A COMPARATIVE STUDY OF LEARNING IN BEGINNING ICE SKATING WITH AND WITHOUT USE OF LOOP-FILMS

Thesis for the Degree of M. A.
MICHIGAN STATE UNIVERSITY

Joyce Marie Watson

1962

BUREAU OF EDUCATIONAL RESEARCH
COLLEGE OF EDUCATION
MICHIGAN STATE UNIVERSITY
EAST LANSING, MICHIGAN

A COMPARATIVE STUDY OF LEARNING IN BEGINNING ICE SKATING WITH AND WITHOUT USE OF LOOP-FILMS

By

Joyce Marie Watson

AN ABSTRACT OF A THESIS

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

MASTER OF ARTS

Department of Health, Physical Education, and Recreation

Approved Roy K. Kleinpeter

1962

ABSTRACT

A COMPARATIVE STUDY OF LEARNING IN BEGINNING ICE-SKATING WITH AND WITHOUT USE OF LOOP-FILMS

by Joyce Marie Watson

Statement of the Problem

The purpose of this study was to determine the effectiveness of the use of loop-films in aiding learning among a large group of students in a typical ice-skating class situation.

Methodology

Forty-six female subjects were chosen from two beginning ice-skating classes at Michigan State University. A pre-test was given for the purpose of equating the students. They were judged on a standard progression rating scale by a panel of three experienced ice-skaters having a high degree of knowledge in the field of ice-skating. As a result of the pre-test, the rating agreed on by two out of three judges was used for grouping the students into non-skater and beginner categories.

The selection of teaching methods to be used in the two classes was determined at random by the instructor before classes were in session. The control group was taught by the instructor's traditional method of teaching ice-skating while the experimental class was taught in the same manner with additional aid of loop-films.

The experiment lasted for a period of ten weeks with two one-hour sessions per week on the ice. The two classes were instructed using identical lesson plans and instructional time was held constant. At the time and place of learning the four skills two different teaching methods were applied.

Tests A, B, X and Y were given to all students in both the control and experimental classes. Tests A and B were administered twice during the ten week period to measure early learning, which was improvement made during the initial instruction period beginning from the first day of instruction up until the mid-term test, late learning was the improvement made between the end of the early learning phase and the end of the term, and over-all learning was the total improvement made during the entire term. Tests X and Y measured advanced skill

learning and were administered once at the end of the term.

The arithmetic average of the ratings given by the same panel of three judges was used to collect mean scores on all four tests administered to both groups. All data were statistically treated using analysis of variance.

Conclusion

Subject to the limitations of the study, the following seems justified: The use of loop-films in teaching of ice-skating, is most beneficial during the early learning period.

A COMPARATIVE STUDY OF LEARNING IN BEGINNING ICE SKATING WITH AND WITHOUT USE OF LOOP-FILMS

By

Joyce Marie Watson

A THESIS

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

MASTER OF ARTS

Department of Health, Physical Education, and Recreation

1962

DEDICATION

To my Mom, Dad and Grandmother whose sincere understanding has guided me in making graduate study a reality.

ACKNOWLEDGMENTS

The writer wishes to express her sincere gratitude to her thesis advisor, Dr. Roy K. Niemeyer for his guidance, kindness and sincere enthusiasm in the preparation of this thesis.

Acknowledgments of sincere thanks are also due to the judges Jack Jost, Ronald Pfenning and Milo Burnham for their valuable assistance in the administration of the test items involved in the study.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

The teaching of various physical education skills to large groups of students tends to lead to problems in methods and techniques among physical education instructors. Therefore, an attempt has been made to teach a college co-educational figure skating class with the aid of loop-films as a means to bring about more efficient learning of skills in the shortest time possible. The use of audio-visual aids, as a supplementary teaching device in physical education is by no means a new technique, but has received increasing attention in recent years.

In an article written by Friedrich, he pointed out that audio-visual aids are being used more extensively and effectively for education purposes. He feels that the actual experience of learning by doing will be the basic learning process in physical education but along with actual learning experiences, audio-visual materials when properly used will increase learning and speed up the

learning process.[1] Furthermore, Friedrich concluded that, "audio-visual aids will more effectively portray certain factors vital to the learning experiences, provide clearer concepts, fuller understanding, improve attention, encourage, develop interest and motivate the learner."[2]

Many research studies have indicated positive value when films have been used in teaching certain physical education skills. The purpose of these investigations was to determine the effectiveness of films on learning in relation to various types of physical education teaching situations. Claus reported that, "the teaching of complex skills involving movement of the whole body has been a problem in teaching methods among coaches and gymnasts."[3] In the field of ice-skating, it is evident that some skaters have successfully executed a complex skill on the first trial. Others may spend months working up to a

---

[1]Friedrich, John A. "Teaching Games and Skills Through Sight and Sound," Journal of Health, Physical Education and Recreation. Vol. 23. No. 6. June, 1952. p. 12.

[2]Ibid., p. 12.

[3]Claus, Marshal R. "A Comparative Study of the Part Method vs. the Whole Method in the Learning of a Fly- Away from the Horizontal Bar," Thesis for the degree of MA. Michigan State University, 1961. p. 1.

specific skill through some selected progression of skills and still have difficulty in performing these skills at the time and place of learning. Due to the aforementioned observations, it is therefore necessary to give individual instruction to aid the students in learning skills more efficiently.

Southward stated,

> "Beginning figure skating classes are a challenge for both the student and the instructor. A challenge to the beginner to become aware of total body balance, to sense the feel for controlling skating edges and challenge to instructor to convey these feelings. Before the basic fundamental figure skating skill can be mastered, body balance and skating edges must be thoroughly understood and mastered. Therefore, the skating instructor is challenged to present the often time timid and discouraged beginner the least painful and most effective way to learn the fundamentals. The manner and method used in teaching each skill depend upon the natural ability of the student, the size of the class and the size of the skating area."[4]

There is relatively little research data available pertaining to the best methods of learning complex skills. However, it has been found in research that there is great value in the use of motion pictures as an aid at the

---

[4]Southward, Barbara. "First Lessons in Figure Skating," Journal of Health, Physical Education and Recreation. Vol. 31. January, 1960. pp. 31, 32 and 68.

time and place of learning. Nelson, pointed out that pointed out that studies on the effect of slow-motion loop-films have been constructed of competitive-athletic-type skills and researchers have found improved performances occurring when films of various kinds were used.[5]

This investigation was undertaken to determine a means of teaching two basic skills and two advanced skills involved in a beginning ice-skating class which may make for more efficient learning of the skills in the shortest time possible.

Statement of the problem

This experiment was designed to determine the effectiveness of the use of loop-films in aiding learning among a large group of students in a typical ice-skating class situation.

Objectives:

1. To determine if a difference existed in speed and effectiveness of learning between a group of students taught with the aid of loop-films and

---

[5] Nelson, Dale O. "Effect of Slow-Motion Loop-films on the Learning of Golf," The Research Quarterly. Vol. 29. March, 1958. pp. 37-45.

a second group taught without the aid of loop-films.

2. To determine which method was more effective in early learning on the two basic skills.
3. To determine which method was more effective in late learning on the two basic skills.
4. To determine which method was more effective in over-all learning on the two basic skills.
5. To determine which method was more effective in advanced skill learning.

Scope of the Study

This study involved two beginning co-educational figure skating classes at Michigan State University. The classes were open to all college students to enroll in for a period of ten weeks.

The members of the class had no knowledge that they were being used as subjects in a research study. Therefore, standard methods of instructions and learning conditions were maintained throughout the term so that the students would think that the instructor ordinarily taught the course in this manner. The only difference in the two

methods of teaching was the use of loop-films in the experimental class as an additional aid at the time and place of learning a particular skill.

Purpose of the Study

The purpose of this study was to determine if a difference existed in speed and effectiveness of learning between a group of students taught with the aid of loop-films and a second group taught without the aid of loop-films.

There have been relatively few studies concerned with the problem of teaching ice-skating involved the methodology of teaching ice-skating skills to individuals from a professional standpoint rather than teaching large groups of students from a non-professional standpoint.

Traditional teaching methods in the field of ice-skating emphasized first, the mastery of school figures such as forward outside figure eights and threes before progressing to free style and dance. This approach eventually led to the best learning situation over a longer period of time.

The problem that confronts the instructor in the university situation is one of teaching many skills and techniques within a ten week period with classes meeting for nineteen,

one-hour sessions. One purpose of instruction in ice-skating, as in many other physical education activities, is to enable the student to develop sufficient skill to enjoy participating in ice-skating after completion of the course. Therefore, the ultimate goal is not to emphasize perfection of technique alone, but to stimulate an interest in figure skating by providing opportunities for an early sense of accomplishment.

The present study was undertaken to determine if the use of loop-films would aid the students accomplishment at the time and place of learning the four skills. The purpose of these loop-films, as stated above, were used as supplementary aids during practice sessions. These sessions consisted of repetitive practice on a particular skill. It was hoped that with the use of loop-films during practice sessions the capacity to provide individual help to all students would be increased. Needless to say, one teacher cannot, try as he may, provide maximal assistance to all students without the aid of a supplementary teaching device, such as a loop-film.

There were no studies of methodologies to be found pertaining to teaching methods for a college co-educational figure skating class, or any large group of students.

Limitations of the Study

1. Lack of a standardized test to determine skating ability. Therefore, tests were prepared by the instructor and data were collected on the subjective judgment of a jury.
2. Time of learning was restricted to one school term. Therefore, four tests designed to measure skating ability in four skills were administered throughout the school term.
3. Both groups met on different days but at the same hour.
4. The students in both classes were not restricted as to additional practice when class was not in session.
5. Individual differences in the initial ability of the students in the two classes.
6. The sample population for this study was drawn from the members of the student body at Michigan State University. It cannot be said that the same result would have been achieved with a different sample.

Explanation of Terms

1. Loop-film-16 mm slow-motion pictures were made of the instructor performing the skating skills. These action shots of each skill were cut by the writer into four short lengths. The ends of each length were spliced together to form a short loop-film which could be viewed over and over again.

2. Early learning-improvement made during the initial instruction period, beginning from the first day of instruction up until the mid-term test.

3. Late learning-improvement made between the end of the early learning phase and the end of the term.

4. Over-all learning-refers to the total improvement made during the entire term.

5. School figures-are the basic edges, turns and changes of edge of which free skating is composed. The figures are two-lobed or three-lobed eights skated alternately on the right and left foot to a center or starting point. Each circle should be retraced a number of times on each foot.

6. Edge-the figure skating blade is hollow ground and therefore has two edges on each blade. The edges are referred to as inside and outside edges, coinciding with the inside and outside of the foot. Skating on an edge will take

the skater in a circle.

7. Forward outside eight-is a start from a point on the ice, called the "center" or "starting point" tracing one complete circle on the right outside edge of the skating foot in a forward direction around to the self same starting point. From there stroke off onto a left outside edge and make a continuous forward circle back to the same point, so that the figure as a whole, once executed, will be a smoothly curved eight laid out on the ice for one to see. The mark that has been skated in the ice surface is called the tracing or print.

8. Forward outside three-is a turn from the outside forward edge of a skate onto the inside back edge of the same skate in the direction of travel. The turn occurs at the exact top of the circle, so that for one-half of the figure you travel forward on your right forward outer edge and for the second half you will be traveling backward (but still in the same clockwise direction) on the right back inner edge. From this right back inner edge, step onto the left forward outer edge as you close the first circle and duplicate the turn on the left foot to form the figure eight.

9. Free style-consists of long edges, dance steps, jumps, spins and turns skated over the whole surface of the ice in

rhythm to music.

10. Skating foot-the skate taking the weight on the ice.

11. Skating arm-corresponds to the side of the body with the skate taking the weight.

12. Free skate-the skate off the ice.

13. Free arm-corresponds to the side of the body with the skate off the ice.

14. Basic skills-

1. Forward inside edge roll-is skated on an inside edge with the free arm forward and free skate and leg extended behind the body after the push-off. After push-off, rotate the free leg forward and close pass the skating foot, also bringing free arm back and then glide in this position.

2. Forward outside edge roll-is skated on an outside edge with skating arm forward. The free arm is behind with the free leg extended straight out behind after the push-off. Slowly rotate the free arm and leg forward to complete the roll for the glide.

15. Advanced skills-

1. Open mohawk-is a turn from a forward inside edge on one foot to a back inside edge on another foot. The purpose of this turn is to bring the skater from a forward

skating position into a back skating position.

2. Three-turn-is a turn from a forward outside edge to a back inside edge on the same foot. The purpose of this turn is to bring the skater from a forward skating position into a back skating position.

CHAPTER II

REVIEW OF RELATED LITERATURE

In this chapter is discussed a review of related literature concerning the use of motion pictures as an aid in teaching, teaching methods and motor learning. As stated in Chapter I, there are no studies of methodologies to be found in teaching methods for a college co-educational figure skating class or any large group of students. Therefore, only a brief summary of very closely related studies and findings will be given here.

Motion Pictures. Brown and Messersmith used two tumbling classes taught with and without the using of moving pictures. The total instruction time was held constant and instructional units were identical. The experimental class viewed pictures of experienced tumblers and later viewed pictures of themselves performing these selected stunts during their class period. As a result of the study, Brown and Messersmith stated,

> "The experimental class made a little more progress than did the control class as measured by the scores on the final battery of tests, but the

> superiority was not statistically significant. There is a great need for more studies dealing with the use of motion pictures and the learning of motor skills."[1]

Nelson used forty-seven adult men and women who had never swung a golf club, gave a pre-test and matched them into two groups to study the effect of slow motion loop-films on the learning of golf. He pointed out, that this study showed no statistical significance, but also what happens in golf instruction may be entirely different from what happens in the learning of other athletic skills. However, it did help in pointing out the intricacies of complex gross motor movement. Both of the groups made gains in learning as was evident by the scoring techniques. The films seemed to favor the learning of golf in the later stages of instruction but not in the early stages. Further breakdown of Nelson's study indicated greater learning in the early stages for the lower levels and greater learning in the later stages for the upper levels.[2]

---

[1]Brown, Howard S., and Messersmith, Lloyd. "An Experiment in Teaching Tumbling With and Without Motion Pictures," The Research Quarterly. Vol. 19. No. 4. December, 1948. pp. 304-307.

[2]Nelson, Dale O. "Effect of Slow Motion Loop-films on the Learning of Golf," The Research Quarterly. Vol. 29. March, 1958. p. 45.

Lockhart pointed out that in any learning problem there is a need to acquire an intellectual concept or clear picture of just what is expected. In this study the film did assist in this concept for the movie groups grasped the skill quicker than the non-movie group. The evidence from this study indicated that the motion picture was of most value not in the first stages, but after the third week when there had been some practice in the skill. She stated,

> "Since the film contained precisely the material which was to be learned, and since the film could be shown at exactly the time it seemed needed, it probably did assist in providing the desired intellectual concept of the bowling skill."[3]

Huelster suggested that the use of motion pictures was a good device in analyzing performance. She felt that by showing good mechanics of movement and then testing it on good and poor performances as it is seen, is excellent drill in keen observation. Most films picture the skills used in one game or one sport together, but she felt it was even more helpful for purposes of analysis to show

---

[3]Lockhart, Aileen. "The Value of the Motion Picture as an Instructional Device in Learning a Motor Skill," The Research Quarterly. Vol. 15. May, 1944. pp. 181-187.

similar skills of different sports being filmed one after another. However, motion pictures of the students themselves in action is revealing, too, for self analysis.[4]

Hupprich stated,

> "Frequently it is desirable to demonstrate some motor skill such as the tennis serve at a slow rate of speed. The slow motion picture can depict correct action better than the instructor who attempts to introduce slow motion into her activity. It has been clearly shown in studies of manual work in industry that the skilled workman adopts an entirely different style when he slows down his activity for the sake of demonstration to a beginner. Slow demonstrations in most activities can best be given by means of slow motion pictures. They should come into greater use than at present. There is no doubt that the slow motion picture is the ideal medium for presenting a motor activity such as the tennis serve as an integrated rhythmic movement."[5]

Ruffa stated,

> "Results of this experiment indicated conclusively the positive value of using films to teach certain athletic skills. The film employed was constructed particularly for the use in this experiment. It was of great help in presenting the desired material and it is evident that the use of

---

[4] Huelster, Laura J. "Learning to Analyze Performance," Journal of Health, Physical Education and Recreation. Vol. 10. No. 2. February, 1939. pp. 84, 121-122.

[5] Hupprich, Florence. "The Use of Visual Aids in Teaching Tennis," Journal of Health, Physical Education and Recreation. Vol. 12. No. 2. February, 1941. pp. 93-95.

> films would more than likely be of great benefit in many other track events, as well as other athletic sports."[6]

Glassow pointed out that the physical educator is in step with the academic profession in the belief that motion pictures are valuable teaching aids. Due to the review of films, publications, and listings by physical education committees there was an indication that the physical educator had accepted the instructional value of films.[7]

Priebe and Burton expressed positive value in the use of loop-films as is stated by the following conclusions.

> "(1) The use of slow motion pictures in coaching the high jump eliminated, to a large extent, the initial period of trial and error. (2) The use of slow motion pictures in coaching the high jump made for faster progress and better achievement. (3) Illustrations of good form in slow motion pictures seem definitely superior to verbal directions and physical demonstrations 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)

---

[6]Ruffa, Edward J. "An Experimental Study of Motion Pictures as Used in the Teaching of Certain Athletic Skills." Unpublished Master's Thesis, Leland Stanford University, April, 1936.

[7]Glassow, Ruth. "Motion Pictures as Teaching Aids," Journal of Health, Physical Education and Recreation. Vol. 13, No. 8. October, 1942. p. 463.

> The use of slow motion pictures enable the coach to handle effectively a large 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. (7) The general conclusions derived from this experiment seem to be in agreement with those derived from investigations of the use of motion pictures in other forms of learning."[8]

Motor Learning. Nelson, points out a view expressed by Ragsdale, most laws and principles of the learning of motor activities were based on experiments which involved only verbal and symbolic material. He casted doubt on the validity of commonly accepted principles of learning as true in the acquisition of the physical skills. He felt that slow motion pictures can do a better job of pointing out the things that are taking place and the relationship of parts to the whole in a clearer way than when the motion is at normal speed. Therefore, he indicated that slow motion films should be of some value during the learning process.[9]

Bruce stated, "Perhaps the greatest contributions of

---

[8] Priebe, Roy and Burton, William. "The Slow Motion Picture as a Coaching Device," School Review. Vol. 47. January-December, 1939. pp. 192-198.

[9] Nelson, Dale O., "Effect of Slow Motion Loop-films on the Learning of Golf."

this study has been to indicate that there are probably different types of motor learning, and that motor learning of "sport type" skills is dependent to a considerable extent upon physical fitness expressed in terms of strength, speed, agility and power."[10]

Seashore, in his study, found no over-all positive dependence or interrelatedness of fine and gross motor abilities in his experimentation. It would seem, therefore, that theories of learning for complex muscle acitivities should be based on experimentations using large muscle activities, preferably under conditions resembling typical learning situations.[11]

Teaching Methods. House stated,

> "The teacher should realize he is teaching an individual and not merely an activity; that methods, techniques, procedures and courses of study are only to be used as aids to the greater task. Therefore, he should be concerned with two groups of objectives-his own and those of the pupil. The concept that the best education for the individual is the education that best meets his immediate needs must have its influence on methodology. To feel that one is teaching something that is

---

[10] Bruce, D.K. "Studies in Motor Learning of Gross B Bodily Motor Skills," The Research Quarterly. Vol. 17. December, 1946. pp. 242-253.

[11] Seashore, Harold G. "Some Relationships of Fine and Gross Motor Abilities," The Research Quarterly. Vol. 13. October, 1942. p. 259.

vital and alive to teacher and pupil alike gives one stimulating and enobling inspiration."[12]

Kretchmar conducted a survey of research in the teaching of sports and from his finding stated,

"In general, the impression built up through study of these materials is the research has barely begun on the heart of learning and teaching problems. Tnis is not only true with respect to the visual factors, but with relations to other factors as well."[13]

Knapp and Hagman felt there was a definite need in motor learning for experimentation in real teaching situations. They reported,

"Much of the research on learning consists of experimentation don under closely controlled laboratory circumstances. Because of the complex factors inherent in both the learning organisms and the environment, very often the experimental results are manifestations purely of the precise situation. Some caution, therefore, must be exercised in directly translating laboratory findings to classroom problems. Fundamental need exists for more

---

[12] House, H. H. "The Problems of Methods and Techniques in Teaching," Journal of Health, Physical Education and Recreation. Vol. 12 No. 1. January, 1941. pp. 24, 25 and 31.

[13] Kretchmar, Robert. "A Survey of Research in the Teaching of Sports," The Research Quarterly. Vol. 20. No. 3. October, 1949. pp. 238-247.

profound research on learning in relation to varying types of physical education teaching situations."[14]

Friedrich stated,

> "The main value of audio-visual aids in physical education is that a large group can be contacted and instructed through their use. This is an important consideration because large groups are the rule in physical education classes. Therefore, mass instruction is not the most effective method of teaching, but until smaller classes can be arranged, teaching large groups will be necessary and with the proper use of audio-visual aids this can be handled. The use of mass instructional aids requires preparation and follow-up and can only be supplementary to instruction and education. There is definite need for more complete and more intelligent use of audio-visual aids in the field of physical education. Through research studies, it was shown that the use of motivation and participation questions tends to increase learning at least 6 percent. This is true in the physical education field because more can be learned and learned faster, by seeing a physical education skill performed than by seeing it explained; and more still can be learned by combining the two, seeing and hearing."[15]

Murin, Hayes and Harby did a study on the comparison of two teaching methods to investigate the practical

---

[14]Knapp, Clyde and Hagman, Patricia. "Teaching Methods for Physical Education." New York: McGraw-Hill Company Inc. 1953. p. 32.

[15]Friedrich, John A. "Teaching Games and Skills Through Sight and Sound," Journal of Health, Physical Education and Recreation. Vol. 23. No. 6. June, 1952. p. 12.

implications of the findings that film demonstrations are at least as effective as a live instructor's demonstrations. The study was designed so that an inexperienced person who could not perform the skills was almost entirely dependent upon film deomonstration, while an experienced person taught using conventional teaching methods without use of films. As a result of the findings from this study the author recommended that in the case of a shortage of trained instructors, perceptual-motor skills can be taught effectively by inexperienced instructors using projection of film loops which provide demonstrations of the skill.[16]

Harby conducted a further investigation to evaluate the best methods of instruction with the practical requirements of perceptual-motor training. He concluded that,

> "(1) A motion picture demonstration is as effective as a live instructor's demonstration. (2) Demonstrations interspersed with practice may be slightly superior to massed demonstrations. (3) Interspersed movie demonstrations and practice is somewhat more effective than free choice of the learner to view the

---

[16] Murin, J.A., Hayes, W., and Harby, S.F. "The Daylight Projection of Film Loops as the Teaching Medium in Perceptual-Motor Skill Training," The Instructional Film Research Program. Pennsylvania State College. May, 1952. p. 8.

films at his own prerogative. (4) Coaching during practice is of significant value."[17]

A study undertaken by Harby to emphasize and encourage "mental practice" during film-showings pointed out that the combination of "mental practice" and "physical practice" are probably more effective than either "mental practice" or "physical practice" alone.[18]

Summary

The related literature in the foregoing chapter indicates that the value of the motion picture, as an aid in learning, has been pointed out by a number of people in a variety of studies. Most of the research has indicated that the use of films enhances the learner at various stages of the learning process. Although most of the studies lack statistical significance, there seems to be a trend toward better learning through the use of motion pictures. Therefore, there is a definite need for more profound research of learning in relation to various types of teaching situations.

---

[17] Harby, S.F. "Evaluation of a Procedure for Using Daylight Projection of Film Loops in Teaching Skills," Instructional Film Research Program. Pensylvania State College. May, 1952. p. 8.

[18] Harby, S.F. "Comparison of Mental Practice and Physical Practice in The Learning of Physical Skills," Instructional Film Research Program, Pennsylvania State College, June, 1952. p. 10

CHAPTER III

METHODOLGY

Statement of the Problem

The experiment was designed to determine the effectiveness of the use of loop-films, used as supplementary aids, in teaching ice-skating among a large group of university students.

Selection of the Sample for Study

For the purpose of this study the instructor chose two beginning co-education ice-skating classes at Michigan State University in East Lansing, Michigan. The students elected the ice-skating class in which they were enrolled. The classes were offered to all freshmen, sophomore, junior and senior students as a one credit elective course in physical education.

The two classes were fairly equal in size with nine boys and thirty-nine girls in the Monday and Wednesday, ten to eleven-thirty class and eleven boys and thirty-five girls in the Tuesday and Thursday, ten to eleven-thirty class.

Both sections of the class were taught by the experimenter.

As many students as possible were to be used in the study. However, due to individual differences and a small enrollment of male students it was necessary to use only female students for the purpose of collecting data. Therefore, as a result of the pre-test, used for the purpose of equating the students to be matched for comparison in both classes, ten non-skaters and thirteen beginners from each of the two classes were used as subjects. The students ranked as non-skaters had no knowledge of how to skate. The students ranked as beginners were able to skate forward and backward.

Method of Instruction

The primary objective of this study was to determine the effect of loop-films on the rate and ability to learn ice-skating skills. Therefore, the instructor selected two basic skills and two advanced skills from the ten week unit plan outline. In order to facilitate the accomplishment of this objective, one of the classes was taught by the instructor's traditional method of teaching ice-skating while the other class was taught in the same manner with additional aid of loop-films. The selection of teaching

method to be used in the two classes was determined at random by the instructor before classes were in session.

From this point on the Monday and Wednesday ten o'clock ice-skating class, taught by the traditional method, will be referred to as the control group. The Tuesday and Thursday ten o'clock ice-skating class, taught with the aid of loop-films, will be referred to as the experimental group.

Both ice-skating classes consisted of two hours of class instruction each week on the ice. The two classes were instructed using identical lesson plans and instructional time was held constant.[1] At the time and place of learning the four skills, two different teaching methods were applied.

The teaching methods with reference to the four skills, for both the control and experimental groups are described below:

Control Group.

1. Students received lecture and demonstration of the skill by the instructor.

---

[1] A copy of the ice-skating lesson plans may be found in Appendix A.

2. As a group the students practiced the skill while the instructor frequently explained and demonstrated.
3. Students were given a practice session during which time as many students as possible received coaching from the instructor.
4. Students continually received interspersed, live demonstrations followed by a practice session.

Experimental Group.

1. A loop-film depicting the particular skill to be learned was shown. Lecture by the instructor was provided along with the film.
2. Students were given a practice session, along with coaching, during which time those having difficulty in performance were referred to the film by the instructor. However, any student at any time was free to analyze and evaluate his performance in comparison to that depicted in the film.
3. Students continually received interspersed movie demonstrations followed by a practice session.

The film was planned by the instructor and therefore contained the fundamentals of the skill to be learned and evaluated.

Experimental Procedure

Tests

Pre-test. Both classes participating in this study were given a pre-test to determine the initial ability in order to equate the groups. The pre-test was constructed by the instructor and based on a progression rating scale.[2]

All students were given a subjective rating by three independent judges who ranked each student on the scale. The pre-test scale was as follows:

1. Non-skaters-had no skating ability and therefore could not manuever on skates.

2. Beginners-able to skate forward and backward, but with no control of edges.

3. Intermediates-able to skate forward and backward with control of forward edges.

4. Advanced-able to do all of the above, control back edges and execute turns from a forward skating position to a back skating position.

Four Skills Tests. For the purpose of measuring skating ability it was, therefore, necessary for the

---

[2] A copy of the pre-test may be found in Appendix B.

instructor to construct a means of evaluating the students' proficiency in the four skills to be administered on a progression rating scale.[3]

From this point on the four skills will be referred to as:

Basic Skills

Test A-forward inside edge roll.

Test B-forward outside edge roll.

Advanced Skills

Test X-mohawk turn.

Test Y-three turn.

The point values on the scale for tests A, B, X and Y began at 1 (poor), 2 (fair), 3 (average), 4 (good), 5 (very good). All of the tests consisted of five steps on the progression scale and each step was rated on a point basis of 1 to 5. The highest possible score that could be given by a single judge for each test was a total of 25 points. Appendix C denotes the progression steps and method of rating for each of the four tests to be administered.

Judging of Tests. A panel of three experienced ice-skaters, each having a high degree of knowledge in the

---

[3] Copies of the four skills test may be found in Appendix C.

field of ice-skating, administered all tests to both the control and experimental groups.

The pre-test, given on the second day of class, was for the purpose of ranking the students in both the control and experimental groups. After the initial testing period, the rating agreed on by two out of three judges was used for grouping the members of the control group to be matched with those of the experimental group with reference to sex and ranking on the rating scale.

Tests A, B, X and Y were given to all students in both the control and experimental class. The reason for this was so that the judges would be unaware of which students were being used as subject for the study.

On all of the above four skills to be learned it is valid to state that all the students used as subjects began at zero level. That is, they had no prior skills in these test items.

Tests A and B were administered twice during the ten week period to measure early learning, late learning and over-all learning. Test X and Y were administered once at the end of the term. The latter two tests were advanced skills, taught during the latter part of the ten week period, and were used to compare the degree of advanced skill learning

between the two groups. Appendix A denotes the days devoted to testing.

The student was allowed to skate each skill across the rink. Therefore, she performed as many repetitions as possible of each skill.

The arithmetic average of the ratings given by the panel of judges was used to collect individual scores. This method was used on tests A, B, X and Y.

Statistical Analysis

Analysis of variance was applied to find the differences within the groups and between the groups. When comparing learning within groups and between groups, non-skaters were always compared to non-skaters and beginners to beginners. Due to the difference in the degree of difficulty in all four tests and the difference in the amount of time spent learning each skill the skills are incomparable to each other.

On page 32 is a table showing the procedure used for testing between and within groups for the four tests to be administered.

TABLE I

TEST SCHEDULE IN REFERENCE TO LEARNING

BASIC SKILL INSTRUCTION AND PRACTICE		ADVANCED SKILL INSTRUCTION AND PRACTICE PLUS BASIC SKILL REVIEW	
	Test A_1	Test A_2	Test X
Pre-test	Test B_1	Test B_2	Test Y
0 Early Learning		Late Learning	
		Advanced Skill Learning	

Over-all Learning Test A and B

Pre-test-equated two groups in the control and experimental class

Basic Skills-Test A--inside edge roll
Test B--outside edge roll

Advanced Skills-Test X--mohawk turn
Test Y--three-turn

These tests were set-up in the following manner to find the learning differences

Procedures for Measuring Learning Within Groups:

1. Test A_1 and B_1--early learning measures
2. Difference between A_1 and A_2, and B_1 and B_2-late learning measures
3. Tests A_2 and B_2--over-all learning measures
4. Tests X and Y--advanced skill over-all learning measures

TABLE I (Continued)

Procedures for Measuring Learning Between Groups:

C Control group E Experimental group

1. $C\text{-}A_1$ and $E\text{-}A_1$--early learning measures

2. $C\text{-}B_1$ and $E\text{-}B_1$--early learning measures

3. Differences between ($C\text{-}A_1$ to $C\text{-}A_2$) and ($E\text{-}A_1$ to $E\text{-}A_2$)--late learning measures.

4. Differences between ($C\text{-}B_1$ to $C\text{-}B_2$) and ($E\text{-}B_1$ to $E\text{-}B_2$)--late learning measures.

5. $C\text{-}A_2$ and $E\text{-}A_2$--over-all learning measures

6. $C\text{-}B_2$ and $E\text{-}B_2$--over-all learning measures

7. C-X and E-X--advanced skill learning measures

8. C-Y and E-Y--advanced skill learning measures

CHAPTER IV

RESULTS

The purpose of this study was to determine the effectiveness of the use of loop-films in aiding learning among a large group of students in ice-skating. Four skill tests were designed and administered by the instructor to both the experimental and control groups.[1]

In this chapter will be discussed the data collected from the experimental group, taught with the aid of loop-films and the control groups, taught without aid of loop-films. Data were accumulated for a total of forty-six subjects. Of this total, twenty were non-skaters and twenty-six were beginners.

Improvement was measured within groups, and a comparison of this improvement was made between the two groups. Gain within groups was measured by the difference between tests.

---

[1] The raw scores between and within groups on the four tests administered may be found in Appendix D.

Results of Test A_1 and A_2

Figure 1 indicates mean scores while Tables II, III, and IV show the statistical results, obtained by analysis of variance, which compare final performance during the various learning stages.

TABLE II

COMPARISON OF EARLY LEARNING BETWEEN EXPERIMENTAL AND CONTROL GROUP ON TEST A_1 (FORWARD INSIDE EDGE ROLL)*

	Sum of Squares	df	Mean Square	f-Ratio
Between Groups--Experimental vs. Control				
Group	22.96	1	22.96	1.89
Error	533.09	44	12.19	
Total	556.05	45		
Within Groups--Experimental Non-Skaters vs. Control Non-Skaters				
Group	32.03	1	32.03	2.34
Error	245.90	18	13.66	
Total	277.93	19		
Within Groups--Experimental Beginners vs. Control Beginners				
Group	1.77	1	1.77	.16
Error	259.83	24	10.83	
Total	261.60	25		

*No significance in early learning between groups or within groups on Test A_1.

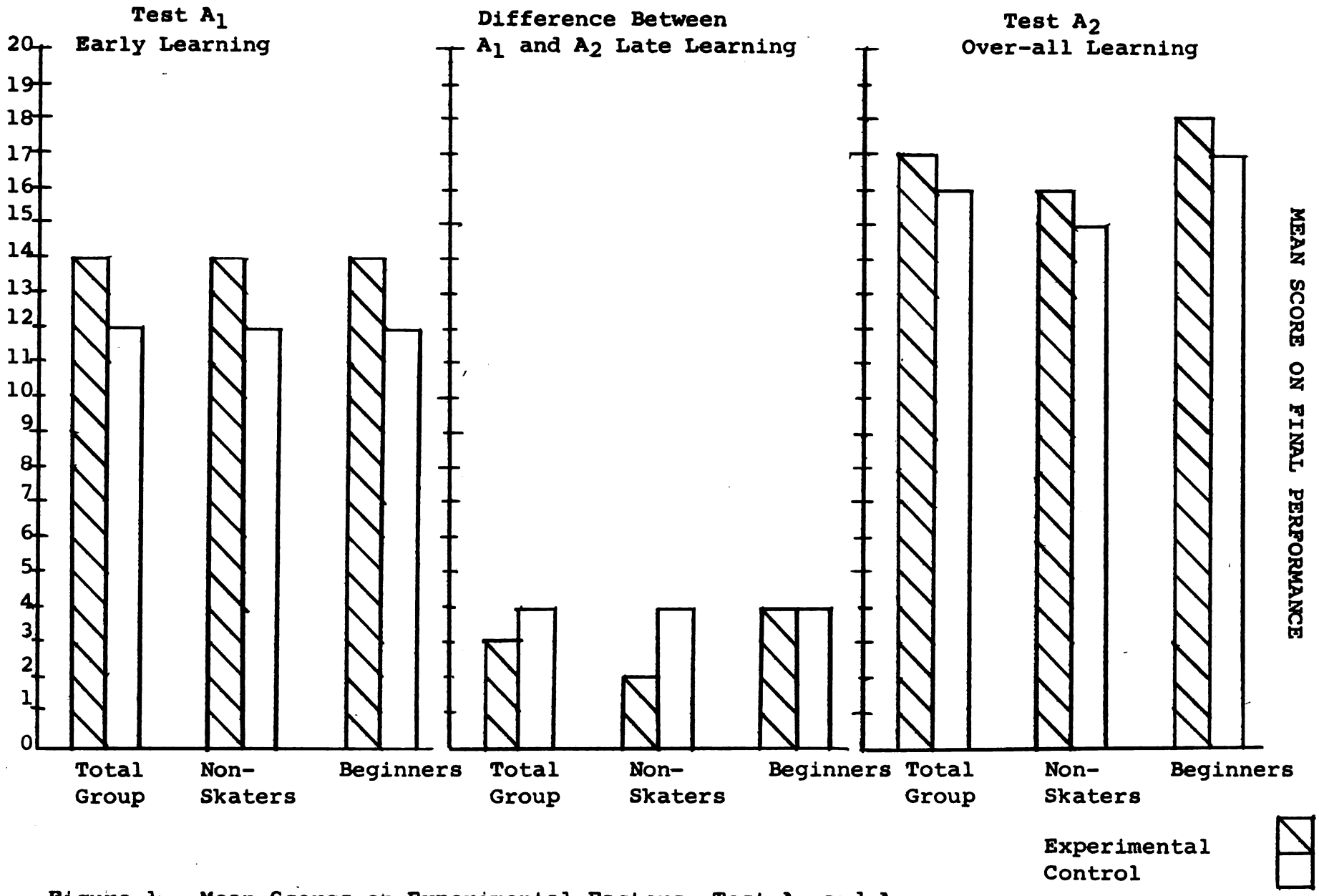

Figure 1. Mean Scores on Experimental Factors Test A_1 and A_2--
Forward Inside Edge Roll

TABLE III

DIFFERENCE BETWEEN TEST A_1 AND A_2 (FORWARD INSIDE EDGE ROLL) FOR COMPARISON OF LATE LEARNING BETWEEN EXPERIMENTAL AND CONTROL GROUP.*

	Sum of Squares	df	Mean Square	f-Ratio
Between Groups--Experimental vs. Control				
Group	.97	1	.97	.13
Error	336.96	44	7.66	
Total	337.93	45		
Within Groups--Experimental Non-Skaters vs. Control Non-Skaters				
Group	11.55	1	11.55	1.52
Error	136.38	18	7.58	
Total	147.93	19		
Within Groups--Experimental Beginners vs. Control Beginners				
Group	2.78	1	2.78	.36
Error	186.15	24	7.76	
Total	188.93	25		

*No significance in late learning between groups or within groups between Test A_1 and A_2.

TABLE IV

COMPARISON OF OVER-ALL LEARNING BETWEEN EXPERIMENTAL AND CONTROL GROUP ON TEST A_2 (FORWARD INSIDE EDGE ROLL).*

	Sum of Squares	df	Mean Square	f-Ratio
Between Groups--Experimental vs. Control				
Group	13.97	1	13.97	1.33
Error	461.16	44	10.48	
Total	475.13	45		
Within Groups--Experimental Non-Skaters vs. Control Non-Skaters				
Group	5.52	1	5.52	.86
Error	111.72	18	6.43	
Total	121.24	19		
Within Groups--Experimental Beginners vs. Control Beginners				
Group	9.	1	9.	.68
Error	318.86	24	13.29	
Total	327.86	25		

*No significance in over-all learning between groups or within groups on Test A_2.

Results of Test B_1 and B_2

The following Figure 2 indicates mean scores while Tables V, VI and VII show the statistical results, obtained by analysis of variance, which compare final performance during the various learning stages.

TABLE V

COMPARISON OF EARLY LEARNING BETWEEN EXPERIMENTAL AND CONTROL GROUP ON TEST B_1 (FORWARD OUTSIDE EDGE ROLL).*

	Sum of Squares	df	Mean Square	f-Ratio
Between Groups--Experimental vs. Control				
Group	43.82	1	43.82	3.74
Error	480.07	44	10.91	
Total	523.89	45		
Within Groups--Experimental Non-Skaters vs. Control Non-Skaters				
Group	4.90	1	4.90	.58
Error	151.93	18	8.44	
Total	156.83	19		
Within Groups--Experimental Beginners vs. Control Beginners				
Group	23.07	1	23.07	1.84
Error	300.04	24	12.50	
Total	323.11	25		

*No significance in early learning between groups or within groups on Test B_1.

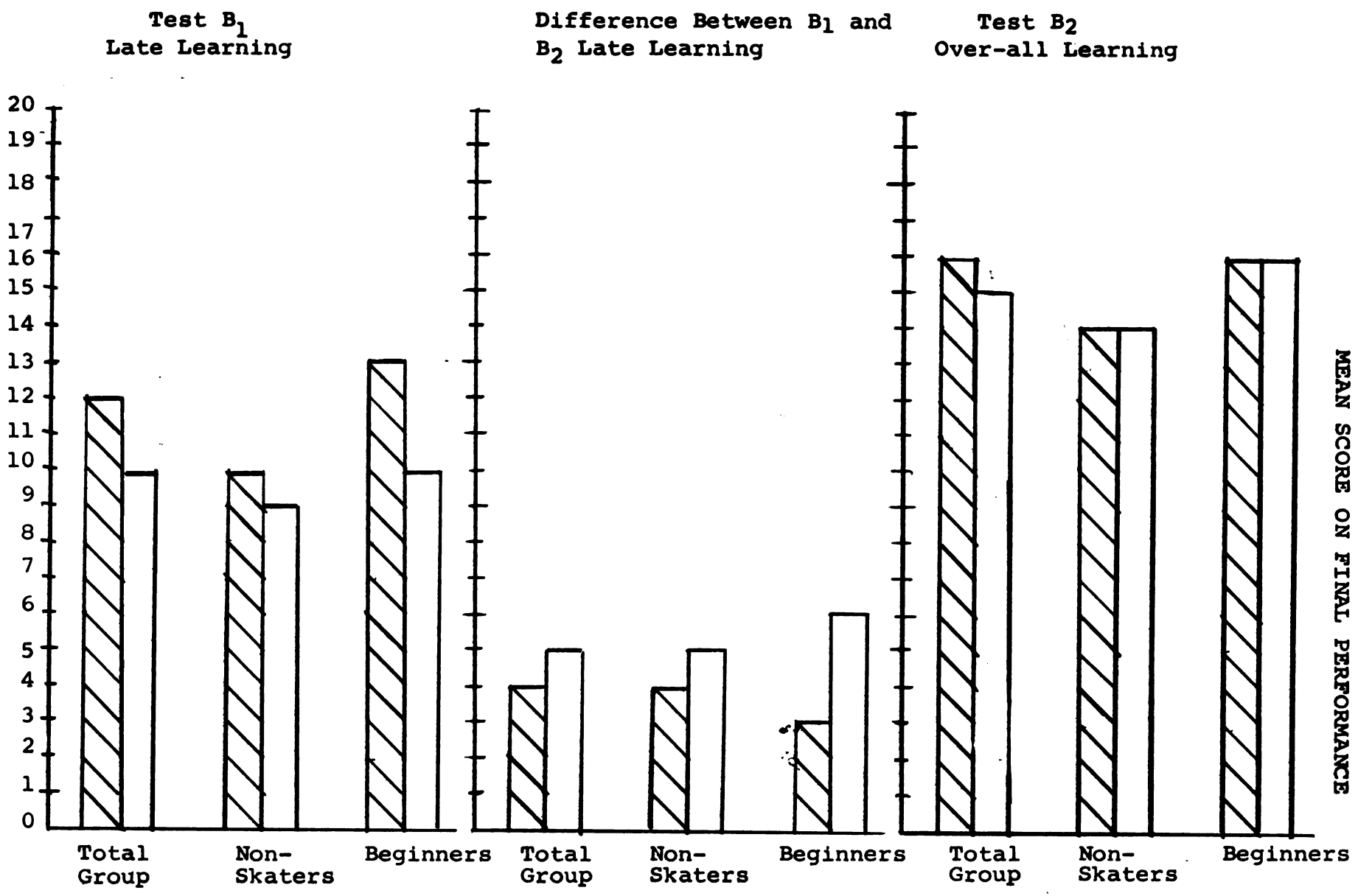

Figure 2. Mean Scores on Experimental Factors. Test B_1 and B_2 Forward Outside Edge Roll.

TABLE VI

DIFFERENCE BETWEEN TEST B_1 AND B_2 (FORWARD OUTSIDE EDGE ROLL) FOR COMPARISON OF LATE LEARNING BETWEEN EXPERIMENTAL AND CONTROL GROUPS.

	Sum of Squares	df	Mean Square	f-Ratio
Between Groups--Experimental vs. Control				
Group	32.72	1	32.72	3.53
Error	408.26	44	9.28	
Total	440.98	45		
Within Groups--Experimental Non-Skaters vs. Control Non-Skaters				
Group	2.25	1	2.25	.19
Error	217.18	18	12.07	
Total	219.43	19		
Within Groups--Experimental Beginners vs. Control Beginners				
Group	39.63	1	39.63	5.23*
Error	181.92	24	7.58	
Total	221.55	25		

*The f-Ratio of 5.23 within the experimental and control beginner group was significant at the 5 per cent level indicating more proficient learning in the control beginner group.

TABLE VII

COMPARISON OF OVER-ALL LEARNING BETWEEN EXPERIMENTAL AND CONTROL GROUP ON TEST B_2 (FORWARD OUTSIDE EDGE ROLL).*

	Sum of Squares	df	Mean Square	f-Ratio
Between Groups--Experimental vs. Control				
Group	.81	1	.81	.056
Error	630.97	44	14.34	
Total	631.78	45		
Within Groups--Experimental Non-Skaters vs. Control Non-Skaters				
Group	.51	1	.51	.053
Error	161.18	18	8.99	
Total	161.69	19		
Within Groups--Experimental Beginners vs. Control Beginners				
Group	.32	1	.32	.018
Error	415.00	24	17.29	
Total	415.32	25		

*No significance in over-all learning between groups or within groups on Test B_2.

Comparison of Results on Tests A and B

Early Learning. A statistical analysis indicated no significant difference in learning, at the 5 per cent level, on Test A_1 and B_1 between and within groups. However, in reference to the raw scores found in Figures 1 and 2, the experimental group appeared to learn better in the early learning period. It is very interesting to note on Test A_1 that the experimental non-skaters reached the same level of learning as the experimental beginners while the learning among the control non-skaters was less as compared with control beginners. On Test B_1 there was also very little improvement difference between control non-skaters and control beginners while a great deal of learning, not significant, occurred between experimental non-skaters and experimental beginners.

Late Learning. A statistical analysis on Test B showed in significant improvement within the control beginner group. In reference to the raw scores found in Figure 1 and Figure 2, indicates that it took the non-film group a longer period of time to learn the basic skills. It is evident from the results, shown on Test B, that most of the learning occurred in the control group during the late learning period.

Over-all Learning. It is evident from the previous observations that the experimental group, on Test A_1 and B_1, was more proficient in learning during the early learning period but the control group was more proficient in the late learning period. Consequently, the over-all learning on Test A_2 and B_2 resulted in equal learning between and within groups.

Results of Advanced Skill Tests X and Y

The following Figure 3 indicates mean scores while Tables VIII and IX show the statistical results, obtained by analysis of variance, wnich compare final performance on advanced skill learning.

The f-Ratio of 7.83 between the experimental and control group indicated a significant difference at the 1 per cent level with the experimental group being far superior in learning.

The f-Ratio of 5.59 within the experimental and control beginner group was significant at the 5 per cent level indicating that the experimental beginner group was superior in learning. It is also interesting to note by looking at the raw scores in Figure 3 (although not statistically significant) that the experimental non-skaters learned better than both the control non-skaters and beginners.

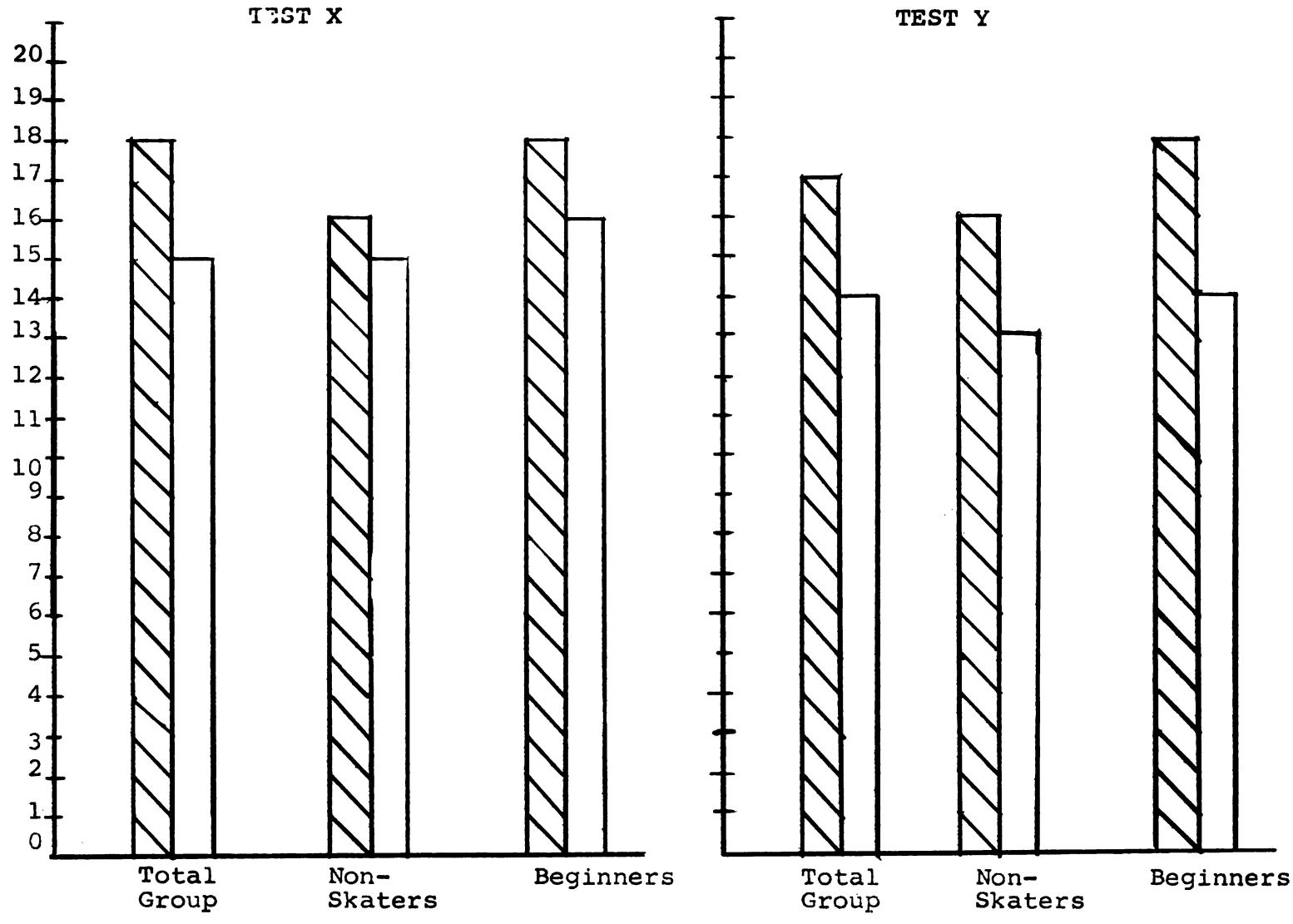

Figure 3. Mean Scores on Experimental Factors. Test X--Mohawk Turn, Test Y--Three-Turn

TABLE VIII

COMPARISON OF ADVANCED SKILL LEARNING BETWEEN EXPERIMENTAL AND CONTROL GROUP ON TEST X (MOHAWK TURN).*

	Sum of Squares	df	Mean Square	f-Ratio
Between Groups--Experimental vs. Control				
Group	55.66	1	55.66	3.14
Error	779.94	44	17.73	
Total	835.60	45		
Within Groups--Experimental Non-Skaters vs. Control Non-Skaters				
Group	13.12	1	13.12	.77
Error	307.87	18	17.10	
Total	320.99	19		
Within Groups--Experimental Beginners vs. Control Beginners				
Group	45.52	1	45.52	2.66
Error	411.12	24	17.13	
Total	456.64	25		

*There was no statistical significance in learning between groups or within groups.

TABLE IX

COMPARISON OF ADVANCED SKILL LEARNING BETWEEN EXPERIMENTAL AND CONTROL GROUP ON TEST Y (THREE-TURN).

	Sum of Squares	df	Mean Squares	f-Ratio
Between Groups--Experimental vs. Control				
Group	167.96	1	167.96	7.83
Error	943.89	44	21.45	
Total	1111.85	45		
Within Groups--Experimental Non-Skaters vs. Control Non-Skaters				
Group	63.73	1	63.73	2.53
Error	453.23	18	25.18	
Total	516.96	19		
Within Groups--Experimental Beginners vs. Control Beginners				
Group	104.89	1	104.89	5.59
Error	450.32	24	18.76	
Total	555.13	25		

Summary of Findings

1. There was no statistical significance on the two basic skills between the film and non-film group during the early and over-all learning period.

2. There was a statistical significance on only one of the basic skills during the late learning period indicating that it took longer for the non-film beginner group to grasp this particular skill.

3. There was a statistical significance between the film and non-film group on one of the advanced skills indicating that the immediate learning of basic skills by the film group aided the students in grasping the advanced skills.

Discussion of Tests

As indicated from the summary of findings it is evident from the statistical significance shown during the late learning period on Test B, which was a more difficult skill than A, that it took a longer period of time from the non-film group to learn the more complex basic skill. In the learning of advanced skills significant difference was evident on the more difficult skill which indicates that the film group was far superior in learning the more complex skill.

Due to the limitations of this study, the subjects were tested once on the advanced skills making this learning period equal in time to the early learning period, in which basic skills were taught and, therefore, this testing period was also an early learning measure in effect. Consequently, it is apparent that films may be of greatest aid during the early learning period.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

The purpose of this study was to determine the effectiveness of the use of loop-films in aiding learning among a large group of student in ice-skating. Therefore the experiment was designed to determine if there was a difference in learning between a group of students taught, with the aid of loop-films and a second group taught without the aid of loop-films.

Forty-six female subjects were chosen from two beginning ice-skating classes at Michigan State University. A pre-test was given for the purpose of equating the students. As a result of the pre-test, the rating agreed on by two out of three judges was used for grouping the students into non-skater and beginner categories.

The selection of teaching methods to be used in the two classes was determined at random by the instructor before classes were in session. The control group was taught by the instructor's traditional method of teaching

ice-skating while the experimental class was taught in the same manner but with additional aid of loop-films.

The experiment lasted for a period of ten weeks with two one-hour sessions per week on the ice. The two classes were instructed using identical lesson plans and instructional time was held constant. At the time and place of learning the four skills, two different teaching methods were applied.

Tests A, B, X and Y were given to all students in both the control and experimental classes. The arithmetic average of the ratings given by the panel of three judges was used to collect mean scores on all four tests administered to both groups. All data were statistically treated using analysis of variance.

Conclusion

Subject to the limitations of the study the following seems justified:

The use of loop-films, in teaching of ice-skating, is more beneficial during the early training period.

Recommendations

1. It is recommended that further studies, pertaining to the learning of other motor skills, be

administered within a typical learning situation as was the purpose of this study.

2. It is further recommended, if other motor tests are administered in ice-skating that a more objective measure of learning be used.

3. It is recommended that more tests on each skill be administered throughout the entire learning period.

4. It is further recommended that more films be made of other skills to be taught and applied during the learning period.

BIBLIOGRAPHY

BIBLIOGRAPHY

Periodicals

Brown, Howard S., and Lloyd Messersmith. "An Experiment in Teaching Tumbling With and Without Motion Pictures," The Research Quarterly, 19:304-307, December, 1948.

Bruce, D. K. "Studies In Motor Learning of Gross Bodily Motor Skills," The Research Quarterly, 17:242-253, December, 1946.

Friedrich, John A. "Teaching Games and Skills Through Sight and Sound," Journal of Health, Physical Education and Recreation, 23:12, June, 1952.

Glassow, Ruth. "Motion Pictures As Teaching Aids," Journal of Health, Physical Education and Recreation," 13:463, October, 1942.

Harby, S. F. "Evaluation of a Procedure for Using Daylight Projection of Film Loops in Teaching Skills," published mimeograph report, Instructional Film Research Program, Pennsylvania State College, Pennsylvania, May, 1952.

Harby, S. F. "Comparison of Mental Practice and Physical Practice in the Learning of Physical Skills," published mimeograph report, Instructional Film Research Program, Pennsylvania State College, Pennsylvania, June, 1952.

House, H. H. "The Problems of Methods and Techniques in Teaching," Journal of Health, Physical Education and Recreation, 12:24, 25 and 31, January, 1941.

Huelster, Laura J. "Learning to Analyze Performance," Journal of Health, Physical Education and Recreation, 10:121, 122, February, 1939.

Hupprich, Florence. "The Use of Visual Aids in Teaching Tennis," Journal of Health, Physical Education and Recreation, 12:93-95, February, 1941.

Kretchmar, Robert. "A Survey of Research in the Teaching of Sports," The Research Quarterly, 20:238-247, October, 1949.

Lockhart, Aileen. "The Value of the Motion Picture as an Instructional Device in Learning a Motor Skill," The Research Quarterly, 15:181-187, May, 1944.

Murin, J. A., Hayes, W. and S. F. Harby. "The Daylight Projection of Film Loops as the Teaching Medium in Perceptual-Motor Skill Training," published mimeograph report, Instructional Film Research Program, Pennsylvania State College, Pennsylvania, May, 1952.

Nelson, Dale, O. "Effect of Slow Motion Loop-films on the Learning of Golf," The Research Quarterly, 19:304-307, December, 1948.

Priebe, Roy and William Burton. "The Slow Motion Picture as a Coaching Device," School Review, 47:192-198, January-December, 1939.

Seashore, Harold G. "Some Relationships of Fine and Gross Motor Abilities," The Research Quarterly, 13:259, October, 1942.

Southward, Barbara. "First Lessons in Figure Skating," Journal of Health, Physical Education and Recreation, 31:31,32 and 68, January, 1960.

Unpublished Materials

Claus, Marshal R. "A Comparative Study of the Part Method vs. the Whole Method in the Learning of the Fly-Away from the Horizontal Bar," Unpublished Master's Thesis, Michigan State University, East Lansing, Michigan, 1961.

APPENDIXES

APPENDIX A

LESSON PLANS

First Week

First Day--Introduction to class--Grading, fees, equipment, proper fit of skates and definition of skating terms.

Second Day--Pre-test--initial ability test to equate students for the purpose of comparison.

Second Week

Third Day--How to fall forward and backward.

Double sculling--with heels together and toes out, bend knees allowing the feet to slide diagonally out then straighten knees, pull toes together and glide on inside edges.

Baby-stepping--weight even with feet beneath you make changing of stroke beside and close to skating foot.

Push off--push from inside edge of the whole blade onto inside edge of other skate.

Stroke and stop--quick strokes across the ice with a strong push-off and come to a stop:

a. snow-plow stop--bend knees, turn toes in and push heels apart to scrape inside edges on the ice.

b. t-stop--put weight on one foot and place the arch of free foot behind heel of skating foot scraping ice with flat of free blade.

Forward Crossovers--skate in a circle by crossing one foot alternately over the other shifting weight to skating foot.

Fourth Day--Review: all techniques taught the previous day.

Teach: inside edge roll--push-off onto inside edge, free arm forward then rotate free arm back and free arm back and free leg forward.*
Twenty-minute practice session with interspersed demonstrations.

Third Week

Fifth Day--Grand March reviewing inside edges and forward crossovers.

Review: all stops in previous lesson.
Teach: Christie Stop--swing whole body to one side, bend both knees and slide to stop on both blades.*
Practice inside edge roll--fifteen minute practice session, interspersed demonstrations.

Sixth Day--Review: push-off, stroking and stopping, inside edge roll and crossovers.
Teach: Outside edge roll--have students practice* leaning against fence to feel the outside edge.
Twenty-minute practice session with interspersed demonstrations.

Fourth Week

Seventh Day--Review: inside edge rolls and stops.
Introduce speed skating--by skating deep inside edges and fast crossovers.
Practice outside edge roll--fifteen minute practice with interspersed demonstrations.*

Eighth Day--Review: inside and outside edge rolls.

Teach: Backward sculling--point toes in and push heels out against the inside edges and then straighten knees to bring feet together and glide on the flat of the blade

* Denotes days the film was used on the skill or skills above to be practiced during this period.

Backward Crossovers: skate around backwards in a circle by crossing one foot alternately over the other shifting weight to skating foot.
Back Inside Edge: push-off onto a back inside edge with skating arm and free leg forward and glide in this position.
Back Outside Edges: push-off onto a back outside edge with free arm and leg forward
Practice Sessions: Students will be grouped according to their ability in learning back edges.

Fifth Week

Ninth Day--Review for midterm
Ten minute practice session on both inside and outside edges. Practice backward skating for the rest of the class period.

Tenth Day
Testing Day for inside and outside edges. Tests A_1 and B_1

Sixth Week

Eleventh Day
Teach: Mohawk Turn--turning from a forward inside edge on one foot to a back inside edge on the other foot.
Twenty-minute practice session with interspersed demonstrations.
Introduce the Dutch Waltz--a dance consisting of forward outside edge rolls and inside edges.

Twelfth Day--Review all skills taught.

Speed skating--backwards and forwards.
Dutch Waltz--swing rolls and progressive.
Practice Mohawk Turn--fifteen minute practice session with interspersed demonstrations.

Seventh Week

Thirteenth Day--Review: mohawk turn, Dutch Waltz and speed skating.
Teach: Three-turn--turning from a forward outside edge onto a back inside edge of the same skate.

Twenty-minute practice session with interspersed demonstrations.

Fourteenth Day--Review: all the techniques taught. Practice Three Turn--fifteen minute practice session with interspersed demonstrations.

Eighth Week

Fifteenth Day--Review: inside and outside edge roll.
Ten Minute practice session on both inside and outside edges.
Practice the Dutch Waltz, and skating to music using all the skills and techniques learned in the previous lessons.

Sixteenth Day--Review: mohawk and three-turn
Ten Minute practice session on both mohawk and three-turn.

Ninth Week

Seventeenth Day
Testing Day for inside and outside edge roll. Tests A_2 and B_2.

Eighteenth Day
Testing day for mohawk and three turn. Test X and Y

Tenth Week

Speed Skating to music
Dutch Waltz
Skating to all types of music applying all skills and techniques learned during the term.

APPENDIX B

PRE-TEST

Judge_____ Name_____

NON-SKATER	CHECK	REMARKS
BEGINNERS		
Forward Stroking		
Backward Stroking		
INTERMEDIATE		
Forward Crossovers		
Push-off onto forward outer and inner edges and balance		
ADVANCED		
Backward Crossovers		
Back Outer and Inner Edges		
Mohawk Turn		
Three-turn		

NON-SKATERS--No skating ability.

BEGINNERS--Skate forward and back.

INTERMEDIATES--Control of forward edges.

ADVANCED--Control of back edges and can execute turns from forward to back position.

APPENDIX C

Judge_____ TEST A Name_____

FORWARD INSIDE EDGE ROLL

	1	2	3	4	5
1. Push-off with inside edge onto an inside edge.					
2. Hold inside edge with free arm forward and free leg straight behind.					
3. Rotate free leg forward and free arm back.					
4. Balance and blide on one foot.					
5. Bring skates close together and push-off onto other foot.					

1--poor

2--fair

3--average

4--good

5--very good

TEST B

Judge_____ Name_____

FORWARD OUTSIDE EDGE ROLL

1 2 3 4 5

1. Push-off with inside edge onto outside edge

2. Hold outside edge with skating arm forward, free arm back and leg straight behind.

3. Rotate free arm and leg forward bringing skating arm back.

4. Balance and glide on one foot.

5. Bring skates close together and push-off onto other foot.

RATING:

1--poor

2--fair

3--average

4--good

5--very good

TEST X

Judge_____ Name_____

MOHAWK TURN

	1	2	3	4	5
1. Proper position--forward inside edge with free arm forward.					
2. Shoulder rotation.					
3. Place heel of free foot to arch of skating foot.					
4. Reverse arms and shift weight onto back inside edge of free foot.					
5. Check rotation with skating arm forward and free arm and leg back before stepping down upon free foot.					

RATING:

1--poor

2--fair

3--average

4--good

5--very good

TEST Y

Judge_____ Name_____

THREE-TURN

	1	2	3	4	5
1. Proper position--forward outside edge with skating arm forward.					
2. Glide onto forward outside edge with skating knee bent and free leg behind.					
3. Start arm rotation bringing free foot close to skating foot.					
4. Lift up from skating knee onto ball of skating foot and reverse arms in order to pivot onto back inside edge.					
5. Check rotation with skating arm forward, free leg and arm back before stepping down upon free foot.					

RATING:

1--poor

2--fair

3--average

4--good

5--very good

APPENDIX D

TEST A--RAW SCORES--FORWARD INSIDE EDGE ROLL

NON-SKATERS--EXPERIMENTAL			NON-SKATERS--CONTROL		
Subject Number	Test A_1	Test A_2	Subject Number	Test A_1	Test A_2
6	18.3	20	5	14.3	13.6
8	17.6	18.6	9	16.3	14
12	11.6	16	12	13	17
13	13	16	18	5.6	11.6
18	12.3	15	22	8.3	15
21	16	16	26	10.3	15.3
29	15.6	16	31	6.3	12.3
33	13.3	17.3	33	15.6	17.6
42	11.6	14.6	35	6.9	14.3
39	8	14	47	15	22.3
Total (10)	137.3	163.5	Total (10)	111.6	153.0

BEGINNERS--EXPERIMENTAL			BEGINNERS--CONTROL		
Subject Number	Test A_1	Test A_2	Subject Number	Test A_1	Test A_2
4	15	15	3	11	20
5	13.3	15.6	7	10	12
7	15	20	8	14.3	13.3
10	16.6	23.6	13	20	17.3
17	19.3	22	15	13	15.6
20	9.6	12.3	17	21.3	23.3
22	13.6	19.3	28	11.6	12.6
27	10.3	17.6	38	12.3	16.6
28	15	17.6	39	8.3	10.6
30	16.3	20.6	42	12	17
31	14.3	18.6	43	15.3	23
34	10.3	15.6	45	14	19.3
40	12.3	15.3	46	11	16.6
Total (18)	180.9	233.1	Total (13)	174.1	217.8

APPENDIX D (Continued)

TEST B--RAW SCORES--FORWARD OUTSIDE EDGE ROLL

NON-SKATERS--EXPERIMENTAL			NON-SKATERS--CONTROL		
Subject Number	Test B_1	Test B_2	Subject Number	Test B_1	Test B_2
6	16	17.3	5	7	12
8	8.3	18.6	9	10.6	13.6
12	5.6	14.6	12	8.6	12.6
13	6.3	14.3	18	10.6	13.3
18	6	11.3	22	8.6	11.6
21	14.3	11.6	26	10	13.3
29	13.3	15.3	31	9	12.3
33	12.6	15.6	33	13	21
42	12.3	15	35	8	13.3
39	10.3	14.6	47	10	22
Total (10)	105.0	148.2	Total (10)	95.1	145.0

BEGINNERS--EXPERIMENTAL			BEGINNERS--CONTROL		
Subject Number	Test B_1	Test B_2	Subject Number	Test B_1	Test B_2
4	13	17	3	12.3	21
5	6.6	12.3	7	10	12.6
7	12.3	16	8	11.3	12
10	18.3	24	13	14	21
17	22.6	23.3	15	9.6	16.3
20	7.6	14.3	17	13.6	23.6
22	12.6	16.6	28	7.6	12.6
27	13.6	15	38	8	13.3
28	15	17.6	39	6.6	10
30	14	17.6	42	11.6	15.3
31	14	18.6	43	13.3	16
34	13.3	13.6	45	12	24
40	10.3	12	46	8.3	17.3
Total (13)	173.2	217.9	Total (13)	138.2	215.0

APPENDIX D (Continued)

TEST Y--RAW SCORES--THREE-TURN
TEST X--RAW SCORES--MOHAWK TURN

NON-SKATERS--EXPERIMENTAL			NON-SKATERS--CONTROL		
Subject Number	Test X	Test Y	Subject Number	Test X	Test Y
6	21.6	18.3	5	12.6	11.6
8	18	20.6	9	12.6	11.6
12	12	17	12	15	5
13	18.6	21.3	18	9.3	5
18	9.3	12.3	22	6.6	8.6
21	17.6	14	26	22.6	24.3
29	14.6	13	31	11.6	10.3
33	14.3	16.3	33	16.6	20
42	13.3	14.3	35	12.6	11
39	10	10	47	13.6	14
Total (10)	149.3	157.1	Total (10)	133.1	121.4

BEGINNERS--EXPERIMENTAL			BEGINNERS--CONTROL		
Subject Number	Test X	Test Y	Subject Number	Test X	Test Y
4	17	16.6	3	19.6	20
5	19.6	18.3	7	8.6	14
7	20.6	20.3	8	15.6	15
10	18	20.3	13	21.6	21
17	15	20	15	17.3	12.6
20	19.6	20.6	17	20	17.6
22	15.6	16.3	28	16.6	8.3
27	13	14.3	38	14.3	12
28	21.3	19.3	39	9	7.8
30	24.3	22	42	17	19.3
31	13.3	17.6	43	14.6	17.6
34	18.3	15.6	45	16.3	5.3
40	14.6	10	46	5.3	9
Total (13)	230.2	231.2	Total (13)	195.8	179.0