span of recognition, and the fewer will be the fixations.<sup>3</sup>

All reading authorities agree that there is a high correlation between effective eye-movements and good reading. Each has a direct relationship to the other: efficient eye-movements assist in reading, and good reading promotes effective eye-movements.

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<sup>2</sup>David H. Russell, Children Learn to Read, p. 78.

<sup>3</sup>Guy L. Bond and Eve Bond Wagner, Teaching the Child To Read, p. 44.



Agreement seems to be lacking, however, as to how these two elements relate in a planned developmental program. Some authorities recommend a diligent effort on the part of the teacher to give specific training in eye-movement skills. Others favor the development of word recognition techniques, feeling that correct eye-movements will follow naturally.

To quote Betts:

The achievement of correct eye-movements is desirable at the earliest possible moment, not as an end in itself, but as an absolutely essential step in the development of comprehension.<sup>4</sup>

The question is; can reading drills and exercises be utilized toward improving eye-movements? Although eye-movement patterns will, admittedly, vary widely among individuals, and each pupil will tend to adopt a pattern of his own, is there any reason why these patterns cannot be advanced toward an ultimate goal for the individual through adequate training? Certainly, "there appears to be some evidence pointing toward the validity of the contention that at least the training incidental to the pacing of eye-movements increases reading efficiency."<sup>5</sup>

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<sup>4</sup>Emmett Albert Betts, The Prevention and Correction of Reading Difficulties, p. 57.

<sup>5</sup>Ibid., p. 143.

From the second half of the first grade onward, good reading is characterized, according to Cole,

. . . by fewer fixations, few regressions, accurate hitting of a new line, little or no vocalization, rhythmic movements, and a wide reading span. This method is not characteristically an adult method that can be achieved only after one is grown up. There is no reason why better teaching in reading should not develop a greater proportion of children into good readers with good habits from the first.<sup>6</sup>

What is, then, the possible contribution that the tachistoscope can make in this area of training? The essential characteristic of the tachistoscopic method is that it provides an opportunity of controlling a single perceptual experience. By providing a time limit for the exposure of the selected word, phrase or sentence it makes it possible to present material for apperception in a single eye fixation. Theoretically, the eye will fixate in such a way as to get the entire word group presented. This training aims to provide greater understanding of word grouping, motivate a greater visual span, and provide a guided experience in flash recognition.

In substantiation of these objectives, Buswell writes:

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<sup>6</sup>Luella Cole, The Improvement of Reading, p. 67.

Reading involves the continuous recognition of consecutive verbal symbols with the subsequent fusion into units of meaning. It must be, therefore, that improvement resulting from tachistoscopic training is to be explained in the changed character of the perceptual experience.<sup>7</sup>

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<sup>7</sup>Guy Thomas Buswell, "Perceptual Research and Methods of Learning," Scientific Monthly, LXIV, p. 522.

## CHAPTER V

### PILOT STUDY USE OF THE TACHISTOSCOPE IN GRADES ONE TO FIVE

The purpose of this study was to test, under normal teaching conditions, various aspects of the practical use of the tachistoscope in the reading program of the elementary grades. To maintain the practicality of the experiment and to provide information on the human equation as related to the use of this teaching technique, only the regular classroom teacher, himself, participated in the training with his class. Also, only standard materials and equipment were used in the training program.

The experiment was purposely left largely unstructured. Within the classroom groupings and the time limits established, the individual teacher was allowed to organize his own program of use for the tachistoscope for the duration of the experiment or study. It was felt that in this way many heretofore unknown factors and relationships concerning the use of the tachistoscope in the reading program would come to view.

The first step in the organization for this study of the use of the tachistoscope in the reading program was to select the equipment and materials that could be used in

the study. It was decided that the Speed I-O-Scope, a product of the Society for Visual Education, Inc., would be the flashmeter, or timing device, utilized in the experiment. This equipment was selected primarily because it is equipment that is adaptable to most standard 35 mm. projectors and, therefore, would fit into a county-wide program of material and equipment supply. Also prepared materials in filmstrip form are available for this equipment. These materials present in single-frame series, line drawings of common objects, basic vocabulary words, commonest nouns, phrases, and sentences from the Dolch Basic Vocabulary. These materials were readily available for the purposes of the study. Prior to use by the experimental group teachers, the words in these filmstrip materials were keyed to the basic state series reader.

The second step was to determine the district or the school that would lend itself best to such a study. It was decided that the Manteca Elementary School District, comprising three schools, would serve excellently for this purpose. Two of these schools have classes in grades kindergarten through grade five.

The third step was to introduce the equipment and the plan for the pilot study to the administration and the supervisory personnel of the district. This was done for

their evaluation and for final determination that the study would be conducted. Introduction of the plan for the study was made in this way so that the total professional personnel would have an opportunity to express either their interest or disinterest in the project. Acceptance of the proposed study was obtained following thorough discussion of the purposes, aims, and general over-all plans of the study.

Key teaching personnel was also invited to participate in an evaluation of the values to be obtained from such a study. It was noted during these discussions that a high degree of interest was expressed concerning the possibilities of this type of instruction.

Following the preliminary discussions of the equipment, materials, and purposes of the study, it was determined that the training given with the tachistoscope would be integrated with the regular program of reading instruction being conducted in the classrooms. This was established as a basic facet in the method to be employed in the study.

A general discussion was then conducted involving all teachers participating in the pilot study. This discussion centered around the function of the training period and the selection of the materials at the several grade

levels. It was decided to start this program with first grade classes and conduct the study in grades one, two, three, four, and five. Teachers of these grades then volunteered to participate either with an experimental group or a control group.

The groupings for the study were then arranged.

Volunteer teachers from each grade level were designated to use the tachistoscope and the Speed-I-O-Strip materials in their daily reading programs. These class groups were designated as the experimental groups and comprised:

- Two first grades -- upper level reading groups
- Two second grades -- middle and upper level reading groups
- Two third grades -- all reading groups
- Two fourth grades -- all reading groups
- One fifth grade -- all reading groups

A total number of 212 students participated in the experimental groups. Of these twenty were first grade; thirty-nine, second grade; fifty-four, third grade; sixty-four, fourth grade; and thirty-five, fifth grade students.

Matching control groups were established at each grade level. This was done by designating a class group at each grade level as a control group to match a corresponding experimental group. Teachers of all groups, both experimental and control, were competent experienced teachers. All class groups were normal, unselected groupings.

A meeting was then held with those teachers who would be utilizing the tachistoscope in their classrooms. Following a general review of the aims, objectives, and general plans for the study, an opportunity was provided for each teacher to become familiar with the equipment and the special training materials he would have available for use during the period of tachistoscopic training.

Included in this program was a demonstration of the techniques of operation of the Speed-I-O-Scope attachment, the tachistoscopic device for the filmstrip projector. The filmstrip series were also exhibited and a Teacher's Guide List of the Reading Speed-I-O-Strip Series (Appendix C, page 91) were provided for each experimental group teacher.

The orientation period concluded with the distribution of the following mimeographed forms:

1. Record Form for Anecdotal Report--Tachistoscope Training
2. Suggestions for use of the Tachistoscope--General Procedures (Appendix C, page 91)

and some basic general recommendations.

These recommendations were advanced by the Curriculum Consultant for the district and included such considerations as:

1. Select only those words for tachistoscopic presentation that are already familiar to the group from another classroom learning experience.



2. Limit the tachistoscopic training to a ten to fifteen minute period, per group, per day.
3. Ask for oral responses to the material suggested.
4. Gear the presentation to group ability.
5. Provide for proper and adequate viewing by all members of the participating group through:
  - a.) Adequate size of the projected image.
  - b.) A clear, distinct image on the screen, preferably in a partially lighted room.
  - c.) Seating the group for unobstructed viewing of the screen.
6. Follow a planned schedule of presentation of the materials for teaching grade group. Gradually increase the difficulty of the materials to challenge the group.

The developmental reading program of the Manteca Elementary School District is a well-organized, adequately supervised program of instruction. A basic function of this experiment with tachistoscopic training was to introduce the tachistoscope as an integral part of this developmental program. Consequently, no adjustment of classroom schedules was made. Teachers of the experimental groups utilized the tachistoscope as part of regular instruction during their previously established reading schedule. No extra class time was given to this activity. It was merely scheduled as a substitute developmental activity. Teachers of the control groups continued their previously established reading programs at the several

grade levels.

The tachistoscopic equipment and the Speed-I-O-Strip materials were placed at the disposal of the district and the teachers of the designated experimental groups made use of them according to a predetermined schedule. As the equipment was to be available for use in two separate school buildings, a schedule was arranged so the equipment would be available to teachers in one building Mondays and Tuesdays of each week. Teachers in the other building would make use of it every Thursday and Friday. In addition to these established days of use, the equipment was to be available for use on alternate Wednesdays at each building. The teachers of the experimental groups then organized their own schedules of use within this framework.

The tachistoscopic training for each experimental group continued for a six-week period. During this period each group averaged two and one-half training sessions per week, or a total of fifteen ten to fifteen minute tachistoscopic training sessions.

Use of the tachistoscope in the classroom was left to the initiative and insight of the teacher of each group. During the orientation session, the function of tachistoscopic training in the development of visual skills, including word recognition and the attainment of a greater

recognition span, were explained. An explanatory sheet of mimeographed suggestions for the operation and use of the flashmeter device was also distributed. These suggestions merely supplied the teacher with basic information to reinforce his confidence in utilizing the equipment in the classroom situation.

Left on his own, the teacher employed the tachistoscope according to his own judgment in meeting the developmental reading needs of his group. He had available to him a list of the words, the line drawings, the phrases, and the sentences as they appeared on the several filmstrips of the series. The Basic Vocabulary Words and the Commonest Nouns introduced in this series had been keyed for grade placement on this list in accordance with the Lyons Carnahan Series of basic readers.

With this information at hand the teacher experimented with the tachistoscope in his own classroom environment. After an introduction of the equipment to his class and an explanation of how it functioned, samples of the material were introduced. These were presented at a slow speed and allowed both the teacher and the class to become accustomed to the operation of the equipment.

Following this introduction, the teacher commenced a planned developmental program with the material. Beginning with the simpler materials he would drill with these until

a satisfactory level of performance was achieved by the groups. Then he would advance to more difficult materials. As a progression in difficulty was made, and new material was presented, a corresponding adjustment of exposure time would be made. When group performance on the most difficult material was established, the exposure time would be gradually reduced to challenge the group. Group performance was checked by the teacher through attention to the oral response of the group.

Teachers were constantly conscious of group performance. Specific types of materials to be presented were selected on the basis of ability of the group to provide adequate responses. Adjustment of the flash interval was made as competency increased with a given type of material.

Two of the class groups made additional breakdowns in grouping during the period of the experiment. Each divided the total class into two groups on the basis of reading ability. Separate training sessions were provided each group.

The six-week period of the pilot study immediately followed the scheduled testing program of the district. Pupil achievement in reading, according to the recorded scores from the California Achievement Test, Form BB, were utilized as pre-test scores for pupils in the experimental

and control groups. The California Achievement Test, Form CC, was administered following the study. This provided the measure of reading achievement during the six-week period of the experiment.

Other evaluative measures employed included gain in oral reading and teacher evaluation of gain in reading skill. The oral reading rates were obtained from tape recordings taken during group reading periods immediately before and following the period of the pilot study.

## CHAPTER VI

### EVALUATION OF READING ACHIEVEMENT FOR THE EXPERIMENTAL AND CONTROL GROUPS

#### I. THE DATA COLLECTED

This study involving the use of tachistoscopic training in the reading program of the elementary grades was carried on in eighteen classrooms with 433 pupils of grades one to five. Statistical and observational data were collected. The statistical data included reading achievement scores, both through a pre-test and a post-test, of reading comprehension and total reading achievement for each pupil. Oral reading rate scores were also recorded for each pupil. Here, too, pre-study and post-study scores were obtained to indicate pupil growth in this reading skill.

A teacher questionnaire was utilized to obtain additional data on significant aspects of the investigation. Teacher evaluation was considered of importance in the areas of the functional use of the equipment, pupil reaction to tachistoscopic training, and evaluation of materials. The questionnaire was completed by each of the nine teachers participating in the training program and the responses reflect the considered professional judgment of these

teachers at their particular grade levels.

A standardized test. The California Achievement Test was employed as the measure of reading achievement. This test provided a grade-equivalent score in both reading comprehension and total reading achievement for each pupil of the second, third, fourth, and fifth grades. To quote the author of this test:

They are standardized, diagnostic tests in the basic skills . . . of reading, arithmetic, and written expression including spelling. The entire test series is organized in four levels or batteries to cover the entire range of school grades and thus reveal the individual differences among pupils ordinarily found in each grade.

An essential characteristic of these tests . . . is that they provide a means of determining or identifying the specific types of learning difficulties of pupils. . . .

The tests are standardized in order that . . . scores obtained may provide the typical survey information regarding achievement in the basic skills.<sup>1</sup>

The author of the California Achievement Test also states:

All test forms have been made equivalent to Form A. . . . This makes it unnecessary to convert raw scores of varying magnitude to comparable measures by additional statistical computation.<sup>2</sup>

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<sup>1</sup>Willis W. Clark, California Achievement Tests, p. 1.

<sup>2</sup>Ibid., p. 3.

Reading scores for all pupils involved in the experiment were recorded from the regularly administered spring testing program of the Manteca Elementary Schools. These tests were administered in February, 1954, at which time Form BB, California Achievement Test, was used.

The experimental study was initiated in the week following the administration of these tests, and was continued for a six-week period. A week of spring vacation intervened and then the post-test was administered to the classes involved in the study. Form CC of the California Achievement Test was used at this time.

Recorded reading rates. Oral reading rates were obtained for pupils in both the experimental and control groups of all grades from grade one to grade five. In order to obtain representative oral reading from each pupil in these grades, the teacher selected individual reading for the pupils from recently experienced reading in standard texts. These selections were read individually in the regular reading group and tape-recorded by the building principal.

Recordings taken after completion of the experiment followed the same pattern. Reading selections were identical to those read for the first recording. All recordings were played, timed, and rated by the investigator



in terms of words read per minute.

Differences in rate of oral reading, first recording and second recording, were interpreted as gain or loss in oral reading rate for the individual pupil during the interval of the experiment.

The questionnaire. A two-page questionnaire was supplied to teachers who had participated in the tachistoscopic training program. This group included two first-grade, two second-grade, two third-grade, two fourth-grade, and one fifth-grade teacher. These nine professional evaluations were considered to contribute materially to the over-all analysis of the total problem. Responses from this group, for purposes of analysis, may be divided into four areas: (1) techniques employed in using the tachistoscope, (2) efficiency of the Speed-I-O-Scope as a teaching tool, (3) pupil reaction to the training, and (4) over-all evaluation of tachistoscopic training in an integrated reading program. The responses in these four areas are as follows:

#### I. Techniques of Use.

- A. Five teachers conducted the program of tachistoscopic training with their entire class group. Four teachers developed training programs for separate reading groups within their classes.

- B. The average number of training sessions in visual perception was fifteen.
- C. The average training period was eleven minutes per group.

## II. Efficiency of Speed-I-O-Scope as a Teaching Tool.

- A. Eight responses indicated that the tachistoscope was effective as a functional tool in the classroom environment. One teacher was unable to conduct training sessions in her home room because of lack of darkening facilities.
- B. Responses were unanimous that the equipment was easy for the teacher to use.
- C. Six teachers felt that the training materials available were sufficient for the purposes of the experiment. Three teachers, two at the primary level and one at the intermediate level, expressed need for a greater range of training materials.
- D. The responses to the item concerning the length of time given to the training sessions showed that seven of the nine teachers felt that ten to fifteen minutes were sufficient time for group tachistoscopic training.

## III. Pupil Reaction to the Training Program.

- A. Pupil interest was held during the course of the training program. Eight teachers indicated pupil interest was maintained throughout the experiment. One teacher reported that interest lagged toward the end of the experiment.
- B. Seven of the nine responses indicated that the pupils found the training a satisfying experience.
- C. Whether or not tachistoscopic training challenged pupils at the several ability levels was reported. Affirmative answers in the following number were recorded:

superior students, eight; above average students, nine; average students, seven; below average students, six; and poor students, six.

#### IV. Over-all Evaluation of Tachistoscopic Training.

- A. Eight teachers thought it contributed to reading skills. They would willingly use the method again.
- B. On a rating scale, six teachers evaluated the pilot study use of the tachistoscope as "good." Two evaluators appraised the experimental methods as "fair" and one teacher was uncertain of its value.
- C. Six respondents saw evidence of increased eye span by pupils during the period of the experiment. A like number thought it aided concentration by pupils. More than half the respondents felt that the tachistoscopic training aided the pupil's comprehension in reading and increased their interest in developing reading skill.
- D. In response to the request to recommend where, in the elementary reading program, they felt tachistoscopic training would be most effective;
  1. Four teachers favored it for the total reading program.
  2. Two teachers felt that it had more direct relationship to remedial reading.
  3. Three evaluators recommended that the method be employed in both developmental and remedial reading programs.

#### II. ANALYSIS OF THE DATA

Statistical data were analyzed to determine the relationship of the tachistoscopic training to pupil growth

in three areas of reading comprehension, total reading achievement, and oral reading speed. Gains in reading skill for each experimental group were compared with those of a similar group composed of pupils from the control classes of the same grade level.

Similar groups were determined by matching pairs at each grade level. Pupils were paired with respect to age, sex, academic ability, and grade in school. Statistics were recorded for these groups of matched pairs and boys and girls were reported separately at each grade level.

(Appendix A, page 68)

Table I provides a comparison of the mean average gain of the matched experimental and control groups. This table of reading achievement was recorded for the mean average gain of the experimental and control groups in reading comprehension, total reading achievement, and oral reading speed. The mean average gains were obtained from the scores of the matched groups at each grade level.

The group scores of the first-grade pupils, herein termed the beginning group; the second- and third-grade pupils, called the primary group; and the fourth- and fifth-grade pupils, the intermediate group, were used as samples to test the null hypothesis.

Visual inspection of the statistical data failed to reveal a pattern that would substantiate a conclusion that

TABLE I

COMPARISON TABLE OF SCORES IN READING ACHIEVEMENT  
EXPERIMENTAL AND CONTROL GROUPS

	Group	Grade I		Grade II		Grade III		Grade IV		Grade V	
		B	G	B	G	B	G	B	G	B	G
Mean gain in Reading Compre- hension	Control			.59	.50	.29	.38	.13	.57	.40	.74
	Exper.			.68	.43	.19	.33	.68	.57	-.17	.42
Mean gain in Reading Achieve- ment	Control			.50	.51	.20	.35	.45	.63	.35	.28
	Exper.			.46	.51	.17	.15	.32	.44	-.67	.38
Mean gain in Oral Reading Speed	Control	22.8	13.2	19.5	17.7	14.9	23.7	27.3	13.9	-8.5	44.8
	Exper.	19.2	18.2	29.1	8.4	10.	24.4	29.1	15.3	-10.5	26.5

NOTE: The letter "B" designates boys; the letter "G" designates girls.

either an experimental or a control group at any of the five grade levels had significantly exceeded the gain of its corresponding group in the three areas being tested. Therefore, the data were subjected to the t test for the significance of the main differences of the groups. In cases where the sampling was of unequal total numbers of scores, the F test of significance was applied to verify the reliability of the t score.

Table II presents the results of the statistical treatment of the data.

The first grade, or beginning group, was subjected to measurement only in the area of oral reading speed. The mean for the total gain in oral reading speed of the experimental group was 18.7 words per minute, and of the control group, 18 words per minute.

When subjected to the t test of the significance of the mean differences, t equalled .796. In order to be a significant mean difference, with 20 degrees of freedom, a t score of 2.086 would be required at the 5 per cent level of confidence, and 2.845, at the 1 per cent level of confidence. Therefore, the Null Hypothesis was accepted and it was concluded that there was no significant difference between the means of the groups.

The primary group gains for the experimental and control groups were subjected to analysis in reading

TABLE II

MEAN SCORES AND DIFFERENCE IN MEANS IN READING COMPREHENSION,  
TOTAL READING ACHIEVEMENT AND ORAL READING SPEED OF  
ELEMENTARY PUPILS AT THREE ACADEMIC LEVELS

	Mean Scores		Difference in Means (t ratio)	Levels of Significance		Degrees of Freedom (n-1)
	Experimental Group	Control Group		5 %	1 %	
<b>Beginning Level (First Grade)</b>						
Gain in Oral reading speed	18.7	18	.796	2.086	2.845	20
<b>Primary Level (Second and Third Grade)</b>						
Gain in reading comprehension	4.191	4.404	.235	1.987	2.632	93
Growth in total reading achievement	3.04	3.66	.762	1.987	2.632	93
Gain in oral reading speed	19.33	18.95	.364	1.992	2.643	76
<b>Intermediate Levels (Fourth and Fifth Grades)</b>						
Comprehension	3.904	4.024	.074	1.990	2.638	81
Total reading achiev.	3.249	5.00	1.324	1.990	2.638	81
Oral reading	17.31	18.31	.552	2.000	2.660	60

comprehension, total reading achievement and oral reading speed. The mean gain of the experimental group in reading comprehension was 4.2 months during the six-week period of the experiment. The mean gain was three months in total reading achievement, and 19.33 words per minute in oral reading speed.

The mean gains of the primary control group were: reading comprehension, 4.4 months; total reading achievement, 3.7 months; and oral reading speed, 18.95 words per minute.

The t score for the mean difference in reading comprehension was .235, and for total reading achievement the t score was .762. With 93 degrees of freedom, a t score of 1.987 would be required at the 5 per cent level of confidence, and a t score of 2.643 would be required at the 1 per cent level of confidence.

The t score in oral reading speed for the primary group was .364. With 76 degrees of freedom, a t score of 1.992 would be required at the 5 per cent level of confidence, and a t score of 2.643 at the 1 per cent level of confidence. These mean differences offered insufficient evidence for rejecting the Null Hypothesis on the basis of the observations obtained through this sampling.

Mean gains in the three areas of reading ability for the intermediate grade group were also compared



statistically. Means gain scores for the experimental group at this level were: reading comprehension, 3.9 months; total reading achievement, 3.2 months; oral reading speed, 17.31 words per minute. Scores for the control group revealed a similar pattern of pupil gain. Mean gains for this group were: reading comprehension, 4 months gain; total reading achievement, 5 months gain; and oral reading speed, 18.31 words per minute.

The t score for the mean difference in reading comprehension was .074 and for total reading achievement the t score was 1.324. With 81 degrees of freedom, a t score of 1.990 would be required at the 5 per cent level of confidence, and a t score of 2.638 at the 1 per cent level of confidence.

The t score in oral reading speed for the intermediate group was .552. With 60 degrees of freedom, a t score of 2 would be required at the 5 per cent level of confidence, and a t score of 2.66 at the 1 per cent level of confidence.

This analysis of the difference in the means of the control and experimental groups at the intermediate level revealed that there was not a significant difference at either the 5 per cent or the 1 per cent level of confidence.

## CHAPTER VII

### SUMMARY AND CONCLUSIONS

This study has reported mean scores in specific reading skills of elementary grade pupils both before and after a six-week training period with a tachistoscope. These mean scores were compared with a like sampling from control groups who did not experience such training.

In addition, the study reports teacher appraisal of tachistoscopic training, both from a functional, teacher-centered viewpoint, and from a child-centered viewpoint.

An analysis of the mean scores reveals that there was an average mean gain in each of the reading skills measured. These gains were consistent for the samplings taken at all three academic levels for both the experimental and control groups. Also, the gains recorded for these groups were in excess of normal expectancy for a six-week period.

However, analysis of the mean differences of the scores for the experimental and control groups failed to disclose a significant difference between the scores at any of the three levels or in any of the reading skills evaluated.

It is concluded, therefore, that the experimental factor of tachistoscopic experience provided in grades one,

two, three, four, and five did not function to produce achievement in the three reading skills superior to that of the control groups of the same grades.

Teacher evaluation of the tachistoscopic training provided through this pilot study was obtained through a questionnaire directed to the nine teachers who participated in the use of the method in their classrooms. Returns from this survey of professional opinion disclosed that all of these teachers stated their belief that:

the tachistoscope functioned adequately as a classroom teaching tool,

the tachistoscopic method was usable at all grade levels,

this method could be used effectively by the average classroom teacher,

tachistoscopic method and materials could be adapted to use in the integrated reading program.

A majority of the teacher responses indicated that tachistoscopic training attracted interest, challenged pupils, and motivated learning in the basic skills of reading. Over-all teacher reaction to use of the tachistoscopic method was revealed by expression of a need for more materials geared to their particular grade level and by a declared willingness on the part of a large proportion of the teachers to incorporate this method into their teaching.

It is concluded from these responses that the teachers giving tachistosopic training found it to be a functional and satisfying educational method. Teachers also appraised the program as having merit from the point of view that it aided in the acquisition of basic reading skills.

The basis of this experiment with the tachistoscope in the primary and intermediate grades was to uncover pertinent facts applicable to the utilization of tachistosopic methods, materials, equipment, and techniques in the schools of San Joaquin County. This function of the pilot study, with its end result aimed at better teaching and improved learning, must await future developments for final evaluation. It can be stated, however, that the study will have served a worthwhile purpose if it contributes toward a fuller understanding of the purposes of perceptual training and the role of the teacher in developing reading skills.

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APPENDIX A

TABLE III

ORAL READING SCORES FOR MATCHED PAIRS, GRADE ONE--CONTROL  
AND EXPERIMENTAL GROUPS, BOYS AND GIRLS

## BOYS

CONTROL					EXPERIMENTAL						
<u>Above Average</u>	Code Letter	Age	Beginning Score	Ending Score	Total Gain	<u>Above Average</u>	Code Letter	Age	Beginning Score	Ending Score	Total Gain
Terry T.	a	6-8	60	83	23	Terry D.	a	6-8	62	105	23
Sammy T.	b	6-9	60	65	5	Arthur H.	b	6-10	59	60	21
Bobbie S.	c	6-10	49	52	3	Jimmy M.	c	6-10	64	93	29
Total:			169	200	31				205	278	73
Mean Gain:			56	66	10				68	92	24
<u>Average</u>						<u>Average</u>					
Jay R.	d	6-8	53	85	32	Darryl C.	d	6-10	56	82	26
Howard C.	e	6-8	55	--	inc.	Kenneth E.	e	6-11	46	53	7
Jessie L.	f	7-3	60	111	51	Billy Mc.	f	7-5	65	74	9
Total:			168	196	28				167	209	42
Mean Gain:			56	98	42				56	70	14

TABLE III (continued)

GIRLS

CONTROL						EXPERIMENTAL					
<u>Above Average</u>	Code Letter	Age	Beginning Score	Ending Score	Total Gain	<u>Above Average</u>	Code Letter	Age	Beginning Score	Ending Score	Total Gain
Susan S.	a	6-5	43	55	12	Gerry H.	a	6-5	76	87	11
Kathleen B.	b	6-7	139	130	-9	Diana H.	b	6-6	67	95	28
Marilyn W.	c	7-1	52	72	20	Linda V.	c	7-1	68	77	9
Carol M.	d	7-3	91	122	31	Donna M.	d	7-2	99	104	5
Total:			325	379	54				310	363	53
Mean Gain:			81	95	14				77	91	14
<u>Average</u>						<u>Average</u>					
Kathy W.	e	6-9	41	54	13	Kathleen P.	e	6-9	44	82	38
Total:			41	54	13				44	82	38
Mean Gain:			41	54	13				44	82	38

TABLE IV

READING ACHIEVEMENT SCORES FOR MATCHED PAIRS  
GRADE 2--CONTROL GROUP--BOYS

<u>Control Group</u>	Code Letters*	Age	Beginning Scores (Comprehension)	Total Reading	Oral Reading	Ending Scores (Comprehension)	Total Reading	Oral Reading	Gain Reading Comprehension % wk. period	Total Growth in Reading Achievement (6 wk. period)	Total Gain--Oral
<u>Above Aver:</u>											
None											
<u>Average:</u>											
John B.	a	8-3	3.3	3.2	129	3.5	3.3	140	.2	.1	11
Danny B.	b	8-0	4.0	3.6	132	4.2	4.0	137	.2	.4	5
Eddie P.	c	7-10	2.8	3.1	55	3.6	3.0	69	1.2	.5	34
Dick H.	d	7-7	3.5	3.0	104	3.3	3.3	141	.0	.3	37
Michael T.	e	7-6	3.4	3.3	73	3.9	3.9	112	.0	.6	39
Gregory G.	f	7-5	2.6	3.1	139	4.0	3.9	151	1.4	.8	12
Roger L.	g	7-7	2.2	2.4	148	2.6	2.6	173	.4	.2	25
Billy D.	h	8-1	1.9	1.9	68	2.5	3.0	100	.9	1.1	32
Pat S.	i	7-9	2.4	2.5	54	3.3	3.1	63	.9	.6	9
Dwayne H.	j	7-9	2.9	3.0	135	3.6	3.6	130	1.1	.6	-5
Bill T.	k	7-4	2.3	2.6	117	2.8	2.6	136	.5	.2	19
<b>Total:</b>			<b>31.3</b>	<b>31.7</b>	<b>1154</b>	<b>36.0</b>	<b>37.3</b>	<b>1402</b>	<b>7.3</b>	<b>5.6</b>	<b>218</b>
<b>Average:</b>											
<u>Below Aver:</u>											
Richard S.	l	7-8	2.2	1.9	38	2.4	2.3	54	.2	.4	16
<b>Total:</b>			<b>2.2</b>	<b>1.9</b>	<b>38</b>	<b>2.4</b>	<b>2.3</b>	<b>54</b>	<b>.2</b>	<b>.4</b>	<b>16</b>
<b>Average:</b>											
<b>Mean Gains:</b>									<b>.59</b>	<b>.50</b>	<b>19.5</b>

\*Code letter refers to matched pairs in the experimental and control groups.

TABLE IV (continued)

## EXPERIMENTAL GROUP

Experi- mental Group	Code Letter	Age	Beginning Scores (Comprehension)	Total Reading	Oral Reading	Ending Scores (Comprehension)	Total Reading	Oral Reading	Total Compre- hension	Total Growth in Reading Achiev. (6 wk. period)	Total Gain--Oral
<u>Above Average:</u>											
None											
<u>Average:</u>											
David B.	a	6-4	3.0	2.8	92	4.2	3.4	97	1.0	.6	5
Davey H.	b	6-1	2.1	2.6	110	3.1	3.0	122	1.0	.4	18
Danny L.	c	6-0	2.4	2.5	70	3.5	3.2	98	1.1	.7	26
Baxter D.	d	6-0	3.3	3.0	54	3.5	3.5	72	1.2	.5	72
Glen O.	e	7-7	3.5	3.4	64	4.7	4.1	86	1.2	.7	22
Michael J.	f	7-7	2.7	2.7	63	3.6	3.1	63	1.0	.4	20
Billy H.	g	7-9	1.9	2.1	55	2.9	2.6	43	1.0	.5	-1
Ronald P.	h	6-0	2.2	2.4	42	2.9	2.9	43	1.0	.5	39
Victor A.	i	6-0	2.6	2.5	66	3.6	3.3	125	1.0	.8	53
George J.	j	7-1	2.7	2.6	159	2.5	2.8	212	.2	.2	53
Larry S.	k	7-5	2.1	2.2		2.9	2.8	83	.8	.6	
Total:			26.5	26.8	795	37.4	34.7	1027	2.5	1.3	352
<u>Average:</u>											
<u>Below Average:</u>											
Martin M.	l	7-6	2.3	2.3		2.0	1.9	49	-.3	-.4	
Total:			2.3	2.3		2.0	1.9	49	-.3	-.4	
<u>Average:</u>											
<u>12 Mean Gains:</u>											
									.68	.46	29.1

\*Code letter refers to matched pairs in the experimental and control groups.

TABLE V

READING ACHIEVEMENT SCORES FOR MATCHED PAIRS  
GRADE 2--CONTROL GROUP--GIRLS

<u>Control Group</u>	Code Letters	Age	Beginning Scores (Comprehension)	Total Reading	Oral Reading	Ending Scores (Comprehension)	Total Reading	Oral Reading	Total Comprehension	Total Growth in Reading Achievement (6 wk. period)	Total Gain--Oral
<u>Above Average:</u>											
None											
<u>Average:</u>											
Patricia M.	a	7-8	2.8	2.8	80	3.5	3.8	84	.7	1.0	4
Linda H.	b	7-8	2.5	2.8	123	3.0	3.1	136	.5	.3	13
Joanne M.	c	7-10	2.5	2.2	34	2.5	2.6	33	.0	.4	-1
Judy Ann A.	d	7-11	3.9	3.6	101	4.0	4.1	115	.1	.5	14
Delores F.	e	7-8	2.9	3.1	116	3.0	3.4	145	.1	.3	32
Margo Y.	f	7-7	3.5	3.1	79	4.2	3.7	135	.7	.6	55
Claudia L.	g	7-11	3.1	3.1	103	4.2	3.8	120	1.1	.7	17
Linda B.	h	7-8	2.7	2.7	98	3.6	3.4	124	.9	.7	26
Lavonne B.	i	8-0	3.0	2.8	147	2.6	2.7	146	.4	.1	-1
<b>Total:</b>			26.9	26.2	881	30.6	30.6	1032	4.5	4.6	159
<b>Average:</b>									.50	.51	15.44
<b>Mean Gains</b>									.50	.51	15.44

\*Code letter refers to matched pairs in the experimental and control groups.

TABLE V (continued)

EXPERIMENTAL GROUP										
<u>Experi- mental Group</u>	Code Letter*	Age	Beginning Scores (Comprehension)	Total Reading	Oral Reading	Ending Scores (Comprehension)	Total Reading	Oral Reading	Total Comprehension	Total Growth in Reading Achievement (6 week period) Total Gain--Oral
<u>Above Average:</u>										
None										
<u>Average:</u>										
Martha K.	a	7-9	2.4	2.4	60	3.0	3.0	94	.6	.6 34
Jo Bell C.	b	7-6	2.4	2.2	73	3.3	3.1	81	.9	.9 8
Nancy F.	c	7-10	3.4	2.7		2.4	2.4	34	-1.0	-.3
Kay S.	d	7-10	4.2	3.8	144	4.9	4.7		.7	.9
Kathy S.	e	7-10	3.1	2.9	119	3.9	3.3		.9	.4
Carolyn S.	f	7-9	3.6	3.9	139	4.4	4.4	145	.8	.6 6
Catherine F.	g	7-9	3.2	3.0	93	4.4	3.9	89	.6	.9 -4
Kathleen J.	h	7-7	3.0	3.0	87	3.4	3.5	85	.4	.5 -2
Carlene B.	i	8-1	2.9	2.9		3.0	3.1		.1	.2
Total			26.8	26.8	715	32.7	31.4	528	39.0	4.6 42
Average:									.43	.51 8.4
Mean Gains:									.43	.51 8.4

\*Code letter refers to matched pairs in the control and experimental groups.



TABLE VI

READING ACHIEVEMENT SCORES FOR MATCHED PAIRS  
GRADE 3--CONTROL GROUP--BOYS

<u>Control Group</u>	Code Letters*	Age	Beginning Scores (Comprehension)	Total Reading	Oral Reading	Ending Scores (Comprehension)	Total Reading	Oral Reading	Total Comprehension	Total Growth in Reading Achievement (6 wk. period)	Total Gain--Oral
<u>Above Aver.</u>											
Larry Z.	s	8-4	4.5	4.6	106	4.7	4.9	95	.3	.3	-11
Donald L.	n	8-1	4.3	4.7	109	4.9	5.0	106	.4	.3	-3
Larry T.	c	8-4	4.3	3.9	40	4.5	4.2	92	.3	.3	52
John B.	d	8-8	4.7	4.8	222	5.2	5.0	202	.5	.2	-20
Total:			17.9	15.0	477	19.3	19.1	495	1.4	1.1	18
Average:			4.5	4.6	119	4.8	4.8	124	.36	.21	5
<u>Average:</u>											
Tipon	e	8-3	3.4	3.3	134	4.2	3.9	131	.6	.6	47
Donald J.	i	8-6	3.4	3.5	55	4.4	4.2	75	1.1	.6	20
Jimmy M.	o	8-6	3.9	3.9	134	4.2	3.7	145	.3	-.2	11
Stephen J.	m	8-6	4.3	4.2	163	3.9	3.9	173	-.4	-.3	10
Russell R.	l	8-1	4.0	3.3	66	4.0	3.8	86	.0	.3	20
Total:			19.0	18.5	552	20.7	19.5	660	1.8	1.0	108
Average:			3.8	3.7	110	4.1	3.9	132	.36	.20	22
<u>Below Aver.</u>											
Carl B.	j	8-3	3.3	2.9		3.6	3.5	102	.3	.6	
Larry B.	m	8-6	2.7	2.7	41	2.4	2.2	49	-.3	-.5	8
Billy D.	l	8-8	2.2	2.8		2.5	2.8	89	.3	.0	
Allen S.	n	8-8	2.7	3.0		2.8	3.3	120	.1	.3	
Henry C.	n	9-1	2.0	1.9	51	2.5	2.2	51	.6	.3	30
Total:			12.9	13.3	92	13.8	14.0	441	.9	.7	38
Average:			2.6	2.7	18	1.8	1.8	88	.18	.14	19
Mean Gains:									.29	.20	14.9

\*Code letter refers to matched pairs in the experimental and control groups.

TABLE VI (continued)

## EXPERIMENTAL GROUP

Experi- mental Group	Code Letters*	Age	Beginning Scores (Comprehension)	Total Reading	Oral Reading	Ending Scores (Comprehension)	Total Reading	Oral Reading	Total Comprehension	Total Growth in Reading Achievement (6 wk. period)	Total Gain--Oral
<u>Above Aver.</u>											
Rex W.	e	8-5	4.5	4.6	56	4.4	4.9	116	-.1	.3	30
Larry G.	b	8-11	4.9	4.7	125	4.9	4.7	135	.0	.0	10
Peter T.	c	8-8	4.2	4.7	158	4.2	4.7	69	.0	.0	69
Steven D.	d	8-9	4.9	5.0	72	4.5	4.7	104	-.4	-.3	32
Total:			18.5	19.0	441	18.0	19.0	444	-.5	.0	3
Average:			4.6	4.8	110	4.5	4.8	111	-.12	.0	1
<u>Average:</u>											
Buddy J.	e	8-4	3.1	3.2	63	3.4	3.9		.3	.7	
Richard A.	f	8-6	3.6	3.1	99	4.2	3.8	92	.6	.7	-7
Louis D.	g	8-7	3.6	3.5	70	4.0	4.2	70	.4	.7	
Donald A.	h	8-8	4.2	4.9	81	3.8	4.0	79	-.4	-.9	-2
Bill M.	i	8-11	4.2	3.6	55	4.3	4.2		1.6	.6	
Total:			18.7	18.3	368	19.7	20.1	341	2.5	1.8	-9
Average:			3.7	3.7	74	3.9	4.0	48	.50	.36	-2
<u>Below Aver.</u>											
Larry A.	j	8-5	3.4	3.3	92	3.3	3.0	114	-.1	-.3	22
Wisley H.	k	8-5	2.3	2.5		2.3	2.4	127	.0	-.1	
Thomas R.	l	8-5	2.2	2.4	60	2.6	2.6	115	.4	.2	55
Ronnie K.	m	8-7	2.7	2.5	67	2.7	2.7		.0	.2	
Calvin W.	n	8-10	2.3	2.3	69	2.7	2.9	68	.4	.6	19
Total:			12.9	13.0	288	13.6	13.6	444	.7	.6	96
Average:			2.6	2.6	58	2.7	2.7	89	.14	.12	19
Mean Gains:									.19	.17	10

\*Code letter refers to matched pairs in the experimental and control groups.

TABLE VII

READING ACHIEVEMENT SCORES FOR MATCHED PAIRS  
GRADE 3--CONTROL GROUP--GIRLS

<u>Control Group</u>	Code Letters*	Age	Beginning Scores (Comprehension)	Total Reading	Oral Reading	Ending Scores (Comprehension)	Total Reading	Oral Reading	Total Comprehension	Total Growth in Reading Achievement (6 week period)	Total Gain--Oral
<u>Above Aver.</u>											
Donna B.		8-9	4.3	4.3		4.9	4.8	130	.6	.4	
Patty R.		8-4	4.4	4.4	75	4.9	5.2	107	.5	.8	27
Paula B.		8-7	4.7	4.4	163	4.9	5.0	175	.3	.6	13
Peggy P.		8-1	4.8	4.6	137	4.9	4.8	148	.4	.0	11
Judy S.		8-4	4.2	4.2	110	4.2	4.3	130	.0	.1	20
Total:			22.1	22.0	455	23.8	23.9	680	1.7	1.9	70
Average:			4.4	4.4	97	4.8	4.8	136	.34	.32	14
<u>Average:</u>											
Patricia C.		8-3	4.2	3.6	107	3.8	3.8	146	-.4	.2	39
Mary C.		8-6	4.5	4.5	91	4.5	4.5	114	.0	.0	23
Jane V. H.		8-9	4.4	4.4	48	4.9	4.6	113	.5	.2	65
Marilyn M.		8-5	4.2	4.1	77	4.7	4.4	94	.3	.3	17
Connie R.		8-1	3.8	3.3	52	4.5	3.9	62	.7	.6	10
Total:			21.1	19.9	375	22.4	21.2	529	1.3	1.3	154
Average:			4.2	4.0	75	4.5	4.2	106	.26	.26	31
<u>Below Aver.</u>											
Anita W.		8-1	2.9	2.7	75	3.5	3.2	88	.6	.5	13
Beverley W.		8-7	2.1	2.4		3.1	2.9	60	1.0	.5	
Total:			5.0	5.1	75	6.6	6.1	148	1.6	1.0	13
Average:			2.5	2.5	75	3.3	3.1	74	.80	.50	13
Mean Gain:									.35	.35	23.7

\*Code letter refers to matched pairs in the experimental and control groups.

TABLE VII (continued)

EXPERIMENTAL GROUP											
<u>Experi- mental Group</u>	<u>Code Letter</u>	<u>Age</u>	<u>Beginning Scores (Comprehension)</u>	<u>Total Reading</u>	<u>Oral Reading</u>	<u>Ending Scores (Comprehension)</u>	<u>Total Reading</u>	<u>Oral Reading</u>	<u>Total Comprehension</u>	<u>Total Growth in Reading Achievement (6 week period)</u>	<u>Total Gain--Oral</u>
<u>Above Aver.</u>											
	Sylvia P.	d	8-8	4.3	4.1	103	4.5	4.5	141	.8	56
	Sharon J.	v	8-5	4.5	4.8	111	5.6	4.5	132	1.1	21
	Patsy M.	d	8-7	4.5	4.8	84	4.4	4.5	111	-.1	27
	Connie L.	d	8-8	4.4	4.5	116	4.5	4.8		.1	
	Jeanette G.	e	8-2	4.5	4.7	102	4.9	4.7	140	.4	38
	<b>Total:</b>			22.2	22.9	516	23.9	22.9	524	1.7	124
	<b>Average:</b>			4.4	4.6	103	4.8	4.6	105	.34	31
<u>Average:</u>											
	Lynn D.	f	8-1	4.2	3.5	100	4.3	3.3	100	.1	-.2
	Pamela H.	g	8-6	4.7	4.7	82	4.7	4.8	93	.0	.1
	Sharon C.	h	8-10	4.5	4.2	100	5.2	4.6	120	.7	.4
	Carol D.	i	8-3	4.2	3.9	71	4.7	4.3	80	.5	.7
	Jannette J.	j	8-11	3.9	3.4	92	4.2	3.6	131	.3	.2
	<b>Total:</b>			21.5	19.7	445	23.1	20.5	524	1.6	1.2
	<b>Average:</b>			4.3	3.9	89	4.6	4.1	105	.32	.24
<u>Below Aver.</u>											
	Doris H.	k	8-10	2.7	2.4	75	3.0	2.7	106	.3	.2
	Sharon L.	l	8-5	2.2	2.5	45	2.5	2.9	59	.3	.3
	<b>Total:</b>			4.9	5.0	118	5.5	5.6	155	.6	.6
	<b>Average:</b>			2.5	2.5	59	2.8	2.8	80	.3	.3
	<b>Mean Gain:</b>									.35	.19
											24.4

\*Code letter refers to matched pairs in the experimental and control groups.

TABLE VIII

READING ACHIEVEMENT SCORES FOR MATCHED PAIRS  
GRADE 4--CONTROL GROUP--BOYS

<u>Control Group</u>	Code Letters*	Age	Beginning Scores (Comprehension)	Total Reading	Oral Reading	Reading Scores (Comprehension)	Total Reading	Oral Reading	Total Comprehension	Total Growth in Reading Achievement (6 week period)	Total Gain--Oral
<u>Above Aver:</u>											
Michael D.	e	10-0	6.0	6.6	168	6.9	7.0	166	.9	.4	3
Larry R.	f	10-4	4.6	5.1	89	5.1	6.0	152	.5	.9	68
Durane M.	c	9-10	6.0	5.2	138	7.1	6.7	121	.8	.5	-17
<b>Total:</b>			<b>16.6</b>	<b>17.9</b>	<b>395</b>	<b>19.1</b>	<b>19.7</b>	<b>439</b>	<b>2.0</b>	<b>1.8</b>	<b>49</b>
<b>Average:</b>			<b>5.5</b>	<b>6.0</b>	<b>130</b>	<b>6.4</b>	<b>6.6</b>	<b>146</b>	<b>.67</b>	<b>.60</b>	<b>16</b>
<u>Average:</u>											
Carol H.	d	9-10	3.2	3.0		4.4	4.0		1.2	1.0	
<b>Total:</b>			<b>3.2</b>	<b>3.0</b>		<b>4.4</b>	<b>4.0</b>		<b>1.2</b>	<b>1.0</b>	
<b>Average:</b>			<b>3.2</b>	<b>3.0</b>		<b>4.4</b>	<b>4.0</b>		<b>1.2</b>	<b>1.0</b>	
<u>Below Aver:</u>											
Frank S.	e	10-1	4.1	3.0		2.7	2.7		-1.4	-.3	
Gracian H.	f	10-0	3.5	3.1	48	3.8	3.8	99	.3	.7	51
Jackie Lel.	g	9-6	3.7	3.0		3.6	3.6	100	-.1	.6	
Jackie D.	h	9-5	3.6	3.0	39	2.3	2.1	89	-1.5	-.9	-10
Robert C.	i	9-5	3.7	2.8	62	2.6	2.6	45	-1.1	.4	-17
John J.	j	10-5	3.2	2.6		3.0	2.9	135	-.2	.3	
Malcolm H.	k	9-3	3.5	2.4		4.0	3.7	73	.5	1.3	
Charles L.	l	9-6	2.3	2.3	82	3.1	3.0	200	1.8	.7	118
<b>Total:</b>			<b>27.8</b>	<b>21.6</b>	<b>231</b>	<b>25.1</b>	<b>24.4</b>	<b>661</b>	<b>-1.7</b>	<b>2.8</b>	<b>142</b>
<b>Average:</b>			<b>3.5</b>	<b>2.7</b>	<b>29</b>	<b>3.1</b>	<b>3.0</b>	<b>85</b>	<b>-.2</b>	<b>.35</b>	<b>36</b>
<b>Mean Gain:</b>									<b>.13</b>	<b>.48</b>	<b>27.3</b>

\*Code letter refers to matched pairs in the experimental and control groups.

TABLE VIII (continued)

## EXPERIMENTAL GROUP

Experi- mental Group	Code Letters *	Age	Beginning Scores (Comprehension)	Total Reading	Oral Reading	Ending Scores (Comprehension)	Total Reading	Oral Reading	Total Comprehension	Total Growth in Reading Achievement (6 wk. period)	Total Gain--Oral
<b>Above Aver:</b>											
	a	10-1	5.7	6.0	139	7.1	6.3	132	1.4	.3	-7
	b	10-5	4.4	4.6	167	5.0	5.3	146	.6	.7	-21
	c	9-7	5.9	6.7	77	6.2	6.1	150	.3	-.6	73
			16.0	17.3	383	18.3	17.7	488	2.3	.4	45
			5.3	5.8	128	6.1	5.9	143	.77	.13	15
<b>Average:</b>											
	d	9-7	2.8	3.1	95	4.7	4.6	86	1.9	1.5	-9
			2.8	3.1	95	4.7	4.6	86	1.9	1.5	-9
			2.8	3.0	95	4.7	4.6	86	1.9	1.5	-9
<b>Average:</b>											
<b>Below Aver:</b>											
	e	10-0	3.8	3.2		2.9	2.8	74	-.9	-.4	
	f	10-0	3.4	3.0	77	3.9	3.7	124	.5	.7	47
	g	9-4	3.7	3.4		3.8	3.8	171	.1	.4	
	h	9-3	4.1	3.0	47	5.9	3.8	51	-.2	.8	4
	i	9-8	3.7	3.3	73	3.8	3.6	64	.1	.3	-9
	j	10-3	3.4	3.4	81	2.7	2.5	146	-.7	-.9	65
	k	9-5	3.5	3.5		3.6	3.6	119	.1	.3	
	l	9-5	2.1	3.0	55	3.5	3.7	174	1.4	.7	119
			27.7	25.8	333	25.1	27.7	923	.4	1.9	236
			3.5	3.2	42	3.5	3.5	116	.05	.24	45
									.58	.32	29.1

\*Code letter refers to matched pairs in the experimental and control groups.

TABLE IX

READING ACHIEVEMENT SCORES FOR MATCHED PAIRS  
GRADE 4--CONTROL GROUP--GIRLS

<u>Control Group</u>		Code Letters*	Age	Beginning Scores (Comprehension)	Total Reading	Oral Reading	Ending Scores (Comprehension)	Total Reading	Oral Reading	Total Comprehension	Total Growth in Reading Achievement (6 wk. period)	Total Gain--Oral
<u>Above Aver:</u>												
	Judith A.	a	9-4	3.0	5.2	116	5.5	6.1	165	.5	.9	49
	Julie S.	b	9-5	4.6	4.6	140	5.0	5.2	172	.4	.6	32
	Carol H.	c	9-0	4.7	5.1	180	5.3	5.5	202	.6	.4	22
	Martha L.	d	9-6	5.5	5.7	132	5.9	6.6	163	.4	.9	31
	<b>Total:</b>			19.8	20.6	568	21.7	23.4	702	1.9	2.8	134
	<b>Average:</b>			5.0	5.1	142	5.4	5.9	176	.48	.70	34
<u>Average:</u>												
	Vivian N.	e	9-7	4.7	4.1		5.5	5.1		.8	1.0	
	Sherrill S.	f	9-3	4.7	4.3	77	4.7	4.2	87	.0	-.1	10
	Linda W.	g	9-6	4.2	3.7	138	4.2	3.7	164	.0	.0	26
	Nadine M.	h	10-0	4.0	3.5	93	4.7	4.5	104	.7	1.3	11
	Linda A.	i	9-3	4.1	3.9	49	4.3	3.9	43	.2	.0	-6
	Sharon F.	j	9-1	4.2	3.9	101	5.0	5.1	109	.8	1.2	8
	Elise P.	k	9-11	4.2	4.7	148	4.6	4.9	170	.4	.2	22
	Nancy F.	l	9-10	3.9	3.8	188	3.6	3.8	161	-.1	.0	-27
	Diana E.	m	9-2	4.6	4.9	114	4.6	4.6	110	.0	-.3	-4
	Nancy G.	n	10-3	4.6	4.2	119	5.0	4.3	145	.4	.0	26
	Linda S.	o	9-7	3.4	2.9		4.3	3.8	103	.9	.9	
	<b>Total:</b>			46.6	44.0	1027	50.7	48.2	1196	4.1	4.2	66
	<b>Average:</b>			4.2	4.0	114	4.6	4.4	120	.36	.37	7
<u>Below Aver:</u>												
	Barbara H.	p	9-7	2.8	2.5		4.0	4.0	110	1.2	1.5	
	Sandra V.	q	9-1	2.1	1.9	58	3.9	3.3	53	1.8	1.4	-5
	Alice H.	r	10-4	3.9	3.7		5.2	5.2	173	1.3	1.5	
	<b>Total:</b>			8.8	6.1	58	13.1	12.5	336	4.3	4.4	-5
	<b>Average:</b>			2.9	2.7	58	4.4	4.2	112	1.4	1.5	-5
	<b>Mean Gains:</b>									.57	.68	13.9

\*Code letter refers to matched pairs in the experimental and control groups.

TABLE IX (continued)

## EXPERIMENTAL GROUP

Experi- mental Group	Code Letters*	Age	Beginning Scores (Comprehension)	Total Reading	Oral Reading	Ending Scores (Comprehension)	Total Reading	Oral Reading	Total Comprehension	Total Growth in Reading Achievement (6 wk. period)	Total Gain--Oral
<b>Above Aver:</b>											
	p	9-4	5.4	5.4	132	5.9	5.5	172	.5	.1	40
	u	9-7	4.6	4.9	129	5.4	5.4	143	.8	.5	23
	c	9-8	4.5	4.8	133	4.9	4.9	145	.4	.1	13
	d	9-4	5.5	5.4	149	7.1	5.6	153	1.6	.2	4
			20.0	20.5	543	23.3	21.4	513	3.3	.9	60
			5.0	5.1	136	5.8	5.4	153	.83	.22	20
<b>Average:</b>											
<b>Average:</b>											
	e	9-5	4.9	4.7	135	4.6	4.9	172	-.3	.3	47
	f	9-5	4.4	4.3	146	5.2	4.9	166	.8	.7	19
	g	9-4	4.0	4.0	128	3.5	3.8	163	-.5	-.3	25
	h	10-0	3.9	3.7		4.4	4.9	143	.5	.6	
	i	9-4	4.1	4.0	64	5.3	4.7	95	1.2	.7	9
	j	9-5	4.2	3.9	143	4.3	4.1	108	.1	.2	-25
	k	10-1	4.0	4.0	91	4.1	4.0		.1	.0	
	l	9-6	3.9	3.7	112	4.9	4.7	146	1.0	1.0	34
	m	9-6	4.7	5.0	133	5.7	5.3	137	1.0	.3	-6
	n	10-5	4.7	4.0	83	4.7	4.6	101	.0	.6	16
	o	10-0	3.7	3.5	79	4.3	4.4	102	.6	.9	26
			46.5	44.7	1123	51.0	49.4	1332	4.5	6.2	147
			4.2	4.1	112	4.6	4.5	132	.41	.47	16
<b>Average:</b>											
<b>Below Aver:</b>											
	p	9-7	3.0	2.8	67	3.9	3.5	69	.9	.7	22
	q	9-1	2.1	2.3	64	3.6	3.3	64	1.5	1.0	-20
	r	10-4	3.6	4.0		3.5	3.8		.0	.2	
			3.9	3.1	131	11.3	10.6	133	3.4	1.9	2
			3.0	3.0	75	3.8	3.8	77	.80	.63	1
									.57	.44	15.3

\*Code letter refers to matched pairs in the experimental and control groups.



TABLE X

READING ACHIEVEMENT SCORES FOR MATCHED PAIRS  
GRADE 5--CONTROL GROUP--BOYS

<u>Control Group</u>	<u>Code Letters*</u>	<u>Age</u>	<u>Beginning Scores (Comprehension)</u>	<u>Total Reading</u>	<u>Oral Reading</u>	<u>Ending Scores (Comprehension)</u>	<u>Total Reading</u>	<u>Oral Reading</u>	<u>Total Comprehension</u>	<u>Total Growth in Reading Achievement (6 week period)</u>	<u>Total Gain--Oral</u>
<u>Above Aver:</u>											
Jerry F.	e	10-6	8.6	8.0	200	9.5	10.0	198	.7	2.0	-2
Bill J.	b	10-7	5.9	6.5	162	7.9	6.3	165	2.0	-.2	3
Total:			14.7	14.5	362	17.4	16.3	363	2.7	1.8	1
Average:			7.4	7.3	181	8.7	8.2	182	1.4	.90	1
<u>Average:</u>											
Johnny C.	c	10-6	5.3	4.4	96	4.7	4.9	71	-.6	.2	-25
Floyd C.	d	10-6	6.0	5.7		5.3	5.5	120	-.7	-.2	
Total:			11.3	10.1	96	10.0	10.4	191	-1.3	0	-25
Average:			5.7	5.1	96	5.0	5.2	96	-.7	0	-25
<u>Below Aver:</u>											
Paul F.	e	10-6	5.0	4.0	126	5.3	4.3	116	.3	.3	-10
Jerry J.	f	10-6	3.1	3.1		3.8	3.1		.7	.0	
Total:			8.1	7.1	126	9.1	7.4	116	1.0	.3	-10
Average:			4.1	3.6	126	4.6	3.7	116	.60	.2	-10
<u>Mean Gain:</u>											
									.40	.35	-8.5

\*Code letter refers to matched pairs in the experimental and control groups.

TABLE X (continued)

## EXPERIMENTAL GROUP

<u>Experi- mental Group</u>	<u>Code Letters*</u>	<u>Age</u>	<u>Beginning Scores (Comprehension)</u>	<u>Total Reading</u>	<u>Oral Reading</u>	<u>Ending Scores (Comprehension)</u>	<u>Total Reading</u>	<u>Oral Reading</u>	<u>Total Comprehension</u>	<u>Total Growth in Reading Achievement (6 week period)</u>	<u>Total Gain--Oral</u>
<u>Above Aver:</u>											
Michael M.	a	10-3	8.8	8.8	193	8.3	8.3	183	-.5	-.5	-10
Tommy H.	b	10-9	6.0	6.2	108	6.4	6.0		-.4	-.2	
Total:			14.8	15.0	301	14.7	14.3	183	-.1	-.7	-10
Average:			7.4	7.5	151	7.5	7.2	183	-.1	-.4	-10
<u>Average:</u>											
Richie E.	c	10-4	5.4	5.9	135	5.5	6.3	101	.1	.4	-34
Frank I.	d	10-11	5.7	5.4	101	5.5	5.0	114	-.2	-.4	13
Total:			11.1	11.3	236	11.0	11.3	215	-.1	0	-21
Average:			5.6	5.7	118	5.5	5.7	108	-.1	0	-11
<u>Below Aver:</u>											
Donald B.	e	10-7	4.9	3.6	91	4.2	3.7	79	-.7	.2	-12
Kenneth W.	f	10-10	3.4	2.9	71	3.3	3.0		-.1	.1	
Total:			8.3	6.4	162	7.5	6.7	79	-.8	.3	-12
Average:			4.2	3.2	81	3.8	3.4	79	-.4	.2	-12
<u>Mean Gains:</u>									+.17	-.67	-10.5

\*Code letter refers to matched pairs in the experimental and control groups.

TABLE XI

READING ACHIEVEMENT SCORES FOR MATCHED PAIRS  
GRADE 5--CONTROL GROUP--GIRLS

<u>Control Group</u>	Code Letters*	Age	Beginning Scores (Comprehension)	Total Reading	Oral Reading	Ending Scores (Comprehension)	Total Reading	Oral Reading	Total Comprehension	Total Growth in Reading Achievement (6 week period)	Total Gain--Oral
<u>Average:</u>											
Sandra C.	a	10-6	5.5	5.4	30	6.9	6.0	109	1.4	.6	75
Dorothy C.	b	10-7	4.9	5.4	140	7.1	6.7	153	2.2	1.3	43
Lydia P.	c	10-6	6.0	5.4	112	6.0	6.0	178	.0	.6	66
Judy F.	d	10-8	5.9	5.3	149	5.7	4.6	140	-.2	-.7	-9
<u>Total:</u>			22.3	21.5	431	25.7	23.3	610	3.4	1.8	179
<u>Average:</u>			5.6	5.4	108	6.6	5.8	153	.9	.5	45
<u>Below Aver:</u>											
Donna S.	e	10-5	4.7	4.3	67	5.0	3.9		.3	-.4	
<u>Total:</u>			4.7	4.3	67	5.0	3.9		.3	-.4	
<u>Average:</u>			4.7	4.3	67	5.0	3.9		.3	-.4	
<u>Mean Gains</u>									.74	.28	44.8

\* Code letter refers to matched pairs in the experimental and control groups.

TABLE XI (continued)

## EXPERIMENTAL GROUP

<u>Experi- mental Group</u>	<u>Code Letters*</u>	<u>Age</u>	<u>Beginning Scores (Comprehension)</u>	<u>Total Reading</u>	<u>Oral Reading</u>	<u>Reading Scores (Comprehension)</u>	<u>Total Reading</u>	<u>Oral Reading</u>	<u>Total Comprehension</u>	<u>Total Growth in Reading Achievement (6 wk. period)</u>	<u>Total Gain--Oral</u>
<u>Average:</u>											
Rita W.	a	10-3	5.3	5.4	138	5.4	5.0	134	.1	-.4	-2
Jenny C.	b	10-6	4.7	4.8	105	5.3	4.9	160	.6	.1	55
Patricia T.	c	10-7	6.4	5.3	102	7.5	6.8		1.1	1.5	
Bernice C.	d	10-11	5.5	5.0	109	6.4	5.4	142	-.1	.4	33
<u>Total:</u>			21.9	20.8	452	23.6	22.1	436	1.7	1.6	86
<u>Average:</u>			5.5	5.1	113	5.9	5.5	145	.4	.4	29
<u>Below Aver:</u>											
Elaine S.	a	10-7	4.7	4.7	103	5.1	5.0	122	.4	.3	20
<u>Total:</u>			4.7	4.7	103	5.1	5.0	122	.4	.3	20
<u>Average:</u>			4.7	4.7	103	5.1	5.0	122	.4	.3	20
<u>Mean Gains:</u>									.42	.38	26.5

\*Code Letter refers to matched pairs in the experimental and control groups.

APPENDIX B

TEACHER QUESTIONNAIRE

USE OF THE TACHISTOSCOPE AS A TRAINING AID IN THE  
DEVELOPMENT OF READING SKILLS

How many daily sessions with the tachistoscope were experi-  
enced by your class group?

\_\_\_\_\_ days per week for \_\_\_\_\_ weeks, equals \_\_\_\_\_ total  
sessions

What was the average length of each training sessions?  
\_\_\_\_\_ minutes

Students trained were in grade \_\_\_\_\_ and ranged in age from  
\_\_\_\_\_ to \_\_\_\_\_.

Grouping employed for the tachistoscopic work was:

\_\_\_\_\_ total class \_\_\_\_\_ reading groups \_\_\_\_\_ other (specify)

The tachistoscope was operated by \_\_\_\_\_ teacher \_\_\_\_\_ student:

Briefly explain the introduction and preparatory explana-  
tions given the class (or groups) prior to the training  
session.

a. The first time the tachistoscope was introduced:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

b. A typical training period at a later date:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

How were the materials selected for the successive training sessions? (What were the determining criteria?)

---



---



---

Was the tachistoscope an efficient teaching tool?

	yes	no
Was it available when you planned to use it?	_____	_____
Did it work effectively in your classroom?	_____	_____
Was it easy to use?	_____	_____
Did it always operate properly?	_____	_____
Were the materials you needed available?	_____	_____
Was adequate time available for adequate use?	_____	_____

Was tachistoscopic training interesting to your pupils?

---

Was it a satisfying experience to pupils? \_\_\_\_\_; teacher? \_\_\_\_\_

Was it a challenging experience?

to the superior student \_\_\_\_\_; the above average student \_\_\_\_\_;

to the average student \_\_\_\_\_; the below average student \_\_\_\_\_;

to the poor student \_\_\_\_\_.

Did you observe evidence of:

increased eye span \_\_\_\_\_; improved concentration \_\_\_\_\_;

increased comprehension \_\_\_\_\_; greater interest in reading

\_\_\_\_\_?

How would you appraise the total, or cumulative, value of the tachistoscopic training for your class?

excellent \_\_\_\_\_ good \_\_\_\_\_ fair \_\_\_\_\_ poor \_\_\_\_\_ uncertain \_\_\_\_\_

Was there apparent pupil gain \_\_\_\_\_ or loss \_\_\_\_\_ from this experience?

In your opinion does the tachistoscope contribute to the development of reading skills at the grade you teach? \_\_\_\_\_

Would you voluntarily choose to use the tachistoscopic technique with your reading groups in succeeding years?

If so, would you use it as a regular part of the total reading program you plan or as a remedial teaching tool (or both)?

Would you use it for all your students or for special groups only?

RECORDED ORAL READING

Were the groups recorded typical reading groups? yes \_\_\_ no \_\_\_

Were the pupils familiar with the story read for the first recording? yes \_\_\_ no \_\_\_

Did you feel the groups were at ease while reading to the recorder? yes \_\_\_ no \_\_\_

Did you encourage the pupils to read: as rapidly as possible? \_\_\_; clearly and distinctly? \_\_\_; with understanding and meaning? \_\_\_.

Did you feel the reading was truly representative for:

the top reading group	1st recording	___	2nd recording	___
the middle reading group		___		___
The lower reading group		___		___

How would you rate the progress made by each group in the interval between the first and second recordings:  
(excellent, above average, average, poor)

top group \_\_\_\_\_, middle group \_\_\_\_\_, lower group \_\_\_\_\_.



APPENDIX C

## SUGGESTIONS FOR USE OF THE TACHISTOSCOPE

### GENERAL PROCEDURES:

Set up the projector and screen for maximum visibility for the entire class.

Attach the tachistoscope. Open the shutter and focus light on the screen.

Setting should be:

f3.5 (for maximum brilliance)

Shutter speed desired: 1/5 sec. (5) or 1/10 sec. (10)

Select the filmstrip material desired. (Teacher guides for each filmstrip are provided to assist you in doing this. Guides include the name and number of the filmstrip, the type of material it contains, and the content of each frame in order of sequence.)

Plan for a ten to fifteen minute period of training for each day of use. Keep a record of time each day if it varies. Start each session with simple, attention-getting material such as selected frames from the "Line Drawing" filmstrips (A-110, #16, #17 and #18).

"Flash" each frame at a steady, rhythmical speed. Prepare the group for the flash by saying, "ready." Commence each session at a slow speed--1/5 sec. or 1/10 sec.--and listen to the group oral response. As soon as you are sure you have the group responding readily, advance the speed progressively to the speed that will challenge--but not defeat--the group.

Continue to say "ready" and then flash the picture!

Listen to the group response. Are they able to do this exercise adequately?

These training periods will continue for six weeks--or about 15 sessions per group.

Select material for each session that will advance the student toward the goals of GREATER CONCENTRATION or ATTENTION, DISCRIMINATION IN WORD FORMATION and EYE SPAN. (The latter should be the major emphasis during this study. We should constantly encourage each student to "look through the screen" and develop in them the ability to see the "whole"

(picture, word, phrase) at a glance or a single "eye fixation.")

Words appearing on the Teacher Guide Lists have been checked against Lyons-Carnahan Series.

RECORD FORM FOR ANECDOTAL RECORDING OF MICROSCOPIC TRAINING

TEACHER	GRADE	SCHOOL	DATE		
Session	Date	Time (in minutes)	Numbers of the filmstrips used (All 16, etc.)	Flash Speed (1/2, 1/10 etc.)	Remarks
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					

TEACHER GUIDE LIST  
 READING SPEED-I-O-STRIP SERIES

SVE Number AL10-1

BASIC VOCABULARY--1 to 3-Letter Words

(Always focus projector on this frame.)

To the pupils:

Can you see the screen?

Are you comfortable?

Now, pretend that you are looking  
 through the screen . . .

and think about what you will see.

a (ppc)	on (lst)	eat (P)
I (ppb)	we (ppc)	fly (2/1)
as (P)	so (lst)	get (ppc)
at (ppa)	up (lst)	had (P)
by (P)	am (lst)	but (lst)
he (ppc)	us (lst)	she (ppb)
it (ppc)	and (ppa)	who (P)
me (ppa)	for (ppb)	you (ppb)
my (lst)	her (P)	too (P)
no (lst)	him (P)	yes (lst)
an (P)	his (P)	old (lst)
be (lst)	its (___)	one (P)
do (lst)	not (ppb)	red (P)
go (ppa)	out (P)	six (3rd)
is (ppc)	all (P)	ten (3/2)
if (P)	big (lst)	
or (2/1)	are (P)	

## SVE Number A110-1 (continued)

in (ppo)

ask (lst)

of (lst)

can (ppa)

to (ppa)

did (ppo)

TEACHER GUIDE LIST  
 READING SPEED-I-O-STRIP SERIES

SVE Number A110-2

BASIC VOCABULARY--3- and 4-Letter Words

(Always focus project on this frame.)

To the pupils:

Can you see the screen?

Are you comfortable?

Now, pretend that you are looking  
 through the screen . . .

and think about what you will see.

the (ppb)	new (1st)	away (ppa)
two (1st)	own (2/1)	into (P)
run (ppa)	may (ppb)	that (1st)
saw (ppb)	put (P)	them (P)
see (ppa)	ran (ppb)	they (P)
was (P)	say (2/1)	this (P)
our (1st)	sit (2/1)	your (P)
for (ppb)	try (2/1)	soon (1st)
how (1st)	use (2/1)	then (P)
now (P)	down (P)	when (1st)
any (2/2)	from (1st)	long (1st)
hot (2/2)	here (ppb)	some (P)
ate (2/1)	just (1st)	jump (ppa)
buy (2/1)	blue (P)	like (ppb)
cut (2/1)	cold (1st)	look (ppa)
got (ppb)	four (1st)	make (ppc)
has (P)	good (ppb)	

SVE Number A110-2 (continued)

let (lst)

call ( \_ )

off (lst)

come (ppa)

why (lst)

help (P)



TEACHER GUIDE LIST  
 READING SPEED-I-O-STRIP SERIES

SVE Number AL10-3

BASIC VOCABULARY--4-Letter Words

(Always focus projector on this frame.)

To the pupils:

Can you see the screen?

Are you comfortable?

Now, pretend that you are looking  
 through the screen . . .

and think about what you will see.

play (ppa)	gave (1st)	made (P)
ride (ppa)	give (P)	must (1st)
said (ppb)	goes (2/1)	open (1st)
stop (ppb)	grow (2/1)	pick (___)
walk (1st)	have (P)	pull (1st)
will (P)	hold (2/1)	read (2/1)
over (1st)	hurt (2/2)	show (1st)
fast (ppc)	keep (2/1)	sing (1st)
much (2/1)	know (1st)	take (P)
best (2/1)	upon (2/1)	tell (2/1)
both (2/1)	with (ppa)	want (ppa)
five (1st)	what (P)	wash (2/1)
full (2/1)	once (1st)	went (P)
been (2/1)	only (2/1)	were (P)
came (ppb)	very (1st)	wish (1st)
does (2/1)	well (2/1)	work (ppc)
done (2/1)	kind (2/1)	

## SVE Number All0-3 (continued)

draw (2/1)

many (P)

fall (P)

warm (P)

find (1st)

live (1st)

TEACHER GUIDE LIST  
 READING SPEED-I-O-STRIP SERIES

SVE Number A110-4

BASIC VOCABULARY--5- to 8-Letter Words

(Always focus projector on this frame.)

To the pupils:

Can you see the screen?

Are you comfortable?

Now, pretend that you are looking  
 through the screen. . .

and think about what you will see.

after (1st)	every (1st)	would (1st)
black (1st)	bring (2/1)	write (2/2)
brown (1st)	carry (2/1)	myself (2/1)
funny (P)	could (1st)	around (P)
green (2/1)	don't ( )	before (1st)
going (P)	drink (2/1)	little (P)
under (1st)	found ( )	pretty (P)
today (1st)	laugh(P)	yellow (2/1)
round (2/1)	those (1st)	always (1st)
three (2/1)	which ( )	better ( )
white (1st)	there (P)	please (2/1)
sleep (1st)	where (P)	because (2/1)
about (1st)	light (1st)	together (2/1)
their (1st)	right (2/1)	
these (2/1)	seven (2/1)	
again (P)	small (1st)	
first ( )	shall (1st)	

## SVE Number AL10-4 (continued)

never (1st)

start ( )

clean (2/1)

think (1st)

eight ( )

thank (1st)

TEACHER GUIDE LIST  
 READING SPEED-I-O-STRIP SERIES

SVE Number A110-5

COMMONEST NOUNS--3- 4-Letter Words

(Always focus projector on this frame.)

To the pupils:

Can you see the screen?

Are you comfortable?

Now, pretend that you are looking  
 through the screen. . .

and think about what you will see.

bed (2/1)	ball (ppb)	home (1st)
box (P)	bear (1st)	milk (2/1)
boy (1st)	bell (___)	name (P)
car (1st)	bird (1st)	nest (1st)
cat (2/1)	boat (P)	rain (___)
cow (2/1)	cake (P)	
day (P)	coat (1st)	
dog (1st)	corn (2/2)	
egg (1st)	doll (P)	
eye (2/1)	door (1st)	
leg (2/1)	duck (P)	
man (P)	farm (P)	
men (2/1)	feet (P)	
pig (2/1)	fire (2/1)	
sun (2/2)	fish (1st)	
top (2/1)	game (P)	
toy (2/1)	girl (1st)	

SVE NUMBRR A110-5 (continued)

way (2/1)	girl (1st)
baby (1st)	head (1st)
back (1st)	hill (2/1)

TEACHER GUIDE LIST  
 READING SPEED-I-O-STRIP SERIES

SVE Number AllO-6

COMMONEST NOUNS--4- to 8-Letter Words

(Always focus projector on this frame.)

To the pupils:

Can you see the screen?

Are you comfortable?

Now, pretend that you are looking  
 through the screen. . .

and think about what you will see.

ring ( _ )	party (P)	brother (2/1)
seed (1st)	robin (2/2)	chicken (P)
shoe (2/2)	sheep (2/1)	good-bye (P)
snow (1st)	stock ( _ )	morning (1st)
song (2/1)	table (2/1)	picture (2/1)
time (1st)	thing (P)	birthday (P)
tree (P)	watch (1st)	children (P)
wind (2/2)	water (ppc)	squirrel (1st)
wood (P)	farmer (2/2)	
apple (1st)	father (2/1)	
bread (3rd)	flower ( _ )	
chair (3/2)	garden (2/1)	
floor (2/1)	ground (1st)	
grass (1st)	letter (2/2)	
horse (1st)	mother (ppc)	
house (P)	rabbit (1st)	
kitty (P)	school (P)	

## SVE Number A110-6 (continued)

money (2/1)

sister (2/1)

night (1st)

street (P)

paper (2/1)

window (P)



TEACHER GUIDE LIST  
 READING SPEED-I-O-STRIP SERIES

SVE Number A110-10

PHRASES--Group I

(Always focus projector on this frame.)	too soon (P-1st)
To the pupils:	
Can you see the screen?	for them (ppb-P)
Are you comfortable?	
Now, pretend that you are looking	You were (ppb-P)
through the screen. . .	
and think about what you will see.	too little (P-P)
I am (ppb-1st)	for them (ppb-P)
at home (ppa-1st)	It is (ppc-ppc)
all night (P-1st)	down there (P-P)
I was (ppb-P)	on the floor
	(-ppb-2/1)
at school (ppa-P)	It was (ppc-P)
all day (P-P)	up there (P-P)
He is (ppc-ppc)	on the chair
	(P-ppb-3/2)
so much (1st-2/1)	they are (P-P)
with mother (ppa-ppc)	down here (P-ppb)
He was (ppc-P)	in the box
	(ppc-ppb-P)
so long (1st-1st)	they were (P--P)
with us (ppa-1st)	up here (P-ppb)
We are (ppc-P)	in the window
	(ppc-ppb-P)
to go (ppa-ppa)	
at once (ppa-2/1)	

SVE Number A110-10 (continued)

We were (ppc-P)

to stop (ppa-ppb)

at three (ppa-2/1)

You are (ppb-P)

TEACHER GUIDE LIST  
READING SPEED-I-O-STRIP SERIES

SVE Number A110-11

PHRASE--Group II

(Always focus projector on this frame.)	could eat (1st-P)
To the pupils:	
Can you see the screen?	some cake (P-P)
Are you comfortable?	
Now, pretend that you are looking	Her mother (P-ppc)
through the screen. . .	
and think about what you will see.	could make (1st-ppc)
My brother (P-2/1)	some bread (P-3)
has found (P-2/1)	the red apple
a big house (ppc-1st-P)	(ppb-P-1st)
My father (P-2/1)	did not fall
has made (P-P)	(ppc-ppb-P)
a pretty home (ppc-P-1st)	from the tree
your sister (P-2/1)	(1st-ppb-P)
will buy (P-2/1)	the red cow
A pretty picture (ppc-P-2/1)	(ppb-P-2/1)
Your mother (P-ppc)	is going (ppc-P)
will read (P-2/1)	to the farm
a new book (ppc-1st-__)	(ppa-ppc-P)
His sister (P-2/1)	the black horse
would like (1st-ppb)	(ppc-1st-1st)
a new hat (ppc-1st-2/2)	can run (ppa-ppa)
His brother (P-2/1)	down the hill
	(P-ppb-2/1)
	the black bird
	(ppb-1st-1st)
	can fly (ppa-2/1)
	to the next
	(ppa-ppb-1st)
	The small boat
	(ppb-1st-P)
	did not go
	(ppc-ppb-ppa)
	in the water
	(ppc-ppb-ppc)

SVE Number A110-11 (continued)

would want (1st-ppa)

a big horse (ppc-1st-1st)

Her father (P-2/1)

The small boy  
(ppb-1st-1st)

will go (P-ppa)

to the school  
(ppa-ppb-P)

TEACHER GUIDE LIST  
 READING SPEED-I-O-STRIP SERIES

SVE Number A110-12

PHRASES--GROUP III

(Always focus projector on this frame.)	has come back (P-ppa- lst)
To the pupils:	
Can you see the screen?	to the house (ppa- ppb-P)
Are you comfortable?	
Now, pretend that you are looking	The little pig
through the screen . . .	(ppb-P-2/1)
and think about what you will see.	
The white duck (ppb-lst-P)	has run away (P-ppa- ppa)
must go (lst-ppa)	from the farm (lst-ppb-P)
to the barn (ppa-ppb-__)	
the white sheep (ppb-lst-2/1)	The yellow cat (ppb-2/1-2/1)
will walk (P-lst)	from home (lst-lst)
in the grass (ppc-ppb-lst)	The yellow ball (ppb-2/1-ppb)
The new coat (ppb-lst-lst)	was seen (P-2/2)
was made (p-P)	The old man (ppb-lst-P)
for the girl (ppb-ppb-lst)	in the garden (ppc-ppb-2/1)
The new doll (ppb-lst-P)	will look (P-ppa)
must be (lst-P)	about him (lst-P)
for the baby (ppb-ppb-lst)	
The funny rabbit (ppb-P-lst)	The old men (ppb-lst-2/1)
went down (P-P)	will think (P-lst)
by the tree (lst-ppb-P)	about it (lst-ppc)
The funny man (ppb-P-P)	The little children (ppb-P-P)

SVE Number A110-12 (continued)

is coming (ppc-\_\_)

down the street (P-ppb-P)

The little dog (ppb-P-1st)

can play (ppa-ppa)

can live (ppa-1st)

The little chicken  
(ppb-P-P)

in the barn  
(ppc-ppb-\_\_)

TEACHER GUIDE LIST  
READING SPEED-I-O-STRIP SERIES

SVE Number All0-16

FAMILIAR OBJECTS--Line Drawings, Group I

(Always focus projector on this frame.)

To the pupils:

Can you see the screen?

Are you comfortable?

Now, pretend that you are looking

through the screen. . .

and think about what you will see.

(dog)  
a dog(cow)  
a cow(bed)  
a bed(car)  
a car(boy)  
a boy(top)  
a top(pig)  
a pig(key)  
a key(cake)  
a cake(coat)  
a coat(shoe)  
a shoe(leaf)  
a leaf(kite)  
a kite(bird)  
a bird(boat)  
a boat

TEACHER GUIDE LIST  
 READING SPEED-I-O-STRIP SERIES

SVE Number AL10-17

FAMILIAR OBJECTS--Line Drawings, Group II

(Always focus projector on this frame.)

To the pupils:

Can you see the screen?

Are you comfortable?

Now, pretend that you are looking  
 through the screen. . .

and think about what you will see.

(doll)  
 a doll

(kitten)  
 a kitten

(duck)  
 a duck

(squirrel)  
 a squirrel

(tree)  
 a tree

(birdhouse)  
 a birdhouse

(bear)  
 a bear

(chair)  
 a chair

(slide)  
 a slide

(chick)  
 a chick

(horse)  
 a horse

(sheep)  
 a sheep

(table)  
 a table

(house)  
 a house

(rabbit)  
 a rabbit



TEACHER GUIDE LIST  
 READING SPEED-I-O-STRIP SERIES

SVE Number AL10-18

FAMILIAR OBJECTS--Line Drawings, Group III

(Always focus projector on this frame.)

To the pupils:

Can you see the screen?

Are you comfortable?

Now, pretend that you are looking  
 through the screen. . .

and think about what you will see.

- |  |   |
|--|---|
| (two chicks)                                     | (six kites--four above and two below)   |
| (two butterflies)                                | (six frogs--two columns of three frogs each)  |
| (three ducks)                                    | (six cars--one at the top, two below, and three on the bottom)  |
| (three airplanes)                                | (six owls--two columns of three owls each)  |
| (four dolls)                                     | (seven turtles--two at the top, two at the left, and three on the right)                              |
| (four trucks)                                    | (five boys and two men--three boys at the top left, two boys in the center, and two men on the right) |
| (five tops)                                      | (five boys and two men--three boys at the top left, two boys in the center, and two men on the right) |
| (five puppies)                                   | (seven kittens--four on the left and three on the right)  |
| (a boy and a girl)                               | (a sheep, a dog, and a goat)  |
| (a man and two chicks)                           | (two airplanes, a kite, and a boat)   |
| (a calf and three colts)                         | (three balls and two blocks)  |
| (a squirrel and four acorns)                     |   |
| (three kittens--two in a basket and one outside) |   |
| (four rabbits--two in the cage and two outside)  |   |
| (five birds--two in a tree and three flying)     |   |

SVE Number A110-18 (Continued)

(four firemen, a fire truck, and a boy)

(two boys, a girl, and three drums)

(two cats, three mice, a boy and a girl)

(five ducks and three boats)

(two elephants, four clowns, and two monkeys)