

Summer 8-1-1962

## The Use of Timed Exposure Devices in Elementary School Teaching

Michael S. McKinney  
*Central Washington University*

Follow this and additional works at: [https://digitalcommons.cwu.edu/all\\_gradpapers](https://digitalcommons.cwu.edu/all_gradpapers)



Part of the [Educational Assessment, Evaluation, and Research Commons](#), [Educational Technology Commons](#), and the [Elementary Education Commons](#)

---

### Recommended Citation

McKinney, Michael S., "The Use of Timed Exposure Devices in Elementary School Teaching" (1962).  
*Graduate Student Research Papers*. 163.  
[https://digitalcommons.cwu.edu/all\\_gradpapers/163](https://digitalcommons.cwu.edu/all_gradpapers/163)

This Thesis is brought to you for free and open access by the Student Scholarship and Creative Works at ScholarWorks@CWU. It has been accepted for inclusion in Graduate Student Research Papers by an authorized administrator of ScholarWorks@CWU. For more information, please contact [scholarworks@cwu.edu](mailto:scholarworks@cwu.edu).

THE USE OF TIMED EXPOSURE DEVICES IN ELEMENTARY  
SCHOOL TEACHING

---

A Research Paper  
Presented to  
the Faculty of the Graduate School  
Central Washington State College

---

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

---

by  
Michael S. McKinney

August 1962

THIS PAPER IS APPROVED AS MEETING THE PLAN 2  
REQUIREMENT FOR COMPLETION OF A RESEARCH  
PAPER.

---

Robert B. Krueger  
FOR THE GRADUATE FACULTY

## TABLE OF CONTENTS

| CHAPTER   | PAGE |
|---|------|
| I. THE PROBLEM AND DEFINITION OF TERMS USED ..... | 1    |
| The Problem .....                                 | 1    |
| Statement of the problem .....                    | 1    |
| Importance of the study .....                     | 1    |
| Definition Of Terms Used .....                    | 2    |
| Timed exposure devices .....                      | 2    |
| Tachistoscopic devices .....                      | 3    |
| Tachistoscopic materials .....                    | 3    |
| Organization Of Remainder Of The Paper .....      | 3    |
| II. REVIEW OF PERTINENT LITERATURE .....          | 4    |
| History Of Timed Exposure Devices .....           | 4    |
| Early history.....                                | 4    |
| Introduction into schools .....                   | 4    |
| Preparation Of Materials For Timed Exposure       |      |
| Devices .....                                     | 5    |
| Preparing the machine .....                       | 5    |
| Tachistoscopic slides and strips .....            | 5    |
| Procedures For The Use Of Timed Exposure          |      |
| Devices .....                                     | 7    |
| Physical conditions .....                         | 7    |
| Method of procedure .....                         | 8    |
| Using timed exposure devices.....                 | 8    |

CHAPTER

PAGE

III. THE USE OF TIMED EXPOSURE DEVICES IN SPECIFIC

SUBJECT MATTER FIELDS ..... 10

Language Arts ..... 10

    Primary ..... 10

    Spelling ..... 10

    Reading ..... 11

    Language ..... 11

Mathematics And Science ..... 11

    Arithmetic ..... 11

    Science ..... 12

Social Studies ..... 12

    Primary ..... 12

    Intermediate..... 12

Health And Physical Education ..... 13

    Health ..... 13

    Physical education ..... 13

Art And Music ..... 13

    Art ..... 13

    Music ..... 14

IV. RESEARCH AND EVALUATION OF TIMED EXPOSURE

DEVICES ..... 15

Studies In The Area ..... 15

| CHAPTER  | PAGE |
|--|------|
| Initial study .....                            | 15   |
| Second study .....                             | 15   |
| Third study .....                              | 16   |
| Fourth study .....                             | 16   |
| Fifth study .....                              | 16   |
| Benefits Of Using Timed Exposure Devices ..... | 17   |
| Intrinsic benefits .....                       | 17   |
| Extrinsic benefits .....                       | 18   |
| V. SUMMARY AND CONCLUSIONS.....                | 19   |
| Summary .....                                  | 19   |
| Conclusions .....                              | 19   |
| BIBLIOGRAPHY .....                             | 21   |

## CHAPTER I

### THE PROBLEM AND DEFINITION OF TERMS USED

Since the beginning of the world man has been using his senses to learn. As formal education progressed, educators began to use sight and sound to help clarify instruction. Commercial enterprises were quick to begin producing audio and visual aids for classroom teachers. At the present time we are bombarded from all sides with new and varied types of teaching aids. It is necessary that more critical thought be given to the choice and use of these. One of the most publicized of these aids at the present is the timed exposure type device.

#### I. THE PROBLEM

Statement of the problem. It was the purpose of this study to (1) explore the use of timed exposure devices for teaching in the elementary school, (2) determine the feasibility of using these devices (to what extent these devices could be used and how they could be used), and (3) determine what value they would have for use by an elementary school teacher.

Importance of the study. The sense of sight is one of

the most acute, far reaching, and quickest of all our senses. It is used in every classroom via teaching aids. Yet there seems to be a general feeling of unrest among educators. They feel that materials produced in the past have been inadequate. The common center of disturbance seems to be that past materials have not sufficiently raised the quality of teaching and learning in the various classrooms. A study done by Hopkins, Stratemeyer, Woodring, Dye, and Smith reports:

So educators seem to agree that their common policy for the future is to evaluate critically all materials produced and used better to locate and develop those which show the best promise of improving the quality of teaching and learning in the individual classrooms (11:10).

## II. DEFINITION OF TERMS USED

Timed exposure devices. A timed exposure device can be defined as a still projector or some device equipped with a shutter for timed exposures. It allows material to be projected on a screen for accurately controlled lengths of time, usually from 1 second to 1/100 of a second.

Timed exposure devices are called by numerous trade names. Some of these trade names are Tachistoscope, Speed-i-o-scope, Tach-X and Flashmeter. These can either be a commercially purchased unit or they can be a simple shutter fitted over the lens of a still projector such as a slide or overhead projector.



Tachistoscopic devices. This term can be used interchangeably with the term, timed exposure devices.

Tachistoscopic materials. These slides or strips impregnated with printing (letters or pictures) are used to flash this printing on the screen.

### III. ORGANIZATION OF REMAINDER OF THE PAPER

The remaining content of this paper will concern itself with the history and use of timed exposure devices and how the teacher can prepare his own materials for use with the timed exposure device. Separate sections will show how timed exposure devices can be used to improve learning in each subject of the elementary field. A summary of the paper will then be made and conclusions drawn from the research.

## CHAPTER II

### REVIEW OF PERTINENT LITERATURE

Although timed exposure devices are not new, the comparatively little research concerning their use has concentrated on the high school or adult level.

#### I. HISTORY OF TIMED EXPOSURE DEVICES

Early history. The field of visual aids is not new.

Chandler and Cypher point out:

Long ago educators realized the value of visual enrichment, not as a separate subject or a teaching project, but as an effective, vital, [sic] teaching method providing for the presentation of knowledge through the seeing experience. Audio-visual enrichment is not entertainment, but a vital part of the curriculum (7:10).

Alterman says:

A form of tachistoscopic classroom training was used as early as 1895. Catherine Aiken, a classroom teacher, improved memory by writing on a blackboard and then rotating it (2:282).

Later, during World War II, timed exposure or tachistoscopic devices were used in training servicemen to instantly recognize plane types.

Introduction into schools. Subsequent articles and reports of this device's potentialities quickly attracted the attention of educators, and its use in school and in-

dustry increased rapidly. Since its introduction into the classroom, emphasis on its use has concentrated on the improvement of reading. Many companies ran pilot projects in reading to see if these would be accepted by teachers and other educators. Reading machines seem to have taken a place in teaching. Now commercial companies are beginning to come out with specialized programs in other fields.

## II. PREPARATION OF MATERIALS FOR TIMED EXPOSURE DEVICES

Preparing the machine. Prices for timed exposure machines vary from five dollars for a simple cardboard shutter type to over one thousand for a complete, complex machine with many materials for specialized teaching included.

If a school cannot afford to purchase a commercial unit, the classroom teacher can easily make a similar device to serve the purpose. Robert B. Leitch suggests that flipping the switch on the slide or overhead projector can be used for a timed exposure device (12:35). However, accuracy of timing using this method is very poor.

A much improved method is to mount a camera type shutter over the lens of a slide or overhead projector. By varying the angle on the drop of the shutter, the speed at which it drops can be more accurately timed.

Tachistoscopic slides and strips. Commercial or pro-

gramed learning kits containing pictures or words to be flashed on the screen can be purchased. A less expensive method is to make them in the classroom. Etched glass slides, simply pieces of glass roughened on one side, can be purchased at a reasonable price from most audio-visual aid supply houses. These slides can be drawn on with a number two pencil. The lines can be erased from the glass, allowing it to be used time and again. A permanent slide can be made by spraying the printing with a clear plastic spray.

Plastic slides can be used in the same manner. However, the writing on these must be done with a greased or marking pencil. The surface can be etched by roughening one side, but the method is not very satisfactory.

Carboned paper which produces typing on a cellophane slide can also be used. This carbon is mounted between two pieces of clear glass to produce a permanent type slide.

Clear filmstrip can be purchased and used in the filmstrip projector. Material can be prepared on this filmstrip by using India ink. An inexpensive but more difficult method is suggested by Edith Taylor and Chalmers Murray:

Outdated 35mm silent film can be purchased at a photographic supply house. Clear the film of emulsion by washing it in sodium thiosulphate in a dark room. Then wash in clear water for about twenty minutes and hang to dry (22:96).

This can be written on using India ink. In making the prints the classroom teacher must remember that every four sprocket holes on the filmstrip is equal to one frame.

### III. PROCEDURES FOR THE USE OF TIMED EXPOSURE DEVICES

Procedures for the use of timed exposure devices vary according to the individual situation. However, some general recommendations might be made here.

Physical conditions. After making or purchasing the flash material (depending on the amount of time and money to be spent), the first step is to set up the machine and screen. Edith S. McCall suggests that the machine be placed about six feet from the screen. Seat pupils in as close a group as possible. The pupils should be seated in front of the screen if possible. This is for use of the Keystone over-head type machine. Most other machines are suited to projection from the rear of the classroom. A flat finish screen is preferred to a beaded finish as the former permits viewing from a wider angle (15:35).

The white back of a map, a piece of white butcher paper, or the chalkboard itself can be used as a screen.

McCall also suggests:

Slides and an ordinary pencil provide the rest of the equipment needed. Glass slides give greater flexibility over the filmstrip at the lower level. This is because the teacher can, with a pencil or card, directly touch the slide to focus the children's attention on certain portions of the slide and because supplementary slides can be easily made. The glass slides can be shown in a room that is not darkened (except at times of brilliant sunshine) which permits other pupils in the room to go about their work unhampered (15:35).

Small groups are much preferred to larger ones. This allows for more individual expression and informality.

It is suggested that in larger groups, raising of hands to answer is desirable if answers are to be given aloud. This will depend on the purposes of the lesson.

Method of procedure. Before flashing the first instructional picture on the screen, it is wise to flash an outline on the screen. This will show the class where they can expect to see the material that will be flashed for learning. Their perspective can be focused on one point of the screen and not all over it.

Certain commands are necessary so the class will be ready to perceive each picture flashed. The command "ready" is a good one to let the class know that a slide is ready to be presented (3:108). The slide is then flashed on the screen, and the desired reaction by the pupil is either spoken or written. If the reaction is to be checked for accuracy after each flash, the next command would be "check." The answer is then flashed on the screen. If checking is left until the end, the command "ready" is given after allowing the pupils time to complete their answers for the previous exposure.

Using timed exposure devices. Training in the initial stage with timed exposure devices should be kept quite short. As the children's eye span and perception develop, the periods can be lengthened and come more frequently. The subject matter should be "ordered" so as to provide a gradual progression in the difficulty of the material with a minimum of frustration due to errors (15:35).

The teacher should be alert to spot student problems from their daily responses. She might have to adjust the speed or the type of material to fit the progress that has been made. Those who need or want more study can be easily taught to operate the timed exposure device. This allows the student to do individual work during his free time. Small groups needing remedial help can also be organized to work by themselves with this device. One of the group can be in charge of flashing the material while the others view the material on the screen.

## CHAPTER III

### THE USE OF TIMED EXPOSURE DEVICES IN SPECIFIC SUBJECT MATTER FIELDS

The specific uses of timed exposure devices are limited only by the imagination and desire of the individual teacher. Only a few samples of the more obvious and tested ways for using the devices will be given here.

#### I. LANGUAGE ARTS

Primary. In the lower elementary grades, letters can be flashed for recognition purposes. The children can either say the letters perceived or they can write the letters on their paper. Combinations of letters can also be flashed in teaching phonics. Symbols, such as an apple, can be flashed for the first grade classes and the children can pick from a list the word representing the object they saw. This can also be done in the upper levels using more difficult symbols.

Spelling. Pretests in spelling can be given by flashing the words and having the students pronounce and write them in the air or on paper. Study of the words can be accomplished after a preliminary showing of the words by covering certain letters and asking the children what letters have been covered (15:36). A study of prefixes and suffixes can be given



by first covering the prefix or suffix flashed on the screen and then covering only the root word. The words can also be studied by determining their origin, meaning, and structure. The class can tell if the word follows the normal rules of phonics.

Reading. Sight span in reading can be improved by first flashing letters and then building up to words, phrases, and finally sentences. As the class advances through each of these phases, they will start at a slow speed and work to the fastest speed possible before going on to the next phase. This same process will help the class more quickly recognize letters, words, and phrases and the eventual result will be an increase in reading speed. Comprehension can be built up by immediate testing after each slide or by testing at the end of each lesson or series of lessons. The first method seems to have proved most helpful in learning. This is because there is immediate feedback and correction of errors.

Language. Symbols of punctuation and the parts of speech can be flashed for recognition and learning. Vocabulary words can be flashed and the class can pick a sentence from their paper which fits the meaning of the word flashed. This same method can be used to match synonyms, antonyms, sentence structure, abbreviations, writing, and all language rules.

## II. MATHEMATICS AND SCIENCE

Arithmetic. Grouping in arithmetic can be enhanced by

pasting stars or other simple materials on glass slides to create simple silhouettes on the screen. Mathematical signs and number recognition can be improved by simply flashing them on the screen singly or in a series. The basic facts in adding, subtracting, multiplying, and dividing can be learned by flashing different number combinations on the screen. The children can say or write the answers as they comprehend them. The answer is then immediately flashed and corrections made if needed. Mathematical formulas and vocabulary recognition can easily be used as the children progress into the higher grades.

Science. Science vocabulary and recognition of formulas, compounds, elements and their symbols such as C- Ca- Mn - Zn - K and O, identifying all types of specimens, and scientific objects, and matching dates with inventors are only a few ways that this device can be used in the science field.

### III. SOCIAL STUDIES

Primary. In the lower grades, pictures of community helpers such as a fireman, policeman, etc., can be flashed and the children write or tell who they are and what they do for the community.

Intermediate. The timed exposure device can be used to flash map study or to recognize sections or states of a country from outline shape. It can also be used to flash pictures of people important in the field. The class could be asked

to match the place or person with a corresponding name of the person or place viewed. Dates can be flashed and matched with their importance in social studies.

#### IV. HEALTH AND PHYSICAL EDUCATION

Health. Contrasts of good and poor health habits can be flashed and the class asked to recognize whether they represent good or poor habits. This same procedure could be used with food or even complete diets. Here the class might look to see if the basic five foods were seen. Health rules could be evaluated as proper or "not to be done." Here again, pictures of important people in the field could be matched with their names or what they had done in the field of health.

Physical education. Body positions for drill exercises can be shown with the timed exposure device. The children then would attain these same positions while actually doing the exercise. Formations of games to be played can be quickly seen and recognized. Dance steps and positions of other rhythmic exercises can be shown and copied by the class after quick recognition of such. Rules for games, game strategies, and diagrams of the different fields and positions to be played on the field can be quickly learned through the use of the timed exposure device (19:80).

#### V. ART AND MUSIC

Art. Various materials used in art can be shown and

recognized (such as paints, crayons, or how to use scrap cloth, buttons, pins, bottle caps, etc., to produce an art scene). Diagrams on how to do the lesson step by step could be helpful to those having trouble following directions. Lester B. Sands suggests, "This device can also be used to develop visual memory and rapid recognition of patterns, colors, moods and creative expressions" (19:80).

Music. Music teachers may find it helpful to use slides of tonal and rhythmic patterns to aid pupils in reading music rapidly, particularly for sight reading. The student reproduces the patterns on the piano, violin, cello, horn, or by singing (19:80). The class could learn to recognize the various instruments by sight. Pictures of these instruments or great artists in the field of music could be matched with their names. Not only matching the person's name with his picture, but telling what he did in the field could be used to challenge the faster pupils.

The timed exposure device can be used to present new materials, to review, to illustrate, test or pre-test, and for reference or study. Material can be presented in an interesting way to challenge every pupil in a class (if used at the right time and in the correct manner).

## CHAPTER IV

### RESEARCH AND EVALUATION OF TIMED EXPOSURE DEVICES

#### I. STUDIES IN THE AREA

A report done by Henry P. Smith and Theodore R. Tate states:

Considerable 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 and in some cases in other perceptual processes, following tachistoscopic training with digits or other materials (20:176).

Initial study. Eye movements of subjects were photographed by means of the ophthalmograph (type of camera to photograph eye movements) at the beginning of the training period, at the thirty-fifth training session, and at the end of the training (20:180). From this study, Smith and Tate report:

The number of fixations necessary for each one hundred words appears to show a regular and in most cases, a substantial drop and the number of regressions is cut nearly in half. Yet too little is known concerning the effect of such equipment on the reading ability of persons of various ages, degrees of intelligence, and varying types of personality patterns to warrant general use of the equipment in remedial reading programs. (20:184).

Second study. In this study, 18 college students took part in a research program lasting for 30 sessions. Each session was for a period of 50 minutes. Indications were that

after the 20th lesson no appreciable increase in performance was noted. In other words as the student's potential is reached, the effectiveness of timed exposure devices goes down and other types of study might be more desirable. The timed exposure device might help the slow learner more than those who have reached their peak (except in reviewing) (9:28,30).

Third study. The use of timed exposure devices in teaching was studied in Minnesota, Michigan, New Jersey, New York, Texas, and Iowa schools. The general consensus was that they were popular with both the students and the teachers. Arnold E. Luce says, "On the teaching side, it almost compels group participation. On the student's side, it is a competitive aid that fosters interest and motivation" (13:71).

Fourth study. Data collected by the Human Engineering Laboratory showed that from ages 23 to 50, vocabulary inched ahead only ten words (or no faster than two average school years) under 23 years of age. Improvement was 5.5 words in about three and one half hours of vocabulary training on a timed exposure device (5:274). Class reading scores in light reading also jumped from 228 words with 65 per cent comprehension at the start to 1000 words per minute or faster with 85 per cent comprehension (5:287).

Fifth study. In this study a timed exposure device was used in spelling for 15 minutes a day for six weeks.

Corinne B. Brown says:

It resulted in a 43% increase in retention of each spelling lesson as tested weekly. After six weeks, the use of the timed exposure device was abruptly discontinued for two weeks. Subsequent testing revealed that even with the same amount of time devoted to spelling (including spelling bees, written and oral drill, etc.) the number of errors in the class jumped 27%. This showed lack of stimulus to learning or perhaps removal of motivation. When use of the timed exposure device was resumed again, only twice weekly, within a period of one school month, the proficiency of the group was again raised to the level reached at the end of the first period (4:105).

Brown also states:

Therefore a conclusion that the immediate effectiveness of the instrument is obvious, as is the permanence of the learning efficiency. As is evidenced by so minute an experiment, usage of timed exposure devices is unlimited (4:106).

Except for the dissenting opinion expressed in the "initial study," this writer's research indicated a general opinion that timed exposure devices were effective and useful.

## II. BENEFITS OF USING TIMED EXPOSURE DEVICES

Intrinsic benefits. Timed exposure devices improve accuracy, promote concentration, and improve motivation and interest; gains made from their use are not subject to decline upon cessation of their use. The students do not have to wait for the teacher to correct the papers before they know if their answers are correct. Immediate correction enhances learning by immediately reinforcing the correct response. Immediate reinforcement has been proven good in general classroom teaching.

Taylor and Frackenpohl state:

These short exposures cause a person to "reach out" visually in an aggressive manner, to react to and apprehend with more attention what was seen, to form a more vivid mental impression of the visual stimuli, and to organize the material in such a way as to prolong its retention (18:1).

Extrinsic benefits. In addition to the intrinsic benefits listed above and many more that space does not permit expounding on, there are also benefits not directly associated with pupil learning.

This device can be used by groups working individually while the teacher is free to give remedial help where needed. While working with the device, individuals seem to exert themselves more without realizing that they are truly learning. This is partially due to an increase in pride of achievement. This extra effort and learning from it has a carry-over value into other subjects.

The timed exposure device is adaptable to all types of teaching in all subject matter fields. If the program is carried on for an extended period of time, the teacher can adapt the machine to fit most effectively the method, purposes, and overall plan of teaching (16:31).



## CHAPTER V.

### SUMMARY AND CONCLUSIONS

#### I. SUMMARY

Of the hundreds of teaching aids being used in education, the ones getting the most publicity at the present time are the timed exposure devices.

These devices have been used in a wide variety of teaching fields and have proved successful in most. They can be used to fit the purposes and methods of each individual teaching situation. They are not, however, a complete, self-contained method of education. They must be used in conjunction with other teaching aids and methods of education.

Timed exposure devices can be inexpensive, simple to make, simple to use, and an aid to every classroom teacher. Their possibilities are unlimited.

#### II. CONCLUSIONS

The value of timed exposure devices to every teacher seems evidenced in the research that has been done. Dr. Fred E. Winger says, "One thing is certain, timed exposure devices are truly teaching aids and not an attempt to exploit another audiovisual device" (23:167).

Any method or device which enhances motivation on the

part of the student or the instructor should not be neglected. However, a variety of methods and devices may supply motivation, and one should be cautioned against sole dependence on one method or device which seems popular or novel for the moment.

As the audio-visual program effectively embraces the total communications pattern, we will be able to make an ever-more effective contribution to the curriculum. And as educators and the lay public come more and more to realize that some of the greatest hopes for improving instruction and the effectiveness of our teacher lie in improving communication, audio-visual programs will be better able to achieve their maximum potential (1:18).

## BIBLIOGRAPHY

## BIBLIOGRAPHY

1. Allen, William H. "Audio-Visual Leadership," Audio-Visual Leadership Conferences 1955-1959, Iowa City: State University of Iowa, 1960. pp. 17-18.
2. Alterman, Rolland A. "Tachistoscopic Teaching," Educational Screen and Audio-Visual Guide, 37:282-293, June, 1958
3. Benson, Frances M. "We Improved Spelling With the Tachistoscope," Educational Screen and Audio-Visual Guide, 35:408, November, 1956.
4. Brown, Corinne B. "Teaching Spelling With A Tachistoscope," The English Journal, 40:104-106, February, 1951.
5. Brown, James I. "A Visual Approach to Improved Reading Ability," Educational Screen and Audio-Visual Guide, 30:274,287, September, 1951.
6. Bryan, Eloise H. "Out of The Classroom into Life," Elementary School Principals' Thirteenth Yearbook, 13:278-284, June, 1934.
7. Chandler, Anna Curtis and Irene F. Cypher, Audio-Visual Techniques for the Enrichment of the Curriculum. New York:Noble and Noble, Inc., 1948. pp. 10-11
8. Clark, Ella Callista, The Use of Visual Aids in Teaching. Winona, Minnesota: State Teachers College, 1938. pp.23
9. Dumlér, Marvin J. "A Study of Factors Related to Gains in the Reading Rate of College Students Trained With the Tachistoscope and Accelerator," Journal of Educational Research, 52:27-30, September, 1958.
10. Galanter, Eugene, Automatic Teaching: The State of the Art. New York: John Wiley and Sons, Inc., 1959. pp. 198
11. Hopkins, Thomas., and others. List of Outstanding Teaching and Learning Materials. Washington D.C.: Association for Supervision and Curriculum Development, 1948-1950. pp. 9-10.

12. Leitch, Robert B. "Audio-Visual Alert," The Clearing House, 28:34-38, September, 1953.
13. Luce, Arnold E. "Flashfilm--Minnesota's Contribution to Better Driver Education," Educational Screen and Audio-Visual Guide, 37:70-75, February, 1958.
14. Marvel, John A. "Acquisition and Retention of Reading Performance on Two Response Dimensions as Related to 'Set' and Tachistoscopic Training," Journal of Educational Research, 52:232-237, February, 1959.
15. McCall, Edith S. "Using the Tachistoscope in the Lower Grades," The Instructor, 46:35-36, January, 1957.
16. Orner, Louise J. "Reviewing Brief Forms With the Tachistoscope," Business Education World, 38:16-31, February, 1958.
17. Palmer, H.O. "Get Better Results in Typing with the Tachistoscope," The Balance Sheet, pp. 200-203, January, 1956.
18. Ruegg, Robert J. "Instrument Training Techniques for Business Education," The Balance Sheet, 42:8-12, September, 1960.
19. Sands, Lester B. "Tachistoscope? Oh, You Mean Flashmeter," Grade Teacher, 75:51-80, January, 1958.
20. Smith, Henry P. and Theodore R. Tate, "Improvements in Reading Rate and Comprehension of Subjects Training with the Tachistoscope," The Journal of Educational Psychology, 44:176-184, March, 1953.
21. Snyder, Alan. "The Flashreader in the Reading Laboratory," The English Journal, 41:269, May, 1952.
22. Taylor, Edith and Chalmers Murray. "We Made Filmstrips for Our Tachistoscope," The Instructor, 65:96, October, 1955.
23. Winger, Dr. Fred E. "What A Tachistoscope is and How It May Be Used in the Typewriting Classroom," Business Education World, 33:165-167, December, 1952.