

ENCLOSURE

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CHAPTER I

THE PROBLEM, DEFINITIONS OF TERMS USED, METHODS OF STUDY, AND LIMITATIONS OF THE STUDY

Moving pictures are now in common use in many educational systems throughout the United States. Indications of this fact are the many film renting and loaning agencies now in business, the vast number of films now available for classroom use, and the demand for visual education classes in the various colleges of education. A number of studies have been made concerning the value of visual aids of various kinds as teaching techniques, but the results have varied widely depending upon the forms of visual aids used, the methods of testing used, the type of information being tested, and the attitudes of the experimenters.

Moving pictures are now being used extensively in many athletic and physical education programs throughout the country, and a few studies have been conducted in an effort to determine their true value. It is the opinion of the author that many of the studies of this nature were based upon the subjective judgements of experts rather than criteria of a more objective nature. Results of these studies vary greatly.

I. THE PROBLEM

Statement of the problem. The purpose of this paper was to determine the value of the use of moving pictures taken of members of a beginning tennis class at the high school level, who were in the process of learning the fore-hand and backhand drives, using an objective method of testing. In accomplishing this, the following questions were to be answered:

1. Will better results on the Dyer Backboard Test be made by a group having moving pictures taken of each individual and projected for the members of this group to view or by a group who uses the same amount of time in practicing the skills to be learned?

2. Does the amount of tennis skill possessed by the student determine the value of moving pictures of the type used in this study?

a) Will the lower twenty-five per cent of the movie group or the lower twenty-five per cent of the non-movie group make better scores on the Dyer Backboard test?

b) Will the upper twenty-five per cent of the movie group or the upper twenty-five per cent of the non-movie group make better scores on the Dyer Backboard Test?

3. If it is found that the movie group is superior, will the results of the test be significant to warrant the extra cost involved in taking and projecting moving pictures?

II. DEFINITION OF TERMS

Control group. This term was used to represent the group of students in this experiment who had tennis instruction but did not have moving pictures taken of them or projected for them to view. It will be used interchangeably with the term non-movie group.

Experimental group. The term experimental group was used to represent the group of students in this experiment who had the usual amount of instruction in tennis, but also had moving pictures taken of them and projected for them to view during part of their practice time.

No training group. The term no training group refers to the students in this experiment who had no tennis instruction of any kind. They were used to form a base from which to figure the amount of improvement in the other two groups.

Projection. Projection was the term used to describe the method of showing the moving pictures to the members of the experimental group.

Instructor. In this study the instructor was responsible for all teaching in all three groups. The instructor did not, however, do the experimenting.

Experimenter. The term experimenter in this study refers to the person taking the moving pictures, projecting them, tabulating the results of the tests and recording the study. This term is used interchangeably with the term author.

Whole-part-whole method. This term refers to the method in teaching the various tennis skills. It involves teaching the whole skill, first breaking down the skill and teaching each of its parts, then again teaching the skill in its entirety by putting the learned parts together.

III. METHODS OF STUDY

To execute this study two classes at Wichita High School South were selected, one a tennis class and the other a hockey class. Members of both classes were junior and senior girls. Members of the tennis class were divided into two groups, one of which was designated as the experimental group and the other as the control group. The students in the hockey class were used in order to find the amount of tennis ability and increase in ability in a group receiving no tennis instruction. This hockey class was designated as

the no training group. The tennis forehand and backhand drives were presented to the control and experimental groups using the "whole-part-whole" method.

After initial introduction and a small amount of practice on these skills by the experimental and control groups, the Dyer Backboard Test of Tennis Ability was given to all three groups. During the remaining weeks of the experiment the control and experimental groups practiced these skills and learned and practiced the other skills necessary for playing tennis. The no training group received no instruction in tennis and was allowed no practice time for this activity.

In addition to this practice, but during practice time, the members of the experimental group had moving pictures taken of their forehand and backhand drives. These moving pictures were projected for them to view, and criticisms were made by the instructor and experimenter, once each week during the sixth, seventh, and eighth weeks. The first projection was made on a large screen for the whole group at the same time. The second and third projections were made on a small rear projection screen and only the student and the experimenter were present.

During the ninth week all three groups were again given the Dyer Backboard Tennis Test and results were compared to determine the significance of the experimentation.

IV. LIMITATIONS OF THE STUDY

All the skills of the game of tennis were not analyzed in this study. Only the forehand and backhand drives were measured. The Dyer Test, which was used in this study does not attempt to measure either of these two strokes specifically, so a student might be very good in one but poor in the other and make fairly high scores on the test.

Due to the fact that large groups were not available, the numbers in each group were not great enough to figure exact significance of any results. The amount of the error of chance would be too great for groups of this size.

The fact that the experimenter was not the instructor for the groups used made it necessary for the experimenter to adjust the experiment to the methods used by the instructor.

Because South High School was a newly organized high school, much time was taken for orientation and organization. Due to this fact, the number of days used for this experiment was smaller than that originally planned.

CHAPTER II

REVIEW OF THE LITERATURE

There has been a vast amount of material written on the value of motion pictures in the fields of education, physical education and particularly athletics, but most authors assume that motion pictures are of value and simply discuss techniques for their use. Some studies have been made, however, which indicate that films have more value in some fields than in others.

This chapter is divided into two parts, the first consisting of reports of research on the value of moving pictures as visual aids and the second a review of specific studies which have been made using motion pictures in teaching certain skills.

I. REPORTS ON THE VALUE OF MOVING PICTURES AS VISUAL AIDS

Use of visual aids. In studies investigated for this experiment most authors support the theory that the use of visual aids do increase the ease of learning in both academic and motor skills; however, there is some disagreement as to which forms are better in certain situations. For instance, where one author might recommend the use of moving pictures, another might prefer the use of film strips or slides.

According to Monroe, the following claims for values of visual materials used adequately in the teaching situation are supported by research evidence:

1. They supply a concrete basis for conceptual thinking and hence reduce verbalistic response of students.
2. They have a high degree of interest for students.
3. They supply the necessary basis for developmental learning and hence make learning more permanent.
4. They offer a reality of experience which stimulates self-activity on the part of pupils.
5. They develop a continuity of thought; this is especially true of motion pictures.
6. They contribute to growth of meaning and hence to vocabulary development.
7. They provide experiences not easily secured in other materials, and hence they contribute to the depth and variety of learning.¹

Monroe further explains that, though it is not agreed by all authors that moving pictures are a superior form of visual aid, there is a high consistency of data among the studies to indicate that the use of film in instruction is superior to the use of verbal material alone or to the unorganized use of other visual aids when retention is measured by delayed tests. He also commented that there is general agreement among the data of these investigations that the percentage of superiority of retention is higher than the

¹W. S. Monroe (ed.), Encyclopedia of Educational Research (New York: The Macmillan Company, 1950), p. 84.

percentage of superiority of immediate learning, when superiority is measured in terms of the test results for the non-film groups.²

Value of moving pictures. Most authors reporting on the use of moving pictures as visual aids consider their proven value in action learning to be common knowledge. Opinions of this nature are not due to actual tests made and recorded but to the fact that a moving picture of an action can be run, rerun, backed up, and slowed down in order to make sure that every member sees the same action. Instructors concerned with teaching specific skill action consider this an advantage which does not need scientific proof.

In support of the use of moving pictures in education, Fern and Robbins give the following statements.

1. Pictures are aids to learning in that they help stimulate a well-defined and accurate image in the mind of the learner.
2. Projected pictures tend to focus attention as the highlight in a darkened room.
3. Teaching films are aids in creating accurate mental images and in developing a relation of these images; that is, sequence of ideas or continuity of action.³

Edgar Dale, who is considered to be an authority in

²Ibid., p. 85.

³George H. Fern and Eldon Robbins, Teaching With Films (Milwaukee: The Bruce Publishing Company, 1947), p. 13.

the field of educational movies gives the following reasons for using motion pictures in the classroom.

1. Through motion pictures certain meanings involving motion can be presented.
2. The motion picture compels attention.
3. The motion picture helps you understand the time factor in any operation or series of events.
4. The motion picture can bring the past and the distant into the classroom.
5. The motion picture can enlarge or reduce the actual size of objects.
6. Motion pictures can be used to present a process that cannot be seen by the human eye--even with the help of microscope or telescope attachments.
7. The motion picture can provide an easily reproduced record of an event.
8. The motion picture can reach a mass audience at a low cost per person.
9. The motion picture builds a common denominator of experience.
10. Motion pictures offer a satisfying aesthetic experience to viewers.
11. The motion picture can give an understanding of relationships of things, ideas and events.⁴

Along with his support for the use of classroom motion pictures, however, Dale points out the following limitations which must be considered in determining the value of motion pictures for a certain situation.⁵

"Effectiveness." Motion pictures should not be used if some other teaching material is more effective.

"Wrong time notions." Telescoping of a century into thirty minutes and other similar alterations of time may

⁴Edgar Dale, Audio-Visual Methods in Teaching

cause confusion.

"Wrong size notions." Use of instruments such as the microscope or telescope in motion picture photography may cause confusion.

"Distorted impressions or conclusions." It is not as easy to check the authenticity and accuracy of materials used in moving pictures as it is of reading materials of an historical or scientific character.

"Administrative details." Problems, such as inadequate film material on a particular topic, no opportunity for previewing the film before showing it to the students, or films having such heavy use that they may be scratched or worn, often arise when moving pictures are used.

"Supplementary use." A motion picture should not be substituted for demonstrations or for the direct experience itself, when either or both of these may be made available.

"Pupil comprehension." Some films are not adequately graded for the group for which they are used.

"Group vs. individual use." The motion picture is a group device, thus little opportunity can be given for individualized study of films.

(New York: Dryden Press, 1947), pp. 183-190.

⁵Ibid., pp. 191-5.

"Film vs. teacher." Some schools may use films as a substitute for the teacher, but motion pictures cannot displace the teacher.

Value of moving pictures in a physical education program. Bernhard summarizes the use of moving pictures in physical education as follows:

Formerly, films were used for orientation alone, but now films for the purposes of demonstration and self-correction are regarded as more educational. They are a valuable aid to the teacher in instructing students in specific activities, by assisting him with the critical analysis of movement that is so necessary a part of successful performance.

Rockwood summarizes the values, which he found in his study on tennis and which others have found in closely related areas, as follows:

In general it can probably be said that of the number of possible values inherent in motion pictures when used in teaching sports skills, those most likely to manifest are: (a) aid in analyzing complex movements, (b) added interest and greater motivation on the part of students, and (c) to some extent the elimination of the early "trial and error" period, thus cutting down learning time.

Haelster advocates the use of moving pictures but qualifies her theories about their use as follows:

⁶Frederica Bernhard, "Do You Use Films?" Journal of Health and Physical Education, 15:8, January, 1944.

⁷Linn R. Rockwood, "An Experimental Study on the Use of Instructional Films in Teaching Tennis" (unpublished Master's thesis, Brigham Young University, 1952), pp. 34-35.

Motion pictures which show the students themselves performing skills may be of great instructional value to the teacher and the student. . . . An impersonal attitude toward analysis of an individual's body mechanics while the film is being shown, and the teacher's ability to analyse the difficulty and be able to change the inefficient muscle pattern determine the instructional benefits of such a picture. If the movie results in self-consciousness, or in a student's determination to fix certain parts of his body for a superficial change, the great expense involved in the film is not justified.⁸

After making her survey on the use of motion pictures in the field of sports for college women, Gladys Palmer stated the following advantages of adding the sports motion picture to the instructional materials of the physical education teacher.

1. Through slow-motion analysis of sport techniques, it is possible to follow: (a) positions of body, (b) execution of movement, (c) planes of movement, (d) relation between different parts, (e) handling of equipment, (f) muscular exertion, (g) plays of teams.
2. The film affords an opportunity to view the separate skills used in a game not only under playing conditions but when practiced in isolation from the game.
3. The timing element which is so important in sport performance can be clearly shown.
4. The contrast between good and bad form can be shown to an advantage.
5. Students with poor coordination could gain much through the use of the "endless loop" type of film which would repeat specific techniques.
6. The "close-up" is an advantage in teaching large groups.⁹

⁸Laura J. Huelster, "Amateur Motion Picture Projects," Journal of Health Physical Education and Recreation, 9:494, October, 1938.

⁹Gladys E. Palmer, "A Motion Picture Survey in the Field of Sports for College Women," Research Quarterly, 7:161, March, 1936.

II. REPORTS ON SPECIFIC STUDIES MADE ON THE USE
OF MOTION PICTURES IN EDUCATION
AND PHYSICAL EDUCATION

Many studies have been made on the use of motion pictures in education and the results have varied greatly. Among these are studies made by the McCluskys,¹⁰ Rolfe,¹¹ and Hollis¹² on making a pasteboard box and a reed mat, laboratory experiments in physics, and making an omelet respectively. In all of these studies the results indicated that the method using teacher demonstration of the skill was significantly superior to the method in which the instructional films were used.

Freeman, Shaw and Walker in an experiment in teaching position in hand writing found that students who were shown movies of the correct position made much greater gains than those receiving other types of instruction.¹³ The study did

¹⁰Frank N. Freeman et al., "Comparison of Motion Pictures, Slides, Stereographs, and Demonstration as a Means of Teaching How to Make a Reed Mat and a Pasteboard Box", Visual Education (Chicago: University of Chicago Press, 1924), pp. 310-334.

¹¹"A Comparison of the Effectiveness of a Motion Picture Film and of Demonstration in Instruction in High School Physics", Ibid., pp. 335-8.

¹²"The effectiveness of the Motion Picture, Demonstration by the Teacher, and Oral Instruction," Ibid., pp. 339-41.

¹³"The Use of a Motion Picture Film to Teach Position and Penholding in Handwriting," Ibid., pp. 282-311.

not however show the film method to be superior in improving the quality of the handwriting.

Arnsperger, after conducting his study "Measuring the Effectiveness of Sound Pictures as Teaching Aids," in the fields of natural science and music, reached the following conclusions.

. . . it appears that the talking pictures used in this experiment made marked and lasting contributions to learning, both in the natural science units and in the music units. These contributions, however, were made without the loss of learning other elements of subject matter of the units not included in the talking pictures themselves.¹⁴ (Only part of the units in both subjects were taught with moving pictures.)

Even when limiting the use of motion pictures in teaching to the field of physical education the results of experiments which have been made vary greatly. This section will be divided into two parts, the first dealing with experiments in the field of physical education in which movies were used profitably and the second dealing with similar studies which indicated the use of movies to be of little or no value.

Experiments in the field of physical education in which movies were used profitably. One of the earliest experiments made on the use of motion pictures in teaching

¹⁴Varney C. Arnsperger, *Measuring the Effectiveness of Sound Pictures as Teaching Aids* (New York: Bureau of Publications, Teachers College, Columbia University, 1933) p. 88.

motor skills was conducted by Ruffa in 1936 in the field of track.¹⁵ The skills tested were the one hundred yard dash, high jump, broad jump, shot put, and football throw.

In preparing for this study a specially made film was produced in which two cameras were used to take pictures of the same action, one at regular speed and the other in slow motion. The two films were then edited so that the two shots of the same scene were projected consecutively in the finished film. The subjects in the film were selected from various college track teams and were considered to be experts.

The participants in the experiment were divided into three equated groups. One group viewed motion pictures and the members were allowed to ask questions, but were given no other instruction. A second group received the usual oral and demonstration instruction commonly used in teaching, plus class time to practice the events. The third group was given only the pre-tests and end tests. The purpose of this group was to check the normal influence of growth during the experimental period.

From the results of this experiment Ruffa concluded the following:

¹⁵Edward J. Ruffa, "An Experimental Study of Motion Pictures in the Teaching of Certain Athletic Skills," (unpublished Master's thesis, School of Education, Leland Stanford University, 1936).

1. Similar units of teaching fundamentals of other track events are advisable.
2. Group classroom teaching as used in this experiment is a better means of motivation than group field teaching as used in this experiment.
3. A slow motion picture unit is three and nine-tenths per cent more efficient than oral and demonstration methods now used.
4. Slow motion pictures are feasible as a means of teaching certain athletic skills.¹⁶

In 1944 the Army Air Forces executed an experiment to determine how effective this method of instruction was in teaching the system of position firing.¹⁷ As nearly as possible a film was made which projected the view into the actual action of the film. The points taught were also taught in a lecture method and a reading method, both of which were accompanied by still pictures. All three groups were compared. The film group had a mean score of 17.91, the lecture group had a mean score of 15.19, and a score of 15.43 was recorded for the reading group.

Some of the advantages which were cited in the use of moving pictures as a teaching technique were: the use of human action, the fact that better perception of distance and relationships of objects is possible, the theory that the viewers can vicariously experience the action and the fact

¹⁶Ibid. p. 80.

¹⁷James J. Gibson (ed.), Motion Picture Testing and Research (Washington, D. C.: U. S. Government Printing Office, 1947).

that films have an entertainment value which, if used, tends to hold the attention of the viewers.

In an experiment conducted by Aileen Lockhart, moving pictures of expert bowlers were used.¹⁸ The participants in the experiment were college women selected at random from bowling classes and had had no previous experience in bowling. There was no statistically significant difference between their initial scores. The study was limited to performance with the first ball because on the first ball the set-up is always the same, but the conditions for the second ball may differ from frame to frame.

As nearly as possible the same methods of instruction and learning conditions were maintained in all classes. The only difference was the presentation of a film, made especially for the experiment, to the experimental group at the beginning of each class period. As the film was shown, attention was called to particular points.

Lockhart felt that there was a definite value in the use of this type of film and made the following conclusions:

The motion picture in this study was found to be of definite value to those groups which had this device as a part of the regular instructional program. The following evidence substantiates this conclusion. These findings

¹⁸Aileen Lockhart, "Value of the Motion Picture as an Instructional Device in Learning a Motor Skill; Abstract of a Thesis," Research Quarterly, 15:181-7, May, 1944.

are based on a consideration of the total of all movie and non-movie groups as judged from the weekly mean value and as indicated in the critical ratios.

1. The rate of improvement in learning of the movie group was more consistent than that of the control.
2. During the first two weeks of instruction the performance in the two groups was practically identical. As shown by the critical ratios and slope of the curve during the third week, the experimental group continued its initial rapid rate of improvement whereas the control group remained at practically a standstill. A similar plateau of learning was shown by the control group in the fifth week while again the experimental group maintained its steady improvement.
3. There is strong evidence, as shown in the critical ratios of the fifth week, that the experimental group at this time was definitely superior to the control.
4. Although the movie and control classes started with practically the same mean score, at the end of the third week of instruction the movie classes surpasses the non-movie group and continued to be superior throughout the remaining periods of observation.¹⁹

In the study made by Priebe and Burton on using slow-motion pictures as coaching devices in track, it was found that these motion pictures were definitely an advantage.²⁰ In this study twenty-six sophomore boys at Polytechnic High School in Los Angeles were matched into thirteen pairs, equated as nearly as possible on age, height, weight, leg spring, previous athletic experience, and natural ability in

¹⁹Ibid. p. 186.

²⁰Roy E. Priebe and William H. Burton, "The Slow Motion Picture as a Coaching Device," School Review, 47:192-8, March, 1939.

jumping as shown by scissors-style jumping.

First the average jumping ability of each boy was measured by using the scissors-style jump. In the second week of the experiment, instruction was begun in the western roll form, which was new to all boys participating. The instruction included detailed explanations, demonstration of the whole movement and of selected parts, and initial attempts by all boys, followed by individual criticism and assistance. This procedure was continued for the remaining five weeks.

Besides this instruction which was given to both groups, the pictures of the champion jumpers were shown to the experimental group in the second week. The films were run and re-run in both slow and normal speeds and then were discussed by the group. During the third week slow-motion pictures of the boys in the experimental group were taken during the regular practice period and were shown to the group. Here again the group was encouraged to discuss good form, defects and coordination. During the fifth and sixth weeks the experimental group saw its own pictures and also those of the champions again and discussed them further.

The results of this experiment were as follows:

	<u>Average before Instruction</u>	<u>Weekly Averages after Instruction</u>			
		<u>3rd</u>	<u>4th</u>	<u>5th</u>	<u>6th</u>
Control	53.96	49.38	51.08	52.46	53.85
Experiment	53.31	54.77	57.04	57.62	57.54

From these results Prieb and Burton drew the following conclusions.

(1) The use of slow motion pictures in coaching the high jump made for faster progress and better achievement. (2) The use of slow motion pictures in coaching the high jump eliminated to a large extent, the initial period of trial and error. (3) Illustrations of good form in slow motion pictures seem definitely superior to verbal directions and physical demonstration of good form, particularly during the initial period of learning. (4) The use of slow-motion pictures in coaching the high jump was of definite assistance in aiding performers to change from a familiar form of skill to a new, superior, but unfamiliar form. (5) The use of slow motion pictures enabled the coach to handle effectively a larger number of boys. The average amount of instructional time for the individual was significantly cut down. (6) The use of slow-motion pictures in coaching the high jump contributed definitely to the interest and the attention of the boys. There was marked interest in analyzing individual errors and in improving pictured defects.²¹

Experiments in the field of physical education which indicate that the use of movies are of little or no value.

Brown and Messersmith, after conducting an experiment in teaching tumbling with and without the use of moving pictures, concluded that, in the field of tumbling, moving pictures were of little value.²²

The study was made at Southern Methodist University using two college freshmen men's tumbling classes. Both

²¹Ibid. p. 198.

²²Howard Steven Brown and Lloyd Messersmith, "An Experiment in Teaching Tumbling with and without Motion Pictures," Research Quarterly, 19:304-7, December, 1948.

classes were given the Metheny Revision of the Johnson Test and the scores were then used to match the twenty members of the control class with twenty of the twenty-three members of the experimental class.

Conditions in both classes were as nearly alike as possible in that they were taught by the same instructor, the total instructional time in both was held constant and the instructional units were the same. The only variable was that of adding the moving pictures in the experimental group.

During the fifth class period demonstration movies were shown to the experimental group. The films showed one experienced and several elementary tumblers performing the stunts that were being presented in this study.

In the ninth class period movies were taken of the members of the experimental class performing the following stunts: front chest roll, high backward roll, front chest roll from high backward roll, snap up, head spring, and cart-wheel. During the thirteenth class period these moving pictures were studied by the members of this class. The instructor pointed out errors and good points.

The performances of students on the final battery of tests, which were administered on the fifteenth and sixteenth class periods were scored by two experienced judges using a subjective rating scale of 0 to 10 for each of the events.

The results of these test scores were as follows.

The slight difference in favor of the experimental class was not significant when measured by the critical ratio technique. The critical ratio proved to be 1.24. . . .

The brevity of the study as to subjects and class periods would make any prediction based on it somewhat hazardous. However, several things were indicated:

1. The experimental class made a little more progress than did the control class as measured by the score on the final battery of tests, but the superiority was not statistically significant.
2. There is a tendency for students to be highly motivated when moving pictures are made on the students in action and later screened for their viewing.
3. It is doubtful that extensive expenditures for moving pictures are warranted in the teaching of simple individual activities such as elementary tumbling unless the class is to extend through the entire semester. It is possible that the time devoted to the filming of class activities in this study could have been used to greater advantage in actual practice of the events included in the lessons.
4. Finally, there is a great need for more studies dealing with the use of motion pictures and the learning of motor skills.²³

The study which is most closely related to the present one was made by Linn Rockwood in 1952 and is concerned with the use of motion pictures in teaching tennis.²⁴ Participants in the experiment were members of four college beginning classes. There were both men and women in all classes. After determining by use of the Dyer Backboard Test of Tennis Ability that all classes were of equal ability, two of

²³ Ibid. p. 307.

²⁴ Rockwood, op. cit.

the classes were designated as the control group and the remaining two as the experimental group.

The instructor made a special effort to incorporate into the instruction of all classes the best practices recommended by experts in the field. The discriminating factor in the teaching methods was the addition of instructional films at regular intervals in the experimental section classes.

Motion pictures used in the experimental section included "Fundamentals of Tennis," starring Don Budge; a school made demonstration film using the instructor as the subject; and a school made diagnostic film in which pictures were taken of all members of the experimental section.

Film strips produced by the Athletic Institute, dealing with service, forehand, backhand and rules were also projected for the members of the experimental section.

Each of the films was shown several times during the experimental period either partially or in total.

The critical ratio technique was used in comparing the results and the following conclusions were made by the author:

1. Classes using the instructional films to supplement the usual methods of instruction made slightly greater gains in tennis playing ability than did classes not using the instructional films. The difference was not significant by the critical ratio technique, however.

2. With classes of the type used in this study, composed of rank beginners and those with little previous experience, the extensive use of instructional films is not indicated.
3. The girls in the movie section showed a greater increase in tennis-playing ability than girls in the non-movie section. The difference in favor of the movie group was significant at the .05 level.
4. The use of instructional films with girls of the playing ability of those found in the classes used in this study shows more promise than does the use of films with classes of both boys and girls.
5. There were great differences shown in the progress made by various individuals in both sections. Cases of remarkable progress and little or no progress were found in both sections.
6. The boys in the movie section made slightly more progress in learning to play tennis than the boys in the non-movie section. The difference was not significant, however.
7. Extensive use of instructional films with classes of boys of the ability represented in this study is not indicated.
8. The highest scoring twenty-five per cent in the movie section showed a slightly greater increase in playing ability than the highest scoring twenty-five per cent in the non-movie section. Again the difference was not significant.
9. The extensive use of instructional films, when with the better students in college elementary tennis classes, is not indicated if the classes used in this study are representative.
10. The lowest scoring twenty-five per cent of the students in the movie section showed a slightly greater increase in tennis playing ability than the lowest scoring twenty-five per cent in the non-movie section. The difference was not significant, however.
11. Extensive use of instructional films with those of the poorest playing ability in classes of which those in this study may constitute a representative sample is not indicated.
12. Under the usual methods of instruction the boys appear to progress just about as rapidly as the girls, but under the method using films as an integral part of the instruction the girls appear to progress slightly more in proportion to their original ability than did the boys.

13. In most groups studied, the variability of the scores of students under the method using instructional films increased more than did the variability of the scores of the students in the groups in the non-movie section.
14. With most groups studied, the students in the movie groups improved more during the initial half of the instructional period than during the latter half, while in the non-movie section the improvement of students was slightly more uniform throughout the instructional period. The upper twenty-five per cent in the movie group was an exception to this.
15. The movie classes evidenced only a slightly greater interest and motivation in learning to play tennis as judged by the instructor.

III. SUMMARY

Most authors feel that much more study is needed in the area of visual aids. They also support the theory that though some areas can be taught better by moving pictures than by other known methods, there are other subject areas in which the expense of motion picture use would outweigh the value gained from it. Therefore, it would seem to be necessary to study the subject matter of each field of study or activity in order to determine the value of the use of motion pictures in that particular field.

CHAPTER III
PROCEDURES OF THE STUDY

The research for this study was made at Wichita High School South in the Girl's Physical Education Department. All classes used were composed of both junior and senior girls. The objectives of the study were (a) to select three groups, one of which would have the usual amount of tennis instruction, a second of which would have the usual amount of tennis instruction plus having moving pictures taken of them while executing the forehand and backhand drives and then projected for them to view, and a third which would have no tennis instruction; (b) to present the skills; (c) to test the amount of learning immediately after presentation; (d) to practice the skills, take, and project moving pictures; (e) retest after some practice; and (f) compare the test results to determine the amount of variation which might occur and the significance of it.

I. SELECTION OF TEST GROUPS

Three groups of girls were used in this study, two of which were taken from the same class. A tennis class of thirty-six students was divided into two groups, one of which was designated as the experimental or movie group and the other as the control or non-movie group. Ten of the

members of this class were seniors and the remaining number were juniors. When the class was divided, the numbers of juniors and seniors were also divided. Five members of the class had had some tennis experience, though no one had had more than one semester of experience in school. These also were divided between the two groups.

In order to determine the amount of learning which would occur, without instruction and practice in the skills being tested, a third group was also used. This group was composed of the members of a hockey class who were also juniors and seniors. Only the initial and final tests were given to this group. That is, no instruction and practice time was given. This group shall be designated as the no training group.

To equate the groups the Youth Fitness Test developed by The American Association of Health, Physical Education and Recreation¹ was administered to all groups. It was impossible to use the results of all eight parts of the test; therefore, only two were used, one for strength and the other for speed and agility. The pull-up test was selected for strength because it involved most of the same arm and shoulder muscles which are used in tennis. Though the fifty

¹A.A.H.P.E.R. Youth Fitness Test Manual, American Association for Health, Physical Education, and Recreation, (Washington D. C. : National Education Association, 1958) pp. 55.

yard dash scores were used to determine speed and agility, the author would have preferred to have used the shuttle run, because it involved not only footwork on the run, but also turning, which is a necessary part of tennis playing. Use of this test proved to be inadvisable, however, because scores for the shuttle run test were not available for seven of the members of one class.

The results of the pull-up and fifty yard dash tests of the Fitness Test are shown in Table I. With the experimental, control, and no training groups having mean scores of 26.75, 27.67, and 27.42 respectively on the pull-up test, there proved to be a variation of only .92 points among the three groups. Results for these three groups on the fifty yard dash section of the test showed mean scores of 8.55 seconds for the experimental group, 8.37 seconds for the control group, and 9.19 seconds for the no training group with a variation of .82 seconds.

Some of the members of each class were not used because of excessive absence and because Physical Fitness Test scores were not available for them.

Scores for the individual members of each class on the two sections of the test used in this study are listed in Appendix A.

TABLE I

A.A.H.P.E.R. YOUTH FITNESS TEST SCORES

Group	Pull-up		Fifty-yard Dash	
	Mean	Range	Mean	Range
Experimental	26.75	15-40	8.55	8.0- 9.5
Control	27.67	15-40	8.37	7.0-10.3
No Training	27.42	10-40	9.19	7.5-10.5
Amount of variation		.92		.82

II. INTRODUCTION AND PRACTICE OF SKILLS

Because the experimental and control groups were parts of the same class, all methods used were the same for both groups. The only difference was that the members of the experimental group had part of their practice time occupied with moving pictures being taken of each girl and projected for the members of this group to view.

The tennis class and the hockey class were both taught by the same instructor. The author did not instruct the classes but assisted by doing the photographing, projecting and tabulating of the test results.

During the nine weeks which were used for the experiment the class met three times a week during five of the weeks and two times a week during the remaining four weeks. The first week was dedicated to the orientation of the students to the physical education program and checking out of equipment.

In the second week and the first part of the third week the A. A. H. P. S. R. Youth Fitness tests were administered. On the last two days of the third week the parts of the racket, the grip, and the waiting stance were taught and film strips of the Athletic Institute Tennis Series were shown to the whole class. The three film strips shown dealt with the serve, the forehand drive, and the backhand drive.

During the fourth week the forehand and backhand drives were presented and one period of practice was allowed on each. In presenting these skills the "whole-part-whole" method was used; that is, first the total skill was presented and practiced slightly, then it was broken down into parts such as footwork, grip, backswing, application of force, and follow through. After presentation of each of the parts, again the whole skill was presented and practiced. This practice was individual and was accomplished by hitting tennis balls against the inside walls of the gymnasium, similar to the Dyer Backboard Tennis Test.

The first period of the fifth week was used for the administration of the Dyer Backboard Test of Tennis Ability² and the remainder of the week was used for practice as during the previous week.

Moving pictures were taken of the members of the experimental group during the fifth week. Members of the class were told that moving pictures were going to be used some throughout the year, but that everyone would not be filmed in every activity. It was emphasized that their ability in a certain activity had nothing to do with their being filmed in that particular activity and should not

²Joanna Thayer Dyer, "Revision of the Backboard Test of Tennis Ability," Research Quarterly, 9:25-31, March, 1938.

affect their attitudes toward it. The faculty at South High School does plan to do further experimenting with the use of moving pictures in other areas of their physical education program.

South High was a new high school in its first year of operation when this study was made. The tennis courts were under construction and were to be finished in time for use by all classes; however, due to administrative difficulties they were not finished and, therefore, the students of the classes in this experiment were not able to practice on a regulation tennis court. The author feels that this greatly affected the attitudes of the players.

Since the tennis courts were not yet ready for use, during the sixth week the volleyball nets in the gymnasium were lowered forming three shortened courts which the students used for practice of the forehand and backhand drives. Since only part of the class could practice over the net, the remaining members practiced hitting the ball against the wall in an adjoining room. Half way through the period those who had been practicing over the net changed places with those who had been hitting the ball against the wall. On the second class period in the sixth week the members of the experimental group were shown, as a group, the motion pictures of themselves which had been taken the previous week.

The tennis serve was presented during the first period of the seventh week in a method similar to that which was used for the presentation of the forehand and backhand drives. This also was practiced over lowered volleyball nets in the gymnasium. Practice was continued on the forehand and backhand drive as during the previous week. The same moving pictures were shown individually to the members of the experimental group during the second class period of the seventh week.

So that the players could experience playing on a full sized court during the eighth week the volleyball net was stretched across the width of the gymnasium and a full court was marked off. One lesson was taught on scoring and playing strategy. Since there was room for only one court, only four players could play at one time. The other members of the class practiced hitting tennis balls against the wall in the adjoining room or waited their turn for a place to practice. During the second period of the eighth week the motion pictures were shown individually to the experimental group for the third and final time.

The two periods of the ninth week were used for more practice as before and for the second administration of the Dyer Backboard Test.

III. INITIAL TESTING

The Dyer Backboard Test of Tennis Ability was administered two times to all three groups involved in this experiment. The first administration was made after the introduction of the skills being tested and before more than one hour of practice time had been allowed on each skill. Ideally the test should have been administered three times, one before any instruction, a second time after the introduction of the skills and a final time at the end of the experiment. Since time for the experiment was quite limited and administration of the test is time consuming, the author used only two administrations and substituted a third group of players, who had had no instruction, for the first administration. This, of course, does not yield as valid results as the three administrations to the same group would have, but by using the third group the author was able in the final test to compare the amount of improvement in the two groups in the tennis class with that of a class receiving no tennis instruction or practice time.

The Dyer Backboard Test of Tennis Ability was used in this experiment because, though it was designed for the purpose of measuring tennis ability for classification and not for grading the individuals, it ranks very high in proven validity and reliability. Both validity and reliability

correlation coefficients of .90 or above have been found for the Dyer test.

Most authors feel that the Dyer Backboard Test or variations of it are the only valid measures of tennis ability known. Clarke, Glassow and Broer, and McCloy describe it as follows:

The only tennis test available that has been sufficiently validated is the Dyer Backboard Test. This test, however, measures general tennis ability only, and does not attempt to analyze the various elements and strokes used in the game. It is, therefore, an excellent classification device for tennis and measures the progress being made in the game as a whole.³

. . . Dyer's test is a measure of playing ability, and does not attempt to measure either forehand or backhand specifically. The coefficients for reliability and for validity indicate, . . . that her test is acceptable.⁴

The only one of the tests proposed that has been subjected to rigorous scientific validation has been the Dyer Backboard Test. The test consists of rallying the ball against a wall for periods of thirty seconds, scoring as many strokes as possible. The reliability is .90 and the validity is from .85 to .90 based on expert ratings and on a round-robin tournament. There is no attempt to measure specific skills. The test may readily be used as a practice device.⁵

The Dyer Test was administered in this experiment according to the revised instructions which are listed in Appendix C.

³H. Harrison Clarke, Application of Measurement to Health and Physical Education (Englewood Cliffs, New Jersey: Prentice Hall, Inc., 1956), pp. 316-7.

⁴Ruth Glassow and Marion R. Broer, Measuring Achievement in Physical Education (Philadelphia: W. B. Saunders Company, 1938), p. 183.

IV. FILMING

Filming procedures. Moving pictures were taken individually of each member of the experimental group. The pictures were taken while the individuals hit tennis balls against the wall in the gymnasium. The reason for this procedure was that the author felt the players would have better control over a ball rebounding from the wall than one which had been hit by another player. Approximately thirty seconds of film was shot of each player. During the first fifteen seconds the player was instructed to try to hit mostly forehand shots and the last fifteen seconds she was instructed to try to hit most shots on the backhand side. These moving pictures were taken at a rate of 24 frames per second so that when the pictures were projected they ran for about forty-five seconds and the motion was slowed down somewhat. The shooting was done from a distance of about forty feet from the subject and at about a forty-five degree angle, as shown in the diagram below.

Subject ○

Camera ○

W
a
l
l

⁵Charles Harold McCloy, Tests and Measurements in Health and Physical Education (New York: F. S. Crofts and Co., 1939), p. 185.

Equipment used. The motion pictures were taken inside the gymnasium, but Kodak Black and White Tri-X film was used so no auxiliary light other than the regular gym lights was necessary. This, the author feels was an advantage because special lighting devices sometimes prove to be even more distracting than the camera itself.

The camera used in this study was an 8 mm. Bolex Paillard B 8 and the lens used had a focal length of 13 mm. As was mentioned above black and white Tri-X film was used because of its high sensitivity to light. Lens opening settings were made with the aid of a General Electric reflective type light meter.

Because one of the objectives of this study was to determine whether or not the value of using moving pictures, in the method described in this study outweighs the cost, it was important that the cost be kept down to a minimum without sacrificing efficiency. Since the cost of 8 mm. equipment is only about one-half that of 16 mm. equipment,⁶ this was considered a great advantage.

The chief reason given by most authors for using 16 mm. equipment is that nearly all school systems now possess 16 mm. projectors and in some instances 16 mm. cameras. The author feels that adequate use of the equipment by the

⁶Appendix D

physical education department would leave very little time for other departments to use it. It would, therefore, be necessary for the physical education department to own its own photographing and projecting equipment.

Hainfield and Flanagan, who have had a great deal of experience in photographing athletic events, list the following advantages of using 8 mm. equipment:

1. A screen five feet by seven feet as many schools use can also be used with an eight millimeter projector.
2. The greatest technical advances of the past decade have been in the improvement of the 8 mm. movie-making equipment.
3. There are twice as many frames of 8 mm. film to a foot of film as compared to sixteen millimeter.
4. Eight millimeter film exposes only half of the film at one time.
5. Equipment costs for 8 mm. is about half that of 16 mm. moving pictures.⁷

They list as disadvantages of 16 mm. moving picture equipment the following:

1. It can operate at only two speeds--24 and 16 frames per second.
2. Many do not have a mechanism that permits easy reversal of the film to reshow a play situation over and over.

The same authors feel that a picture large enough for as many as forty students to view clearly can be projected distinctly with 8 mm. equipment.

⁷Harold Hainfield and Dick Flanagan, "How About 8-mm. Film for Your Game Movies?" Scholastic Coach, 28:36 & 59, September, 1958.

V. PROJECTING THE FILM AND ANALYSIS OF
EACH INDIVIDUAL'S STROKES

The motion pictures which were taken of the members of the experimental group were projected a total of three times. The room used for projection was a large equipment room adjoining the gymnasium, which made it possible for the players to go immediately into the gymnasium and practice.

First showing. The three rolls of film used for the study were edited and all spliced onto one reel for the first showing. All of the members of the experimental group saw the film at the same time. The whole film was projected twice; the first time good and bad points were indicated by the instructor, and the second time questions and comments were allowed from the members of the group.

For this showing an 8 mm. projector and a five foot by seven foot beaded screen were used. The viewing conditions were not good, as the members of the group had to sit on the floor, some too close to the screen, and the ventilation was poor.

The author does not advise group viewing of this type of film, because the participants appeared to be more interested in how the rest of the class thought they looked physically than they were in any tennis playing errors they were making.

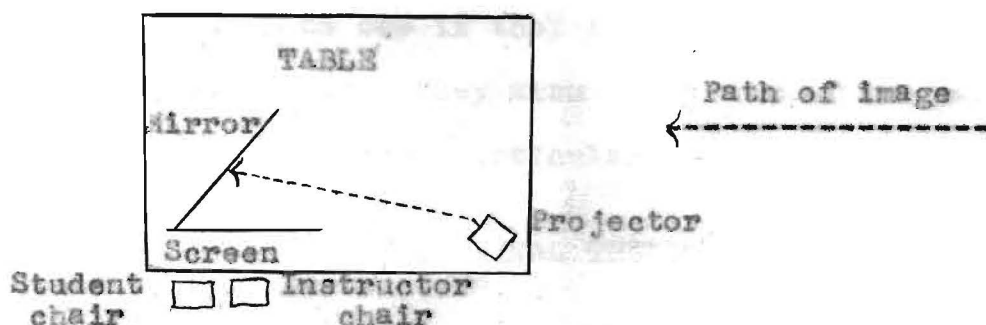
Second showing. After the first showing the film was cut between each player's performance and the ends of each film section were spliced together to make a film loop.

To project these loops a regular 8 mm. moving picture projector was used with a home constructed rear projection screen.

The rear projection screen was constructed by mounting a piece of tracing paper on a card-board frame twelve by eighteen inches in size and inserting this frame and a mirror of the same dimensions in two grooved boards which were hinged on one end with a bolt.

The projector was then set at such an angle that the image would strike the mirror and then reflect onto the tracing paper. By using this procedure the instructor could point out certain aspects of the action without interfering with the picture coming from the projector.

During the second projection the film loops were shown to the players individually with only the player and the author being present. Therefore, it was not necessary to use a large screen and the small one used proved to be quite sufficient in size. By using the small screen it was possible to place the projector and the screen all on the same table. A diagram of the set up is shown on the following page.



The film loops continued through the projector showing the same scenes over and over, thereby enabling the student to study individual parts of the stroke. In most instances the loop was shown three times through, but if there proved to be a need for it, it was allowed to run a fourth time. During the projections the experimenter reviewed the criticisms which had previously been indicated by the instructor and then the student decided upon two or three particular items to practice on or to pay special attention to during the remaining practice periods that week. When one particular skill or movement was being studied the projector was often slowed down to a very slow speed so that the student could observe each individual part of the action.

Attention to tennis playing was much better when this method of projection was used.

Third showing. The third showing was performed in the same manner as the second using the rear projection screen on the same table with the projector. The students again observed the actions which they had decided needed

particular work, to see if they felt they had made the desired improvements. They also decided on other parts of the strokes which needed particular attention.

VI. FINAL TESTING

After all beginning tennis skills had been presented and practiced for the specified amount of time, the Dyer Backboard Tennis Test was administered to all three groups a second and final time. Administration of the test was made according to the directions given by Dyer for the test in the revised method. These directions are listed in Appendix C. The results of this second testing were then compared with those of the first and the differences were analyzed.

To analyze these results the means, medians, ranges, standard deviations, and percentages of increase of the three groups were compared. In addition to comparing these results for the total groups they were compared for the high and low twenty-five per cent of all three groups. The purpose of these two comparisons was to determine whether or not the amount of tennis skill possessed by the student determines the value of moving pictures of the type used in this study. The critical ratio technique was also used to compare the experimental and control groups but no significance was found. The author feels that this was due to the

small number of subjects being tested. The formula used for tabulating the critical ratios was $cr = \sqrt{\sigma^2 M_1 + \sigma^2 M_2}$

VII. SUMMARY

Two classes at Wichita High School South were used for this study, a tennis class and a hockey class. Members of both classes were juniors and seniors. The members of the tennis class were divided into two groups, an experimental group and a control group. The hockey class was designated as the no training group. The tennis forehand and backhand drives were presented to the control and experimental groups using the "whole-part-whole" method.

After initial introduction and little practice of these skills by these two groups the Dyer Backboard Test of Tennis Ability was given to all three groups. During the remaining weeks of the experiment the control and experimental groups practiced these skills and learned and practiced the other skills necessary for playing tennis.

In addition to this practice, but during practice time, the experimental group had moving pictures taken of their forehand and backhand drives. These moving pictures were projected for them to view, and criticisms were made by the instructor and experimenter, once each week during the sixth, seventh, and eighth weeks. The first projection was made on a large screen for the whole group at the same time.

The second and third projections were made on a small rear projection screen and only the student and the experimenter were present.

During the ninth week all three groups were again given the Dyer Backboard Tennis Test and results were compared to determine the significance, if any, of the use of moving pictures as an aid to teaching motor skills.

CHAPTER IV

RESULTS OF TEST SCORES

I. TABULATION OF SCORES

Comparison of the experimental, control, and no training sections on the first Dyer Backboard Test. Results for this section are recorded in Table II.

The mean scores for the experimental, control, and no training groups on the first administration of the Dyer Backboard Test were 25.38, 28.25, and 22.92 respectively. This would seem to indicate that the instruction and small amount of practice time received by the experimental and control groups did increase their tennis ability. If no learning had occurred, however, it could indicate that the control and experimental groups had an advantage over the no training group at the beginning of the experiment.

These mean scores would also indicate that probably at the start of the experiment the control group had a slight advantage over the experimental group in total tennis ability. This was quite possible due to the fact that the only attempt made to equate the groups according to tennis ability was to divide the students who had had tennis instruction between the two groups. Since the number having experience was uneven the extra person was placed in the

control group. This was done only because it made the Physical Fitness Test scores come out more evenly distributed.

Median scores for this first test were all slightly higher than the mean scores. The median score for the experimental group was 27.0, for the control group it was 29.0, and for the no training group it was 24.0. This would seem to indicate that the median scores are slightly lower than what might be expected of students in the middle ranges of each of these groups.

Though the control group had the advantage in high scores, its scores also ran lower than those of the experimental group. This was illustrated by ranges of 12 to 33 for the experimental group, 7 to 48 for the control group, and 7 to 32 for the no training group.

With standard deviations of 6.26 for the experimental group, 8.66 for the control group and 6.72 for the no training group, there was indication again that the experimental and no training groups were slightly more homogeneous than was the control group.

As stated previously the higher mean scores for the experimental and control groups would seem to indicate that the members of these groups did have slightly more knowledge of the techniques of tennis than did the members of the no training group due either to instruction and practice time

TABLE II

COMPARISON OF THE CONTROL, EXPERIMENTAL AND NO TRAINING
SECTIONS ON THE FIRST DYER BACKBOARD TEST

Group	Experimental	Control	No Training
Number	13	13	24
Raw Score (total)	330	367	550
Mean	25.38	28.23	22.92
Median	27.0	29.0	24.0
Range	12--33	7--48	7--32
Standard Deviation	6.26	8.66	6.72
Amount learned (Mean minus mean of no training group)	2.46	5.31	

they had received, or to the fact that the first two groups started the experiment with an advantage over the last group. The mean score for the experimental group was 2.46 points higher than that of the no training group and the mean score of the control group was 5.31 points higher than the no training group.

Comparison of the experimental, control, and no training sections on the second Dyer Backboard Test.

Results of these comparisons are shown in Table III.

Mean scores for the experimental, control, and no training groups on the second administration of the Dyer Backboard test were 29.31, 31.31, and 25.50 respectively. Since these scores still remain in about the same relationship to one another as they did in the first test, the control group being highest, the experimental group second and the no training group lowest, it would seem that the assumptions made from the results of the first test were correct; that is, that the control group had a slight advantage over the experimental group and that both groups either derived some benefit from the tennis instruction and practice time given them or they began the experiment with a slight advantage over the no training group. There were 3.81 points difference between the experimental group and the no training group and 5.81 points difference between the control and the no training groups.

TABLE III

COMPARISON OF THE CONTROL, EXPERIMENTAL AND NO TRAINING
SECTIONS ON THE SECOND DYER BACKBOARD TEST

Group	Experimental	Control	No Training
Number	13	13	24
Raw Score (total)	381	407	612
Mean	29.31	31.31	25.50
Median	30.0	32.0	25.0
Range	16--42	18--44	13--43
Standard Deviation	7.39	5.44	6.93
Amount learned (Mean minus mean of no training group)	3.81	5.81	

Median scores of 30.0 for the experimental group, 32.0 for the control group, and 25.0 for the no training group would seem to indicate, when compared with the mean scores that, as in the results of the first test, the mean scores were slightly lower than the middle scores of the ranges of each group.

The ranges for the second test were quite similar in all three groups, being 16 to 42 for the experimental group, 18 to 44 for the control group, and 13 to 43 for the no training group.

Standard deviations for the three groups were similar with the control group being slightly more homogeneous than the other two. The standard deviations were 7.39 for the experimental group, 5.44 for the control group and 6.93 for the no training group. The standard deviations of the experimental and no training groups increased but the increase in the no training group was slight. There was a decrease in standard deviation in the control group. This reversal of the positions of the experimental and control groups was made because the experimental group made increases throughout the range, but the control group made most of its increases in the lower scores.

Comparison of the low twenty-five per cent of the experimental, control, and no training sections on the first Dyer Backboard Test. Results of these comparisons are shown in Table IV.

On the first Dyer Backboard Test the low twenty-five per cent of each group had mean scores of 16.00 for the experimental group, 17.33 for the control group and 13.17 for the no training group. As in the mean scores for the total groups, the control group seemed to have a slight advantage over the experimental group and both the experimental and control groups have higher scores than the no training group. There were 2.83 points difference between the experimental and no training groups and 4.16 points difference between the control and the no training group.

Median scores of 17.0, 20.0 and 14.0 for the experimental, control, and no training groups respectively, indicate that the mean scores were slightly below the middle ranges of these groups, though not significantly so.

Ranges of 12 to 19 for the experimental group, 7 to 25 for the control group and 7 to 17 for the no training group show that the range of the control group was considerably greater than those of the other two. The standard deviation for the control group was 7.59 points while for the experimental group it was only 2.94 and for the no training group it was only 3.80. Because the top two scores for the control

25, were both above

the control group

and the

control

TABLE IV

COMPARISON OF THE LOW TWENTY-FIVE PER CENT OF THE
CONTROL, EXPERIMENTAL AND NO TRAINING SECTIONS
ON THE FIRST DYER BACKBOARD TEST

Group	Experimental	Control	No Training
Number	3	3	6
Raw Score (total)	48	52	79
Mean	16.00	17.33	13.17
Median	17.0	20.0	14.0
Range	12--19	7--25	7--17
Standard Deviation	2.94	7.59	3.80
Amount learned (Mean minus mean of no training group)	2.83	4.16	

group, 20 and 25, were both above the top score for the experimental group, the control group would have a decided advantage over the experimental group were it not for the low 7 score which was five points below the lowest score in the experimental group.

Comparison of the low twenty-five per cent of the experimental, control, and no training sections on the second Dyer Backboard Test. The comparisons made in this section are shown in Table V.

Mean scores for this second administration of the Dyer Backboard Test were 20.00 for the experimental group, 24.67 for the control group, and 17.17 for the no training group. The relationship of these scores was similar to that of the first administration of the test, the control group being highest, the experimental group second and the no training group lowest. The difference between the experimental and the no training group was only 2.83 points, but the difference between the control group and the no training group is 7.50 points. This would seem to indicate that the control group had made more learning progress than had the experimental group.

Median scores of 22.0 for the experimental group, 27.0 for the control group and 18.0 for the no training group again were slightly higher than the mean scores for these groups.

TABLE V

COMPARISON OF THE LOW TWENTY-FIVE PER CENT OF THE
CONTROL, EXPERIMENTAL AND NO TRAINING SECTIONS
ON THE SECOND DYER BACKBOARD TEST

Group	Experimental	Control	No Training
Number	3	3	6
Raw Score (total)	60	74	103
Mean	20.00	24.67	17.17
Median	22.0	27.0	18.0
Range	16--22	18--29	13--20
Standard Deviation	2.83	4.78	2.79
Amount learned (Mean minus mean of no training group)	2.83	7.50	

Ranges of 16 to 22 for the experimental group, 18 to 29 for the control group and 13 to 20 for the no training group and standard deviations for these same groups in the same order of 2.83, 4.78 and 2.79 indicate that there was still a greater amount of variation in the scores of the control group than in those of the other two.

Comparison of the high twenty-five per cent of the experimental, control and no training sections on the first Dyer Backboard Test. Results of this comparison are shown in Table VI.

With mean scores of 32.67 for the experimental group, 38.00 for the control group and 30.33 for the no training group, again it would indicate that the control group started the experiment with a slight advantage over the others. The difference between the experimental and the control groups was only 2.34 points, while the difference between the control group and the no training group was 7.67 points.

Though there was considerable difference between the mean scores of the experimental and the control groups, the median scores were the same. This would seem to indicate that there was one outstanding player in the upper twenty-five per cent of the control group who was causing that group to have relatively high scores. The median scores for these three groups were 33.0 for the experimental group, 33.0 for the control group and 30.5 for the no training group.

TABLE VI
 COMPARISON OF THE HIGH TWENTY-FIVE PER CENT OF THE
 CONTROL, EXPERIMENTAL AND NO TRAINING SECTIONS
 ON THE FIRST DYER BACKBOARD TEST

Group	Experimental	Control	No Training
Number	3	3	6
Raw Score (total)	98	114	182
Mean	32.67	38.00	30.33
Median	33.0	33.0	30.5
Range	32--33	33--48	29--32
Standard Deviation	.47	7.10	1.11
Amount learned (Mean minus mean of no training group)	2.34	7.67	

In this comparison the median score was lower than the mean, rather than higher as it had been in the preceding comparisons, in all but the experimental group.

The ranges of 32 to 33 for the experimental group, 33 to 48 for the control group and 29 to 32 for the no training group again indicate that, except for the one extremely high score in the control group, the upper twenty-five per cent of the experimental group and of the control group were very nearly alike. The range of the no training group was very near to that of the experimental group and all but the high score of the control group. This might be an indication that not as much benefit was derived by those of higher ability from the small amount of instruction and practice time which had been given at the time of this first administration of the Dyer Test. The experimental and no training groups proved to be quite homogeneous with standard deviations of .47 for the experimental group and 1.11 for the no training group. Due to the one extremely high score, the control group had a standard deviation of 7.67 points.

Comparison of the high twenty-five per cent of the Experimental, control and no training sections on the second Dyer Backboard Test. Results of these comparisons are shown in Table VII.

Mean scores of 39.00 for the experimental group, 37.33 for the control group and 34.50 for the no training

TABLE VII
 COMPARISON OF THE HIGH TWENTY-FIVE PER CENT OF THE
 CONTROL, EXPERIMENTAL AND NO TRAINING SECTIONS
 ON THE SECOND DYER BACKBOARD TEST

Group	Experimental	Control	No Training
Number	3	3	6
Raw Score (total)	117	112	207
Mean	39.00	37.33	34.50
Median	41.0	35.0	33.0
Range	34--42	33-44	30--43
Standard Deviation	3.56	4.78	4.65
Amount learned (Mean minus mean of no training group)	4.50	2.83	

group, showed that in this section the scores in the experimental group exceeded those in the control and no training groups. With a difference of 4.50 points between the experimental and the no training groups and a difference of only 2.83 points between the control and the no training groups, it would appear that more learning had occurred in the experimental group in this instance.

Median scores of 41.0 for the experimental group, 35.0 for the control group and 33.0 for the no training group, again showed the superiority of the experimental group. They also showed that in this group the mean scores were slightly above the middle ranges of the groups in all but the experimental group.

The ranges and standard deviations for all three groups were quite similar. Ranges were 34 to 42 for the experimental group, 33 to 44 for the control group and 30 to 43 for the no training group. The standard deviations for these three groups were 3.56 for the experimental group, 4.78 for the control group, and 4.65 for the no training group. The experimental group appeared to be slightly more homogeneous.

II. ANALYSIS OF SCORES

Since in all comparisons, except those of the second administration of the Dyer Backboard Test to the upper

twenty-five per cent of the three groups, the control group had higher scores than the experimental group and the no training group, it would appear to be safe to assume that the control group had an advantage over the other two groups. That is to say that, tennis knowledge in the control group was greater than in the other two groups at the beginning of this experiment. At the time of the first administration of the test no division of the class had been made and no moving pictures had been taken or projected; therefore, there should have been no significant difference between the experimental and control groups if they really were equated according to ability.

In all except the comparisons made in the upper twenty-five per cent of the groups, the median was slightly higher than the mean. This would seem to indicate that there was some distance between the lower and the middle ranges of all groups.

Differences between the results of the two administrations of the Dyer Backboard Test are shown for all groups in Table VIII. Differences in mean scores for the three groups were 3.93 for the experimental group, 3.08 for the control group and 2.58 for the no training group. Though the experimental group difference was the greatest, there was very little variation among the three groups. The difference in the amount of increase between the experimental and control

groups was nearly twice that of the amount between the control and the no training groups. It would appear from these results that there was not a great deal of increase in tennis ability in any of these three groups. From these results it would appear that none of the methods used had a very great effect on the tennis ability of the class. This might, however, be due to the fact that the results for the low twenty-five per cent of the groups were completely opposite of those for the high twenty-five per cent of the same groups.

In comparing the differences in means in the low twenty-five per cent of each group it was found that there was no difference between the amount of increase in the experimental group and the amount of increase in the no training group. The difference in the control group, however, was considerably higher than these two. Differences in score for these three groups were 4.00 for the experimental group, 7.34 for the control group, and 4.00 for the no training group. From these results it would seem that perhaps time used in taking and projecting moving pictures might have been used more profitably in practice.

When differences in scores were compared for the high twenty-five per cent of each group, the results were opposite those found in the low group. Differences in mean scores for this high section were 6.33 for the experimental group,

TABLE VIII

AMOUNTS OF DIFFERENCES IN RESULTS BETWEEN THE
FIRST AND SECOND DYER BACKBOARD TEST

Group	Raw Score	Mean	Median	Standard Deviation	Per cent of Increase
Totals of All Groups					
Experimental	51	3.93	3	Increased 1.13	15
Control	40	3.08	3	decreased 3.22	11
No Training	62	2.58	1	Increased .21	11
Low Twenty-five Per Cent					
Experimental	12	4.00	5	decreased .11	25
Control	22	7.34	7	decreased 2.81	42
No Training	24	4.00	4	decreased 1.01	30
High Twenty-five Per Cent					
Experimental	19	6.33	8	increased 3.09	19
Control	2 dec.	.67	2	decreased 2.32	1.8 dec.
No Training	25	4.17	2.5	increased 3.54	13

a decrease of .67 in the control group and 4.17 for the no training group. From the results of these scores, it would seem that the students in the high twenty-five per cent of the experimental group did derive some benefit from the use of moving pictures.

In computing the percentage of increase in scores for the three groups, it was found that for the totals of the groups there were increases of fifteen per cent for the experimental group, eleven per cent for the control group and eleven per cent for the no training group. In the low twenty-five per cent of the groups, increases were twenty-five per cent for the experimental group, forty-two per cent for the control group and thirty per cent for the no training group. Percentages of increase in the high twenty-five per cent of the groups were nineteen per cent for the experimental group, a decrease of 1.8 per cent for the control group and thirteen per cent for the no training group. These scores would seem to further substantiate the theory that the moving pictures were of some value in the high twenty-five per cent of the groups, but that the extra practice time was more beneficial for the low twenty-five per cent of the groups.

III. SUMMARY

After tabulation of the results of the two administrations of the Dyer Backboard Test in this experiment, it was found that there was very little difference in results among the three groups when all of each group were considered. From tabulation of results in the low twenty-five per cent of each group, it was found that the experimental and no training groups ranked about the same, but that improvement in the control group was considerably greater. Differences in the scores of the high twenty-five per cent of each group indicated that the control group made no increase in average score, but that the experimental group made a sizable increase of 6.33 points. This would seem to indicate that the experimental group had made superior gains over those of the control and no training groups. Since the results of the tests did not prove to be significant when measured by the critical ratio technique, this conclusion cannot be stated.

CHAPTER V

CONCLUSIONS

I. RESULTS OF CRITICAL RATIO SCORES

Since the results in this experiment were all below that necessary for a critical ratio measurement at the .05 level, it must be stated that statistically the results of this experiment were insignificant. The author feels, however, that had it been possible to use a greater sampling of students, there would have been some measurable results in comparing the low twenty-five per cent of each group and again among the high twenty-five per cent of each group.

In computing the percentage of increase in scores for the three groups, it was found that in the low twenty-five per cent of the groups, the control group having made an increase of forty-two per cent, made the greatest increase in mean score. The percentage of increase for the experimental group was twenty-five per cent and for the no training group it was thirty per cent.

Percentage increases for the high twenty-five per cent of each group were nineteen per cent for the experimental group, thirteen per cent for the no training group and a decrease of 1.8 per cent for the control group. In the opinion of the author these increases would be significant for larger groups.

II. INDICATIONS OF OTHER SCORE TABULATIONS

The amount of increase in mean score of the total experimental group (3.93 points) was slightly more than those in the control (3.08 points) and the no training (2.58 points) groups. From these results, it would appear that, though the moving pictures did not provide an increase in the amount of tennis skill learned, the time taken for photographing and projecting did not cause the members of the experimental group to learn less than the members of the control group. This fact, however, would not warrant the use of moving pictures because the cost of this method is definitely greater.

When percentages of increase were tabulated for all three groups, the results were similar to those reported for differences among mean scores. Percentages of increase for each group were fifteen per cent for the experimental group, ten per cent for the control group and eleven per cent for the no training group. In the low twenty-five per cent of each group the experimental group had an increase of twenty-five per cent, the control group an increase of forty-two per cent and the no training group an increase of thirty per cent. Among the scores of the high twenty-five per cent of each group were increases of nineteen per cent for experimental group, thirteen per cent for the no training group and a decrease of 1.8 per cent for the control group.

After the last projection of the films, the experimenter asked each girl if she thought the moving pictures were of any value to her. All but one girl stated that they did think the movies were helpful and four said that they thought they would have been of more value had they had more time to practice what they saw. Since tennis is considered by most authorities to be a highly complex motor skill, the three showings all occurring within three weeks may not have provided enough time for most of the players to derive a great deal of benefit from them.

Within the low twenty-five per cent of each group, it would appear that students benefited more from the practice time than from the use of moving pictures. In this area the control group had a mean increase of 7.34 points, while both the experimental and no training groups had mean increases of only four points. This would seem to indicate that those with poor muscle coordination benefit more from practice for these particular groups and in this particular activity.

Increases in mean scores for the high twenty-five per cent of each group were 6.33 for the experimental group, 4.17 for the no training group and a decrease of .67 for the control group. This would seem to indicate that those who already possessed some tennis skill or greater motor ability did derive more from seeing their strokes in moving pictures

than the members of the control group did from having only the regular instruction using lecture and demonstrations.

Standard deviations for the experimental and no training groups increased slightly, but the standard deviation for the control group decreased between the two testings. From these results it can be observed that members in all parts of the ranges of the experimental and no training groups increased their scores with more increase being made in the upper ranges of the experimental group. In the control group, little increase was made by members of the lower part of the range. This is further illustrated by tabulations of standard deviations for the lower twenty-five per cent and the upper twenty-five per cent of each group.

From the results in all of these tabulations, it would appear that only the upper twenty-five per cent of the members of the experimental group derived any benefit from the use of moving pictures, and the low twenty-five per cent of the control group derived more from their extra practice time than the low twenty-five per cent of the members of the experimental group did from the use of moving pictures of the nature employed for this experiment.

III. COMPARISON OF RESULTS WITH THOSE OF SIMILAR STUDIES IN THE FIELD OF PHYSICAL EDUCATION

Results tabulated from scores made in this experiment tend to be in agreement with those in studies by Rockwood,¹ and Brown and Messersmith.² In both studies, though it was found that results were not great enough to be significant, slightly greater gains were made by the moving picture groups. Rockwood also found that improvement was greater in the lower twenty-five per cent of the non-movie group than in the lower twenty-five per cent of the movie group, and that improvement was greater for the upper twenty-five per cent of the movie group than for the upper twenty-five per cent of the non-movie group.

Studies completed by Ruffa,³ Gibson,⁴ Lockhart,⁵ and Priebe and Burton⁶ all found a significant difference in favor of the moving picture groups. Since no attempt was made in these experiments to measure specific parts of the groups, no comparisons can be made of high and low scoring groups. Priebe and Burton did state that higher scores were made by the moving picture group in the first part of the

¹Rockwood, op. cit. ²Brown and Messersmith, loc. cit.

³Ruffa, loc. cit. ⁴Gibson, loc. cit.

⁵Lockhart, loc. cit. ⁶Priebe and Burton, loc. cit.

study, but by the end of the study the scores of members of the non-movie group were approaching those of the movie group. From this, he concluded that more was derived from use of moving pictures early in the instructional period than in the latter part. These results would appear to be opposite of those found by Rockwood⁷ in his lower twenty-five per cent tabulations and of those found for the lower twenty-five per cent of each group in the present study.

IV. EVALUATION OF EQUALITY OF GROUPS

For groups used in this study the physical fitness scores used to equate them do not appear to be true predictions of success in the skills of tennis. When the groups were originally equated, mean scores did not vary more than one point. When the experiment was completed, however, three members of the experimental group and two members of the control group had been dropped due to schedule changes, excessive absences, and moving from the school district. When mean scores were tabulated for those remaining in these groups, the experimental group had an advantage of 1.56 points over the no training group and 3.46 points over the control group on the pull-up test. Scores on the fifty yard dash test were still within one point among all three groups.

⁷Rockwood, loc. cit.

Though the experimental group had the advantages listed above on the pull-up test, on the first administration of the Dyer Backboard Test the control group had an advantage of 2.85 points over the experimental group and 5.31 points over the no training group. Since the experimental group had had no moving picture experiences at the time of the first administration of the Dyer Backboard test, the results between the members of that group and the members of the control group should have been similar or perhaps slightly higher for the experimental group, had the physical fitness scores made a true equation of the groups.

Since it cannot be determined by examining the physical fitness scores whether or not the groups were equated according to tennis ability, it is possible that not only did the control group begin the experiment with a slight advantage over the other two, but that the control and experimental groups started the experiment with an advantage over the no training group.

V. EVALUATION OF PUPIL ATTITUDES TOWARD FILMS USED

When moving pictures were being filmed, two of the original sixteen in the moving picture group were somewhat reluctant to have pictures taken. Three members of the same group were quite eager to have these moving pictures made. The remaining members of this group made no comment and were

not asked, therefore, it is not known how they felt at the time of the filming.

After the last projection of each girl's film loop, she was asked if she felt that she had benefited from the use of moving pictures of this type. All but one girl felt that they had received some benefit from them. The one girl had been reluctant to have the moving pictures taken in the beginning, and the same attitude prevailed with her for each of the three showings. Her reason was that it embarrassed her.

When asked what benefit they had derived from using the moving pictures, all comments made were relative to better understanding of the specific corrections which had been indicated to them, both through oral instruction and viewing of the moving pictures.

VI. ALLOWANCE FOR ADVERSE CONDITIONS

Numbers in each of the groups in this experiment were much too small to draw any definite conclusions. Actually they were not large enough even to be a representative sampling of the school in which they were taken. Different conditions prevailing in other classes, however, made it impossible to use larger groups.

With groups of the size used, scores would have to yield exceptionally great differences among the groups to

indicate statistically significant results. The margin of chance for these small numbers is quite large.

Had the experimenter also been the instructor for the classes involved, perhaps the experiment could have been more closely related to the methods of instruction. Plans were made before the start of the experiment by the experimenter working with the instructor, but often, due to administrative difficulties or special problems which arose within the classes, it was necessary to make last minute changes in these plans which greatly affected the experiment. Inclement weather often forced this class to share its facilities with another physical education class. When this happened other activities than tennis were planned for all classes involved. During the time of this experiment, at least six special all school assemblies were called which either shortened the class hour considerably or eliminated it entirely. When these changes occurred on short notice, it was not possible for the experimenter to be present for the class session. After several of these emergency changes, the instructor substituted other days than those originally scheduled for tennis instruction. Due to conflicts, when these other periods of instruction were scheduled, the experimenter was unable to be present.

Because South High School was in its first year of operation when this experiment was made, the tennis courts

had not been completed. The members of this class, therefore, were not able to practice on a regulation size tennis court. All practicing took place in the gymnasium, either by hitting tennis balls against the walls or across lowered volleyball nets. The experimenter feels that this factor greatly affected the attitudes of all players, and it would seem to have an effect on the amount of tennis skill gained by them.

The author was not able to obtain good service on picture development; therefore, a week elapsed between the photographing and the first projection. The pictures would undoubtedly have meant more to the students, had they been able to view them within a day or two of the filming.

VII. EVALUATION OF EQUIPMENT USED

Both the Bolex eight millimeter camera and the Bell and Howell eight millimeter projector used in this experiment yielded sufficient results in picture filming and projecting for the purpose of this experiment.

Pictures taken with tri-X film turned out well in this experiment. The regular gymnasium lights, which were used, provided sufficient light for this highly light sensitive film.

For projection of pictures in this experiment the use of the rear projection screen was beneficial. It was small

and easily stored. A place for using it needed to be no larger than a table three feet wide by four feet long. The instructor could point out errors and other items of importance without interfering with the reflection of the moving picture image.

The author feels that both the eight millimeter equipment and the rear projection screen were quite sufficient in size and quality for use in this experiment. As was previously stated the cost of eight millimeter equipment is only about half that of sixteen millimeter equipment, and the rear projection screen can be constructed from scraps of wood, a belt, a mirror, a piece of cardboard and a piece of tracing paper.

VIII. OTHER EQUIPMENT POSSIBILITIES

A number of types of moving picture viewers are now available, most of which can be used in the gymnasium or an adjoining room without darkening the room. Screens on these viewers vary from one and one-half or two inches in diameter up to two or three feet in diameter. The small viewers are relatively inexpensive and could be added to the equipment of nearly any school physical education department. Viewers of this nature are for individual or small group use. Most viewers of this type are hand driven.

Also available at a very low cost is a peep in type

viewer for individual use. This viewer is about the size of an eight millimeter moving picture camera and is hand driven.

Prices for some viewers are listed in Appendix D.

Other pieces of photographing equipment which might be useful in similar experiments are tripods and moving picture lights. A tripod was not used in this experiment because it was necessary that the photographer be able to move the camera from its place quickly when balls were hit wildly.

Though it was not necessary to use auxiliary lighting in this experiment, the lighting in some gymnasiums might be so inadequate that more light would be needed. The amount of light necessary would vary with the conditions and, therefore, would have to be calculated with the aid of a light meter for each location used. Where lighting and expense are not problems, it might be desirable to occasionally use color films. This also would be a decision to be made for each situation.

IX. RECOMMENDATIONS FOR FURTHER STUDY

The author feels that much more research is needed on using moving pictures in the field of physical education. It would seem that if moving pictures are of value in the field of education, that they would have particular worth in physical education where movement is the main objective.

Some suggestions for further research are: (1) Similar

studies in related skills; (2) Repetition of this study or similar ones in other schools and at other age levels; (3) Intensified study on the effects of moving pictures on students at various levels of skill; and (4) Development of a way of equating groups according to motor ability.

X. SUMMARY

Differences in scores made by groups involved in this experiment were not great enough to be statistically significant for the size of the groups; however, there was a slight difference in favor of the experimental group. When differences in the lower twenty-five per cent of each group were tabulated, the control group appeared to be somewhat superior. Differences in scores in the upper twenty-five per cent of all groups involved indicated the experimental group to be superior.

The results of scores tabulated for this experiment tend to agree with those of studies made by Rockwood⁸ and Brown and Messersmith,⁹ in that there was only a slight difference in favor of the moving picture group.

For this experiment the use of the A. A. H. P. E. R. Physical Fitness Test did not seem to provide a true equation of the groups.

⁸Rockwood, loc. cit.

⁹Brown & Messersmith, loc. cit.

Attitudes of the students in the experimental group toward the moving pictures used appeared to be favorable in all but one instance.

More conclusive results might have been obtained for this experiment had it been possible to have more regularly scheduled classes and regulation tennis courts for practice.

Sight millimeter equipment used in this experiment was quite sufficient in quality to accomplish the desired purpose. Other equipment possibilities might include viewers, tripods, lights, and color films.

Much more research should be completed in the use of moving pictures in various parts of the field of physical education.

Answers to questions in the statement of purpose.

1. Only slightly better results on the Dyer Backboard Test were made by the group having moving pictures taken of the members of that group and projected for them to view, than the group which had only the lecture and demonstration method presented to them.

2. The amount of tennis skill possessed by the student did in this experiment appear to determine the value of using moving pictures, of the type employed, in that (a) the lower twenty-five per cent of the non-movie group made better scores on the second administration of the Dyer Backboard

Test of Tennis Ability than did the lower twenty-five per cent of the movie group and (b) the upper twenty-five per cent of the movie group made better scores on the second administration of the Dyer Test than did the upper twenty-five per cent of the non-movie group.

3. Since the superiority of the moving picture group was not found to be statistically significant, it would not in this particular situation warrant the extra cost involved in using moving pictures.

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CHAPTER VI

SUMMARY

I. STATEMENT OF PURPOSE

The purpose of this paper was to determine the value of the use of moving pictures taken of members of a beginning tennis class, at the high school level, who were in the process of learning the forehand and backhand drives, using an objective method of testing.

II. BACKGROUND MATERIAL

In reviewing reports on related studies, it was found that most authors feel that much more study is needed in the area of visual aids. They also feel that, while it has been demonstrated that some areas can be taught better by moving pictures than by other known methods, there are other subject areas in which the expense of motion picture use would outweigh the value gained from it. Therefore, it would seem to be necessary to study the subject matter of each field of study or activity in order to determine the value of the use of motion pictures in that particular field.

III. PROCEDURES OF THE STUDY

To execute this study two classes at Wichita High School South were selected, one a tennis class and the other

a hockey class. Members of both classes were junior and senior girls. Members of the tennis class were divided into two groups, one of which was designated as the experimental group and the other as the control group. The students in the hockey class were used in order to find the amount of tennis ability and increase in ability in a group receiving no tennis instruction. This hockey class was designated as the no training group. The tennis forehand and backhand drives were presented to the control and experimental groups using the "whole-part-whole" method.

After initial introduction and little practice of these skills by the experimental and control groups, the Dyer Backboard Test of Tennis Ability was given to all three groups. During the remaining weeks of the experiment the control and experimental groups practiced these skills and learned and practiced the other skills necessary for playing tennis. The no training group received no instruction in tennis and was allowed no practice time for this activity.

In addition to this practice, but during practice time, the experimental group had moving pictures taken of their forehand and backhand drives. These moving pictures were projected for them to view, and criticisms were made by the instructor and experimenter once each week during the sixth, seventh, and eighth weeks. The first projection was made on a large screen for the whole group to view at the

same time. The second and third projections were made on a small rear projection screen and only the student and the experimenter were present.

During the ninth week all three groups were again given the Dyer Backboard Tennis Test and results were compared to determine their significance. Methods used in making these comparisons were to compare critical ratio scores; differences in mean, median, and standard deviation scores; and differences in percentages of score increases within each group.

IV. RESULTS

Only slightly better results on the Dyer Backboard Test were made by the group having moving pictures taken of the members of that group and projected for them to view, than the group which had only the lecture and demonstration method presented to them.

The amount of tennis skill possessed by the student did in this experiment appear to determine the value of using moving pictures, of the type employed, in that (a) the lower twenty-five per cent of the non-movie group made better scores on the second administration of the Dyer Backboard Test of Tennis Ability than did the lower twenty-five per cent of the movie group and (b) the upper twenty-five per cent of the movie group made better scores on the second administration

of the Dyer Test than did the upper twenty-five per cent of the non-movie group.

Since the superiority of the moving picture group was not found to be statistically significant, it would not in this particular situation warrant the extra cost involved in using moving pictures. The author feels, however, that much more research is needed before any conclusions can be drawn.

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APPENDIX

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APPENDIX A

SCORES FOR THE PULL-UP AND FIFTY YARD DASH ITEMS ON THE
A.A.H.P.E.R. YOUTH FITNESS TEST

I. EXPERIMENTAL GROUP

Names	Pull-up Scores	50 Yard Dash Scores
Carpenter	40	8.0
Robinson	40	8.0
Price	36	8.3
Sanders	34	8.0
Cornelius	30	8.5
Mullins	30	8.5
Fulcher	30	9.4
Kaufman	30	9.0
Ross	25	8.3
Gier (dropped)	25	10.3
Drake	25	9.5
Avila	23	6.5
Greenfield	20	9.0
Brown	15	8.5
Emley (dropped)	15	8.0
Diffenbaugh (dropped)	10	9.0
 Total group mean scores	 26.75	 8.55
 Mean scores after three members were dropped	 29.08	 8.42

II. CONTROL GROUP

Names	Pull-up Scores	50 Yard Dash Scores
Weed	40	7.0
Bay	40	8.0
Shade (dropped)	40	8.0
Loepp	40	8.5
Pond	38	8.0
Potter	30	8.5
Martin	30	8.5
Flemming	27	8.5
McGlothlin	20	7.0
Lamb	20	9.0
Anderson (dropped)	20	9.5
Weber	16	9.3
Betournay	15	7.0
Benoit	15	8.5
Coles	15	10.3
Total group mean scores	27.67	8.37
Mean scores after two members were dropped	26.62	8.32

III. NO TRAINING GROUP

Names	Pull-up Scores	50 Yard Dash Scores
Irons	40	7.5
Harris	40	7.0
Shurtliff	40	8.5
Goodacre	40	9.0
Jackson	36	9.0
Shea	35	9.0
Costner	33	10.0
Williams	31	8.5
Draper	30	8.5
Reece	30	9.0
Shaw	30	9.0
Bennet	30	9.5
Angleton	29	9.5
Hatfield	25	9.0
Brunk	25	9.5
Kabler	25	10.5
Wilson	23	9.5
Gray	21	9.0
Benham	20	9.5
McCullough	20	9.5
Dueroux	17	9.5
Vannerson	14	9.0
Baer	14	10.0
Kogle	10	10.5
Total group mean scores	27.42	9.19

APPENDIX B

RESULTS OF THE FIRST AND SECOND ADMINISTRATIONS OF THE
DYER BACKBOARD TEST OF TENNIS ABILITY

I. EXPERIMENTAL GROUP

Name	First Test	Second Test
Carpenter	9-10-10	14-12-7
Robinson	10-11-12	9-12-12
Price	8-7-9	10-10-9
Sanders	5-8-9	9-12-12
Cornelius	8-11-11	14-15-12
Mullins	7-9-11	10-5-7
Fulcher	10-10-13	9-12-13
Kaufman	6-5-8	7-7-8
Ross	10-12-12	15-14-13
Gier (dropped)	2-7-7	----
Drake	2-6-4	5-8-3
Avila	8-9-11	8-11-13
Greenfield	7-8-9	7-8-10
Brown	4-6-7	8-6-8
Emley (dropped)	9-9-9	----
Diffenbaugh (dropped)	9-6-9	----

9-7-12
5-6-10

II. CONTROL GROUP

9-17-17
6-8-10
12-9-12
12-13-13
9-10-9

Name	First Test	Second Test
Weed	10-10-11	8-9-10
Bay	8-9-11	8-11-13
Shade (dropped)	----	----
Loepp	14-17-17	14-14-16
Pond	9-13-6	9-12-14
Potter	10-10-13	10-12-10
Martin	7-8-10	11-9-10
Flemming	10-9-10	11-10-11
McGlothlin	9-12-12	10-12-11
Lamb	8-9-10	9-13-11
Anderson (dropped)	----	----
Weber	6-6-8	8-10-11
Betournay	7-10-12	8-11-12
Benoit	8-12-9	10-13-9
Coles	3-1-3	5-6-7

III. NO TRAINING GROUP

Name	First Test	Second Test
Irons	9- 9-12	9-17-17
Harris	5- 6-10	6- 8-10
Shurtliff	10- 6-11	12- 9-12
Goodacre	10-11-10	12-13-13
Jackson	7- 8-10	8-10- 9
Shea	8- 9-10	9-11-10
Cestner	4- 9- 9	5- 8-11
Williams	9-11- 9	12-10-11
Draper	4- 9- 9	5- 8-10
Reece	9-12-11	9-10- 8
Shaw	7- 7- 9	8-10- 9
Bennet	3- 6- 7	7- 5- 7
Angle ton	8-11-10	10- 8- 7
Hatfield	8- 8-11	7- 9- 9
Brunk	5- 7- 8	11- 8- 9
Kabler	3- 5- 9	5- 7- 9
Wilson	4- 7- 6	5- 8- 7
Gray	10-10-11	9-11-10
Bonham	2- 4- 6	6- 6- 5
McCullough	2- 4- 4	5- 4- 5
Dueroux	6- 7-10	7- 8- 7
Vannerson	4- 3- 0	6- 4- 3
Baer	7-10-10	5- 8- 7
Kogle	7- 9- 9	8-11-10

IV. LOW TWENTY-FIVE PER CENT OF ALL GROUPS

Name	First Test	Second Test
<u>Experimental Group</u>		
Drake	2- 6- 4	5- 8- 3
Brown	4- 6- 7	8- 6- 8
Kaufman	6- 5- 8	7- 7- 8
<u>Control Group</u>		
Coles	3- 1- 3	5- 6- 7
Weber	6- 6- 8	8-10-11
Martin	7- 8-10	----
Weed	----	8- 9-10
<u>No Training Group</u>		
Vannerson	4- 3- 0	6- 4- 3
McCullough	2- 4- 4	5- 4- 5
Bonham	2- 4- 6	6- 6- 5
Bennet	3- 6- 7	7- 5- 7
Kabler	3- 5- 9	----
Wilson	4- 7- 6	5- 8- 7
Baer	----	5- 8- 7

V. HIGH TWENTY-FIVE PER CENT OF ALL GROUPS

Name First Test Second Test

Experimental Group

Table with 3 columns: Name, First Test, Second Test. Rows include Ross, Robinson, Fulcher, and Cornelius.

Control Group

Table with 3 columns: Name, First Test, Second Test. Rows include Potter, McGlothlin, and Loapp.

No Training Group

Table with 3 columns: Name, First Test, Second Test. Rows include Williams, Angleton, Irons, Goodacre, Gray, Reece, Shurtliff, and Shea.

APPENDIX C

REVISED DIRECTIONS FOR THE DYER BACKBOARD TEST

OF TENNIS ABILITY

Equipment--1. Backboard or wall, approximately ten feet in height and allowing about fifteen feet in width per person taking the test at one time. Two players taking the test at once has been found to be a very satisfactory arrangement. This allows for adequate supervision by the administrator.

2. On this wall a plainly visible line three inches in width, to represent the net, should be drawn so that the top is three feet from the ground.

3. A restraining line, five feet from the base of the wall, should be drawn on the floor.

4. Stop watch with second hand.

5. Two balls and a racquet per player. It is desirable that the balls be in good condition, although it is not essential that they be exactly new. The racquet should be without flaws.

6. Box for extra balls, about 12 inches long, 9 inches wide and 3 inches deep, placed on the floor where the restraining line joins the side at the left for right handed players and right for left handed players.

7. One pencil per group of four players.

8. Score card per player.

Organization--Divide the group to be tested into units of four players each, and number them from one to four. Provide each player with a score card on which she writes her name. Then read the following description of the test to the group.

"The Backboard Test consists in rallying a tennis ball against the wall. The object of the test is to cause the ball to strike the wall on or above the net line as many times as you can in 30 seconds. (Pause) When I say 'Go!' start the test immediately. Drop the ball and let it hit the

floor once, then put it in play against the wall. Continue to play it to the wall until I say, 'Stop!' at the end of 30 seconds. There is no limit to the number of times the ball may bounce before you hit it. You may volley the ball. The ball need not touch the floor before you play it except at the start and when a new ball is being put in play. You may use any stroke or combination of strokes. You may cross the line to retrieve balls, but any hits made while in such a position do not count. You may use any number of balls. If for any reason you lose control of the ball in play, do not try to retrieve it. Take another ball from this box (indicate clearly) and put it in play as you did at the start. Each ball striking the wall on or above the net line before the word 'Stop!' counts as a hit and scores one point. You will each be given three trials today. The final score on the test is the sum of the scores on the three trials."

Demonstrate the following points:

1. Two balls in hand.
2. Start test by dropping ball, letting it hit floor at least once, then play it.
3. Rally a few times, showing volley.
4. Cross restraining line to retrieve a ball, a low hit to keep it in play and retreat for next shot.
5. Make a wild shot to show how taking another ball saves time. Put this new ball in play as at the start.

Read the following paragraph, making certain that each person understands the test procedure and her duties.

"In each group:"

"No. 1 takes the test. At the signal, 'Ready?' she stands anywhere behind the restraining line with her racquet and two balls prepared to start the test at the word 'Go!'"

"No. 2 counts the number of balls which strike the wall on or above the net line before the word 'Stop!' and enters them on the score card opposite the appropriate trial number. If any infringements are reported by No. 3 these are deducted before the score for the trial is recorded. A ball striking coincident with the word 'Stop!' does not count."

"No. 3 watches the player in relation to the restraining line. She reports to the scorer at the end of the trial the number of hits, if any, made while the player was standing closer to the wall than the restraining line."

"No. 4 collects the balls of her group before the start of a trial and puts them in the box. During the trial she collects and returns to the box any balls going out of play."

"Each person takes the test in rotation. After No. 1 has had her first trial she assumes the duties of No. 2 while the latter takes the test; No. 3 and No. 4 remain the same. While No. 3 takes the test, No. 4 scores the hits, No. 1 and No. 2 assume the duties of No. 3 and No. 4 respectively. When No. 4 takes the test, No. 3 scores hits and No. 1 and No. 2 remain the same. After each person in the entire group being tested has had one trial, the test is repeated in the same order until everyone has had three trials in all."

Answer questions. This organization will consume about ten minutes. Great care should be exercised in these preliminaries to make certain that the test procedure is clearly understood. The testing will then take place smoothly and accurately.

The examiner then assumes a position to the rear of the players with the stop watch, and begins testing the No. 1's who are to take the test at one time, usually one or two. Numbers 2, 3, and 4 of these groups will follow, and then the No. 1 of the next two groups, and so on until all have had one trial, after which the test is repeated twice in the same order. In case the group does not divide exactly into groups of four, adjust groups to suit.¹

¹Dyer, loc. cit.

APPENDIX D

COMPARISON OF PRICES OF EIGHT AND SIXTEEN MILIMETER EQUIPMENT

Eight Milimeter

Sixteen Milimeter

CAMERAS

Tower

Roll Load, Single Lens \$ 59.50
Electric Eye, Turret 125.00

Revere

Roll Load, Single Lens 97.50
Electric Eye, Turret 149.50

Wallensak

Roll Load, Single Lens 69.50
Electric Eye, Turret 139.50

Bell and Howell

Roll Load, Single Lens 39.95
Electric Eye, Turret 169.95

Kodak

Browaie, Single Lens 32.50
Electric Eye, Turret 124.50

Bolex

Roll Load, Single Lens 89.50
Compumatic, Turret 164.50

Wallensak

Low Price Range \$187.50
Upper Price Range 287.50

Bell and Howell

Low Price Range 179.00
Upper Price Range 537.00

Kodak

Low Price Range 198.00
Upper Price Range 445.00

Bolex

Low Price Range 200.00
Upper Price Range 360.00

Pathe Webó

Turret Model 495.00

PROJECTORS

Tower

Roll Load, Single Lens 99.95
Turret Model 159.95

Kodak (Sound)

Low Price Range 295.00
Upper Price Range 850.00

Eight MilimeterSixteen MilimeterKodak

Low Price Range 49.95
Upper Price Range 169.50

Bolex

Low Price Range 149.50
Upper Price Range 194.50

Bell and Howell

Low Price Range 79.95
Upper Price Range 199.95

Keystone

Low Price Range 79.95
Upper Price Range 179.95

Bolex

Low Price Range 499.95
Upper Price Range 799.95

Bell and Howell

Low Price Range 210.00
Upper Price Range 799.95

Revere (silent)

Low Price Range 210.00
Upper Price Range 459.95

Kalart

Low Price Range 479.00
Upper Price Range 534.00

VIEWERS

Baia

Action Viewer 47.50
Upper Price Range 69.50

Bell and Howell

Action Viewer 122.50

Compeo

Action Viewer 49.95

Craig

Action Viewer 79.50

Mansfield

Action Viewer 45.00

Hudson Photographic Industries (Peep-show Type)

Action Viewer 10.95

Baia

Action Viewer 47.50
Upper Price Range 69.50

Bell and Howell

Action Viewer 155.95

Compeo

Action Viewer 49.95

Craig

Action Viewer 79.50

Mansfield

Action Viewer 49.50

Prices for motion picture equipment vary greatly depending upon the company selling them and the firm or individual making the purchase. The prices listed in this table are average prices and were supplied by the courtesy of Roberts Audio-visual Company, Frank Bangs Audio-visual Company and Sears and Roebucks Company, all of Wichita, Kansas.

Equipment listed in this table does not include all equipment made by each company, but only items from the top and bottom extremes of price ranges for the brands listed.

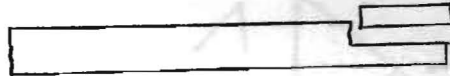
APPENDIX E

CONSTRUCTION OF A REAR PROJECTION SCREEN

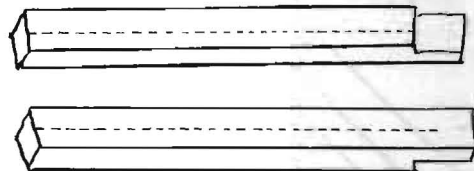
In constructing a rear projection moving picture screen similar to the one used for this study, the following equipment is needed: a saw, two boards approximately one by two by twenty inches in size, a flat head bolt about one and one-fourth inches in length and a washer and square nut to fit it, a piece of cardboard about twelve by eighteen inches in size, and pieces of tracing paper and mirror of the same dimensions as the cardboard.

Procedure.

1. Cut half way through the boards about two inches from one end of each and then cut this short piece off the boards as in drawing 1.



2. Using the saw, cut a groove in each board lengthwise of them. One groove should be the width of the thickness of the cardboard and the other the width of the thickness of the mirror. The groove in one board (board a) should be on the notched side and in the other board (board b) it should be in the un-notched side as in drawing 2.



3. Put the notched sides of the two boards together at the notched area and drill a hole through both boards as in drawing 3.

4.. Insert the bolt in the hole from the un-notched side. Apply the washer and nut on the end of the bolt on the notched side and tighten.

5. Draw lines 2 inches from all four sides of the piece of cardboard, then cut along them to make a frame as in drawing four.

6. Paste the tracing paper to one side of the frame. Some may prefer to reinforce it by pasting a second frame of the same size on the other side of the tracing paper.

7. Insert the frame in the groove of the proper board.

8. Insert the mirror in the groove of the other board.

9. When this is finished the screen should resemble drawing 5.

10. For a sharper image when there is considerable light present in the projection room a dark piece of paper may be put across the top of the screen so that it rests on the top edges of the frame and mirror.

