AN ABSTRACT OF THE THESIS OF

- Purpose: The purpose of the study was to determine if there was a significant difference in learning gain using a slide-tape lecture presentation method in teaching the concept of cardiovascular endurance.
- Method of Research: Seventy-one students who were enrolled in a high school "Concepts of Physical Education" course during the spring semester of 1977 were used to test the hypothesis of the study. Each of the 37 subjects in the control group (lecture-discussion) and the 34 subjects in the experimental group (slide-tape) were asked to complete a forty question pretest and posttest knowledge examination on cardiovascular endurance. The differences in the mean gain between the pretest and posttest scores were used as the test data. A t-test was used to determine statistical significance at the .05 level.
- Conclusions: Based on the data presented, it can be concluded that the lecture-discussion method and the slide-tape method both produced mean gains in learning during the treatment. However, neither method proved to be significantly more effective than the other. It was also found that boys and girls do not differ significantly when either a slide-tape method or lecture-discussion method are used.

THE EFFECTS OF SLIDE-TAPE AND LECTURE-DISCUSSION METHODS ON LEARNING GAIN IN TEACHING PHYSICAL EDUCATION CONCEPTS

A Thesis

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by

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Chapter 1

INTRODUCTION

This chapter has been developed to present information concerning the difference in learning gain between boys and girls of the concept of cardiovascular endurance using a slide-tape lecture method of presentation or a lecture-discussion method of presentation. The theoretical formulation of the problem, the specific statement of the problem, the null hypothesis, the assumptions of the study, and the significance of the study have all been included. The terms that require definition and limitations and delimitations of the study have also been discussed.

THEORETICAL FORMULATION

The traditional approach to physical education has for years been devoted to the education "of" the physical, namely the "what" of the performance (13). Selected physical educators (4, 19, 26) however, believe that it is important to also include the "how" and "why". The conceptual approach to physical education was developed as a means of promoting their belief.

The conceptual approach to physical education seeks to give students the understanding and knowledge they need to make

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intelligent choices concerning the planning and development of physical fitness programs for a lifetime. The sedentary lifestyle of most Americans is leading to epidemic proportions of degenerative diseases, examples of which are heart disease, backache, obesity, and high blood pressure (4). If this trend is to be halted, an effort must be made to provide people with adequate knowledge so they can reduce the risk of such disease and live their life to the fullest (24).

The most important of all degenerative diseases is heart disease. It is the leading cause of death in the United States (11). For that reason the concept of cardiovascular endurance has been chosen as the one most worthy of study.

In order to stimulate interest and thereby promote a better understanding of cardiovascular endurance, new and innovative teaching methods need to be developed. It is with this purpose in mind that the slide-tape presentation method has been developed. It is a concise, practical method of presenting information using both audio and visual stimuli. With the proper equipment, a fully automated slide-tape presentation can be presented with a minimum of teacher preparation and time. Modern audio-visual aids, such as the slide-tape lecture, should be able to motivate and challenge the students to exciting cognitive achievement (27).

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THE PROBLEM

It was in answer to the following questions that the knowledge of the students of cardiovascular endurance was tested to determine if there was a significant difference in learning gain using a slide-tape lecture presentation method or a lecturediscussion presentation method: (1) Does the use of audio-visual aids, such as the slide-tape lecture, help students achieve a gain in learning? (2) Are boys and girls stimulated by the same or different methods of presentation? (3) Is there a difference between boys' and girls' learning gain using the same methods of presentation?

Statement of the Problem

Is there a significant difference in learning gain using a slide-tape lecture presentation method or a lecture-discussion presentation method in teaching the concept of cardiovascular endurance?

Statement of the Null Hypothesis

The general statement of the hypothesis is that there is no significant difference in learning gain between sophomore boys and girls of the concept of cardiovascular endurance using a slide-tape lecture presentation method or a lecture-discussion presentation method. Stated symbolically, the five specific null hypotheses and their alternates were:

1.
$$H_0$$
 : \checkmark ST - \checkmark LD = 0
 H_1 : \checkmark ST - \checkmark LD \checkmark 0
 H_2 : \checkmark ST - \checkmark LD \checkmark 0
2. H_0 : \checkmark BST - \checkmark GST = 0
 H_1 : \checkmark BST - \checkmark GST \checkmark 0
 H_2 : \checkmark BST - \checkmark GST \checkmark 0
3. H_0 : \checkmark BLD - \land GLD = 0
 H_1 : \checkmark BLD - \land GLD \lt 0
 H_2 : \checkmark BLD - \land GLD \lt 0
 H_2 : \checkmark BLD - \land GLD \lt 0
 H_1 : \checkmark BLD - \checkmark GLD \lt 0
 H_2 : \checkmark BST - \checkmark GLD \lt 0
 H_1 : \checkmark BST - \checkmark GLD \lt 0
 H_1 : \checkmark BST - \checkmark GLD \lt 0
 H_1 : \checkmark BST - \checkmark GLD \lt 0
 H_1 : \checkmark GST - \checkmark BLD \lt 0
 H_1 : \checkmark GST - \checkmark BLD \lt 0
 H_2 : \checkmark GST - \checkmark BLD \lt 0

The meaning of the symbols used in the above symbolic hypotheses statements are as follows:

- 1. ST = Slide-Tape
- 2. LD = Lecture-Discussion
- 3. BST = Boys' Slide-Tape
- 4. GST = Girls' Slide-Tape
- 5. BLD = Boys' Lecture-Discussion
- 6. GLD = Girls' Lecture-Discussion

Assumptions of the Study

The following assumptions were made in conducting this study: (1) that all subjects came from a similar socioeconomic background; (2) that all subjects had a similar background with regard to their physical education experience; (3) that learning gain is measurable.

Significance of the Study

Physical educators who are concerned with the increased occurrence of degenerative diseases have come to recognize the importance of teaching the "whys" of physical education. According to Cundiff:

If individuals in a free society are to make logical choices of lifestyles which will enhance their chances of greater vitality, health, and well-being they must be provided with up-to-date information concerning optimal body function based on scientific evidence (5).

The most serious of all degenerative diseases is heart disease. The incidence of heart disease among males and females in the United States is rising alarmingly. The death rate due to cardiovascular disease is higher in the United States than any other country in the world (11). The harsh facts of this problem indicate that there is a need to develop better and more effective methods of disseminating information concerning the "how", "what", and "why", of cardiovascular endurance so as to reduce the risk of coronary heart disease (4). Any evidence that the use of the slide-tape lecture presentation method can accomplish the purpose of making a significant difference in learning gain of the concept of cardiovascular endurance would be of major importance. Furthermore, it could lead to the development of sophisticated, professional slide-tape lectures, specifically in the area of concepts. This could be an important teaching aid to busy physical educators who generally have the added responsibility of coaching duties, which the majority of them assume.

DEFINITION OF TERMS

Terms related to audiovisual and physical education programs are frequently associated with a variety of meanings and connotations. Therefore, definitions of terms related to this study have been included in this section.

Aerobics

Refers to a variety of exercises that stimulate heart and lung activity for a time period sufficiently long to produce beneficial changes in the body (3).

Audiovisual-Tutorial System AVT

A system of instruction employing slides and tapes and a machine for showing them. Students generally use the machines on an independent time schedule.

Cardiovascular Endurance

The ability of the blood, heart, lungs, and other systems of the body to effectively persist in effort (4).

Conceptual Approach to Physical Education

The presentation of the "how", "what", and "why", of physical education and activity (4).

Learning Gain

The difference in the mean gain between the pretest, posttest cardiovascular knowledge examination.

Lecture-Discussion

A discourse given before a class for instruction followed by an informal question and answer session.

Slide-Tape Lecture

A tape recorded commentary by a master teacher which is synchronized with, and provides the base for, the visual element of slides.

LIMITATIONS OF THE STUDY

The population from which the sample was taken is limited by its size and geographic location; medium sized city in an essentially rural area. Another limiting factor of the study is that the students for the control and experimental groups were selected from classes that met at different times of the day. Due to the scheduling of classes it was not possible to randomly select students to participate in the control and experimental groups, which imposes another limitation of the study. The acceptance of the instructor by the students, which was a limiting factor of the study, was not controlled. No attempt was made to control the interest and motivation of the students which provided another limitation. The course was a requirement for all students which further limited the study. No attempt was made to determine to what extent the students "accepted" the slide-tape system which imposes the final limitation of the study.

DELIMITATIONS OF THE STUDY

The study was conducted under the following delimitations:

1. Only one concept was used in the study. Cardiovascular endurance was chosen because it is considered the most important health related aspect of physical fitness.

2. Only two of the seven classes offering concepts of physical education were used in the study. This was done so that both the control and experimental groups would have the same instructor, thereby eliminating another variable. 3. The treatment was conducted from February 1, 1977 to February 16, 1977. Four days for lectures on cardiovascular endurance were included in the treatment, plus one day for the pretest and one day for the posttest.

4. The slide-tape lecture scripts used to produce the tapes for the experimental group were used for the "live" lecture-discussion delivered to the control group.

5. The slides and tapes for the unit on cardiovascular endurance were co-produced by the investigator.

Chapter 2

REVIEW OF RELATED LITERATURE

The literature related to this study was organized into three major parts. The first section is concerned with the conceptual approach to physical education. Cardiovascular endurance is presented in the second section. The last section deals with audio-visual aids.

THE CONCEPTUAL APPROACH TO PHYSICAL EDUCATION

The conceptual approach to physical education was a development of the 1960's. This was evidenced by the number of articles appearing in the <u>Journal for Health, Physical Education and</u> <u>Recreation</u>, The Physical Educator, and the Research Quarterly (24).

Philosophy

In matters relating to health and fitness there is much public apathy, indifference, skepticism and even hostility to the role physical education purports to play in dealing with these problems. These attitudes, for the most part, can be directly related to the failure of the traditional programs to present the "why" of physical education effectively (15). The conceptual approach to physical education was developed to overcome this deficiency. Wireman (26), in discussing his views, stated that there must be a new approach advanced in physical education. In the past it has been far too removed from the mind and spirit of the main educational stream. Thus its low educational status and low degree of academic respectability (17).

Cognitive Implications

There is a body of knowledge in physical education that every individual needs to have access to so that they may make intelligent decisions concerning their personal fitness needs (4, 15). Physical educators have a responsibility to disseminate that knowledge. Huelster (13) stated that intellectualization about physical education depends upon our ability to express our concepts in ways which are understood by our professional associates, students, and public.

According to Wireman (26), a physically educated person means being proficient in a leisure-time skill; being aware of the fundamental relationship between exercise, diet, and weight control; being aware of the prominent role which sports enjoy in our culture today; having a body capable of sustaining itself in the daily demands made upon it; and understanding the concept of total health. Physical Educators cannot claim that they are truly "physically educating" students until those students have proficiencies in, and understandings of, all of the concepts listed above. In the past, many excuses have been given by physical education teachers for not teaching the conceptual approach to physical education. One of these excuses is that students need activity when they come to physical education class. They claim that students have all day to "intellectualize" in other classes. Another excuse they use is that if the activity the students receive is vigorous enough, they will acquire the traits of a physically educated person without having been formally educated on the topic. The final argument is that most students are not interested or ready for that type of instruction.

The truth is that most physical educators are not prepared to teach using a cognitive approach to physical education. Their training has been activity oriented and they are not comfortable in a more formal teaching situation. As Wireman (26) states, "We are not realizing our potential as a profession if we teach only skill related material." Therefore, the task remains for all physical educators to join in a major reform movement that has at last begun to challenge the traditional physical education program (18).

CARDIOVASCULAR ENDURANCE

The importance of cardiovascular endurance cannot be overstressed. Those who possess it are likely to have less risk of coronary heart disease. Good cardiovascular endurance requires a fit heart muscle, fit vascular system, fit respiratory system, fit blood, and fit bodily muscles capable of using oxygen (4).

Sedentary Lifestyles and Their Effect on the Heart

Degenerative diseases are now more predominant than infectious diseases (6). This can be directly attributed to the change in our lifestyle. We have developed a philosophy of "takeit-easyism". We have become a nation of spectators (11).

Many studies have shown the relationship of sedentary occupations to increased incidence of heart disease. In a study conducted by Morris, et al (6), they found that of 31,000 bus drivers and conductors of the London Transport Authority, bus drivers suffered significantly more coronary heart disease than the conductors. Since drivers might be considered sedentary, while conductors of the two story buses did considerable walking and stair climbing, it would seem that men in active jobs suffer less coronary heart disease. It is possible, however, that coronary prone people selected the driver jobs.

Mechanization, of course, is the culprit for taking away the necessity for exercise. The lack of exercise has caused many health problems such as obesity and lower back pain. They are major health problems, but the main difference is they are not necessarily lethal, whereas heart disease is. As Kattus (28) states, "What an irony of our time that this scourge of the human race is self-inflicted".

Development of Cardiovascular Endurance

The heart is a tough organ. It gains strength through work, which produces extra blood supply with better nourishment. Regular exercise, with periods of rest, is the most important measure against heart disease (9).

Friedrich (9) states the viewpoints of experts on exercise and health regarding the heart and exercise as compiled by the American Medical Association as follows: (1) Vigorous exercise reasonably applied under rational conditions will not damage healthy young hearts; (2) Proper exercise as a way of life helps to keep hearts healthy and tends to prevent the onset of cardiovascular disease; (3) Proper exercise as a way of life may help to lessen the severity of, and make recovery from, cardiovascular disease more likely.

The basic concept that needs to be understood about attaining cardiovascular endurance is that while physical exertion is a necessity, it will only be of benefit if it is aerobic in nature (3). Not every type of exercise will result in increased cardiovascular endurance. The facts relating to the selection of an exercise program that will promote cardiovascular endurance, including how often it needs to be performed, how long, and how hard, are referred to by Corbin, et al (4) as the frequency, duration, and intensity of exercise. Far too few people who comprise the general public have knowledge of these facts. Also, anyone who undertakes an exercise program needs to understand the preliminary precautions that need to be taken according to their age and physical condition. To certain people, exercise may be dangerous, but not very many (28).

Some of the benefits, according to Cooper (31), that one might expect to receive from a cardiovascular endurance exercise program are: (1) lower resting pulse rate; (2) increased efficiency of the heart and lungs; (3) a larger, stronger heart; (4) increased blood volume. With all of these benefits, people not only begin to feel better, but they also look better.

Programs promoting cardiovascular endurance are many and varied. They include running, bicycling, swimming, walking and aerobic dancing (3). Each individual needs to be able to plan and carry out such a program. Physical educators must give their students the proper guidance and direction so that each one may achieve their personal fitness goals.

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AUDIOVISUAL AIDS

The modern secondary school houses thousands of dollars' worth of instructional materials. This phenomena has occurred neither by accident nor the imprudent use of money (16). The value of audiovisuals as Kinder (16) sees them are: (1) They induce greater acquisition and longer retention of factorial information; (2) They give all members of a group the opportunity to share an experience; (3) They are valuable for almost all age and ability groups; (4) They get and hold the attention of almost all students; (5) They reinforce verbal messages by providing a multi-media approach.

It now appears that properly designed media "packages" can assume at least a part of the teacher's traditional role. In fact, they can "teach" the student many of the things that formerly were considered the domain of only the teacher (2). Experienced teachers report that continued use of any one kind of device or stimulus results in its decreasing efficiency (27). Daydreaming, which is a great defense mechanism used by pupils to combat classroom fatigue and boredom, can certainly be lessened or obliterated by using new and innovative visual and audio media (27).

The modern teacher, instead of functioning as an imparter of facts and knowledge, can leave that aspect of teaching to the mediated "package" and can concentrate on the more personal and human dimensions of education (2). Both the students and the teacher will benefit.

The creative teacher uses films, filmstrips, television, models, globes, maps, slides, audio recordings and museum materials to improve learning opportunities (27). These media can significantly affect the quality of learning experience for pupils as well as provide rich visual experiences not possible without them (10). Audiovisual materials and techniques are not educational "fads and frills". According to Kinder (16), they are tools for learning and are, therefore, part of the school experience.

Slide-Tape Systems

The value of a slide-tape show as an educational and creative tool should not be underestimated. It has great versatility, ease of preparation and is low in cost (23). Ryan (23) reports that slide-tape lectures can be kept up-to-date simply and economically. An old slide can be replaced by a new one. Audiotapes and cassettes also lend themselves to modification and updating by means of the erasure and re-record features on the audio-machine.

Brooks (1) reports that in a study conducted at Texas A&M University, instructors in a first year chemistry course used a library of synchronized slide-tape supplements in their classes. The collection was authored entirely by scientists and teachers associated with Texas A&M. The purpose of the slides was to present contemporary topics and problems which reflect the scientists' activities. Besides being low in cost and easily prepared, the slide-tapes proved beneficial to students who could readily identify with the scientists and their work. Students could follow up any interests which were aroused by visiting the actual laboratory facilities and talking with scientist authors.

In a study conducted by Miller (21), an instructional format employing low cost slides and photos was used to train men to maintain complex electronic equipment. Two classrooms, each using five experimental instructional blocks, were compared with two control classes who were taught maintenance techniques using the actual electronic equipment. The results indicated that the experimental group showed superior mastery of the skills contained in the five instructional blocks.

Alvin Junior College in Texas was the site of a study conducted by Hoffman (12). Provisional accreditation was placed on the nursing program because of the high percentage of students failing the State Board Exams for licensure as registered nurses. Teaching methodology was examined as a possible cause for the failures. To correct the situation, a team-teaching method supplemented with audio-taped lectures was instituted. Compared to classes the year before, who were taught using the one-teacher method and used no audio-tapes, the proportion of students who passed the State Board Exams was 94% compared to 77% in the control group.

In the fall of 1976 and the spring of 1978, a study was conducted by Menne, et al (20) at Iowa State University using students enrolled in one section of Psychology 101. Students enrolled in the course could choose to take it by traditional lecture or by taped lecture. Each student in the experimental group was issued a tape recorder, a complete set of lecture tapes, a booklet containing the usual blackboard material, and a schedule of the lecture topics to be given to the control group. Each member of the experimental group agreed not to attend the live lectures, not to copy the tapes, and not to allow the students in the control group to listen to the tapes. Except for exams, the experimental group was not required to come to class. They were allowed to come to class when supplemental movies were shown. This study confirms previous findings that taped lectures were as effective as the traditional lecture presentation method in supplying information to undergraduates. There was no significant difference in the mean course grade attained by the two groups.

Well's, et al (25) study which investigated the effectiveness of three visual media in teaching concepts involving time, space, and motion, found that motion pictures were more effective for presenting concepts involving motion. For concepts involving space, sequential still photographs and slides appeared to be more effective than motion pictures. According to Johnson (14), when compared with motion pictures, still-picture visuals frequently are at no disadvantage. They can offer greatly superior image quality (compared with any form of motion picture) and enough time to study the details of a picture diagram. Johnson (14) also suggests that slide-tapes can be used in a university in two distinct ways. The first provides a means of recording a live lecture before an audience by perhaps a distinguished visiting speaker. The speaker's slides could be copied, photographs taken of the blackboard materials, and the lecture recorded. This, of course, all being done with the permission of the lecturer.

The second use of slide-tapes is as a production medium in its own right, in which original material is planned and presented in the slide-tape format. The method of scriptwriting and production planning is very similar to that used for a film production, and involves quite as much care and attention to detail as motion pictures do.

Audio-Tutorial Instruction

Individualizing slide-tape lectures may be done easily and economically with the addition of a rear screen projector. This makes the use of slide-tapes even more valuable. Students who miss lectures can come in individually and make-up the lectures. Slow learners can listen to the lectures more than once. Or, as in the case of Laurie's (17) study, whole classes can be taught using the rear screen projection system known as the Audiovisual-tutorial method of presentation.

The AVT plan was developed at Purdue University during the 1960's by Dr. S.N. Postlethwait, a noted biologist. It is a system that allows students to study independently and on their own time schedule when they are the most alert and have the greatest attention span. The AVT system makes it possible for students to stop the lectures to take notes, to solve problems, or to deliberate ideas. In this way he becomes an active participant in the course.

Laurie (17) found in his study, conducted at Oklahoma State University in the spring semester of 1974, that the lecture method of instruction and the AVT method of instruction seemed to be equally efficient in regard to the test score improvement by students exposed to either treatment. The subjects for this study were students enrolled in the course, Health, Physical Education, and Recreation 2423, (Personal, School, and Community Health).

According to Edling (7), students like the AVT system. Ninety percent or more say they would choose a well organized AVT course over the same materials taught by conventional lecturerecitation methods. Students often learn more with AVT - making higher scores on achievement tests, developing more positive attitudes toward the subject matter, and mastering up to a third more information than in a typical course.

Favorable reactions come from other sources besides students. Erickson (8) reports teachers using individualized instructional techniques say that while they are working harder than before, they are more satisfied. Traditional disciplinary problems virtually disappear and attendance is improved.

Edling (7) believes individualized instruction methods are here to stay. Machines do the mechanical, repetitive presentations of materials far more efficiently than teachers can. A tape recorder, projector, or a computer, will not become tired, bored, cranky, or impatient. One thing is certain, students can teach themselves fundamental skills and concepts. Often they can do so more efficiently as an individual, rather than as a member of a class.

In concluding this review of literature, it has been found that in the past, teaching depended entirely on verbal communication between teacher and pupil. In modern society, communication techniques have been vastly expanded. There is no one way to transmit ideas; there are many ways. As Margaret Mead once remarked, "No one will live all his life in the world into which he was born, and no one will die in the world in which he worked in his maturity" (16).

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Chapter 3

METHODS AND PROCEDURES

A description of the methods and procedures used to investigate the question concerning the differences in learning gain using a slide-tape presentation method or a lecture-discussion presentation method has been discussed in this chapter. The design of the study and the materials and instrumentation have also been described. The population involved in this research, as well as the sampling procedures used, have been presented. In addition, the data collection process and the methods used for statistical analysis of the data have been included in this chapter.

DESIGN OF THE STUDY

The design chosen for this study was a non-randomized pretest, posttest design using both an experimental group and a control group. The overall design of this study can be described as a 2 X 2 factorial design with respect to the variables involved.

The independent variable, modes of learning, studied in the investigation was of two levels. Level I was the group of 34 students in the third hour experimental group who were exposed to the slide-tape lectures during the spring semester of 1977. Level

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II was the group of 37 students in the fifth hour control group who were given the lecture-discussion treatment during the same time period as stated above. The dependent variable, learning gain, was measured by the forty question knowledge test used in the study. The moderator variables investigated in the study were the sex of the students, using the same instructor for both groups, and class size.

MATERIALS AND INSTRUMENTATION

The materials used in this study were prepared during the summer of 1976. A description of these materials is contained in the following paragraphs.

The scripts used for the four slide-tape lectures were prepared and written by the investigator. The titles of the scripts and the order in which they were presented are as follows: (1) The Heart; (2) Threshold of Training; (3) Cardiovascular Disease; (4) Risk Factors. The material presented in the four slide-tape lectures was based primarily on the textbook, <u>Concepts in Physical</u> <u>Education</u>, by Corbin, Dowell, Lindsey, and Tolson, and was published by Wm. C. Brown Publishers, 1970. It was the required textbook for all students enrolled in the concepts course.

The tapes used in the slide-tape lectures were recorded on a variety of tape brands, each containing twenty-two and one half minutes of playing time per slide. They were narrated by the instructor who taught both the control and experimental groups. The tapes used in the slide-tape lectures contain the identical information given to the lecture-discussion group. The tapes were played on the Wollensak 3M Cassette System, Model 2551.

Slide material selection and preparation was done by the investigator and two other members of the physical education staff. Pictures for the slides were selected from magazines, books, posters and laboratory manuals. The slides were taken with a 35mm camera owned by the school library. A micro-lens and a copy stand were used to photograph close-up information. A total of 61 slides were used in the study for a mean number of 15 slides per lecture. The slides were stored in Kodak Carousel 80 slide trays. The Kodak Carousel Custom 850 H Auto-Focus projector was used to show the slides.

The instrumentation used for this study was a written examination developed by the investigator. The test, which was identical for both the pretest and the posttest, was a forty question general knowledge examination. The questions of this instrument were designed to test the students' knowledge of cardiovascular endurance. Thirty of the questions were multiple choice and ten were true-false. A pre-trial study was conducted on the test instrument using 350 students enrolled in the fall semester concepts course. An item analysis was then applied to the test. Based on the results of the item analysis, the test was altered to its present and final form. Two tests of reliability were then administered to the test based on the results of 71 student scores. A .69 reliability coefficient using the Coefficient of Internal Consistency (splithalf method) was obtained by dividing the items of the test independently into two equivalent halves (odd and even). The Spearman-Brown formula was then applied to estimate the reliability of the complete test.

Employing the Method of Rational Equivalence using the Kuder-Richardson formula 20, a reliability coefficient of .74 was obtained. The reliability of the test, for the Kuder-Richardson formula 20, was computed on the IBM 360 Computer.

The reliability of the test was also promoted through the use of an objective test. A test is said to be objective if several persons can score a test for a given individual and award the same score. Objectivity is an essential ingredient in reliability. A lack of objectivity is reflected in a lack of reliability.

Validity of a knowledge test is dependent upon how well the test covers the curriculum, including the proper weighing of various areas of emphasis, and the wording of the questions. The test was valid in that it covered the framework of the subject area presented in the lecture review. Curricular validity was determined through the study of other tests, and the judgment of two other competent instructors who examined the test questions for structure and content related to cardiovascular endurance.

In summary, it can be stated that both curricular analysis and item analysis are the means used to arrive at the total validity of a knowledge test. Both requirements were met to establish the validity of the test instrument used in this study.

POPULATION AND SAMPLING

The subjects for this study were students enrolled in the course, "Concepts of Physical Education" during the spring semester of 1977. The third hour class, which met from 10:00 to 10:55, was designated as the experimental group. The fifth hour class, which met from 12:45 to 1:40, was designated as the control group. All students who completed the pretest and posttest in both classes were included in the study. Thirty-four students participated in the third hour experimental group, of which 14 were girls and 20 were boys. In the fifth hour control group there were 37 students who participated, including 22 boys and 15 girls.

All sophomore students were required to enroll in the one semester concepts course as partial fulfillment of their two semester physical education requirement. Sections were scheduled during both semesters of the academic year. During the 1976-1977 academic year, five concepts sections were scheduled during the fall semester and two sections were scheduled during the spring semester. The classes met five days a week for 50 minutes. Each class was team taught by one man and one woman instructor.

There were approximately 475 students enrolled in the concepts course during the 1976-1977 academic year. Each of the five instructors in the physical education department was required to teach at least one section of the concepts course during the year. Students were given the choice of enrolling in the semester, section, and instructor of their choice during the enrollment procedure.

DATA COLLECTION

A pretest, using the forty question knowledge test developed by the investigator, was given to both the experimental and control groups on February 1, 1977. All participants who took the test were given the same instructions. They were required to place their answers on answer sheets which were provided. The test was not timed and all participants were given adequate time to finish the test.

Following the pretest, both classes were exposed to the same conditions, except for exposing the experimental group to the experimental treatment for a specified period of time. A posttest, which was identical to the pretest, was then administered to both groups on February 14, 1977. The same instructions and procedures that were used for the pretest were again employed for the posttest.

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Neither the control group nor the experimental group was told that it was participating in a study. The instructor for the control group and the experimental group was the same person. He administered the pretest and posttest to both groups and conducted both classes in between administrations of the test.

DATA ANALYSIS

The data in this study was based on the scores of the 71 subjects who completed the pretest and posttest in the experimental and control groups. The mean pretest and posttest scores for both the experimental and control groups were found separately as well as the separate mean pretest and posttest scores for the boys and girls in both the experimental and control groups. The mean of the differences between the pretest and posttest was calculated separately for each group and for the boys and girls in each group.

A comparison of these differences was made to determine whether the application of the experimental treatment was associated with a change favoring the experimental group as a whole, the boys or girls in the experimental group, or with a change favoring the control group as a whole, or the boys or girls in the control group. A comparison was also made of these differences between the boys and girls within each of the groups.

For analysis of these data, the \underline{t} -test for two independent samples was used to determine whether the criterion means for the groups as a whole differed significantly. In addition, the Student \underline{t} distribution was used to analyze the comparison of differences of the means for the boys and girls within group and between group studies because of the small sample size. The .05 level of significance was selected for this study to test the null hypotheses.

Chapter 4

ANALYSIS OF DATA

This study was primarily designed to investigate the differences in learning gain through the use of two different methods of instruction in a "Concepts of Physical Education" course. The necessary information for this study was obtained by administering a forty question pretest and posttest to the 71 subjects involved in the study. The results of the study have been discussed in this chapter.

PRETEST EXPERIMENTAL GROUP VERSUS PRETEST CONTROL GROUP

No significant difference at the .05 level was found between the mean of the experimental group and the mean of the control group on the pretest. These scores have been shown in Table 1.

PRETEST POSTTEST EXPERIMENTAL GROUP VERSUS PRETEST, POSTTEST CONTROL GROUP

No significant difference at the .05 Level was found in the mean of the differences between the pretest, posttest scores of the experimental group versus the mean of the differences between the

Means, Standard Deviations, and <u>t</u> Ratios for the Significance of the Difference of the Mean Pretest Score in the Experimental Group Versus the Mean Pretest Score of the Control Group

Group	N	x	s.d.	<u>t</u> Ratio	
Experimental	34	19.41	5.15		
Control	37	18.92	4.42		
				.429*	

* = not significant at the .05 level, critical value needed

was 2.00.

Means, Standard Deviations, and \underline{t} Ratios for the Significance of the Difference in the Mean of the Differences Between the Pretest, Posttest Experimental Group Versus the Mean of the Differences Between the Pretest, Posttest Control Group

Group	N	x	s.d.	<u>t</u> Ratio
Experimental	34	6.44	4.20	
Control	37	7.22	5.02	
				708*

* = not significant at the .05 level, critical value needed

was 2.00.

pretest, posttest scores in the control group. Therefore, the null hypothesis was retained. These scores have been shown in Table 2.

PRETEST, POSTTEST BOYS' EXPERIMENTAL GROUP VERSUS PRETEST, POSTTEST GIRLS' EXPERIMENTAL GROUP

No significant difference at the .05 level was found in the mean of the differences between the pretest, posttest boys' experimental group versus the mean of the differences between the pretest, posttest girls' experimental group. Therefore, rejection of the null hypothesis was not warranted. These scores have been shown in Table 3.

PRETEST, POSTTEST BOYS' CONTROL GROUP VERSUS PRETEST, POSTTEST GIRLS' CONTROL GROUP

No significant difference at the .05 level was found in the mean of the differences between the pretest, posttest boys' control group versus the mean of the differences between the pretest, posttest girls' control group. Therefore, the null hypothesis was retained. These scores have been shown in Table 4.

PRETEST, POSTTEST BOYS' EXPERIMENTAL GROUP VERSUS PRETEST, POSTTEST GIRLS' CONTROL GROUP

No significant difference at the .05 level was found in the mean of the differences between the pretest, posttest boys' experimental group versus the mean of the differences between the pretest,

Means, Standard Deviations, and <u>t</u> Ratios for the Significance of the Difference in the Mean of the Differences Between the Pretest, Posttest Boys' Experimental Group Versus the Mean of the Differences Between the Pretest, Posttest Girls' Experimental Group

Group	N	x	s.d.	<u>t</u> Ratio	
Boys Experimental	20	6.65	4.15		
Girls Experimental	14	6.14	4.01		
				.022	

* = not significant at the .05 level, critical value needed

was 2.042.

Means, Standard Deviations, and <u>t</u> Ratios for the Significance of the Difference in the Mean of the Differences Between the Pretest, Posttest Boys' Control Group Versus the Mean of the Differences Between the Pretest, Posttest Girls' Control Group

	<u> </u>			
Group	N	x	s.d.	t Ratio
Boys Control	22	6.27	5.19	
Girls Control	15	8.6	4.41	
				08*

* = not significant at the .05 level, critical value needed
was 2.042.

Means, Standard Deviations, and <u>t</u> Ratios for the Significance of the Difference in the Mean of the Differences Between the Pretest, Posttest Boys' Experimental Group Versus the Mean of the Differences Between the Pretest, Posttest Girls' Control Group

	N		s.d.	<u>t</u> Ratio
Boys Experimental	20	6.65	4.15	
Girls Control	15	8.6	4.41	
				079

* = not significant at the .05 level, critical value needed
was 2.042.

posttest girls' control group. Therefore, the null hypothesis was retained. These scores have been shown in Table 5.

PRETEST, POSTTEST GIRLS' EXPERIMENTAL GROUP VERSUS PRE-TEST BOYS' CONTROL GROUP

No significant difference at the .05 level was found in the mean of the differences between the pretest, posttest girls' experimental group versus the mean of the differences between the pretest, posttest of the boys' control group. Therefore, rejection of the null hypothesis was not warranted. These scores have been shown in Table 6.

Means, Standard Deviations, and <u>t</u> Ratios for the Significance of the Difference in the Mean of the Differences Between the Pretest, Posttest Girls' Experimental Group Versus the Mean of the Differences Between the Pretest, Posttest Boys' Control Group

Group	N	x	s.d.	<u>t</u> Ratio
Girls Experimental	14	6.14	4.01	
Boys Control	22	6.27	5.19	
				004*

* = not significant at the .05 level, critical value needed was 2.042.

Chapter 5

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The first section of this chapter contains a summary of the study done by the researcher who investigated the difference in learning gain using two different methods of presentation. The conclusions drawn from the statistical analysis of the subjects, 34 of whom were in the experimental group and 37 of whom were in the control group, have been presented in the second major part of this chapter. The last section of this chapter presents recommendations for additional studies which may be conducted in relation to the subject area focused on by this study.

SUMMARY

The purpose of the study was to investigate whether a slide-tape method of presentation would significantly improve the learning gain of the concept of cardiovascular endurance as measured by the difference in pretest, posttest scores between two nonrandomized groups after attending either the lecture-discussion method of presentation or the slide-tape method of presentation. A further purpose of the study was to investigate whether boys or girls improved significantly while participating in either of the

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two groups described above or whether one method of presentation was more significant for boys than it was for girls.

Thirty-four students were enrolled in the third hour experimental group, twenty of whom were boys and fourteen of whom were girls. Twenty-two boys and fifteen girls were enrolled in the fifth hour control group. Each of the subjects was asked to complete a pretest and a posttest, which consisted of a forty item objective test on cardiovascular endurance. The seventy-one subjects were enrolled in a "Concepts of Physical Education" course during the spring of 1977.

A \underline{t} test for significant difference between means was used to determine whether or not a significant change in learning gain occurred between the experimental group and the control group from the pretest to the posttest. A \underline{t} test was also used to determine if there was a significant difference in mean gain between boys and girls in the same group or between boys and girls in the experimental versus control groups between the pretest and the posttest.

No significant difference was found at the .05 level in the mean gain from pretest to posttest when comparing the experimental and control group. No significant difference was found at the .05 level in the mean gain from pretest to posttest when comparing the boys and girls in the control group, the boys and girls in the experimental group, the boys in the control group and the girls

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in the experimental group, or the girls in the experimental group and the boys in the control group.

CONCLUSIONS

Within the assumptions and limitations of the study, the following conclusions seem justified.

1. Based on the data presented, it can be concluded that the lecture-discussion presentation method and the slide-tape presentation method both produced mean gains in learning during the treatment. However, neither method proved to be significantly more effective than the other.

2. Boys and girls do not differ significantly in learning gain when either a slide-tape lecture presentation method or a lecture-discussion presentation method is used.

RECOMMENDATIONS

After reviewing the results of the study, the following recommendations for additional studies are made:

1. A replication of the study should be conducted using the slide-tape lectures for all sixteen concepts presented during the semester.

2. A replication of the study should be conducted to determine whether the students of either treatment method would

retain the desired information for longer periods of time.

3. A replication of the study should be conducted using a third group to determine if the pretest affected the learning gain in either of the two groups who were studied.

4. A replication of the study should be conducted using other age levels for the sample.

5. A replication of the study should be conducted to measure the attitude of students towards different methods of presentation.

6. Similar studies should be conducted with the intent of improving instructional methods of presentation in the cognitive area of physical education.

7. A replication of the study in other subject areas should be conducted.

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APPENDIX

PRETEST AND POSTTEST

MULTIPLE CHOICE

- 1. The blood that fills the left side of your heart comes from your:
 - a. trunk and legs
 - b. head
 - c. arms
 - *d. lungs
- 2. Which of the following would be considered the most dangerous high blood pressure?
 - a. 140/90
 - *b. 184/110
 - c. 120/80
 - d. 150/90
- 3. The vessels taking the blood supply to the heart muscle are the primary location of a heart attack. These vessels are known as the:
 - *a. coronary arteries
 - b. carotid arteries
 - c. brachial arteries
 - d. pulmonary arteries
- 4. The portion of the heart that pumps blood to all parts of the body is the:
 - a. right atrium
 - b. right ventricle
 - c. left atrium
 - *d. left ventricle
- 5. In atherosclerosis the damaging process to the heart is brought about by:
 - *a. fatty degeneration, with fat and fibrin deposits on the walls of the arteries
 - b. degeneration of the walls of the arteries

- c. blockage of a coronary artery
- d. failure of the heart, caused by its inability to pump a sufficient proportion of the blood it contains
- 6. If you were to select a man who is cardiovascularly fit your best bet would be to select:
 - a. a weight lifter
 - b. a football lineman
 - *c. a cross-country runner
 - d. a gymnast
- 7. The pain caused in a heart attack is from:
 - a. pressure of a clot against the coronary arteries
 - b. lack of adrenalin in the heart muscle
 - c. lack of food or energy in the heart muscle
 - *d. lack of oxygen in the heart muscle
- 8. Which of the following relates to the fatty deposits on the inside of the artery?
 - *a. lipid theory
 - b. fibrin theory
 - c. collateral circulation theory
 - d. loafer's heart theory

9. Blood is pumped to the lungs from which chamber of the heart?

- a. right atrium
- b. left atrium
- *c. right ventricle
- d. left ventricle
- 10. The walls of arteries are:
 - a. rigid
 - *b. elastic
 - c. soft
 - d. none of the above
- 11. Another term for "thrombus" is
 - *a. clot
 - b. infarction
 - c. heart disease
 - d. blood

- 12. Fatty deposits on the inner walls of arteries form a condition known as:
 - a. arteriosclerosis
 - b. varicose veins
 - *c. atherosclerosis
 - d. loafer's heart
- 13. Which of the following refers to the contraction phase of the heart:
 - a. thrombus
 - *b. systole
 - c. diastole
 - d. stroke
- 14. Lying down after vigorous exercise is not healthy. The blood needs to be returned to the heart through the action of the muscles on the:
 - a. arteries
 - b. capillaries
 - c. lungs
 - *d. veins
- 15. If you were 18 years old and your resting pulse rate was 72, what would your threshold of training be? (Select the closest answer)
 - a. 148
 - b. 149
 - *c. 150
 - d. 151
- 16. In order to reach the threshold of training that will cause increases in cardiovascular endurance, the minimum amount of time to be spent exercising is 10 to 15 minutes. This is an example of:
 - *a. duration
 - b. endurance
 - c. frequency
 - d. intensity

- 17. The weakest part of the heart (is, are) the:
 - a. aorta
 - b. atrium
 - *c. coronary arteries
 - d. ventricle
- 18. The difference between a heart attack and a stroke is that in a stroke the blockage occurs in the:
 - a. heart
 - b. neck
 - c. lungs
 - *d. head
- 19. What is coronary collateral circulation?
 - a. deposits of fat on the walls of the arteries
 - b. deposits of fibrin on the walls of the arteries
 - *c. the buildup of extra blood vessels in the heart
 - d. the area of the heart left dead by a coronary thrombosis
- 20. Which of the following is the correct pattern of blood flow away from the heart?
 - a. veins, capillaries, arteries
 - b. veins, arteries, capillaries
 - c. arteries, veins, capillaries
 - *d. arteries, capillaries, veins
- 21. Another term for high blood pressure is:
 - *a. hypertension
 - b. infarction
 - c. angina pectoris
 - d. stroke
- 22. Which is least true?
 - a. exercise lowers blood fat levels
 - *b. exercise causes heart attacks
 - c. sedentary people have 3 times more heart attacks
 - d. exercise improves collateral circulation

23. Which of the following is America's most serious health problem?

- a. cancer
- *b. heart disease
- c. mental health
- d. obesity
- 24. Which is least true of a fit person?
 - a. low heart rate
 - b. large heart muscle
 - *c. high blood pressure
 - d. less atherosclerosis
- 25. Chest pain associated with lack of oxygen supply to the heart muscle is called:
 - a. heart murmur
 - b. coronary thrombosis
 - c. congenital heart disease
 - *d. angina pectoris
- 26. In order to achieve cardiovascular endurance a person should exercise a minimum of:
 - a. one time a week
 - b. two times a week
 - *c. three times a week
 - d. four times a week
- 27. Of the following risk factors, the one a person can control is:
 - a. age
 - *b. obesity
 - c. heredity
 - d. sex

28. The primary responsibility of the circulatory system is to:

- a. provide oxygen to the body tissues
- b. carry off waste products
- c. constantly supply blood to all body tissues
- *d. all of the above

- 29. A soft sound heard over the heart due to a backflow of blood through a valve is called:
 - a. "athletes" heart
 - b. loafer's heart
 - *c. heart murmur
 - d. conjective heart failure
- 30. Hardening of the arteries is a disease known as:
 - *a. arteriosclerosis
 - b. coronary occlusion
 - c. hypertension
 - d. atheriosclerosis

TRUE-FALSE

- Pressure of blood against the walls of the arteries is known as the systolic pressure. (True)
- 2. The values allow the blood to flow either direction in the heart. (False)
- 3. Exercise prevents heart attacks. (False)
- A blood clot within an artery of the heart causes a condition known as a coronary thrombosis. (True)
- 5. People with high blood pressure should not exercise. (False)
- 6. The diastolic pressure is more important for health considerations than the systolic pressure. (True)
- 7. Inactive people who rest their hearts are less likely to have heart attacks than very active people. (False)
- 8. Death rate due to heart disease is on the decrease. (False)

- 9. Veins are thick and elastic and carry blood from the heart to all parts of the body. (False)
- 10. People who exercise frequently can develop a condition known as "athlete's heart". (False)