A COMPARISON OF THE EFFECTS OF TWO METHODS
OF TEACHING PHYSICAL EDUCATION ON
PHYSICAL FITNESS AND ATTITUDE

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A COMPARISON OF THE EFFECTS OF TWO METHODS
OF TEACHING PHYSICAL EDUCATION ON
PHYSICAL FITNESS AND ATTITUDE

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By

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CHAPTER I

INTRODUCTION

During recent years technology has lessened the amount of necessary physical work required of the average American citizen. Automation and mechanization have increased tremendously while the amount of physical activity participated in by an individual has decreased. The evolution in transportation has probably been one of the greatest factors in limiting the individual's muscular effort. As a result of this marked inactivity in American life our nation is in a physical fitness revolution. Americans have become very self-conscious about their physical fitness status; they are becoming aware that they must put back into their daily lives some of the activity which technology has taken out. It is also important that they formulate a positive attitude toward physical activity and exercise.

Statement of the Problem

The problem under consideration was a study of physical fitness and attitude utilizing two methods of teaching physical education in a metropolitan junior college.
Purposes of the Study

To further clarify the problem, the purposes of this study were

1. To determine the relative effectiveness of an independent work program as compared to a structured group physical fitness program on muscular explosiveness of first semester freshman men in a metropolitan junior college.

2. To determine the relative effectiveness of an independent work program as compared to a structured group physical fitness program on gross body coordination of first semester freshman men in a metropolitan junior college.

3. To determine the relative effectiveness of an independent work program as compared to a structured group physical fitness program on circulorespiratory endurance of first semester freshman men in a metropolitan junior college.

4. To determine the relative effectiveness of an independent work program as compared to a structured group physical fitness program on attitude toward physical education of first semester freshman men in a metropolitan junior college.

5. To provide useful data for junior college administrators and physical educators to utilize when designing or evaluating the physical education curriculum and methods of teaching.
Hypotheses

In this study it was hypothesized that

I. The mean score in muscular explosiveness, as measured by the sum of the weighted items on the American Association of Health, Physical Education and Recreation Youth Fitness Test (AAHPER Youth Fitness Test) by first semester freshman men in junior college, will be significantly greater for the group conditioned by an independent work program than the mean score of the group conditioned by a structured group physical fitness program.

II. The mean score in gross body coordination, as measured by the sum of the weighted items on the AAHPER Youth Fitness Test by first semester freshman men in junior college, will be significantly greater in the group conditioned by a structured group physical fitness program than the mean score of the group conditioned by an independent work program.

III. The mean score in circulorespiratory endurance, as measured by the sum of the weighted items on the AAHPER Youth Fitness Test by first semester freshman men in junior college, will be significantly greater in the group conditioned by a structured group physical fitness program than the mean score of the group conditioned by an independent work program.

IV. The mean score in attitude toward physical education, as measured by the Wear Physical Education Attitude
Inventory on the part of first semester freshman men in junior college, will be significantly greater in the group conditioned by an independent work program than the mean score of the group conditioned by a structured group physical fitness program.

Definition of Terms

1. **Attitude** is a manner of feeling or thinking that shows one's disposition, opinion, or set of mind formulated through past experiences, as reflected by the scores on the Wear Physical Education Attitude Inventory.

2. **Circuit training** is a type of program referring to a number of carefully selected exercises arranged and numbered consecutively about a given area.

3. **Circulorespiratory endurance** is the ability of an individual's heart and lungs to adjust to prolonged physical exertion.

4. **Gross body coordination** is the ability to integrate and perform a number of complex motor movements simultaneously in order to successfully complete a complicated motor skill.

5. An **independent work program** is a type of program whereby the student is placed in a training situation in which he is on his own to develop and put into practice, at his own pace, for his own needs, a program in which he is interested and motivated.

6. **Muscular explosiveness** is the ability to exert maximum energy in one dynamic act.
7. A **structured group physical fitness program** is a type of program developed and led by the instructor. This is a daily planned conditioning program consisting of a combination of mass calisthenics, circuit training, and running.

**Background and Significance**

The present-day fitness emphasis had its beginning in an article written by Kraus and Hirschland\(^1\) in which they revealed the results of minimum muscular fitness tests given to American and European children. The tests showed that only 8.7 per cent of European children failed to meet minimum standards, whereas 57.9 per cent of American children failed the test. These results were pointed out to President Eisenhower, who called a conference on Fitness of American Youth in June, 1956.\(^2\) From this and several other conferences came a new program called **Operation Fitness—U.S.A.**, of which the **AAHPER Youth Fitness Test Project** became the first sponsored program. The original test battery was developed in 1957.\(^3\)

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\(^2\)American Association for Health, Physical Education and Recreation, **AAHPER Youth Fitness Test Manual**, Washington, D.C., AAHPER, 1958, p. 3.

\(^3\)Ibid., p. 7.
With the use of the AAHPER Youth Fitness Test and the motivation of the Kraus and Hirschland findings, Campbell and Pohndorf\(^4\) compared the performances of British children with those of American children and found results similar to those of Kraus and Hirschland. However, in 1965 Hunsicker and Reiff\(^5\) supervised a retesting of a nation-wide sample of American youth and found marked improvement in the fitness level of American boys and girls.

A review of the related literature has revealed that a considerable number of articles and studies dealing with the improvement of the methods of instruction have been done in the general area of physical education. Massey, in his address to the basic instruction sections of the 1962 convention of the National College Physical Education Association, identified four main problem areas in which research in physical education is most urgently needed. One of these was the effectiveness of our teaching methods. He stated, "How effective are our present teaching methods, or are there laws of motor learning yet to be discovered which we are routinely violating? There is some evidence that students


learn despite the teacher, not because of him."⁶ Scott said, "We are so conditioned by habit to certain practices that we just don't try new approaches. We need time to sit and meditate, to dream, to speculate, and perhaps even to regret."⁷ Kretchmer, Sherman, and Mooney,⁸ in a survey of research in the teaching of sports, point out that research has barely begun on the heart of learning and teaching problems. In talking about excellence in the teaching of physical education, Snyder speaks in relation to methodology: "My plea is for planned experimentation rather than innovation."⁹ At the 1962 convention of the National College Physical Education Association For Men, Kasch¹⁰ pointed to methods in physical education, curriculum, and physical fitness, as three of the areas in which research is needed.


In pursuing an investigation of the literature no research was found which studied physical fitness and attitude toward physical education when utilizing the independent work and structured group methods. It was felt that such a study would contribute to metropolitan junior colleges and senior colleges as well in providing useful data for administrators and physical educators to utilize when designing or evaluating the physical education curriculum. In addition, it was hoped that this study would focus on the need for more innovation and experimentation in institutions where such programs are not in operation.

**Procedures for the Study**

During the first three hours of class time of the experiment, the **Wear Physical Education Attitude Inventory Form A** and three selected items from the **AAHPER Youth Fitness Test** were administered to students in four sections of basic physical education at Tarrant County Junior College, Fort Worth, Texas. Two of the four classes were assigned to a structured group physical fitness program and the other two were assigned to an independent work program. The above mentioned tests were used to determine group similarity.

Both groups utilized approximately 105 minutes of class time per week for a total of eight weeks exclusive of pre-test and posttest administrations. At the conclusion of the training period the **Wear Physical Education Attitude Inventory**
Form B and all seven items of the AAHPER Youth Fitness Test were administered to each of the subjects in the two groups. The subjects' scores for muscular explosiveness, gross body coordination, and circulorespiratory endurance were then calculated.

Each hypothesis was treated in the null form by use of the $t$-test for significant difference between means. The null hypothesis was rejected at the .05 level of significance.

**Limitation of the Study**

This study was limited to eighty-seven male students enrolled in four sections of basic physical education at Tarrant County Junior College in Fort Worth, Texas, during the 1968 fall semester.

**Basic Assumptions**

1. It was assumed that the subjects in both groups would cooperate to the best of their ability and would be honest and serious in their responses and effort on the evaluative instruments.

2. It was assumed that any outside activity would be equal in both groups so as not to affect the results of the experiment.
CHAPTER II

REVIEW OF THE LITERATURE

Since this study proposed to determine the relative effectiveness of an independent work program as compared to a structured group physical fitness program, studies of research in these particular areas were reviewed. The review of the literature also provided data for developing the study and establishing the hypotheses. It is divided into the following three general sections: (1) studies within the general framework of conditioning methods and physical fitness, (2) studies and literature within the general framework of independent or non-directed study, (3) studies and literature within the general framework of attitude toward physical education.

Conditioning Methods and Physical Fitness

In a comparative study of the effects of two approaches to teaching the college required physical education program for men, Byrd\textsuperscript{1} compared the results of a traditional approach with those of a fundamental movement approach. Twenty-five matched pairs of students were selected to form the two

\textsuperscript{1}Leland Eugene Byrd, "A Comparative Study of the Effects of Two Approaches to Teaching the College Required Physical Education Program for Men," unpublished doctoral dissertation, West Virginia University, Morgantown, West Virginia, 1967.
experimental groups. He found that the fundamental movement group made significant gains over the traditional group in tumbling skill, motor ability, speed, agility, and, when introduced to the sports of tumbling and swimming, showed marked progress over the traditional group in learning the skills of the two activities. However, there were no significant differences between the groups in swimming skill, endurance, coordination, flexibility, balance, power, and strength. He concluded that this study could well serve as a point of departure for more studies designed to improve the general program of physical education. He recommended that further studies of the values of various combinations of approaches to teaching of physical education be conducted.

White compared the basic skill method to the calisthenic method on the development of physical fitness. The basic skill method consisted of a number of selected motor ability skills and the calisthenic method consisted of the developmental exercise program as outlined by the President's Council on Youth Fitness. The subjects were sixty-six fourth- and fifth-grade boys. After a six-week training program the subjects were tested with the President's Physical Fitness Screening Test and Latchaw's Test of Motor Ability. The results of this study indicated that physical fitness can be

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attained through both calisthenics and basic skill practice. They also showed that in some aspects of body development, basic skill practice is superior to calisthenics in the development of physical fitness. However, in the ability to perform motor skills, the basic skill group was superior in all seven items of the Latchaw Test of Motor Ability. White concluded that a program emphasizing basic skill development is satisfactory for developing physical fitness and increasing the motor ability level of an individual.

Westering used 140 undergraduate college men, all of whom were enrolled in tennis sections, in a study conducted to determine the effects of four physical conditioning programs and their respective time variable upon selected measures of physical performance. The Harvard Step Test, 50-yard dash, two-minute sit-ups, pull-ups, standing broad jump, bar-dips, 600-yard run, shuttle run, and the leg-lift were the measures used to test physical performance. The four physical conditioning programs with their time variables were (1) isometrics for four minutes each period, (2) intensity for seven minutes each period, (3) circuit training for thirteen minutes each period, and (4) calisthenics for fifteen minutes each period. The students were placed into the programs by random drawing. The experiment took place

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over a period of eight weeks. All groups participated in their regular tennis activity for the remainder of each period. As a result of his findings Westering concluded that circuit training or intensity programs develop a higher degree of physical performance in less time than does a conventional calisthenic program and that the isometric program was the least effective in the development of physical performance. He also concluded that of the four programs, circuit training was the most effective. In contrast with the results of Westering's study, an eight-week study by Ralls compared three different training programs and their effects on five physical fitness components. He concluded that weight training was superior to regular physical education for improving muscle power and endurance of the arms and legs, and isometric training was superior to the other programs for improving muscle power and endurance of the arms.

Parkman used subjects from men's required physical education classes at Mississippi College and analyzed their physical fitness with the AAHPER Youth Fitness Test. He concluded that ten minutes of vigorous exercises and endurance activities per session three times a week does as much for

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individual physical fitness as physical education classes which meet 150 minutes a week, two or three times a week. From this Parkman implied that one's state of fitness can be kept at its present level by the normal physical education program which stresses play activities present in current physical education classes.

In an effort to justify physical conditioning as a course in the curriculum at Murry State University, Frank took a class of twenty-three male college students and by the use of a six station circuit training program improved the physical condition of the subjects in each of the fitness factors. Pretest and posttest conditioning measures were obtained by use of the Harvard Step Test and the sit-ups, pull-ups, shuttle-run, and broad jump sections of the AAHPER Youth Fitness Test.

In another circuit training experiment, Baker tried to determine the effects of intensity and modified circuit training programs by utilizing alternate-day training. His subjects were 128 undergraduate college men enrolled in three physical education activity classes, whom he assigned to


experimental groups by random drawing. The three groups were intensity, regular, and modified circuit training. The physical performance test battery, which consisted of the 50-yard dash, leg lift, pull-ups, one-minute sit-ups, AAF Endurance Test, modified arm strength test, bar-dips, standing broad jump, shuttle run, and the 600-yard run, was used for both the pretest and posttest. He concluded that although all three groups achieved significant improvement, the modified circuit training program is superior in developing physical fitness in the time period generally allotted to this type of activity in a physical education program.

Stokes attempted to compare the effectiveness of three different approaches to improving physical fitness of sixty-one high and low fitness female students. The three approaches were general conditioning and team sports, specific conditioning and team sports, and team sports. Agility, power, flexibility, strength, endurance, and balance were the components of fitness tested. Based on the findings he concluded that no combination of fitness level, periodic test, or course content would combine to result in an increase of physical fitness. The results did indicate that a significant gain in fitness was achieved, and that high fitness students emerged significantly above low fitness students in their fitness level.

McNair studied 120 college males to try to determine the effects of three exercise routines of short duration, given in conjunction with a regular physical education program, on the development of cardiovascular fitness, leg strength, and muscular endurance of the legs. He divided the subjects into four groups and assigned each group a program. The programs were a five-minute interval run, in addition to the regular required physical education program; stepping exercises of two and one-half minutes duration along with the physical education activity; four isometric exercises for a period of eight seconds for each exercise along with the physical education activity; and participation only in the regular required program of physical education. Activities in which all students participated were soccer, touch football, basketball, and wrestling. The experiment took place over a six-week period with the subjects participating three days a week. The gains in all three measures were significant at the .01 level of confidence, but no significant differences were found among the four groups in any of the measures. From the findings McNair concluded that the nature of the conditioning program is not the important consideration, as long as it is sufficiently strenuous.

In a similar study to that of McNair, Coker\textsuperscript{10} administered a test consisting of sit-ups, pull-ups, squat thrusts, and a 300-yard shuttle run to determine the effects of three pre-activity calisthenics programs and a program of no calisthenics upon the physical fitness of seventy-five male college students. All of the subjects participated in touch football during the class. He found that the pre-activity calisthenics programs did not differ in their effects upon the overall or specific components of physical fitness of the subjects and that all mean gain scores, calculated for each group on each item, proved to be non-significant. He concluded that pre-activity calisthenics programs will not differ significantly in their effects upon overall or specific components of physical fitness and that pre-activity calisthenics programs will not bring about significant improvement in any aspect of physical fitness of college males.

Guinther\textsuperscript{11} attempted to compare overall physical fitness achievement gains of 273 ninth grade girls who received instruction in three varied calisthenics programs. The three programs were timed, flexible, and none. Sit-ups, standing

\textsuperscript{10}Homer Lee Coker, "Selected Pre-Activity Calisthenics Programs and Their Effects upon the Physical Fitness of the College," unpublished doctoral dissertation, University of Arkansas, Fayetteville, Arkansas, 1964.

\textsuperscript{11}Pauline Guinther, "The Effects of Timed and Flexible Calisthenics Instruction on Achievement in a Selected Physical Fitness Battery," unpublished doctoral dissertation, Arizona State University, Tempe, Arizona, 1966.
broad jumps, and push-ups were the pretest and posttest instruments. The experiment was of four weeks duration. As a result of the findings she concluded that all three programs were equally effective in the achievement of sit-ups and push-ups but in achievement in the standing broad jump the timed calisthenic program was superior.

Kistler in a study of 1,650 university men, over an eight-week period, investigated the amount of improvement in strength, endurance, and agility after a program which was designed to improve these elements of physical fitness. The tests used in this study were a five-minute run for distance, and obstacle course run for time, push-ups, chinning, and sit-ups. Kistler concluded that significant improvement may be achieved in each of these elements, but strength and endurance are the most amenable to improvement, while cardio-respiratory endurance appears to be the most difficult to improve. He further concluded that the time required for achieving physical fitness is not excessive. It was also concluded that an appreciable number of men actually demonstrate retrogression in the ability to perform motor tasks during a training period of eight weeks.

In a comparative study of the effectiveness of two methods of exercise in a physical education instructional

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program, Rice administered five tests of strength, flexibility, and total body endurance, before and after a six-week conditioning program, to two groups of college women. One group worked on maximum repetitions for one minute of strength exercises and had three minutes of work on total body endurance. The other group worked on maximum repetitions for the three prescribed exercises within six minutes. She found no significant improvement except for the intense group on push-ups.

Wireman used a sample of forty-eight male freshmen enrolled in a required physical education orientation class to study the relative effectiveness of four approaches to increasing physical fitness. He attempted to determine if informing students periodically of their progress or regression would be as effective as participation in fifteen minutes of strenuous calisthenics at the beginning of each class period, on the increasing of physical fitness. Wireman concluded that knowledge of results seemed to have more effect on physical fitness than fifteen minutes of calisthenics at the beginning of each class.

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Mullins measured the contributions of selected activities toward the development of strength and endurance over a period of ten weeks of participation. He selected the Sargent jump, two minute sit-ups, burpee, and the 300-yard shuttle run as his measuring instruments. The subjects were 221 freshmen and sophomores enrolled in the required physical education program. Based on the results it was concluded that students in trampoline, weight training, and basketball showed some improvement in strength but none in soccer, tennis, and badminton. In soccer, basketball, weight training, general activities, touch football, tennis, and badminton, students showed some improvement in endurance while those in trampoline showed no improvement in endurance.

The Fleishman Basic Fitness Test, for measuring physical fitness and the Scott Motor Ability Test for College Women, for measuring motor ability, were used by Butts to investigate the contributions of ten physical education class activities on physical fitness and general motor ability of college women. The subjects were 227 undergraduate women enrolled in the required program. The study lasted for one


semester (September through December) with students meeting class twice per week. Based on the results it was concluded that students in basketball, field hockey, and tennis made the most significant gains in both motor ability and physical fitness, while students in fencing and badminton ranked last in both measures.

In a comparative study of physical fitness indices as measured by the sports method and the apparatus method, Wilbur used 366 male freshman students in the required physical education classes. His test items included chins, dips on the parallel bars, baseball throw for distance, jump and reach test, quarter-mile run, bar snap for distance, and the dodging run. He concluded that the sports method was superior to the apparatus method in body coordination, agility, control, for improving arm and shoulder-girdle strength, and in improving physical fitness. The apparatus method and sports method were equal in improvement in speed of the legs and in jumping and leg strength. There was no significant improvement of one group over the other in arm and shoulder-girdle coordination or in endurance.

In a study by Landiss\textsuperscript{18} the results were in opposition to those of Wilbur.\textsuperscript{19} Landiss used a modification of the Army Air Force PFR Test and the Larson Test of Motor Ability. His subjects were 1,031 first semester freshman men enrolled in the activity program. His study was designed to compare eight selected physical education activities in their development of physical fitness and motor ability. The results indicated that the course using the combined activities of tumbling and gymnastics best developed physical fitness and motor ability and that the activities which tend to least develop these areas are tennis, swimming, and boxing.

The review of the literature showed research in a number of aspects of teaching methodology in physical education. It also revealed a number of studies comparing various physical education activities and their relationship to motor ability and physical fitness measures in which there seems to be very little agreement as to which activities are the most effective.

Independent or Non-Directed Study

The review of the literature revealed that a considerable amount of writing has been done in the area of independent


\textsuperscript{19}Wilbur, pp. 326-330.
and non-directed study but only a few research studies were found. Halsey states that "self direction is a necessary complement to problem solving." Referring to methods she states, "... rapport, individualized teaching, problem-solving, and self-direction improve motivation, and highly motivated students are criterion of good method." Empey, in his article about independent study, states:

Self-direction is one of the most important objectives of education. By the time a student graduates from senior high school, he should have developed a high sense of self-direction and motivation. Unfortunately, much of the education in our schools today consists of teachers talking and (hopefully) students listening. If pupils are to have an opportunity to develop self-direction, they must have an opportunity to experience it through independent study.

Empey also reports: "Valid research indicates that learning is better acquired when the teacher creates situations whereby the student can discover knowledge for himself." Abernathy, in an address to the 1961 meeting of the American Academy of Physical Education, states: "As each of you know change is an actuality—all around us is evidence

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21 Ibid., p. 75.
of change in our society," Referring to physical education, she stressed "... the re-examination and revision of methods including lecture, discussion, and independent study, utilizing such teaching aids as educational television and teaching machines." 25

Spears and Swire, 26 in a discussion of self-directed physical education, point out that independent study in the college physical education program should provide the bridge between the traditional instructional program and regular participation in physical recreation in later life. They further emphasize that independent work can give the students an opportunity to study or practice activities in ways that are not possible in the regular instructional class.

At Antioch College, physical education of the independent or autonomous type has been conducted for over fifteen years 27 and is encouraged during the last two semesters of a six semester required physical education program. About 10 percent of the Antioch students who are enrolled in physical


25 Ibid.


27 Ibid., p. 40.
education are enrolled in independent physical education.\textsuperscript{28} The most successful programs have been carried out by upper division students. The philosophy of the Antioch program as reported by Spears and Swire is as follows:

Within Antioch's philosophy of education through involvement in lifelike situations through the work-study program, a variety of activities has been possible from mountaineering to native folk dancing, body conditioning, modern dance, aquatics, tennis, golf, and outing activities.\textsuperscript{29}

Spears and Swire\textsuperscript{30} also discuss how independent study in physical education takes place at Wellesley College, an all girls college, in Massachusetts. At Wellesley College the independent physical education program was organized to meet the needs of the highly skilled students.

The program has four prerequisites which must be met in order to enroll in the independent study curriculum. Students must have passed or be exempted from the fundamentals of movement course, have a satisfactory standing posture, have a small craft permit (have passed swim test), and be highly skilled in the activity which she selects for independent work. At Wellesley, activities proposed for independent work must be those which are included in the instructional program.

\textsuperscript{28}\textit{Ibid.}\textsuperscript{29}\textit{Ibid.}\textsuperscript{30}\textit{Ibid.}, pp. 40-41.
The authors conclude that the advantages of independent study programs far outweigh the problems and that the students are particularly appreciative of the flexibility of the program and the opportunity to pursue activities of specific interest to them. Spears and Swire further state:

Independent physical education increases the opportunity to provide a meaningful experience through the instructional program of physical education in which the student can plan and carry out an activity based on his interests, his daily life pattern, at his discretion, and initiated by him. By this method the gap between the philosophically desirable aspects of college physical education and the actual practices in the program can be diminished.31

Russman32 outlined the four major objectives of the independent study program for seniors at Stamford High School in Connecticut, as affords an opportunity for students to grow more intellectually and emotionally self-reliant, encourages the student to develop an appreciation of and taste for thoroughness, provides an ideal, one-to-one, student-teacher relationship, and provides an opportunity for the students to grasp the inter-dependence of all academic disciplines in the cultural milieu. He concludes his discussion by stating:

Many of those students who have been involved in Independent Study at Stamford High School have returned from college with the remark that they have had far less trouble than most students in

31 Ibid., p. 41.
managing the relative freedom of college life. They claim that this is a result of their experience in Independent Study. 33

Naal 34 believes that the term "independent" study is a misnomer since the teacher must be one step ahead of the student in order to give him proper guidance. However, he indicates that the main advantages of independent study are: the acquisition of mechanical skills, such as organizing note taking, use of books, and how to find and check factual information; and, thought processes which make him organize and analyze, search for information, use his time profitably, become immersed in his study, give him knowledge based on experience, and help him think critically. He also discusses a list of common objections but states that, "... the common objections to independent study disappear when they are faced squarely." 35

In one of the few studies found directly relating to this investigation, Keller 36 compared an informal, student-centered method of teaching to a formal, teacher-centered method of teaching in the learning of selected motor skills.

33 Ibid., p. 473.


and the improvement in certain physical fitness measures. The test for physical fitness was the AAHPER Youth Fitness Test. The subjects were seventy-nine high school boys. He concluded that the informal student-centered method of teaching showed as much or more progress in skill learning and improvement on selected physical fitness measures as did those taught by a formal, teacher-centered method. Those who were taught motor skills by an informal, student-centered method, did better in game competition than students who were taught by a formal, teacher-centered method.

Kulcinski investigated the comparative effectiveness of formal, informal, and combination methods of teaching freshman men's tumbling classes. The formal method involved activity conducted as a class unit on command or at the direction of the teacher. No individual help was given. The informal group went through the same activity but individual help and suggestions were given. The combination group alternated between formal and informal instruction. The number of skills mastered was the criterion for determining the most effective teaching method. As a result of the findings the investigator concluded that the methods ranked as follows: (1) informal, (2) combination, and (3) formal.

Garcia\textsuperscript{38} in an investigation of the utilization of independent study time in the physical education program in a high school that has flexible scheduling found that independent study time was deemed desirable but that it required increased facilities and more teachers to function adequately. He further indicated an increased use of flexible scheduling with definite time for independent study.

Reavis\textsuperscript{39} studied twenty-four selected high schools in the North-Central Association of Colleges and Secondary Schools in an effort to determine current practices for independent study and to secure evaluations of these practices by students and faculty. He found an increasing number of independent study programs and positive reactions from both students and faculty. He further concluded that there needs to be further investigations and evaluations of independent study programs and that more objective means for evaluating the results of these programs should be obtained. He further recommended that the results of investigations and evaluations of independent study programs need to be submitted to professional organizations in order that the


education profession could keep pace with the various evolving independent study programs.

Murphy\textsuperscript{40} investigated students' attitudes toward independent study and how students in high, average, and low achievement groups utilized their time and the facilities. He used 461 study opinionnaires and 117 study diaries of eleventh-grade students for his source of data. As a result of his findings about independent study he concluded that students had little difficulty in adjusting to it; that they experienced less difficulty after a small group discussion in which the teacher helped them plan their work, especially in reading and taking notes; and, that it enabled teachers to give more help to individual students. He further concluded that students like to study in a quiet study area in groups of two or three, and that supervision in any form in any area reserved for study is regarded as undesirable. He concluded that students thought that by participating in independent study and the use of the library had helped them develop better study habits. The fact that it gave them freedom to choose where and when to study were the reasons why the majority of students liked independent study.

\textsuperscript{40}Gerald Murphy, "A Study of the Relationship Between Achievement and the Use of Time and Facilities by Students in High Schools Using Staff Utilization and Independent Study Techniques," unpublished doctoral dissertation, University of Oregon, Eugene, Oregon, 1967.
Finally, he concluded that students in the low achievement group spent less time in resource centers.

Unlike most researchers, Koenig and McKeachie studied personality and independent study and found that there is little evidence to support the view that certain types of personalities should be excluded from independent study. They used 124 students enrolled in a lecture session of an elementary psychology course which met two times a week as their subjects for the experiment. It was their feeling that all students should learn to work independently and to participate responsibly in small groups.

Hartnett and Stewart compared students taking college courses in the independent program with those taking the same courses in the traditional or regular fashion. He used students at the University of South Florida and matched them according to their composite percentiles on the Florida Twelfth Grade Test battery. A tolerance of three points was the most allowed for matching. Performance on their final examination was used as the criterion for achievement. Comparisons were made in six courses having at least fifteen pairs of matched ability students. He found a significant

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difference in favor of the independent study group in two of the six courses. In the other four courses no significant difference was found.

Congreve\footnote{Willard J. Congreve, "Toward Independent Learning," \textit{North Central Association Quarterly}, XXXVII (Spring, 1963), 298-302.} reported on a study in which 175 freshman students were assigned to a group of eight teachers for the purpose of conducting an independent study program. The tentative conclusions were that students met the objectives in each subject at a level as high as or higher than if they had met a regular class, that students made greater use of the library, that they made significant growth in critical thinking, and that students' attitudes toward the teacher and the school had changed to the extent that they accept more responsibility for their own learning.

Chickering\footnote{Arthur W. Chickering, "Dimensions of Independence," \textit{Journal of Higher Education}, XXXV (January, 1964), 38-41.} reported on a study conducted at Goddard College in which the major purpose was to determine the main characteristics of the "independent study student." He concluded that intellectualism and academic criteria are not the distinguishing characteristics but that social, emotional, and attitudinal characteristics are important. The faculty felt that the independent student must be interdependent, venturesome, resourceful, persistent, and reflective.
In an early investigation Umstattd conducted a students' appraisal of the Minnesota three-year independent study experiment. This was conducted at the end of the second year of the experiment. He found that the disadvantages of independent study, as presented by the students, were in administration and organization, influences of regular routine methods, and certain individual student problems. The main advantage, as presented by the students, "... was the opportunity to gain a perspective which would enable the student to understand the three basic courses in education." All of the advantages as reported by the students were under one of the headings of content, method, learning, personal relations, or personal development. Umstattd concluded that if the students' appraisal is correct it indicates greater consideration of independent study plans.

Although the amount of research relating to independent study and physical education is limited, the results indicate that the few programs which are in existence have been successful. Teachers and students alike have favorable attitudes toward these programs. The research also indicates that further research is needed in this area.

46 Ibid., p. 242.
Attitude Toward Physical Education

In the area of attitudes and attitude development in physical education, a review of the literature revealed that numerous studies have been conducted in an effort to determine the effect of various programs of physical education and the effect of specific sports upon the attitudes of students.

Moyer, Mitchem, and Bell\textsuperscript{47} used a modified Wear Physical Education Attitude Inventory to determine the attitudes of freshman and junior women toward the required physical education program. They found that the majority of women chose individual sports over team sports and that 62 per cent of the juniors felt that a required body mechanics and rhythm fundamentals course was most beneficial. They also found a highly favorable attitude toward physical education by both freshmen and juniors. Another study by Bell\textsuperscript{48} and associates supports the findings of Moyer, Mitchem, and Bell, in that individual sports, outside of physical education class, are the most frequently engaged-in activities by both freshman and senior women.

Bell used all freshmen and seniors who were taking or had taken required physical education at the University of

\textsuperscript{47}Lou Jean Moyer, John C. Mitchem, and Mary M. Bell, "Women's Attitudes Toward Physical Education in the General Education Program at Northern Illinois University," Research Quarterly, XXXVII (December, 1967), 515-519.

\textsuperscript{48}Margaret Bell, C. Etta Walters, and staff, "Attitudes of Women at the University of Michigan Toward Physical Education," Research Quarterly, XXIV (December, 1965), 379-385.
Michigan. She used the Wear Physical Education Attitude Inventory as her instrument. Based on the results, she concluded that there was a positive and significant relationship between attitude and the extent to which the students enjoy physical education classes, and the extent to which the instructors are interested in them as individuals. All students rated the social, the physical, and especially mental health, as attributes of physical education activity courses.

Mista used a revision of the Plummer Attitude Inventory along with a background information questionnaire to study attitudes of college women toward their high school physical education programs. Her subjects were 1,126 freshman college women enrolled in private four-year colleges in Iowa. She concluded that college freshman women who enjoyed their high school physical education had better attitudes toward physical education than those who did not enjoy high school physical education. She also concluded that the following factors affect the attitudes of college women toward their high school physical education programs: interscholastic athletic competition, out-of-school physical activity, where the subjects' homes are located, the size of the high school graduating class, the vocational choice of a teaching career, and the subjects' self-rated skill. In a

similar study by Fisher\textsuperscript{50} many factors were found to be related to attitudes, but no single factor or group of factors had appreciable predictive value.

Campbell\textsuperscript{51} administered the Wear Physical Education Attitude Inventory to a group of 199 college males. His study was designed to determine if students differ in their attitude toward physical education as a result of the size of high school attended, the program of physical education experience, or the nature of academic interests. He concluded that no significant variations in attitude toward physical education could be predicted by the size of high school attended, area of academic interest, or preference of physical activities.

Turner\textsuperscript{52} investigated the relationship between the quality of physical education programs and expressed attitudes by senior girl participants in three high schools in Iowa City, Iowa. She concluded that there appeared to be little relationship between quality of physical education

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\textsuperscript{50}Anita Fisher, "Factors Identified with Positive and Negative Attitudes Toward Physical Education," unpublished doctoral dissertation, University of Southern California, Los Angeles, California, 1964.

\textsuperscript{51}Donald E. Campbell, "Student Attitudes Toward Physical Education," Research Quarterly, XXXIX (October, 1968), 456-461.

\textsuperscript{52}Mary Ann Turner, "Senior Girls' Attitudes Toward High School Physical Education and Their Relationship to Program Quality and Other Factors," unpublished doctoral dissertation, Ohio State University, Columbus, Ohio, 1965.
}
and attitude toward physical education. She further con-
cluded that there was no relationship between physical fitness
and attitude toward physical education nor between educational
development and attitude toward physical education. However,
in two of the schools, girls who came from families that
participated in a number of sports or outdoor activities had
higher attitude scores.

Lemen53 used 1,840 subjects from 20 colleges and uni-
versities in another attempt to determine the relationship
between selected educational and social background factors
and the attitudes of college women toward physical education.
She concluded that the primary components affecting favor-
ability of attitudes are activeness and wholesomeness. She
concluded that college women appear to have favorable
attitudes toward activities and physical education, relation-
ships exist between certain social background factors and
attitudes, enjoyment of one's physical education program and
attitudes are related, relationships exist between skill and
leisure participation in sports, and women prefer individual
sports over team sports for leisure time participation.

53 Mildred Gene Lemen, "The Relationship Between Selected
Variables and Attitudes of College Women Toward Physical
Education and Certain Sports," unpublished doctoral disser-
tation, State University of Iowa, Ames, Iowa, 1962.
Hunter analyzed attitudes of college women toward physical education and tried to discover possible causal relationships of other life experiences. Six hundred eighty-seven women enrolled in the University of Florida required physical education program served as her subjects. She concluded that many girls shift their attitudes from positive to negative and from negative to positive from their high school to college experiences. However, interested members of a family who include young girls in their sports and recreational programs, promote a favorable and lasting attitude toward these activities. She further concluded that the majority of derogatory factors are of a type that can be eliminated from the physical education programs.

Cutler used a random sample of 648 entering male students from seven randomly selected California junior colleges to study attitude toward physical education and to determine their attitudes after one semester at the junior college level. Cutler concluded that students' attitudes were consistently favorable and that they did not change appreciably as a result of junior college participation. Their attitudes

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attitudes were very favorable for compulsory participation, and toward the practice of awarding grades and credit. There was also strong student opposition to substitutions for physical education.

Brumbach and Cross measured the attitude toward physical education of all University of Oregon lower division students who entered in September, 1960. In comparing various subgroups he found that athletes had better attitudes than non-athletes, that the more experience in physical education a student had in high school the better his attitude, and that those who came from small high schools had better attitudes toward physical education than those from large high schools.

In 1968 Brumbach used the Wear Physical Education Attitude Inventory to study the effect of a special conditioning class upon students' attitudes toward physical education. He used as the core of the special class the U.S. Army's calisthenic series known as "The Army Dozen" and endurance running, interspersed with various low organized conditioning games and activities. He also tried to educate the students as to the "why" of physical activity. He


concluded that when working with students who lack physical fitness one can conduct a class in such a manner that their physical fitness and their attitudes toward physical education can be substantially improved. He also concluded that an improved teacher-student rapport may bring about improvement in students' attitudes toward physical education.

Juel\textsuperscript{58} administered an attitude scale to students being taught by three different methods to ascertain the effects of these methods upon the attitudes toward physical education of the students. Juel concluded that no one method of teaching was better than another in effecting attitudes of students, but that items such as absences and make-ups, methods of motivation, amounts of explanation and demonstration, and methods of grading are influential in effecting attitude changes. There was also slight evidence that a more liberal method of teaching produces the best results in changing attitudes, followed by the control method, and then the "middle-of-the-road" method.

It was the purpose of Davis\textsuperscript{59} to determine if there would be a change in attitude toward physical education.

\textsuperscript{58} Martin Oliver Juel, Jr., "The Effects of Present Methods of Teaching on Attitudes of Men Students at Southwest Texas State Teachers College Toward Recreational Physical Activity," unpublished doctoral dissertation, University of Minnesota, Minneapolis, Minnesota, 1954.

\textsuperscript{59} Leon Glen Davis, "Changes in the Attitudes of College Freshmen Toward Physical Education Participation," unpublished doctoral dissertation, University of Alabama, University, Alabama, 1964.
during one semester's participation in a college physical education activity course. His subjects were 265 first semester male freshmen enrolled in activity courses at three colleges in Alabama. Attitude was measured by the Wear Physical Education Attitude Inventory. Based on the results he concluded that participation in the activity course had no effect on attitude; however, no participation resulted in a less favorable attitude toward physical education. He also found that the attitudes of incoming freshmen were related to background experiences, and a slight negative relationship was found between attitude scores and having been in high school programs with only students of their own age and grade level.

Sheehan attempted to construct a teaching model that would insure attitude modification toward the social object of cooperation. He used 145 college men divided into five groups. The experimental group was in a soccer class, two control groups were placed into separate soccer classes. The other two groups were in tennis units. All instructional units ended after eighteen class periods. The main finding of this study was that it is possible to construct an attitudinal teaching model. The results also indicated that participation alone in an activity class containing a social

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objective was not enough to modify the students' attitudes. He further concluded that when a group's attitude was modified by the teaching model that the modified attitude would transfer to other situations.

Broer, Fox, and Way used the Wear Physical Education Attitude Inventory to survey the attitude of 1,149 college freshman women toward physical education as an activity and found that a very favorable attitude existed. Students in swimming and tennis were above average while archery students showed a less favorable attitude. A high percentage of students indicated that physical education activity classes contributed to social development, and mental and physical health.

Vincent used the Wear Physical Education Attitude Inventory in a study of 188 college women in a variety of physical education activities. Her main concern was to investigate the relationship between attitude and success, as measured by the student's final grade. She found that the higher significance accrued to those students having a more favorable attitude. In another study relating to the success

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factor, Carr\(^{63}\) attempted to determine the relationship between success in physical education and selected attitudes of 335 high school freshman girls.

She concluded that attitudes held by freshman girls do influence their success in physical education and that motor ability, attitudes, and intelligence were the three main factors found to be effective in determining success. Carr further stated that

> For the sake of better guidance of students in physical education classes, it would seem advisable for teachers to make themselves aware of the attitudes of their students. If undesirable attitudes are obstacles to learning, it would follow that the removal of those obstacles should facilitate learning. Students who will be handicapped by poor attitudes should be helped just as the students who are physically handicapped are helped.\(^{64}\)

Wessel and Nelson\(^{65}\) used 200 college women as subjects to investigate the relationship between strength and attitudes toward physical education. They also used the Wear Physical Education Attitude Inventory as their instrument. They found significant relationships between back strength and all attitude measures.


\(^{64}\)Ibid., p. 187.

\(^{65}\)Janet A. Wessel and Richard Nelson, "Relationship Between Strength and Attitudes Toward Physical Education Activity Among College Women," Research Quarterly, XXXV (December, 1964), 562-569.
Keogh\textsuperscript{66} studied the responses of 136 men and 130 women with the use of the Wear Physical Education Attitude Inventory Form A in an effort to determine whether or not students differed in their attitudes toward general benefits of physical education and whether or not there was a difference in responses between men and women. He found no differences between the stated attitudes toward physical education of men and women. He further found that subjects endorsed the value of physical education but they conflicted in their opinions regarding the relative value of a physical education program in the school curriculum.

In 1962, Keogh\textsuperscript{67} selected sixty-nine men and women from his previous study, whose scores on the Wear Physical Education Attitude Inventory were extremes of high or low, and analyzed their stated attitude responses, as well as selective descriptive information. From this analysis he concluded that there were no differences in attitudes between males and females within the extreme groups. He also concluded that the low group offered minimum support for the outcome of physical education, but they vigorously questioned the value of physical education as a school program.


Marburger studied ninety-three college subjects randomly assigned to two classes taught by the Gestalt method of teaching and two classes taught by the Stimulus-Response method of teaching. She was attempting to investigate the effects of these two teaching methods on student attitude toward physical education. She used both Form A and Form B of the Wear Physical Education Attitude Inventory. She concluded that neither of the methods was significantly better than the other in changing attitude toward physical education.

The amount of research dealing with attitudes and physical education is very vast. However, the majority of the studies have been conducted with women. As a result of the review of the literature it was concluded that attitudes are related to enjoyment of one's experiences, amount of participation, skill, success, and background experiences.

CHAPTER III

PROCEDURES OF THE STUDY

Description of the Subjects

The subjects for this study were 87 male students enrolled in four sections of basic physical education at Tarrant County Junior College, Fort Worth, Texas, during the 1968 fall semester. Their ages ranged from 17 to 20 years of age, with the exception of one 27-year-old subject. The four sections contained a total of 104 students, but only those students who completed both the pretests given for equating the groups, and the final tests, were used as subjects in this experiment. All of the students within each of the four sections had had some previous physical education class experience.

During the first three weeks of the semester all four sections had listened to the same lectures. These lectures pertained to the "Why" of physical activity (see Appendix A).

Assignment of Groups to Programs

During the first class hour of the fourth week of the 1968 fall semester all students in the four sections used in this experiment were administered the Wear Physical Education Attitude Inventory Form A (see Appendix B). During the second and third class hours of the same week a test
consisting of three selected items of the AAHPER Youth Fitness Test (softball throw, standing broad jump, and 600-yard run-walk) were administered to the subjects according to the directions in the AAHPER Youth Fitness Test Manual\(^1\) (see Appendix C).

The sections which met on Monday, Wednesday, and Friday at 8:00 A.M. and Tuesday and Thursday at 9:30 A.M. comprised Group I. The sections which met on Monday, Wednesday, and Friday at 9:00 A.M. and Tuesday and Thursday at 8:00 A.M. comprised Group II. The two groups were assigned to their respective programs by the toss of a coin. As a result of the toss of the coin Group I was assigned the structured group physical fitness program and Group II was assigned the independent work program. After their programs were determined, the nature of their programs were explained and they began their respective activities. All four sections were taught by the same instructor.

In order to substantiate group similarity, pretest group means for the attitude inventory and each of the three selected items of the AAHPER Youth Fitness Test were treated statistically by the use of the \(t\)-test. The significant level was set at .05. As can be seen in Table I, a significant \(t\) was not found; therefore, it was concluded that the two groups were similar on each of the four test variables.

TABLE I
PRETEST MEANS, STANDARD DEVIATIONS AND t SCORES FOR THE
THREE PHYSICAL FITNESS TEST ITEMS AND THE
ATTITUDE INVENTORY

<table>
<thead>
<tr>
<th>Items</th>
<th>Group I (N = 45)</th>
<th>Group II (N = 42)</th>
<th>Fisher's t</th>
</tr>
</thead>
<tbody>
<tr>
<td>I(^a)</td>
<td>83.99 (8.28)</td>
<td>85.50 (9.26)</td>
<td>.79</td>
</tr>
<tr>
<td>II(^b)</td>
<td>109.98 (12.31)</td>
<td>115.00 (15.69)</td>
<td>1.65</td>
</tr>
<tr>
<td>III(^c)</td>
<td>176.29 (34.52)</td>
<td>168.88 (33.65)</td>
<td>1.01</td>
</tr>
<tr>
<td>IV(^d)</td>
<td>123.45 (10.30)</td>
<td>120.45 (10.03)</td>
<td>1.37</td>
</tr>
</tbody>
</table>

\(^a\) Standing Broad Jump.
\(^b\) 600-Yard Run-Walk.
\(^c\) Softball Throw.
\(^d\) Wear Physical Education Attitude Inventory Form A.

Class Procedures
In the structured group physical fitness program the calisthenics and circuit training phases were designed to contribute to all the elements of physical fitness. The group assigned to the structured group physical fitness program (Group I) received the following: approximately forty-five minutes of group calisthenics per week, approximately thirty minutes of circuit training per week, and approximately thirty minutes of running per week.

In the calisthenics phase, the subjects in the Monday, Wednesday, Friday class were led through approximately ten
exercises of twelve repetitions each meeting period, while the subjects in the Tuesday, Thursday class were led through approximately fifteen exercises of twelve repetitions each period. During the first few periods of the experiment the students had to learn the exercises; therefore, they performed fewer repetitions and fewer exercises per period (see Appendix D).

In the circuit training phase the subjects in the Monday, Wednesday, Friday class went through the circuit one time each meeting period, while those subjects in the Tuesday, Thursday class made two trips through the circuit each meeting period. The circuit contained ten stations. Subjects spent thirty seconds on each station with five to ten seconds of rest between stations (see Appendix D).

In the running phase the subjects in the Monday, Wednesday, Friday class ran wind sprints totaling approximately 750 yards during one period and a one mile job during the next period. They alternated between the wind sprints and the mile each class period. The subjects in the Tuesday, Thursday class jogged approximately one and one-half miles each Tuesday and ran wind sprints totaling approximately 1,125 yards each Thursday.

The group assigned to the independent work program (Group II) was placed in a situation in which the student was on his own to develop at his own pace those areas of physical fitness in which he was interested and motivated.
No directions or guidance was initiated by the instructor. The main gymnasium floor, swimming pool, tennis courts, handball courts, gymnastics room, weight training room, dance studio, and outdoor grass fields were available for the students' use. The only limitations placed on the subjects by the instructor were that they attend and suit out for each scheduled class period, keep busy doing some type of physical activity program, and not interfere with other scheduled physical education classes. The instructor's role was one of observation and he served as an advisor to the student only if the student initiated the request for advice. All classes, in both Group I and Group II, utilized approximately 105 minutes of class time per week for a total of eight weeks, exclusive of pretest and final test administrations.

Final Testing Procedure

At the conclusion of the eight-week training period the Wear Physical Education Attitude Inventory Form B and the seven items of the AAHPER Youth Fitness Test were administered to the subjects. The Wear Physical Education Attitude Inventory Form B was administered during the first hour of testing. During the second and third hours of testing the seven items of the AAHPER Youth Fitness Test were administered in the following order: pull-ups, sit-ups, standing broad jump, shuttle-run, 50-yard dash, softball throw, and 600-yard run-walk. Extreme care was taken to administer each
test item to each class in exactly the same manner (see Appendix C). Each subject's score was recorded on a score card as he completed each test item (see Appendix E).

Instruments

Through the AAHPER Youth Fitness Test Project of 1957 the seven-item AAHPER Youth Fitness Test was devised. Approximately 8,500 boys and girls were administered the tests by which norms were developed. In 1960, under the direction of Paul A. Hunsicker, the test was administered to approximately 2,200 college men and percentile scores were developed.

Barrow states: "There are numerous tests designed to measure fitness. Most of these are similar in design and measure similar factors. The AAHPER Youth Fitness Test has been the most widely used test." Klesius, in a study to determine the reliability of the AAHPER Youth Fitness Test items and the relative efficiency of the performance measures, concluded "... that the selected test items appear to be reliable and that the number of trials and measures recommended by the Youth Fitness Test Manual to represent performance seem justified."

2 Ibid., p. 10.


Ponthieux and Barker\textsuperscript{5} made an analysis of the AAHPER Youth Fitness Test by use of correlation and factor analysis and found that the test primarily measures three factors: circulorespiratory endurance, loaded heavily by the 600-yard run-walk; gross body coordination, loaded heavily by the softball throw; and muscular explosiveness, loaded heavily by the standing broad jump.

In an attempt to secure a reliable and valid evaluation of attitude toward physical education, Wear\textsuperscript{6} constructed the Wear Attitude Inventory in 1950. In 1955 he developed two equivalent forms, Form A with a reliability coefficient of 0.94 and Form B with a reliability coefficient of 0.96. A correlation of 0.96 was found between the two forms.\textsuperscript{7} Wear states, "In order to rule out any influence, through suggestion, of the first response upon a subsequent response, particularly in short-term studies, the use of an equivalent, but not identical, set of statements would be indicated."\textsuperscript{8} Wear further states that, "The validity of this instrument

\textsuperscript{5} N. A. Ponthieux and D. G. Barker, "An Analysis of the AAHPER Youth Fitness Test," Research Quarterly, XXXIV (December, 1963), 526.

\textsuperscript{6} Carlos L. Wear, "The Evaluation of Attitude Toward Physical Education as an Activity Course," Research Quarterly, XXII (March, 1951), 114-126.

\textsuperscript{7} Carlos L. Wear, "Construction of Equivalent Forms of an Attitude Scale," Research Quarterly, XXVI (March, 1955), 113-119.

\textsuperscript{8} Ibid., p. 113.
rests largely on logical foundation." Campbell, in a study of student attitudes toward physical education, concluded that: "The Wear Physical Education Attitude Inventory is a reliable and valid means for determining attitude toward physical education."¹⁰

Procedures for Treating Data

After each subject's raw scores for the seven physical fitness items were recorded on their score cards, the investigator recorded their percentile scores for each of the seven items of the AAHPER Youth Fitness Test (see Appendix E). These percentile scores were obtained from the norms in the AAHPER Youth Fitness Test Manual¹¹ (see Appendix F). When raw scores fell between those reported in the norms, percentile scores were figured by interpolation.

In circulorespiratory endurance the subject's percentile scores were multiplied by each of the factor loadings as indicated in Table II.¹² The sum of the products of these multiplications were used as the subject's total scores for circulorespiratory endurance. The same procedure was performed

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¹¹ AAHPER, Youth Fitness Test Manual, p. 65.
¹² Ponthieux and Barker, p. 526.
TABLE II
FACTOR LOADINGS FOR THE AAHPER YOUTH FITNESS TEST

<table>
<thead>
<tr>
<th>Tests</th>
<th>Circulo-respiratory Endurance</th>
<th>Gross Body Coordination</th>
<th>Muscular Explosiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pull-Ups</td>
<td>.54</td>
<td>.01</td>
<td>.55</td>
</tr>
<tr>
<td>Sit-Ups</td>
<td>.53</td>
<td>.27</td>
<td>.16</td>
</tr>
<tr>
<td>Shuttle Run</td>
<td>.14</td>
<td>.27</td>
<td>.71</td>
</tr>
<tr>
<td>Broad Jump</td>
<td>.31</td>
<td>.21</td>
<td>.80</td>
</tr>
<tr>
<td>50-yd Dash</td>
<td>.39</td>
<td>.29</td>
<td>.73</td>
</tr>
<tr>
<td>Softball Throw</td>
<td>.23</td>
<td>.49</td>
<td>.39</td>
</tr>
<tr>
<td>600-yd Run-Walk</td>
<td>.51</td>
<td>.19</td>
<td>.56</td>
</tr>
</tbody>
</table>

in order to obtain their total scores for gross body coordination and muscular explosiveness.

The total scores for circulo-respiratory endurance, gross body coordination, and muscular explosiveness, and the raw scores from the attitude inventory for each of the subjects, were then transferred to IBM cards for computations at the North Texas State University Computer Center, Denton, Texas. Each hypothesis was treated in the null form by use of the *t*-test for significant difference between means.
CHAPTER IV

RESULTS OF THE STUDY

In order to determine group similarity the Wear Physical Education Attitude Inventory Form A and three selected items of the AAHPER Youth Physical Fitness Test were administered to students in four sections of basic physical education at Tarrant County Junior College, Fort Worth, Texas. These tests were administered during the first three hours of class time of the experiment. Two of the sections were assigned to a structured group physical fitness program and the other two were assigned to an independent work program. The \( t \)-test was the statistical procedure used.

After the conclusion of an eight-week training period the subjects were re-tested with the seven items of the AAHPER Youth Physical Fitness Test and their scores for muscular explosiveness, gross body coordination, and circulo-respiratory endurance were calculated. The subjects were also re-tested with the Wear Physical Education Attitude Inventory Form B. Only the scores for those subjects (eighty-seven) who completed both the pretests and the final tests were used in the study.

Each hypothesis was treated in the null form by use of the \( t \)-test for significant difference between means. The
research hypotheses were accepted at the .05 level of significance.

Findings Related to the Hypotheses

**Hypothesis I.**—It was hypothesized that the mean score in muscular explosiveness, as measured by the sum of the weighted items on the AAHPER Youth Fitness Test by first semester freshman men in junior college, would be significantly greater for the group conditioned by an independent work program than the mean score of the group conditioned by a structured group physical fitness program.

The results of the two conditioning programs in physical education classes with respect to muscular explosiveness were compared by computing the data collected from the administration of the seven items of the AAHPER Youth Fitness Test. The subjects in the structured group physical fitness program had a mean of 1.78 and a standard deviation of .62, while the subjects in the independent work program had a mean of 1.75 and a standard deviation of .87.

Analysis of the difference between Group I and Group II means in muscular explosiveness, when measured by the sum of the weighted items on the AAHPER Youth Fitness Test, revealed a t ratio of .18. Since there was no significant difference, Hypothesis I was rejected. An analysis of the data is presented in Table III.
TABLE III
MEANS, STANDARD DEVIATIONS AND THE t VALUE BETWEEN GROUPS I AND II ON MUSCULAR EXPLOSIVENESS

<table>
<thead>
<tr>
<th>Groups</th>
<th>Means</th>
<th>S.D.</th>
<th>Fisher's t</th>
</tr>
</thead>
<tbody>
<tr>
<td>I* (N = 45)</td>
<td>1.78</td>
<td>.62</td>
<td>.18</td>
</tr>
<tr>
<td>II** (N = 42)</td>
<td>1.75</td>
<td>.87</td>
<td></td>
</tr>
</tbody>
</table>

*Structured group physical fitness program.
**Independent work program.

Hypothesis II.--It was hypothesized that the mean score in gross body coordination, as measured by the sum of the weighted items on the AAHPER Youth Fitness Test by first semester freshman men in junior college, would be significantly greater for the group conditioned by a structured group physical fitness program than the mean score of the group conditioned by an independent work program.

The results of the two conditioning programs in physical education classes with respect to gross body coordination were compared by computing the data collected from the administration of the seven items of the AAHPER Youth Fitness Test. The subjects in the structured group physical fitness program had a mean of .78 and a standard deviation of .28, while the subjects in the independent work program had a mean of .72 and a standard deviation of .36. An analysis of the data is presented in Table IV.
TABLE IV
MEANS, STANDARD DEVIATIONS AND THE t VALUE BETWEEN
GROUPS I AND II ON GROSS BODY COORDINATION

<table>
<thead>
<tr>
<th>Groups</th>
<th>Means</th>
<th>S.D.</th>
<th>Fisher's t</th>
</tr>
</thead>
<tbody>
<tr>
<td>I* (N = 45)</td>
<td>.78</td>
<td>.28</td>
<td>.82</td>
</tr>
<tr>
<td>II** (N = 42)</td>
<td>.72</td>
<td>.36</td>
<td></td>
</tr>
</tbody>
</table>

*Structured group physical fitness program.

**Independent work program.

An analysis of the difference between Group I and Group II means in gross body coordination, when measured by the sum of the weighted items on the AAHPER Youth Fitness Test, revealed a t ratio of .82. Since there was no significant difference, Hypothesis II was rejected.

Hypothesis III.—It was hypothesized that the mean score in circulorespiratory endurance, as measured by the sum of the weighted items on the AAHPER Youth Fitness Test by first semester freshman men in junior college, would be significantly greater for the group conditioned by a structured group physical fitness program than the mean score of the group conditioned by an independent work program.

The results of the two conditioning programs in physical education classes with respect to circulorespiratory endurance were compared by computing the data collected from the administration of the seven items of the AAHPER Youth Fitness Test. The subjects in the structured group physical fitness
program had a mean of 1.37 and a standard deviation of .41, while the subjects in the independent work program had a mean of 1.24 and a standard deviation of .56. An analysis of the data is presented in Table V.

**TABLE V**

**MEANS, STANDARD DEVIATIONS AND THE \( t \) VALUE BETWEEN GROUPS I AND II ON CIRCULORESPIRATORY ENDURANCE**

<table>
<thead>
<tr>
<th>Groups</th>
<th>Means</th>
<th>S.D.</th>
<th>Fisher's ( t )</th>
</tr>
</thead>
<tbody>
<tr>
<td>I* (N = 45)</td>
<td>1.37</td>
<td>.41</td>
<td>1.15</td>
</tr>
<tr>
<td>II** (N = 42)</td>
<td>1.24</td>
<td>.56</td>
<td></td>
</tr>
</tbody>
</table>

*Structured group physical fitness program.

**Independent work program.

An analysis of the difference between Group I and Group II means in circulorespiratory endurance, when measured by the sum of the weighted items on the AAHPER Youth Fitness Test, revealed a \( t \) ratio of 1.15. Since there was no significant difference, Hypothesis III was rejected.

**Hypothesis IV.**--It was hypothesized that the mean score in attitude toward physical education, as measured by the Wear Physical Education Attitude Inventory on the part of first semester freshman men in junior college, would be significantly greater for the group conditioned by an independent work program than the mean score of the group conditioned by a structured group physical fitness program.
The results of the two conditioning programs in physical education classes with respect to attitude toward physical education were compared by computing the data collected from the administration of the Wear Physical Education Attitude Inventory Form B. The subjects in the structured group physical fitness program had a mean of 123.87 and a standard deviation of 8.98, while the subjects in the independent work program had a mean of 121.76 and a standard deviation of 12.14. An analysis of the data is presented in Table VI.

**TABLE VI**

**MEANS, STANDARD DEVIATIONS AND THE \( t \) VALUE BETWEEN GROUPS I AND II ON ATTITUDE TOWARD PHYSICAL EDUCATION**

<table>
<thead>
<tr>
<th>Groups</th>
<th>Means</th>
<th>S.D.</th>
<th>Fisher's ( t )</th>
</tr>
</thead>
<tbody>
<tr>
<td>I* (N = 45)</td>
<td>123.87</td>
<td>8.98</td>
<td>.91</td>
</tr>
<tr>
<td>II** (N = 42)</td>
<td>121.76</td>
<td>12.14</td>
<td></td>
</tr>
</tbody>
</table>

*Structured group physical fitness program.

**Independent work program.

An analysis of the difference between Group I and Group II means in attitude toward physical education, when measured by the Wear Physical Education Attitude Inventory Form B, revealed a \( t \) ratio of .91. Since there was no significant difference, Hypothesis IV was rejected.
Teacher Observations and Student Reactions

In this study the instructor's role with the independent work program (Group II) was one of observation. The instructor advised students only if they initiated the request. Only twice during the study were such requests made. One student requested some help in paddleball serving, while another student requested help in setting up a running program.

As a result of the instructor's close observations and familiarity with the subjects and the activities in this study, it was observed that subjects in the independent work program tended to participate in only those areas in which they possessed fairly adequate skills. They also did not tend to vary their program from day to day. For the most part, basketball and paddleball were the activities participated in by the independent work group. The independent work group utilized outdoor facilities very little.

In an attempt to obtain student reactions to the independent work method of teaching, the subjects in that group were asked, after the completion of the study, to write down an expression of their feelings about the program. They were asked to respond by comparing the independent method with the conventional or traditional method to which they had previously been exposed. The following is a list of representative statements obtained from the students' written reactions about the independent work method of teaching.
1. It puts the responsibility on the student.
2. It gives the student a chance to work on what he wants or what he feels he needs.
3. It did not force the student to play something that he did not want to play.
4. There was no pressure from the instructor.
5. By working toward one's own goals a student will work harder than when working toward the instructor's goals.
6. The student gets out of the program only what he puts into it.
7. The students need more supervision.
8. Because of a lack of interest, the students did not work on their needs.
9. Individual programs should be worked out by the instructor and given to the students.
10. The teacher needs to instruct rather than supervise.

The students in the independent work program were also asked to list the activities in which they participated. A summary of these activities is presented in Table VII.

Basketball, paddleball, and weight lifting were the most frequently listed activities, while squash, jump rope, and handball were the least frequently listed activities. The largest number of activities which any one individual listed was seven while the smallest number of activities participated in by an individual was one.
**TABLE VII**

ACTIVITIES PARTICIPATED IN BY SUBJECTS IN THE INDEPENDENT WORK PROGRAM
(N = 42)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Number*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basketball</td>
<td>27</td>
</tr>
<tr>
<td>Paddleball</td>
<td>20</td>
</tr>
<tr>
<td>Weight Lifting</td>
<td>17</td>
</tr>
<tr>
<td>Gymnastics</td>
<td>11</td>
</tr>
<tr>
<td>Swimming</td>
<td>7</td>
</tr>
<tr>
<td>Table Tennis</td>
<td>6</td>
</tr>
<tr>
<td>Football</td>
<td>6</td>
</tr>
<tr>
<td>Trampoline</td>
<td>5</td>
</tr>
<tr>
<td>Running or Jogging</td>
<td>4</td>
</tr>
<tr>
<td>Tennis</td>
<td>3</td>
</tr>
<tr>
<td>Golf</td>
<td>2</td>
</tr>
<tr>
<td>Conditioning Exercises</td>
<td>2</td>
</tr>
<tr>
<td>Squash</td>
<td>1</td>
</tr>
<tr>
<td>Jump Rope</td>
<td>1</td>
</tr>
<tr>
<td>Handball</td>
<td>1</td>
</tr>
</tbody>
</table>

*Number of subjects stating that they participated in the activity.
CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The problem under consideration was a study of physical fitness and attitude, utilizing two methods of teaching physical education in a metropolitan junior college. In order to further clarify the problem the primary purposes were to determine the relative effectiveness of an independent work program as compared to a structured group physical fitness program on muscular explosiveness, gross body coordination, circulorespiratory endurance, and attitude toward physical education of first semester freshman men in a metropolitan junior college. To provide useful data for junior college administrators and physical educators to utilize when designing or evaluating the physical education curriculum and methods of teaching was also a purpose of this study.

During the first three weeks of the semester, prior to the beginning of the experiment, all four sections had listened to the same lectures. These lectures pertained to the "Why" of physical activity. All four sections were taught by the same instructor. The subjects used in the study were eighty-seven male students who completed both the pretests and final tests.
During the first three class hours of the study the Wear Physical Education Attitude Inventory Form A and the standing broad jump, 600-yard run-walk, and softball throw items of the AAHPER Youth Fitness Test were administered to 104 students in four sections of basic physical education at Tarrant County Junior College, Fort Worth, Texas. These tests were used to determine group similarity between two sections which were assigned an independent work program and two sections which were assigned a structured group physical fitness program. The sections which met on Monday, Wednesday, and Friday at 8:00 A.M. and Tuesday and Thursday at 9:30 A.M. were assigned the structured group physical fitness program (Group I) and the sections which met on Monday, Wednesday, and Friday at 9:00 A.M. and Tuesday and Thursday at 8:00 A.M. were assigned the independent work program (Group II).

The independent work program was a type of program whereby the student was placed in a training situation in which he was on his own to develop and put into practice, at his own pace, for his own needs, a program in which he was interested and motivated. The structured group physical fitness program was a type of program developed and led by the instructor. The program was a daily planned conditioning program which consisted of a combination of mass calisthenics, circuit training, and running. Students in both groups utilized approximately 105 minutes of class time per week for a total of eight weeks, exclusive of pretest and final test administrations.
At the conclusion of the eight-week training period the \textit{Wear Physical Education Attitude Inventory Form B} and all seven items of the \textit{AAHPER Youth Fitness Test} were administered to the subjects. The percentile scores for each of the seven items were then recorded. In each of the three fitness areas (circulorespiratory endurance, gross body coordination, and muscular explosiveness) the subject's percentile scores were multiplied by each of the respective factor loadings. The sum of the products of these multiplications were used as the subject's total scores for each fitness area. The raw scores from the attitude inventory were used for the attitude score. Each hypothesis was then treated in the null form by use of the $t$-test for significant difference between means.

A summary of the findings with respect to the hypotheses is as follows:

I. It was hypothesized that the mean score in muscular explosiveness, as measured by the sum of the weighted items on the \textit{AAHPER Youth Fitness Test} by first semester freshman men in junior college, would be significantly greater for the group conditioned by an independent work program than the mean scores of the group conditioned by a structured group physical fitness program.

An analysis of the difference between the two group means in muscular explosiveness revealed no significant
difference at the .05 level of significance. Therefore, the hypothesis was rejected.

II. It was hypothesized that the mean score in gross body coordination, as measured by the sum of the weighted items on the AAHPER Youth Fitness Test by first semester freshman men in junior college, would be significantly greater in the group conditioned by a structured group physical fitness program than the mean score of the group conditioned by an independent work program.

An analysis of the difference between the two group means in gross body coordination revealed no significant difference at the .05 level of significance. Therefore, the hypothesis was rejected.

III. It was hypothesized that the mean score in circulorespiratory endurance, as measured by the sum of the weighted items on the AAHPER Youth Fitness Test by first semester freshman men in junior college, would be significantly greater in the group conditioned by a structured group physical fitness program than the mean score of the group conditioned by an independent work program.

An analysis of the difference between the two group means in circulorespiratory endurance revealed no significant difference at the .05 level of significance. Therefore, the hypothesis was rejected.

IV. It was hypothesized that the mean score in attitude toward physical education, as measured by the Wear Physical
**Education Attitude Inventory** on the part of first semester freshman men in junior college, would be significantly greater in the group conditioned by an independent work program than the mean score of the group conditioned by a structured group physical fitness program.

An analysis of the difference between the two group means in attitude toward physical education revealed no significant difference at the .05 level of significance. Therefore, the hypothesis was rejected.

**Conclusions**

As a result of the findings of this study the following conclusions are drawn:

1. An independent work program is no more effective than a structured group physical fitness program in the development of muscular explosiveness.

2. A structured group physical fitness program is no more effective than an independent work program in the development of gross body coordination.

3. A structured group physical fitness program is no more effective than an independent work program in the development of circulorespiratory endurance.

4. An independent work program is no more effective than a structured group physical fitness program in the development of attitude toward physical education.
Based on the instructor's experience with the study, the following observations are also presented:

1. When students are allowed independent selection of activities for participation they tend to participate in those activities in which they possess fairly adequate skill.

2. When students are allowed independent selection of activities for participation they tend to engage in the same activity from one class period to the next.

3. When students are allowed independent selection of activities for participation they tend to select indoor activities rather than outdoor activities.

4. When students are allowed independent selection of activities for participation, basketball, paddleball, weight lifting, and gymnastic activities are the most popular activities.

Recommendations

The findings of this study do not suggest any recommendations for radical program or curriculum changes. However, the following are recommended for consideration:

1. The fact there was no significant difference between the two programs in the development of muscular explosiveness, gross body coordination, circulorespiratory endurance, and attitude tends to raise a question of the value of physical fitness or condition-oriented courses.
2. Since there was no significant difference between the two programs, it is suggested that sports and game type activities be emphasized.

3. Some consideration should be given to include some independent work in the curriculum.

4. Junior college administrators and physical educators should continually evaluate the advantages and disadvantages of the independent work method of teaching.

Based on the findings of this study the following problems are recommended for further research:

1. A similar study should be conducted over a longer time period.

2. A study in which the independent work subjects would have a closer relationship with their instructor should be conducted. A suggestion would be for the independent work subjects to present a proposal of their work-out program and get approval from their instructor.

3. A study should be conducted in order to determine participation carryover as a result of an independent work physical education program.

4. A similar study should be conducted comparing mean gain as well as the mean score at the end of the training period.

5. A similar study should be conducted utilizing students in female or co-educational classes as subject.
6. A study utilizing an independent work method of teaching in relation to different ability levels should be conducted.
APPENDIX A

LECTURES DURING THE FIRST THREE WEEKS OF THE SEMESTER

I. "Introduction to Physical Fitness--What It Is"

II. "The Components of Physical Fitness"

III. "The Flabby American"--a film

IV. "Physical Fitness and the College Student--Why It Is Important"

V. "Nine Myths About Your Health"

VI. "Current Concepts of the Relationship Between Physical Activity and Coronary Heart Disease"

VII. "Interval Training and Its Application in Circulatory Improvement"

VIII. "Exercising for Physical Fitness"

A. How to develop muscular strength and endurance

B. How to develop circulatory endurance

C. Principles of exercise to apply in the conduct of activities for the improvement of physical fitness
APPENDIX B

THE UNIVERSITY OF NEBRASKA
Lincoln, Nebraska 68508

Physical Education for Men
Physical Education Building

August 16, 1968

Mr. Charles R. Erickson
Associate Professor of Education
Tarrant County Junior College District
5301 Campus Drive
Fort Worth, Texas 76119

Dear Mr. Erickson:

You have my permission to use my Attitude Inventory.

Statement #26 of form B was unintentionally omitted from the Research Quarterly article. It should read, "By the time a person has acquired a skill he has less emotional control than before."

Instructions for administering and scoring this inventory are given in the March 1951 article.

Sincerely

/s/ C. L. Wear

C. L. Wear

CLW:ns
APPENDIX C

DIRECTIONS FOR ADMINISTRATION OF THE AAHPER YOUTH FITNESS TEST

Pull Ups

Description: The pupil hangs from a bar by the use of an overhand grasp. The bar must be high enough that the pupil's feet cannot touch the floor. The pupil raises himself so that his chin can be placed over the bar and then lowers himself back to the starting position. The exercise is repeated as many times as possible.

Rules: Only one trial is allowed per pupil. The body can not swing in executing the exercise. The movement must be a straight pull, not a snap movement. Kicking the legs and feet or raising the knees is not permitted.

Scoring: Only the number of complete pull-ups are recorded as the pupil's score.

Sit Ups

Description: The pupil begins from a position on the mat with his legs extended and feet approximately two feet apart. He is on his back with his fingers interlocked behind his neck. His elbows are on the floor. With a partner holding his ankles in contact with the mat, the pupil sits up, turning the trunk to the left and touching his right elbow to his left knee. He then returns to the starting position and sits up to the opposite side. The exercise is repeated as many times as possible, alternating sides.

Rules: The pupil's fingers must remain interlocked behind the neck throughout each repetition. The knees must remain on the floor during the sit-up but may be bent slightly while touching the elbow to the knee. The back should be rounded and the elbows and head brought forward while sitting up. The pupil must return to the starting position before sitting up again.
Scoring: One point is given for each complete movement of touching the elbow to the knee as long as it is executed according to the rules. The maximum number for boys should be 100.

Shuttle Run

Description: On the signal "Ready? Go!" the pupil starts from a line on the floor and runs thirty feet to another line. Here he picks up a block, runs back to the starting line and places the block behind that line. He then runs back and picks up the second block, which he carries back across the starting line. He does not set this block down.

Rules: The pupil is allowed two trials with several minutes of rest in between.

Scoring: Only the time of the fastest of the two trials is recorded.

Standing Broad Jump

Description: The pupil stands with his feet several inches apart and his toes just behind the take-off line. Before jumping, he swings his arms backward and bends his knees. He jumps by simultaneously extending his knees and swinging his arms forward.

Rules: The pupil is allowed three trials. Measurement is made with a metal tape from the take-off line to the part of the body which touches the ground nearest the take-off line.

Scoring: Only the best jump of the three trials is recorded. It is recorded to the nearest foot and inch.

50-Yard Dash

Description: The pupil takes his position behind a starting line. The starter gives the commands "Are you ready?" and "Go." The command "Go" is accompanied by a downward sweep of his arm in order that the timer will have a visual signal.

Rules: The pupil is allowed only one trial and his score is the amount of time between the starter's signal and the instant the pupil crosses the finish line.
Scoring: The pupil's time is recorded to the nearest tenth of a second.

Softball Throw

Description: The pupil throws a regulation softball while remaining within two parallel lines, six feet apart. The point at which the ball lands is marked with a small stake and if he throws a further distance with his second or third throw the stake is moved to his furthest throw.

Rules: Only an overhand throw is allowed. The pupil gets three throws. The distance recorded is that which is measured at right angles from the point of landing to the restraining line.

Scoring: Only the best of the three trials is recorded to the nearest foot.

600-Yard Run-Walk

Description: The pupil uses a standing start and starts on the signal "Ready? Go!" He is instructed to run the distance in as fast a time as possible but his running may be interspersed with walking if he wishes. In this event the pupils are paired. One pupil runs while his partner listens for his time which is called out as the runner crosses the finish line.

Rules: Walking is permitted, but the object is to cover the distance in the shortest possible time.

Scoring: The pupil's time is recorded in minutes and seconds.
APPENDIX D

CALISTHENIC EXERCISES AND CIRCUIT TRAINING STATIONS USED
IN THE STRUCTURED GROUP PHYSICAL FITNESS PROGRAM

I. Calisthenic Exercises

A. Alternate Toe Touch
B. Trunk Rotation
C. Side Straddle Hop
D. High Jumper
E. Reverse Stride Lunge
F. Trunk Twister
G. Leg Extension Sideward
H. Burpee
I. Side Bender
J. Squat Bender
K. Hand Kick
L. Leg Cross Over
M. Hip Raiser
N. Horizontal Run
O. Two Leg Lift
P. Leg Lift With Spread

II. Circuit Training Stations (30 seconds per station)

A. Jump Rope (Both feet at a time)
B. Isometric (Both hands pushing together)
C. Sit Ups (As many as possible)
D. Bench Steps (Executed on eighteen inch bench)
E. Inclined Push-Ups (Executed from eighteen inch bench)
F. Toe Touches (Down and hold)
G. Jump Rope (One foot at a time)
H. Isometric (Hands pulling apart a horseshoe)
I. Dive and Roll (Executed with three or more people on the mat)
J. Medicine Ball Pass (Two-Hand Chest Pass)
APPENDIX E

SCORE CARD FOR RECORDING POSTTEST DATA

<table>
<thead>
<tr>
<th>ITEMS</th>
<th>SCORE</th>
<th>% tile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pull-ups</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sit-ups</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shuttle-Run</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S.B. Jump</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50-yd.-Dash</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Softball Throw</td>
<td></td>
<td></td>
</tr>
<tr>
<td>600-yd. Run-Walk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitude Inventory (Form B)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### APPENDIX F

**AAHPER PHYSICAL FITNESS NORMS: PERCENTILE SCORES FOR COLLEGE MEN**

<table>
<thead>
<tr>
<th>Percentile</th>
<th>Pull-up</th>
<th>Sit-up</th>
<th>Shuttle Run</th>
<th>Standing Broad Jump</th>
<th>50-Yard Dash</th>
<th>Softball Throw</th>
<th>600-Yard Run-Walk</th>
</tr>
</thead>
<tbody>
<tr>
<td>100th</td>
<td>20</td>
<td>100</td>
<td>8.3</td>
<td>9'6&quot;</td>
<td>5.5</td>
<td>315</td>
<td>1:12</td>
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<tr>
<td>95th</td>
<td>12</td>
<td>99</td>
<td>9.0</td>
<td>8'5&quot;</td>
<td>6.1</td>
<td>239</td>
<td>1:35</td>
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<tr>
<td>90th</td>
<td>10</td>
<td>97</td>
<td>9.1</td>
<td>8'2&quot;</td>
<td>6.2</td>
<td>226</td>
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</tr>
<tr>
<td>85th</td>
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<td>79</td>
<td>9.1</td>
<td>7'11&quot;</td>
<td>6.3</td>
<td>217</td>
<td>1:40</td>
</tr>
<tr>
<td>80th</td>
<td>9</td>
<td>68</td>
<td>9.2</td>
<td>7'10&quot;</td>
<td>6.4</td>
<td>211</td>
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</tr>
<tr>
<td>75th</td>
<td>8</td>
<td>61</td>
<td>9.4</td>
<td>7'8&quot;</td>
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<td>206</td>
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<tr>
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<td>8</td>
<td>58</td>
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<td>6.5</td>
<td>200</td>
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<tr>
<td>65th</td>
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<td>52</td>
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<td>7'6&quot;</td>
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<td>196</td>
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</tr>
<tr>
<td>60th</td>
<td>7</td>
<td>51</td>
<td>9.6</td>
<td>7'5&quot;</td>
<td>6.6</td>
<td>192</td>
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</tr>
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<td>6</td>
<td>50</td>
<td>9.6</td>
<td>7'4&quot;</td>
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<td>188</td>
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<tr>
<td>50th</td>
<td>6</td>
<td>47</td>
<td>9.7</td>
<td>7'3&quot;</td>
<td>6.8</td>
<td>184</td>
<td>1:52</td>
</tr>
<tr>
<td>45th</td>
<td>5</td>
<td>44</td>
<td>9.8</td>
<td>7'1&quot;</td>
<td>6.8</td>
<td>180</td>
<td>1:53</td>
</tr>
<tr>
<td>40th</td>
<td>5</td>
<td>41</td>
<td>9.9</td>
<td>7'0&quot;</td>
<td>6.9</td>
<td>176</td>
<td>1:55</td>
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<tr>
<td>35th</td>
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<td>38</td>
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<td>6'11&quot;</td>
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<tr>
<td>30th</td>
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<td>36</td>
<td>10.0</td>
<td>6'10&quot;</td>
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<td>166</td>
<td>1:59</td>
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<tr>
<td>25th</td>
<td>3</td>
<td>34</td>
<td>10.1</td>
<td>6'9&quot;</td>
<td>7.1</td>
<td>161</td>
<td>2:01</td>
</tr>
<tr>
<td>20th</td>
<td>3</td>
<td>31</td>
<td>10.2</td>
<td>6'7&quot;</td>
<td>7.1</td>
<td>156</td>
<td>2:05</td>
</tr>
<tr>
<td>15th</td>
<td>2</td>
<td>29</td>
<td>10.4</td>
<td>6'5&quot;</td>
<td>7.2</td>
<td>150</td>
<td>2:09</td>
</tr>
<tr>
<td>10th</td>
<td>1</td>
<td>26</td>
<td>10.6</td>
<td>6'2&quot;</td>
<td>7.5</td>
<td>140</td>
<td>2:15</td>
</tr>
<tr>
<td>5th</td>
<td>0</td>
<td>22</td>
<td>11.1</td>
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<td>7.7</td>
<td>125</td>
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<tr>
<td>0</td>
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