A COMPARISON OF THE EFFECTS OF FOUR SELECTED PROGRAMS OF PHYSICAL EDUCATION WITH REGARD TO PHYSICAL FITNESS AND ATTITUDES TOWARD PHYSICAL EDUCATION

APPROVED:

Graduate Committee:

[Signatures]

Dean of the School of Education

[Signature]
A COMPARISON OF THE EFFECTS OF FOUR SELECTED PROGRAMS OF
PHYSICAL EDUCATION WITH REGARD TO PHYSICAL FITNESS
AND ATTITUDE TOWARD PHYSICAL EDUCATION

DISSERTATION

Presented to the Graduate Council of the
North Texas State University in Partial
Fulfillment of the Requirements

For the Degree of

DOCTOR OF EDUCATION

By

Bob L. Gravett, B.S.E., M.S.E.
Denton, Texas
January, 1969
## TABLE OF CONTENTS

### LIST OF TABLES

<table>
<thead>
<tr>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>v</td>
</tr>
</tbody>
</table>

### Chapter

#### I. INTRODUCTION

- The Problem
- Purposes of the Study
- Hypotheses
- Definition of Terms
- Limitations of the Study
- Basic Assumptions
- Procedures for Collecting Data
- Procedure for Treating Data
- Organization of Remainder of the Study

#### II. RELATED LITERATURE

- An Overview of Physical Fitness
- Relationship Between Methods, Programs of Physical Education, and Physical Fitness
- Relationship of Ability Grouping, Physical Fitness, and Attitude Toward Physical Education
- Relationship of Methods, Programs, and Attitude Toward Physical Education

#### III. PROCEDURE OF THE STUDY

- Description of the Subjects
- Experimental Design
- Orientation and Testing of Subjects
- Grouping of Subjects and Assignment of Groups to Treatments
- Class Procedure
- Experimental Groups
- Description of Instruments Used in the Study
- Treatment of Data

#### IV. PRESENTATION AND ANALYSIS OF DATA

- Results of the Study
- Findings Related to the Hypotheses
<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Groups, Activities and Number of Subjects</td>
<td>66</td>
</tr>
<tr>
<td>II. Comparison of Groups on Four Selected Test Items by Means and Standard Deviations</td>
<td>68</td>
</tr>
<tr>
<td>III. Pretest and Posttest Means and Standard Deviations and Mean Gains for Groups I, II, III, and IV on the Standing Broad Jump</td>
<td>77</td>
</tr>
<tr>
<td>IV. Pretest and Posttest Means and Standard Deviations and Mean Gains for Groups I, II, III, and IV on the Softball Throw</td>
<td>79</td>
</tr>
<tr>
<td>V. Pretest and Posttest Means and Standard Deviations and Mean Gains for Groups I, II, III, and IV on the 600-Yard Run-Walk</td>
<td>80</td>
</tr>
<tr>
<td>VI. Pretest and Posttest Means and Standard Deviations and Mean Gains for Groups I, II, III, and IV on the Wear Attitude Scale Form A</td>
<td>81</td>
</tr>
<tr>
<td>VII. Mean Gain Scores and t Values Between Groups I and II on Three Physical Fitness Test Items</td>
<td>82</td>
</tr>
<tr>
<td>VIII. Means, Mean Gain Scores, and the t Values Between Groups I and II on the Wear Attitude Scale Form A for Physical Education</td>
<td>84</td>
</tr>
<tr>
<td>IX. Mean Gain Scores and t Values Between Groups I and III on Three Physical Fitness Test Items</td>
<td>86</td>
</tr>
<tr>
<td>X. Means, Mean Gain Scores, and the t Value Between Groups I and III on the Wear Attitude Scale Form A for Physical Education</td>
<td>87</td>
</tr>
<tr>
<td>XI. Mean Gain Scores and t Values Between Groups I and IV on Three Physical Fitness Test Items</td>
<td>89</td>
</tr>
<tr>
<td>Table</td>
<td>Page</td>
</tr>
<tr>
<td>-------</td>
<td>------</td>
</tr>
<tr>
<td>XII. Means, Mean Gain Scores and the $t$ Value Between Groups I and IV on the Wear Attitude Scale Form A for Physical Education</td>
<td>91</td>
</tr>
<tr>
<td>XIII. Mean Gain Scores and $t$ Values Between Groups II and III on Three Physical Fitness Test Items</td>
<td>92</td>
</tr>
<tr>
<td>XIV. Means, Mean Gain Scores and the $t$ Value Between Groups II and III on the Wear Attitude Scale Form A for Physical Education</td>
<td>94</td>
</tr>
<tr>
<td>XV. Mean Gain Scores and $t$ Values Between Groups II and IV on Three Physical Fitness Test Items</td>
<td>95</td>
</tr>
<tr>
<td>XVI. Means, Mean Gain Scores and the $t$ Value Between Groups II and IV on the Wear Attitude Scale Form A for Physical Education</td>
<td>96</td>
</tr>
<tr>
<td>XVII. Mean Gain Scores and $t$ Values Between Groups III and IV on Three Physical Fitness Test Items</td>
<td>99</td>
</tr>
<tr>
<td>XVIII. Means, Mean Gain Scores and the $t$ Value Between Groups III and IV on the Wear Attitude Scale Form A for Physical Education</td>
<td>101</td>
</tr>
</tbody>
</table>
CHAPTER I

INTRODUCTION

The advent of the machine age freed man from many of the labors performed by his forefathers. Many of their labors necessitated such actions as running, throwing, jumping, and lifting, all of which were conducive to good physical fitness. Man now has more time free from labor in which to pursue activities of special interest to him. However, with regard to physical fitness, he has not always made the proper selection of activities. One reason for poor selection of activities conducive to good physical fitness may be that many persons have been deprived of participation in a good program of physical education. The late Jesse F. Williams stated that the adequacy of a physical education program should never be assumed. Physical education programs should be critically examined and, when necessary, selection of activities should be revised so that all children who are able to do so can participate in vigorous activities.¹

It would be presumptuous to believe that every student has equal opportunity in the pursuit of excellence in health, physical fitness, and activity skills in relation to his needs.

The trend in teaching has been to organize instruction around the group average in ability, thus neglecting to a great extent the high- and low-achiever groups. Frequently those who are in greatest need for improvement in physical fitness, health, and activity skills have actually enjoyed less opportunity for participation and assistance from the teacher. There is a need for provisions that will help to alleviate the problem of inequity of opportunity in class participation.

Hubert Humphrey contended that "Every American youth is entitled to a body that is as healthy and fit as heredity, medical science, physical training, and facilities can help make possible."² Stan Musial, while serving as director of the President's Council on Physical Fitness, recognized that many youngsters did not get adequate exercise and play. He placed the responsibility for the alleviation of the problem upon leaders in sports, government, education, and upon parents.³ Each of these prominent leaders believed that physical education could be the medium for youth achievement in individual and group sports and in physical fitness.


Several factors have aroused the interests of leaders in government and in physical education concerning the fitness of America's youth. During the early stages of the Korean crisis, statistics produced evidence that one out of every two young Americans was rejected from the draft as mentally, morally, or physically unfit. Other sources have shown that approximately 75 per cent of all youth in the United States can be classified as having varying degrees of poor physical fitness.

Results of the Kraus-Weber Test jolted the national fitness image when it reported that, compared to about 8 per cent of European youth, over 50 per cent of American children failed the test. Kirchner and Glines, however, refute the validity of the test to measure physical fitness since the method of scoring, involving a choice of "pass" or "fail," does not distinguish levels of ability.

Regardless of the validity of the test as a determiner of physical fitness, it served as a device for alerting the American people to the physical fitness condition of the youth of the nation. In 1956, former President Eisenhower called a conference on youth fitness. He later appointed a

---


5Glenn Kirchner and Don Glines, "Comparative Analysis of Eugene, Oregon, Elementary School Children Using the Kraus-Weber Test of Minimum Muscular Fitness," Research Quarterly, XXVIII (March, 1957), 16.
Council on Youth Fitness. In September of 1956, 100 delegates representing the field of physical education met in Washington, D.C. to study the problem of fitness of American youth.

Since the 1956 Youth Fitness Conference the problem has been studied by many individuals and committees. The American Association for Health, Physical Education and Recreation created a national committee to devise a battery of tests that would measure, to some degree, some of the components of fitness. The outcome was a battery of seven test items which has been instrumental in evaluating the fitness of American youth and stimulating greater interest in physical education. It is now possible to identify individual needs, with some degree of accuracy, and from these data pertaining to individual fitness needs devise a program of activities adapted to individual needs.

Even with improved facilities, more and better qualified instructors, and knowledge of methods of determining individual needs, the regular classroom teacher, according to Moore, continues to face the problem of providing opportunities for all students within a heterogeneous class. Generally, institutions of learning have made little attempt to provide equal opportunity to all ability levels of students.

---

The apparent decline in physical fitness of Americans, the attitude of unconcern for good health and physical fitness among the youth, and the hesitancy of educational institutions in inaugurating and implementing programs of physical education based upon individual needs have created a need for more research in the area of methods of conducting physical fitness programs.

The Problem

The problem of this study was the determination of the relationship between four selected programs of physical education and (a) physical fitness, and (b) attitude toward physical education among low-physically-fit freshman and sophomore male college students.

Purposes of the Study

The following purposes were formulated for this study:

1. To compare the results of an adaptive activities program upon (a) a group of low-physically-fit freshman and sophomore male college students participating in a homogeneous class and, (b) a group of low-physically-fit freshman and sophomore male college students participating in heterogeneous classes in terms of gross body coordination, explosive power, and circulorespiratory endurance.

2. To compare the results of an adaptive activities program upon (a) a group of low-physically-fit freshman and sophomore male college students participating in a homogeneous
class and (b) a group of low-physically-fit freshman and sophomore male college students participating in heterogeneous classes in terms of attitude toward physical education.

3. To compare the results of (a) an adaptive activities program and (b) a regular program activity upon two groups of low-physically-fit freshman and sophomore male college students participating in homogeneous classes in terms of gross body coordination, explosive power, and circulorespiratory endurance.

4. To compare the results of (a) an adaptive activities program and (b) a regular program activity upon two groups of low-physically-fit freshman and sophomore male college students participating in homogeneous classes in terms of attitude toward physical education.

5. To compare the results of (a) a group of low-physically-fit freshman and sophomore male college students participating homogeneously in an adaptive activities program and (b) a group of low-physically-fit freshman and sophomore male college students participating in a regular program activity in heterogeneous classes in terms of gross body coordination, explosive power, and circulorespiratory endurance.

6. To compare the results of (a) a group of low-physically-fit freshman and sophomore male college students participating homogeneously in an adaptive activities program and (b) a group of low-physically-fit freshman and
sophomore male college students participating in a regular program activity in heterogeneous classes in terms of attitude toward physical education.

7. To compare the results of (a) a group of low-physically-fit freshman and sophomore male college students participating in heterogeneous classes of an adaptive activities program and (b) a group of low-physically-fit freshman and sophomore male college students participating homogeneously in a regular program activity in terms of gross body coordination, explosive power, and circulorespiratory endurance.

8. To compare the results of (a) a group of low-physically-fit freshman and sophomore male college students participating in heterogeneous classes of an adaptive activities program and (b) a group of low-physically-fit freshman and sophomore college students participating homogeneously in a regular program activity in terms of attitude toward physical education.

9. To compare the results of (a) an adaptive activities program and (b) a regular program activity upon two groups of low-physically-fit freshman and sophomore male college students participating in heterogeneous classes in terms of gross body coordination, explosive power, and circulorespiratory endurance.

10. To compare the results of (a) an adaptive activities program and (b) a regular program activity upon two groups
of low-physically-fit freshman and sophomore male college students participating in heterogeneous classes in terms of attitude toward physical education.

11. To compare the results of (a) a group of low-physically-fit freshman and sophomore male college students participating homogeneously in a regular program activity and (b) a group of low-physically-fit freshman and sophomore male college students participating in heterogeneous classes of a regular program activity in terms of gross body coordination, explosive power, and circulorespiratory endurance.

12. To compare the results of (a) a group of low-physically-fit freshman and sophomore male college students participating homogeneously in a regular program activity and (b) a group of low-physically-fit freshman and sophomore male college students participating in heterogeneous classes of a regular program activity in terms of attitude toward physical education.

Hypotheses

The following hypotheses were tested in this study:

1. The mean gain in physical fitness for a group of low-physically-fit subjects participating as a homogeneous class in an adaptive activities program will be significantly greater, as measured by each of three selected items from the AAHPER Youth Fitness Test, than the mean gain for a group of low-physically-fit subjects participating in heterogeneous classes of an adaptive activities program.
II. A group of low-physically-fit subjects participating as a homogeneous class in an adaptive activities program will show a significantly greater mean gain on the Wear Attitude Scale Form A for physical education than will a group of low-physically-fit subjects participating in heterogeneous classes of an adaptive activities program.

III. The mean gain in physical fitness of low-physically-fit subjects participating as a homogeneous class in an adaptive activities program will be significantly greater, as measured by each of three selected items from the AAHPER Youth Fitness Test, than the mean gain of a group of low-physically-fit subjects participating as a homogeneous class in a regular program activity.

IV. A group of low-physically-fit subjects participating as a homogeneous class in an adaptive activities program will show a significantly greater mean gain on the Wear Attitude Scale Form A for physical education than will a group of low-physically-fit subjects participating as a homogeneous class in a regular program activity.

V. The mean gain in physical fitness for a group of low-physically-fit subjects participating as a homogeneous class in an adaptive activities program will be significantly greater, as measured by each of three selected items from the AAHPER Youth Fitness Test, than the mean gain for a group of low-physically-fit subjects participating in heterogeneous classes of a regular program activity.
VI. A group of low-physically-fit subjects participating as a homogeneous class in an adaptive activities program will have a significantly greater mean gain on the Wear Attitude Scale Form A for physical education than will a group of low-physically-fit subjects participating in heterogeneous classes of a regular program activity.

VII. The mean gain in physical fitness for a group of low-physically-fit subjects participating in heterogeneous classes of an adaptive activities program will be significantly greater, as measured by each of three items from the AAHPER Youth Fitness Test, than the mean gain for a group of low-physically-fit subjects participating as a homogeneous class in a regular program activity.

VIII. A group of low-physically-fit subjects participating in heterogeneous classes of an adaptive activities program will show a significantly greater mean gain on the Wear Attitude Scale Form A for physical education than will a group of low-physically-fit subjects participating as a homogeneous class in a regular program activity.

IX. The mean gain in physical fitness for a group of low-physically-fit subjects participating in heterogeneous classes of an adaptive activities program will be significantly greater, as measured by each of three selected items from the AAHPER Youth Fitness Test, than the mean gain for a group of low-physically-fit subjects participating in heterogeneous classes of a regular program activity.
X. A group of low-physically-fit subjects participating in heterogeneous classes of an adaptive activities program will show a significantly greater mean gain on the Wear Attitude Scale Form A for physical education than will a group of low-physically-fit subjects participating in heterogeneous classes of a regular program activity.

XI. There will be no significant difference in mean gain in physical fitness, as measured by each of three selected items from the AAHPER Youth Fitness Test, between a group of low-physically-fit subjects participating as a homogeneous class in a regular program activity and a group of low-physically-fit subjects participating in heterogeneous classes of a regular program activity.

XII. A group of low-physically-fit subjects participating as a homogeneous class in a regular program activity will have a significantly greater mean gain on the Wear Attitude Scale Form A for physical education than a group of low-physically-fit subjects participating in heterogeneous classes of a regular program activity.

Definition of Terms

The following definitions were used for this study:

1. Adaptive physical education. Adaptive physical education as used in this study means a program of activities selected with regard to specific physical weaknesses of the individual as made evident by three selected items
from the American Association for Health, Physical Education, and Recreation Youth Fitness Test. 7

2. AAHPER Youth Fitness Test. The AAHPER Youth Fitness Test is a seven-item test developed by the AAHPER in 1957. The seven items are (1) pull-ups, (2) sit-ups, (3) shuttle run, (4) standing broad jump, (5) 50-yard dash, (6) softball throw for distance, and (7) 600-yard run-walk. The items are measures of arm strength, abdominal strength, speed and agility, leg power, speed, arm power, and endurance. Upon the basis of research by Fleishman 8 and Ponthieux and Barker, 9 the softball throw, the standing broad jump, and the 600-yard run-walk were selected for use in this study.

3. Physical fitness. Physical fitness as used in this study refers to an individual's performance on three selected items associated with gross body coordination, explosive power, and circulorespiratory endurance.

4. Attitude. Attitude as used in this study refers to a predisposition or set of mind formulated through past experiences and readily adaptable to future events of a similar nature, specifically as measured by the Wear Attitude Scale for Physical Education.

---

7 Hereafter referred to as the AAHPER Youth Fitness Test.


5. **Low-physically-fit.** Low-physically-fit as used in this study refers to students who ranked among the lowest thirty-three of a section of physical education in which they were enrolled, as determined by the AAHPER Youth Fitness Test.

6. **Regular program activity.** A regular program activity as used in this study refers to a regularly scheduled class of basketball.

**Limitations of the Study**

This study was limited by the following:

1. The findings of this study in terms of physical fitness will be limited to results obtained from data collected during administration of three items of the AAHPER Youth Fitness Test.

2. The findings of this study in terms of attitude toward physical education will be limited to results obtained from data collected by use of the Wear Attitude Scale Form A for physical education.

**Basic Assumptions**

1. It was assumed that subjects would cooperate and provide honest, maximum effort on the pretest and posttest administrations of the instruments.

2. It was assumed that, while all classes were not directed by the same instructor, orientation of instructors would minimize the effects of teacher differences upon the results of the study.
3. It was assumed that any differences in outside activities, such as intramural activities, individual training, and part-time employment, would not significantly affect the results of the study.

4. It was assumed that any differences in ability, weight, height, and age of subjects would be equalized among the several groups involved in the study.

Procedures for Collecting Data

Beginning in the fall semester of 1968, 465 male freshman and sophomore students enrolled in eight sections of activity physical education from the North Texas State University Department of Physical Education were selected for the study. Physical Education 116, Sections 1, 2, 3, 4, 6, 8, 15, and 18 were selected because the same program activity—basketball—was offered in all of these sections.

The first class period of the semester was used for student orientation. The nature and duration of the study was explained and the Wear Attitude Scale Form A for physical education was administered.

During the second class period three selected items of the AAHPER Youth Fitness Test were administered in accordance with instructions given in the test manual. Individual's

10 See Appendix A. 11 See Appendix B.

scores were entered on four-by-six inch cards for later computation. 13

Subjects were ranked within each section on each of the three items of the fitness test and an average rank was computed for each subject. From each section the lowest thirty-three students were identified for participation in the experiment. This population of low-physically-fit subjects constituted a pool from which four groups were selected.

Four groups were randomly selected for the study in the following manner. Group I consisted of thirty-one 14 subjects from the lowest thirty-three students in Section 116-01 and was selected to participate in the adaptive activities program 15 as a homogeneous class.

Group II was formed by randomly selecting nine subjects from Section 116-06 and eleven subjects from each of Sections 116-08 and -18. These subjects were randomly selected to participate in the heterogeneous classes of an adaptive activities program within their respective sections. 16

---

13 See Appendix D.
14 Subjects with extreme scores were not used in order to establish similarity between groups on each variable.
15 See Appendix F.
16 See Appendix F.
Thirty-one subjects from the low-physically-fit students from Section 116-02 were selected as Group III. This group participated in a regular program activity of basketball as a homogeneous class.\(^{17}\)

Physical Education 116, Sections 3, 4, and 15 contained the subjects for Group IV. Eleven students were randomly selected from each of the low-physically-fit segments of the three sections to participate in heterogeneous classes of a regular program activity of basketball within their respective sections.\(^{18}\)

A test for homogeneity between groups provided evidence of group similarity on the following pretest variables: (a) gross body coordination, (b) explosive power, (c) circulorrespiratory endurance, and (d) score on the Wear Attitude Scale Form A for physical education.

All classes met three fifty-minute periods each week for a total of six weeks, exclusive of pretest and posttest administrations. Upon completion of a six-week training period, the Wear Attitude Scale Form A for physical education and the three items selected from the AAHPER Youth Fitness Test were again administered.

Procedure for Treating Data

Each hypothesis was restated and statistically tested in the null form by a t-test for large independent groups.

\(^{17}\)See Appendix G. \(^{18}\)See Appendix G.
Hypotheses were rejected when the .05 level of significance was reached. Mention was made concerning instances in which the .05 level of significance was not attained.

Raw score data were transferred to IBM cards, and computations were made at the North Texas State University IBM Computer Center, Denton, Texas.

Organization of Remainder of the Study

A survey of related literature is presented in the second chapter. An overview of physical fitness is reviewed in section one. In the second section, literature related to the relationship between methods and programs of physical education and physical fitness is discussed. The third section is devoted to the relationship of ability grouping, physical fitness, and attitude toward physical education. The fourth section contains a review of literature pertaining to the relationship of methods, programs, and attitude toward physical education.

In Chapter III, the methods and procedures of the study are described.

Treatment of the data and the findings related to the hypotheses are presented in Chapter IV.

Chapter V is composed of a summary of the study, findings and implications based upon the findings.
CHAPTER II

RELATED LITERATURE

The literature was reviewed to provide data for developing the study, and to locate studies concerning the effects of exercise programs upon physical fitness and the relationships of ability grouping, attitude toward physical education, and physical fitness.

The chapter is divided into the following sections:

1. an overview of physical fitness;
   a. meaning of physical fitness
   b. levels of physical fitness
   c. values of physical fitness
   d. physical fitness movement

2. studies related to the relationship of various exercise programs and physical fitness;

3. studies related to the relationship of ability grouping and physical fitness;

4. studies related to the relationship of attitudes toward physical education and physical fitness.

An Overview of Physical Fitness

Meaning of Physical Fitness

Physical fitness connotes a diversity of meanings.

To some persons, varsity spectator sports such as football,
basketball, and track are the epitome of physical fitness. To others, such as those in the physical education and medical professions, physical fitness denotes the ability to perform a stipulated task without an undue feeling of fatigue.

There is not a steadfast definition of physical fitness that is readily acceptable to all people. According to Karpovich,¹ "Physical fitness measures merely the ability to pass physical fitness tests; and therefore, the so-called degree of fitness possessed by an individual depends on the character of the test." From an occupational point of view, physical fitness is "the degree of the ability to execute a specific physical task under specific ambient conditions."²

Morehouse and Miller³ are in harmony with Karpovich on a definition of physical fitness. They contend that "the term 'fitness' implies a relation between the task to be performed and the individual's capability to perform it." A task may either be specific or nonspecific. Fitness for a specific task can be demonstrated by an attempt to perform the task. This type of test fails to reflect an individual's degree of fitness, since the performance is either a success or a failure. It does not reveal an individual's capacity

¹Peter V. Karpovich, Physiology of Muscular Activity (Philadelphia, 1965), p. 221.
²Ibid., p. 221.
³Laurence E. Morehouse and Augustus T. Miller, Jr., Physiology of Exercise (St. Louis, 1967), p. 263.
to perform, nor does it make evident the reasons for failure. A nonspecific task, such as a normal daily life activity, implies a reasonable degree of efficiency without excess fatigue and with complete recovery before the following day's activities are begun. Fitness does not describe a state of health; but rather, it relates to a task.\footnote{Ibid., p. 263.}

One writer who has a firm background in the physiology of exercise, Herbert de Vries,\footnote{Herbert A. de Vries, Physiology of Exercise for Physical Education and Athletics (Iowa, 1966), p. 204.} is reluctant to define physical fitness in an absolute manner. He would prefer that physical fitness be defined arbitrarily "so that we may proceed with an operational definition, and with the most important work of all: improving levels of physical fitness at all levels of our population." The physical education and medical professions' work should receive credit as offering the best possible definition of physical fitness. Test batteries have been developed by physical educators which include such items as running, throwing, jumping, pull-ups, and push-ups. These test batteries are considered as tests of motor fitness, which attempt to measure such elements of physical fitness as coordination, speed, agility, endurance, power, strength, balance, flexibility, and body control.\footnote{Ibid., p. 204.}
An eminent physical educator, Charles Bucher, states that physical fitness refers primarily to the bodily aspects of fitness and that, "it represents the individual's capacity to live most vigorously and effectively with his own resources." Physical fitness implies the ability to resist fatigue, an acceptable degree of motor performance, and the ability to adapt to muscular stress.

Levels of Physical Fitness

Physical fitness is only one of several very important objectives of physical education. Voltmer and Esslinger state that the physical fitness objective is concerned with increasing the capacity of the body for movement. It is involved with such components as strength, stamina, cardiorespiratory endurance, agility, flexibility, and speed. This objective has been prevalent for thousands of years. In primitive times physical exercise was recognized as a means of improving the physical fitness of individuals. Military leaders, for centuries, have utilized the role of physical activity in improving the effectiveness of their personnel.

---


8 Ibid., p. 30.

With regard to the physical education of youth, Plato\textsuperscript{10} once said, "... send them to the master of physical training so that the bodies may better minister to the virtuous mind, and that they may not be compelled through weakness to play the coward in war or any other occasion." Socrates\textsuperscript{11} also stressed the importance of physical development when he stated, "No citizen has a right to be an amateur in the matter of physical training ... what a disgrace it is for a man to grow old without ever seeing the beauty and strength of which his body is capable."

There should be no discrimination as to who should possess physical fitness. Bucher\textsuperscript{12} contends that "All people need strength, endurance, and the other components of physical fitness. Such qualities are essential for excellence." Turner\textsuperscript{13} further elaborates that a good physique contributes to successful living by its ability to meet the daily demands of work and play without undue fatigue. Although heredity determines the development of a good physique in part, it is largely within one's own control.

\textsuperscript{10}E. N. Gardner, Greek Athletic Sports and Festivals (London, 1910), p. 130.
\textsuperscript{11}Ibid., p. 130.
\textsuperscript{12}Bucher, op. cit., p. 171.
\textsuperscript{13}C. E. Turner, Personal and Community Health (St. Louis, 1967), p. 225.
One question has been asked many times: How much physical fitness is necessary for an individual? Karpovich feels that since the degree of fitness necessary is relatively unknown, "it is safer to follow the example set by nature, and have an excess of fitness to guarantee a sufficient reserve for emergencies." He further agrees "that there is general physical fitness—present or potential—for most activities involving physical work."

Some authorities discuss fitness in terms of fitness for living. To Kozman, Cassidy, and Jackson it involves the functioning person. Specificities of fitness are recognized in such phrases as fit for the job, fit to teach, fit to fight, and fit to be a parent. They believe that "such perceptions give meanings to the generalized concept of fitness as the power and skill of the purposeful, learning organism to act with ever increasing competence and maturity."

With regard to the assessment of general fitness, Morehouse and Miller believe that since more than one task is implied, not only the daily activities, but also unexpected emergencies, that it would be unrealistic to expect

---


17 Morehouse and Miller, *op. cit.*, p. 265.
persons in sedentary occupations to prepare themselves by regular exercise to meet all demands. In this instance a more rational goal "would be at that level represented by an hour of vigorous tennis or an afternoon of moderately heavy yard work."

In reference to the level of fitness required of an individual, Johnson and his associates\(^\text{18}\) described four levels of functional fitness:

1. Subminimal functional fitness is a state of physical inefficiency and sometimes emotional stability as well. It usually prevails because the individual has expended little energy and time in an attempt to improve his functional fitness potential; consequently, he becomes easily fatigued and is unable to meet physical and/or emotional challenges with reasonable success.

2. Minimal functional fitness is characterized by the ability to respond adequately in a physiological and emotional manner to typical daily problems in such a way that will maintain the systemic health base and will enable an individual to carry out his function in society effectively.

3. Maximal fitness for an individual can never be known; however, there is a maximal level. The highly trained athlete approaches this point, but it can never be ascertained whether or not one has reached the maximal level.

4. Optimal functional fitness is considered the ideal functional fitness level. According to Johnson:

At this level a person has the capacity to respond to near maximal, short-term effort or sub-maximal (but long-term) work without physiological or emotional debilitation. He is usually emotionally quite stable and probably has a tremendous capacity to "enjoy life." Such a person is capable of carrying out a number of common tasks (even though he may be unaccustomed to them) without undue discomfort or injury.\(^19\)

Johnson and his co-workers\(^20\) further stated that to arrive at the optimal functional fitness level, "a person must expend more energy, and in different ways, if he is to avoid the more serious consequences of unaccustomed, occasional, near maximal work or play efforts."

Values of Physical Fitness

To function properly, the human organism needs physical activity on a regular basis, just as it requires nutritious food every day. Bucher\(^21\) stated, "Being active is not a sometimes thing but a continuing must for good health."

Morehouse and Miller\(^22\) and Bucher\(^23\) each agree with the physiological law of use. The functional efficiency of an organ or system is developed or improved with use and regresses or wastes away from dis-use.

\(^{19}\)Ibid., p. 18.  
\(^{20}\)Ibid., p. 18.  
\(^{21}\)Bucher, op. cit., p. 349.  
\(^{22}\)Morehouse and Miller, op. cit., p. 288.  
\(^{23}\)Bucher, op. cit., p. 350.
The literature discloses many of the desired benefits derived through exercise. Observations and studies by Hein and Ryan\textsuperscript{24} revealed that physical exercise contributes significantly to physical health in the following ways:

1. It helps to prevent obesity; it delays degenerative diseases associated with it; and it increases life longevity.
2. Physical activity aids in the prevention of coronary heart disease.
3. It preserves physical characteristics of youth.
4. Proper exercise increases the effectiveness of an individual in meeting emergencies.

Turner\textsuperscript{25} discussed more specific effects which regular exercise produces upon the body:

1. It serves as a stimulus to the circulation of blood and lymph. Heart rate may increase from 75 beats to 150 beats per minute and the total blood output may be increased five- or six-fold. More blood reaches the muscles and with the increased need for heat reduction more blood goes to the skin. The massaging action created by movement of muscles and other organs and the increased respiration strengthens the suction of venous blood into the great veins near the heart.


\textsuperscript{25}Turner, \textit{op. cit.}, pp. 229-230.
2. The rate of breathing may be doubled; consequently, the air intake may actually increase to 50 or 100 liters per minute in comparison to 5 to 8 liters per minute normally.

3. Because of an increase in bodily activity, oxidation is increased. Carbon dioxide output is increased from three to ten times normal resting output.

4. The demand for oxygen in tissues is increased, thereby stimulating the formulation of red corpuscles which leads to an increase in hemoglobin.

5. The excretion of the sweat glands serves to clear the skin and soften the horny layers.

6. The churning action of the organs and abdominal muscles increases peristalsis which aids in digestion.

7. Muscular activity redistributes the flow of blood, thereby producing a beneficial effect upon the heat regulating mechanism.

8. Relaxation and sleep are facilitated by exercise.

9. Overweight and obesity are curtailed, which in turn reduces the danger of coronary heart disease.

10. Neuromuscular coordination is improved.

11. Probably the most obvious aspect of exercise is the effect it has on the skeletal muscular system. This can be readily seen in the highly conditioned athlete and in the person who can work without excessive fatigue. The heart is also built up and strengthened by physical exercise. This is of importance in times of emergencies and in certain
illnesses. Exercise also seems beneficial to other internal organs. Internal congestion in the viscera, which tends to interfere with digestion, circulation, and physical well-being is relieved to some extent by proper exercise.

12. Activity has a beneficial effect on mental health since sports and games provide opportunity for self-expression, social contact, and identification with a group.

From a more practical viewpoint, Voltmer and Esslinger\textsuperscript{26} state that good physical fitness is a necessity for successful and enjoyable life because it increases the functional efficiency of the organism. Physically fit people can do more things with more efficiency than the physically unfit. This concept is further expressed by Lee and Wagner. They stated:

\begin{quote}
No matter what the arena of life, physical fitness increases materially the opportunities for living fully. Many people live at a level of fitness far below their capacities, making drudgery both of work and play. Others, although living more nearly at their fitness level, do not experience a rich, full life through sheer lack of what it takes physically to reach the heights. Those who in the growing years attained the heights of physical capacity and, in later years, have had the determination to maintain those heights experience a fullness of life that is a closed book to the weak of spirit.\textsuperscript{27}
\end{quote}

The importance of exercise upon the mind of man was believed by Bock and Dill\textsuperscript{28} to "serve to divert the mind

\begin{flushright}
\textsuperscript{26} Voltmer and Esslinger, \textit{op. cit.}, p. 29.
\end{flushright}

\begin{flushright}
\end{flushright}

\begin{flushright}
\textsuperscript{28} F. A. Bainbridge, \textit{The Physiology of Muscular Exercise}, rewritten by A. V. Bock and D. B. Dill (London, 1931).
\end{flushright}
into fresh channels and gives an emotional outlet for the cares and worries of daily life, especially in later life. The relief of emotional tension in turn reacts favorably upon the physical state of a person."

Former president John F. Kennedy considered physical fitness pertinent to intellectual performance, as evidenced when he stated:

> For physical fitness is not only one of the most important keys to a healthy body; it is the basis of dynamic and creative intellectual activity. The relationship between the soundness of the body and the activities of the mind is subtle and complex. But we do know what the Greeks knew: that intelligence and skill can only function at the peak of their capacity when the body is healthy and strong; that hardy spirits and tough minds usually inhabit sound bodies.29

Although the literature divulges a voluminous array of the values of exercise and physical fitness, physical activity alone is not enough to insure proper fitness. As Jesse Ferring Williams30 asserted, fitness for living is dependent upon the degree of satisfaction one receives from performance of motor skills, interests in motor recreation and an attitude that favors enjoyment and continuance of physical activity.


Physical Fitness Movement

Much of the present concern for physical fitness can be traced to the draftee rejection rate during the Korean War. Kennedy reported that one out of every two young Americans was rejected from the draft as mentally, morally, or physically unfit. Karpinos studied the fitness of American youth for military service and reported that from the 3,500,000 pre-induction examinations of men during the Korean War, 14.4 per cent were rejected for medical reasons. Further evidence of the nation's fitness level was produced by Bucher; 75 per cent of all youth in the United States can be classified as having varying degrees of poor physical fitness.

If one single event produced a more profound effect on a national concern for fitness, it would probably be the results of the Kraus-Weber test. On a six-item test for appraising strength and flexibility of trunk and limbs,

---

32 Kennedy, op. cit., pp. 15-17.
34 Bucher, op. cit., p. 51.
Kraus, and his associates did much to arouse the national interest in fitness. Kraus and Hirschland administered the test to American and European youth and reported that 57.9 per cent of the American youth did not reach minimum standards while only 8.7 per cent of the European youth fell below minimum standards.

Kirchner and Glines have questioned the validity of the Kraus-Weber test to measure fitness. The method of scoring is either pass or fail; therefore, levels or degrees of fitness cannot be obtained. Regardless of the weaknesses ascribed to the test, it served to alert the American people to the significant problem of physical fitness.

Primarily as a result of the findings by Kraus and his associates in June 1956, President Eisenhower called a conference on Fitness of American Youth. Later, on September 6, 1956, he created the President's Council on Youth Fitness. Within a week following this appointment, 100 delegates representing the field of physical education met in Washington.

---


37 Ibid., p. 178.

38 Glenn Kirchner and Don Glines, "Comparative Analysis of Eugene, Oregon, Elementary School Children Using the Kraus-Weber Test of Minimum Muscular Fitness," Research Quarterly, XXVIII (March, 1957), 16.
D. C. to study the problem of fitness of American youth. In February, 1957, representatives of the American Association for Health, Physical Education and Recreation Research Council met in Chicago to discuss plans for conducting a pilot study of the fitness of American youth. After two days of discussion, a battery of seven test items was agreed upon. These items were the pull-up, the sit-up, the shuttle run, the standing broad jump, the 50-yard dash, the softball throw, and the 600-yard run-walk.  

Shortly after the Chicago meeting, Paul A. Hunsicker was appointed director of the Youth Fitness Project. Under his direction a nationwide survey was conducted in which 8,500 boys and girls in grades five through twelve participated. National norms were compiled for ages ten through seventeen. Because of the need for a physical-fitness-test for college men, the Research Council of the AAHPER appointed Hunsicker to establish norms for college level students. In 1960, norms for college men eighteen through thirty years of age were completed.  

President Kennedy continued the President's Council on Youth Fitness after the Eisenhower administration ended. He stated that "The softening process of our civilization

---

40 Ibid., pp. iv, 1-2.
41 President's Council on Youth Fitness, Youth Physical Fitness (Washington, D.C., 1961), preface.
continues to carry on its persistent erosion." The young people are fundamentally healthier than the youth of previous generations; however, the majority have not developed strong, agile bodies. All school board members, school administrations, teachers and pupils were urged to strengthen all programs which contributed to physical fitness. A request was made for each school to adopt the three specific recommendations of the Council on Youth Fitness. These were:

1. Identify the physically underdeveloped pupil and work with him to improve his physical capacity.
2. Provide a minimum of fifteen minutes of vigorous activity every day for all pupils.
3. Use valid fitness tests to determine pupils' abilities and evaluate their progress.

Relationship Between Methods, Programs of Physical Education and Physical Fitness

The purpose of this section was to present the work which had previously been done pertaining to the relationship between various programs of physical education and the components of physical fitness; more specifically, the components of explosive power, gross body coordination, and circulorespiratory endurance.

White studied the relative effect of a basic skill method and a calisthenic method of developing physical

---

fitness among sixty-six boys in the fourth and fifth grades. Activities used in the basic skill method consisted of basketball wall pass, volleyball wall volley, softball repeated throws, soccer wall volley, shuttle run, standing broad jump, and vertical jump. The exercise program which was recommended by the President's Council on Youth Fitness was employed in the calisthenic method. The President's Physical Fitness Screening Test and latchaw's Test of Motor Ability were administered prior to the experiment and at the completion of a six weeks period of training.

An analysis of the data by the t test for mean gain on the motor ability test revealed that the basic skill group made a significant gain over the calisthenic group in all the seven items with the exception of the vertical jump. On the physical fitness test, a significant improvement in pull-ups at the .001 level of confidence was found in the basic skill group. The calisthenic group recorded a small but non-significant gain over the basic skill group in the performance of squat thrusts. On the basis of the findings it was concluded that physical fitness and motor ability level can be increased in a basic skill developmental program.

In a study of junior high school boys, Coyne\(^4\) found that a combination of exercise routines were more effective.

in the improvement of physical fitness than isometric or isotonic routines alone.

In an effort to validate isometric activity as a means of developing physical fitness, Redemer placed sixty-six ninth-grade students into a weight training program and forty-five others were selected to participate in an isometric program. Both groups exercised for three sessions each week during the first school semester.

Significant gains were found on all test items for both groups except the sit-up test for the isometric group. It was concluded that isometric training is beneficial in physical fitness development, and that the programs need to be varied to avoid monotony.

Grades ten through twelve were used by Kusmutz to investigate the effects of a twelve weeks training program upon running speed and circulorespiratory endurance. Group I participated in a program of running; Group II was placed into a progressive weight training program in addition to running. Subjects were paired on the basis of pretest scores on the 50-yard dash, the 60-yard dash, and the 300-yard

---


shuttle run. Muscular fitness was determined by the McCloy Strength Index Revision.

It was found that progressive weight training in addition to running was more effective in developing muscular strength, running speed, and running endurance, in contrast to running alone. It was also discovered that individuals who were low in strength at the beginning of the experiment did not make greater gains in speed and running at the beginning of the study. Similar results were found with a group of sixty-one high- and low-fitness female college students in a study by Stokes. The effectiveness of three programs: general conditioning, specific conditioning and team sports, and team sports upon the improvement of six components of physical fitness, agility, power, flexibility, strength, endurance, and balance were compared.

In general, Stokes found that a significant improvement in fitness was achieved. The girls who were high in fitness at the beginning of the study emerged from the experiment with a significantly higher gain in physical fitness than the girls who were low in fitness at the start of the study.

---

Mullins\textsuperscript{47} utilized college men to investigate the contributions of soccer, basketball, weight training, general activities, touch football, tennis, trampoline, and badminton upon strength and endurance.

Subjects were tested before and after ten weeks of participation and an analysis of the data indicated the following conclusions: (1) achievement in strength was achieved through the programs of general activities, weight training, trampoline, and basketball; (2) soccer, basketball, weight training, general activities, touch football, tennis, and badminton programs resulted in improvement in endurance; and (3) the activities were not equally effective in improvement of strength and endurance. In a similar study which supported the findings by Mullins, Butts\textsuperscript{48} investigated the contributions of ten physical education class activities upon the physical fitness of 227 undergraduate college women students. The groups met two times a week for one semester.

Data gathered by the Fleishman Basic Fitness Test and the Scott Motor Ability Test for College Women revealed that basketball, field hockey, and tennis, in that order, made the


most significant contribution in motor ability and in physical fitness levels.

Kistler,⁴⁹ in 1944, conducted an eight-weeks study to determine the achievement in physical fitness from regular participation in a program which was designed to improve strength, endurance, and agility. The subjects, 1,650 male college students, met for a thirty-minute workout three times each week. The program consisted of chinning bars, obstacle-course running, pick-a-back wrestling, modified boxing, catch-as-catch-can, Indian wrestling, a cross country running program, wind sprints, and relays.

Kistler concluded that (1) significant improvement may be achieved in the physical fitness elements of strength, endurance, and agility through specified training; (2) the time required for achieving physical fitness of the type involved is not excessive; and (3) cardio-respiratory endurance appears to be the most difficult to improve. Strength and endurance of the type measured by doing sit-ups and chinning are most easily improved through systematic training procedures.

The effects of exercises of varying intensity and duration in conjunction with basketball were studied by Wilder. Wilder used five groups of college level students as follows: Group I participated in ten minutes of exercise followed by basketball; Group II participated in basketball followed by ten minutes of exercises; Group III performed fifteen minutes of exercise in addition to basketball; Group IV practiced basketball followed by fifteen minutes of exercises; and Group V participated in basketball only. Although there was a significant improvement in motor ability found in all the programs, the differences among the programs were non-significant.

A similar study by Davis produced findings which were in contrast with the findings of Wilder. Three groups of college men participated in a regular track program. One group did calisthenics in addition to track, another group performed the Bunn Technique of exercises, and a third group participated in track only. There was no significant difference found between the group participating in track only and the group participating in a regular track program.


supplemented by calisthenics. However, a significant improvement in physical fitness was obtained in the group which was supplemented by the Bunn Technique of exercises.

Calisthenics were used as pre-activity supplements to college male touch football classes in a study conducted by Coker. Four intact sections of students enrolled in touch football classes were randomly assigned to three calisthenic treatments, "Army dozen" exercises, Steinhaus' exercise program for men, an exercise program advocated by B. E. Lyle and L. W. McGraw, and a control group of touch football only. A physical fitness test consisting of two minute sit-ups with flexed knees, unlimited pull-ups using palms-in method, sixty-second squat thrust, and a 300-yard shuttle run was administered prior to the experiment and at the conclusion of a six weeks period.

Analysis of the data found none of the supplemental pre-activity programs helpful in producing a significant improvement in any aspect of physical fitness measured.

McDavid studied the relative effects of two types of work upon cardiac performance and endurance training. Each

---


of three categories of male subjects, non-athletic college freshmen, freshman athletes, and inactive adults were divided into two groups. One group from each category worked intermittently and at a fast pace on the Exercycle. The other group worked continuously and at a slower pace on the Exercycle.

The manner of performing work had no significant effect upon inducing cardiac performance changes. Intermittent work produced static strength gains and it was also sufficient to produce cardiac improvement in the inactive males. A similar study conducted by Lister gave some support to McDavid's findings. Lister investigated the relationship of the circulorespiratory condition of three goups of freshman and sophomore college male students participating in an eight weeks cross country training program. Each group worked in one of either a three, four, or five days a week program. Five physiological factors were measured: (1) heart rate, (2) respiratory rate, (3) minute volume of respiration, (4) volume of expiration, and (5) oxygen.

Circulorespiratory performance was improved by each of the programs; however, no significant superiority was evident among the three programs.

Parkman used the AAHPER Physical Fitness Test to analyze the physical fitness of college men participating for twelve weeks in one of four program arrangements. They were (a) a regular physical education class which met 150 minutes each week, (b) ten minutes of strength exercises performed three times a week, (c) a short inactive period, and (d) a non-active group.

Parkman surmised that the present physical education classes were not producing physical fitness; ten minutes of vigorous exercises and endurance activities performed three times a week did as much for individual physical fitness as the regular classes which met 150 minutes each week. A three weeks inactive period did not significantly lower the fitness level but there was a decrease in physical fitness among the non-active subjects. Results from a study by Coyne supported Parkman's study. Coyne found that a program of intensive exercises performed on a one day a week schedule was more effective than activities of isometrics or calisthenics performed on the same schedule.

Currently there has been widespread interest in the use of isometric and isotonic exercises in the physical

---


56 Coyne, op. cit., p. 141.
education and athletic programs. Helvey\textsuperscript{57} compared the
effects of isometrics, isotonics, and sports programs on the
physical fitness of 127 male college freshman students who
selected one of three required activity classes without
knowledge of the type of program involved. Group I partici-
pated in an isometric program, Group II participated in an
isotonic program, and Group III was active in the regularly
scheduled activity classes consisting of softball and volley-
ball. The AAHPER Fitness Test was administered at the begin-
ning and conclusion of an eight-weeks program. Mean gain
scores were used as criterion measures. The greater improve-
ment in the standing broad jump was in the isotonic program.
The larger increase in the softball throw was found in the
sports program. There was no significant improvement in the
600-yard run-walk found in any of the three programs. Helvey
recommended that weaknesses in areas of physical fitness be
strengthened by a type of program which increases physical
fitness in the specific area of weakness and that a study
should be conducted to determine the attitudes of students
toward the three programs. One year following Helvey's

\textsuperscript{57}Omar H. Helvey, "The Effects of Isometric, Isotonic,
and Sports Programs on Physical Fitness," unpublished doctoral
dissertation, Department of Education, University of Arkansas,
study, Glad discovered that a twelve weeks isometric and isotonic program were equally effective in developing cardiovascular efficiency in college under graduates.

In a study utilizing programs of Exer-Genie training, isometric training and isotonic training, Waddle found that each program induced a significant improvement in cardiovascular endurance; however, there were no significant differences identified among the three programs. The Exer-Genie program produced a greater increase in strength than either of the other two programs.

The effects of time and four programs of physical fitness upon the physical fitness of 140 male college men were examined by Westering. The four programs were: isometrics, calisthenics, intensity, and circuit training. These were in combination with regular tennis classes.

---


All groups participated in tennis twice a week for a period of eight weeks. The isometric group trained four minutes each period, the calisthenics group trained fifteen minutes, the intensity group worked seven minutes, and the circuit training group trained thirteen minutes. Results of the experiment indicated the circuit training group's improvement was significantly superior to the other groups in flexor and extensor arm-shoulder strength-endurance, leg power and the simplified Physical Fitness Index; the circuit training and intensity group improved significantly more than the other groups in endurance as measured by the Harvard Step Test and the 600-yard run-walk; the intensity group was superior to other groups in abdominal strength-endurance; and the isometric group failed to improve significantly. In a similar study by McNair the effects of different exercise programs on the development of cardiovascular fitness, strength, and muscular endurance were examined. Regular classes of physical education were supplemented by either a five-minute run, stepping exercises, or isometric exercise. After six weeks of training, all classes experienced a significant improvement in cardiovascular fitness, leg strength, and muscular endurance. Further examination revealed that

there were no significant differences in the improvement of any of the physical variables tested.

Rope skipping has been considered a good exercise activity by physical educators for several years. Recently it has been the subject of experimentation. Jones, Squires, and Rodahl\(^6\) used seven sedentary females as subjects in a program to determine the effects of rope skipping upon physical work capacity. Results indicated a significant improvement in the maximal oxygen intake and in the pulse response to a bicycle ergometer. However, Curtis\(^6\) found a rope skipping program unsuccessful in producing significant improvement in leg power, endurance, agility, or coordination with a group of elementary school children. An increase in cardiovascular fitness was found in a study by Garrett, Sabie, and Pangle\(^6\) in which a volleyball program was supplemented by the activities of running in place, bench stepping, and rope skipping. Baker\(^6\) used ninety-two male

---


students in a study to determine the effects of rope skipping and jogging programs upon cardiovascular efficiency. Group I skipped a rope for ten minutes a day for six weeks; Group II jogged thirty minutes daily for six weeks. The results tended to justify the conclusion that a daily ten minute program of rope jumping will significantly improve cardiovascular efficiency; a daily ten minute program of jogging will improve cardiovascular efficiency significantly; and that the rope skipping program used will improve cardiovascular efficiency equally well as the jogging program used in the study.

A review of the literature indicated that relatively little study in physical fitness has been conducted at the post-college or adult level. In 1951, Bender conducted a case method study with five adult males to determine the effects of various exercises on basal metabolism. Subjects received two months of intensive training. Results indicated that basal metabolism of the poor cardiovascular conditioned individual can be raised by the use of endurance type exercises, provided the exercises are greater in intensity than the daily routine.

Two years after Bender's study, Donnelly interviewed and tested 534 male adults between the ages of 30 and 79. Of the men in the study, 242 were YMCA members, 223 were inmates of a prison, 25 were factory workers, 25 were university faculty members and graduate students, and 15 were residents of a farming community. The subjects were placed into four categories of sports participation according to strenuousness: light, moderate, heavy, and no participation. The dynamometer strength, occupation strenuousness, and athletic experience were compared with dynamometer strength to determine the effect of sports participation upon strength. One significant fact was that former athletes who were not currently participating in recreational sports were stronger in back and in total strength than were the non-athletes.

There is experimental evidence which tends to indicate that age and sex are not hindrances to the improvement of physical fitness. Pohndorf used the case study approach to ascertain the physical fitness changes in two middle-aged adults, one male and one female.


Both subjects swam 1,000 yards daily for 10 weeks. Data changes were found for physique, circulatory-respiratory fitness, and various blood values. A total of 73 changes for both subjects were found to be significant at the 1 and 5 per cent levels of confidence. Both had significant changes in blood serum cholesterol values. The female continued swimming 1,000 yards two to five times each week with no significant changes noted. The male returned to sedentary habits and experienced a significant rise in blood serum cholesterol four months later.

Relationship of Ability Grouping, Physical Fitness, and Attitude Toward Physical Education

A survey of the literature revealed that much has been written with regard to ability grouping in the classroom. However, the literature discloses relatively little research in conjunction with the effects of ability grouping upon the components of physical fitness and attitudes toward physical education.

Support is offered for both the advantages and the disadvantages of ability grouping. Goldberg and his associates studied the effects of ability grouping upon learning and concluded that "ability grouping inherently is neither good nor bad." It is neutral, with values depending upon the way

---

in which it is used. When it is used without close scrutiny of the specific needs of various pupils and without the recognition that it must follow the demands of carefully planned variations in curriculum, grouping can be ineffective or even harmful.

According to Parkinson, grouping students with regard to body type increases the possibility of predicting success in certain activities. He recommended that advanced, intermediate, and beginning sections be utilized in each physical education class. Williams advocated grouping by ability when he stated, "To prescribe the same activities to a large group is like treating a group in the clinic with the same medicine." Feely believes that the misplaced individual not only retards the group but makes little personal progress.

Hock supports grouping in terms of commonality of interests, skills, ability, and individual needs. Experienced

---


teachers, according to Clarke, feel that class instruction is more efficient when groups are formed on the criterion of similar ability.

A preponderance of the results of studies on grouping tends to indicate that grouping alone has little significant value. The implication that the success of a teaching program is dependent upon the adaptation of teaching methods, content, and techniques to the specific needs of the individuals within the group was made by Kierstead, Hock, Polglaze, and Goldberg.

The effects of homogeneous ability grouping on motor performance of freshman women students enrolled in a fundamentals class was studied by Lockhart and Mott. The class met twice weekly for thirty-five minute sessions during a nine weeks period. Significant skill improvement was made at the .01 level of confidence by an experimental superior group. There was no significant improvement found in a

---


76 Hock, op. cit., p. 422.


control superior group. The program produced no significant difference in improvement between an experimental inferior group and a control inferior group. It was concluded that superior ability subjects benefitted by being segregated while inferior ability groups did not. Lockhart and Mott did not adapt specific activities to individual needs, as did Nessler, who found that participation in an eight-weeks activity course especially adapted to the needs of poorly-skilled freshman women was of more value to the low-skilled students than participation in the regular activities program. Experimental findings by Savard and Parchini supported Nessler's finding. They acquired significant results which favored low-ability groups. Smith and others discovered that "an activity suited to the needs of each group was more successful than scheduling three levels of one sport simultaneously."


Vodola reported that success in ability grouping was experienced in a New Jersey high school gymnastics unit. Students were grouped into squads on the basis of their ability to perform certain gymnastic skills. Each class day a new skill was introduced and demonstrated to the squad. Students were allowed to practice until they felt confident to demonstrate the skill to the instructor.

Grades were assessed on the basis of the number of new skills acquired in comparison with other members of the same group. Vodola stated that "Ability grouping has permitted the gifted child to advance much more rapidly." And "The slow learner is no longer embarrassed and has accepted the program." The parents and community reportedly accepted the program with enthusiasm.

Baiow and Rudii along with Olson have refuted the theory that the method of grouping has influence upon growth.

---


85 Ibid., p. 31.


87 Willard C. Olson, "Ability Grouping Pros and Cons," The Education Digest, XXXII (September, 1966), 18.
Berkun\textsuperscript{88} and Smith\textsuperscript{89} believe that all levels, the high, the average, and the low tend to benefit from homogeneous ability grouping. They recommend that homogeneous ability groupings be utilized because it provides attainable goals and increases motivation.

Clarke\textsuperscript{90} surmises that homogeneous ability grouping is probably of greater importance in physical education than in the conventional classroom programs, because what an individual does and how he reacts, depends to a great extent upon those with whom he is participating.

**Relationship of Methods, Programs and Attitude Toward Physical Education**

The concept of attitude has many connotations. To Allport\textsuperscript{91} attitude means a "mental and neural state of readiness, organized through experience, exerting a directive or dynamic influence upon the individual's response to all objects and situations with which it is related."

McPherson\textsuperscript{92} defines it as "the feelings, beliefs, and action

\begin{flushleft}
\textsuperscript{88}Mitchell M. Berkun, Lloyd W. Swanson, and David M. Sawyer, "An Experiment on Homogeneous Grouping for Reading in Elementary Classes," The Journal of Educational Research, LIX (May-June, 1966), 413-414.

\textsuperscript{89}Smith, op. cit., p. 19.

\textsuperscript{90}Clarke, op. cit., p. 231.


\end{flushleft}
tendencies of an individual." Thurston\textsuperscript{93} considered attitude as the "sum-total of man's inclinations, and feelings, prejudice or bias, preconceived notions, ideas, fear, threats, and convictions about any specific topic."

Real and lasting interest in physical education is desirable. If individual success can be increased, it follows that a more wholesome outlook toward physical education should appear.\textsuperscript{94}

Can attitude toward physical education be changed? If so, how much time is required for the change? Are there instruments that accurately measure an individual's attitude toward physical education? It was hoped that a review of the literature would resolve some of these questions.

Results of studies by Brumbach,\textsuperscript{95} Hicks,\textsuperscript{96} and Nessler\textsuperscript{97} tend to indicate that attitude toward physical education can

\textsuperscript{93}L. L. Thurston and E. J. Chave, The Measurement of Attitude (Chicago, 1929), pp. 6-7.


\textsuperscript{95}Wayne B. Brumbach, "Effect of a Special Conditioning Class Upon Students Attitudes Toward Physical Education," American Association for Health, Physical Education and Recreation Research Quarterly, XXXIX (March, 1967), 211-213.


\textsuperscript{97}Joan Nessler, "An Experimental Study of Methods Adapted to Teaching Low-Skilled Freshmen Women in Physical
be changed favorably and can be done in a relatively short span of time. Hicks found a significant improvement in attitude toward physical education in a twenty-four period women's physical education program.

Several instruments have been devised by which the attitude of certain aspects of physical education can be ascertained. In 1950, Wear\textsuperscript{98} constructed an instrument to evaluate attitude toward physical education as an activity course. In 1955, Wear\textsuperscript{99} constructed equivalent forms of the attitude scale. According to Wear\textsuperscript{100} "The forms are proposed for use in appraising attitude change resulting from brief experiences such as listening to a talk on physical education, watching a demonstration, viewing a film, or taking part in some activity." This instrument has been accepted and used extensively by the physical education profession.

\begin{footnotesize}


\footnotesuperscript{100}Ibid., p. 113.
\end{footnotesize}
Brumbach used the Wear Attitude Inventory to measure the attitude toward physical education of lower division male students entering the University of Oregon in the fall of 1960. He concluded that the students had a rather favorable attitude toward physical education.

Again in 1968, Brumbach reported the results of a study utilizing the Wear Attitude Scale for physical education which was designed especially to elicit a change in attitude toward physical education among a group of twenty-eight college male students. He felt that the following actions contributed to the significant change in attitude which was obtained: (1) learning the students' names during the first two weeks, (2) talking to each class member on an individual basis, (3) participating in class calisthenics, and (4) giving a brief quotation pertaining to physical fitness each class day. Brumbach stated that "while results which involve only one class and one instructor cannot be generalized, it would appear that perhaps attitudes toward physical education can be substantially improved."


102 Brumbach, AAHPER Research Quarterly, XXXIX (March, 1968), 211-213.

103 Ibid., p. 212.
Students who demonstrated extremely favorable or unfavorable attitudes toward physical education were studied by Keogh. Sixty-nine men and women who scored extremely high or low on the Wear Physical Education Attitude Inventory were selected for the Study. The purpose was to analyze attitude responses in relation to the two groups of men and women.

Careful analysis revealed that (1) the individuals in the high group were physically active and possessed high personal judgments of their physical skills, (2) members of the low group were relatively active physically but very critical of their high school physical education programs and made less personal judgments, and (3) the validity of the Wear Attitude Inventory as a measure of attitude toward physical education was strengthened.

Knowledge of the effects of (a) activity, (b) teaching method, (c) class organization, and (d) background and experiences of students, upon their attitude toward physical education, is imperative if physical education programs are to be successful in meeting the needs of individuals. In an effort to ascertain the proper perspective of each of the aforementioned, Davis administered the Wear Physical Education Inventory.

---


Education Attitude Scale to 265 first semester male freshman students of non-professional physical education activity courses in three colleges in Alabama.

After one semester of class participation, the experimental data supported the following conclusions: (1) there was no significant change in attitude after one semester of participation in a non-professional activity course, (2) attitudes of incoming freshmen were related to background experiences, (3) methods of class organization and instructional procedure had no significant effect upon attitude change in either direction, and (4) background experiences had no significant effect upon attitude change in either direction. This finding supported a finding from a previous study by Hunter, in which the attitudes toward physical education of college women were analyzed. Hunter found that regardless of a girl's attitude toward physical education prior to university, a shift was possible upon entering the university.

An adapted form of the Wear Attitude Inventory was used to study the attitude of senior high girls from three girls' physical education programs in a study by Turner.


Whereas Davis found no relationship between background experience and attitude toward physical education, Turner's study disclosed no relationship between physical fitness nor educational development and attitude toward physical education. Only a minute relationship existed between the quality of the physical education program and the attitudes held by the student toward the program.

Both Turner's study and Hunter's previous study agreed that family interest in sports and recreation had a high relationship with the daughter's attitudes toward activities.

Lemen\textsuperscript{108} studied the attitude toward physical education among college women and discovered that among the primary components affecting the favorability of attitude toward physical education were activeness and wholesomeness and the degree to which one enjoys her physical education program in high school. It was also noted that a favorable relationship existed between leisure participation in sports and skill.

In a study to determine the relationship between the attitude toward physical education and success and achievement in activities of physical education, Vincent\textsuperscript{109}


administered the Wear Attitude Inventory to 188 college women enrolled in a variety of physical education courses. She concluded that "There is a significant relationship between expressed attitudes and success in physical education, with the higher significance accruing to those subjects expressing more favorable attitudes."\(^{110}\)

\(^{110}\)Ibid., p. 130.
CHAPTER III

PROCEDURE OF THE STUDY

Description of the Subjects

Subjects for the study were 127 male freshman and sophomore college students selected from eight sections of physical education activity courses in the North Texas State University Department of Physical Education during the 1968 fall semester. The 33 students in each section who were lowest in average rank on three selected items from the AAHPER Youth Fitness Test constituted a pool from which the subjects were selected. Juniors, seniors, varsity athletes, and students whose medical records prevented participation, were excluded from the study. Attendance requirements were based upon routine procedure followed by the physical education department. One hundred-three of the original 127 subjects completed the experiment.

Experimental Design

The study was conducted through a quasi-experimental Design 10. This design is applicable when the nature of

---

1 The eight sections contained 465 freshman and sophomore male students.

the experiment employs extant intact comparison groups of unassured equivalence.

Naturally assembled sections were used with Group I and Group II forming the experimental groups and Groups III and IV serving as control groups.

Orientation and Testing of Subjects

The first regular class period for each section was used for orientation of students. The nature and duration of the study were explained in identical manner to all sections. The Wear Attitude Scale Form A for physical education was administered to all freshman and sophomore students. Methods of administering and scoring as prescribed by the author of the inventory were adhered to. Students were instructed to meet in proper clothing at the football stadium on the following class meeting for administration of the AAHPER Youth Fitness Test items.

The second class period was devoted to administering the selected items from the AAHPER Youth Fitness Test. Each item was administered according to instructions found in the AAHPER Youth Fitness Test Manual. The experimenter

---

3See Appendix A.  
4See Appendix B.  
6See Appendix C.
supervised all test administrations with assistance from part-time instructors and graduate assistants.

Students from each section were divided into two groups and the partner system was utilized. While one subject performed a test item another subject entered the score. One group was tested on the softball throw for distance while the other group performed the standing broad jump. The groups then rotated events. Upon completion of the softball throw for distance and the standing broad jump, both groups met at the track for the 600-yard run-walk test.

For purposes of computation, the softball throw was measured in feet to the nearest foot; the standing broad jump was measured in inches to the nearest inch; and the 600-yard run-walk was scored in seconds.

At the end of a six-week period of training, posttests were administered from the two instruments in identical manner to the pretests. Individual's scores on pretests and posttests were kept on four inch by six inch cards.\(^7\)

**Grouping of Subjects and Assignment of Groups to Treatments**

At the beginning of the investigation freshman and sophomore male college students from Sections 116-01, 02, 03, 04, 06, 08, 15 and 18 were tested on three selected items from the AAHPER Youth Fitness Test. Subjects were ranked on

\(^7\)See Appendix D.
each of three selected items: (1) standing broad jump, (2) softball throw, and (3) 600-yard run-walk. An average rank was computed for each student. From each section the lowest thirty-three students were identified for participation in the experiment. This population of low-physically-fit students constituted a pool from which four groups were selected.

A table of random numbers was used for assigning the groups to the several treatments in the experiment. As described in Table I, the low-physically-fit subjects from Section 116-01 were designated as Group I and were assigned by use of a table of random numbers to a program which included basketball, plus appropriate adaptive activities.

Eleven subjects from each of the low-physically-fit segments of Sections 116-06, 08, and 18 comprised Group II and were randomly selected for participation in a program within their respective section which included basketball plus appropriate adaptive activities. The activities for this group thus were identical to those used by Group I.

The low-physically-fit subjects from Section 116-02 were randomly assigned to participate entirely in the regular program activity of basketball. This group was referred to as Group III.

---

### TABLE I

**GROUPS, ACTIVITIES, AND NUMBER OF SUBJECTS**

<table>
<thead>
<tr>
<th>Group</th>
<th>Activities&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Section</th>
<th>Number of Subjects</th>
</tr>
</thead>
</table>
| I<sup>b</sup> | Basketball plus adaptive activities:  
1. Cross country run  
2. Run in place  
3. Medicine ball passes  
4. Exer-Genie exercises:  
  a. Big four  
  b. Exer-Genie run | 116-01   | 32                  |
| II<sup>c</sup> | Basketball plus adaptive activities:  
   Same as for Group I | 116-06   | 9                   |
|        |                                                                                   | 116-08   | 11                  |
|        |                                                                                   | 116-18   | 11                  |
| III<sup>d</sup> | Basketball only                                                                     | 116-02   | 31                  |
| IV<sup>e</sup> | Basketball only                                                                     | 116-03   | 11                  |
|        |                                                                                   | 116-04   | 11                  |
|        |                                                                                   | 116-15   | 11                  |

<sup>a</sup>The time devoted to each activity is found on pages 70-72.

<sup>b</sup>Homogeneous Adaptive Activities Program.

<sup>c</sup>Heterogeneous Adaptive Activities Program.

<sup>d</sup>Homogeneous Regular Activity Program.

<sup>e</sup>Heterogeneous Regular Activity Program.

Sections 116-03, 04, and 15 formed Group IV. Eleven subjects were selected by use of a table of random numbers from the low-physically-fit segments of each section and this group was selected to participate as heterogeneous...
classes in a regular activity of basketball within their respective sections.\textsuperscript{11}

Gage asserts that "the more similar the experimental and control groups are in their recruitment, and the more this similarity is confirmed by the scores on the pretest, the more effective this control becomes."\textsuperscript{12} As a check for appropriate similarity of groups, a \( t \)-ratio test for independent groups was computed between groups for each of four items, (1) standing broad jump, (2) softball throw for distance, (3) 600-yard run-walk, and (4) score from the Wear Attitude Scale Form A. Pretest scores which were used for computing the means and standard deviations were reported in Table II. After discarding the extreme scores of five subjects, the differences among the means established by the \( t \)-ratios did not reach the .05 level of significance; therefore, it was concluded that the four groups were similar on the four test variables.

Class Procedure

Groups I and II constituted the experimental groups and participated in the adaptive activities program.\textsuperscript{13} Groups III and IV served as control groups, participating in basketball only. A work plan was developed for basketball, which

\textsuperscript{11}See Appendix G.

\textsuperscript{12}Gage, \textit{op. cit.}, pp. 217-218.

\textsuperscript{13}See Appendix F.
TABLE II

COMPARISON OF GROUPS ON FOUR SELECTED TEST ITEMS
BY MEANS AND STANDARD DEVIATIONS

<table>
<thead>
<tr>
<th>Groups</th>
<th>Item I ²</th>
<th>Item II ³</th>
<th>Item III ⁴</th>
<th>Item IV ⁵</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>S.D.</td>
<td>M</td>
<td>S.D.</td>
</tr>
<tr>
<td>I</td>
<td>172.13</td>
<td>31.29</td>
<td>81.94</td>
<td>6.10</td>
</tr>
<tr>
<td>II</td>
<td>164.97</td>
<td>35.16</td>
<td>85.42</td>
<td>8.49</td>
</tr>
<tr>
<td>III</td>
<td>179.55</td>
<td>25.87</td>
<td>85.32</td>
<td>7.11</td>
</tr>
<tr>
<td>IV</td>
<td>170.56</td>
<td>34.46</td>
<td>84.06</td>
<td>7.55</td>
</tr>
</tbody>
</table>

²Softball throw for distance.
³Standing broad jump.
⁴600-yard run-walk.
⁵Attitude Scale score.

was followed by all groups. The adaptive activities program followed by Groups I and II was designed for specific deficiencies portrayed by individuals on performances of the selected test items from the AAUPPER Youth Fitness Test. The activities were approved by a panel of physical educators from the North Texas State University Department of Physical Education as being appropriate for the experiment.

All classes met three fifty-minute periods each week for a total of six weeks exclusive of pretest and posttest administrations. Ten minutes were allowed for dressing and

¹⁴See Appendix G.
roll check before class activities and ten minutes were allotted for showering and dressing following each class session. Thirty minutes were utilized in class work.

Exact content of the courses in basketball was carefully planned so that all students would receive identical instruction as near as possible. The same plan for the adaptive activities program was used for both experimental groups.

Instructors for the experiment were full-time teachers and graduate assistants. Each instructor was carefully oriented as to the teaching procedure desired in the experiment.

Experimental Groups

Group I and Group II participated in an adaptive activities program as follows:

All subjects participated in (1) basketball, (2) cross country run, (3) Exer-Genie\textsuperscript{15} Big Four, and (4) run in place. In addition to these four activities, subjects participated in one of the following three activities with regard to the specific deficiency of the individual: (1) bench jump, for students weakest in explosive power; (2) medicine ball passes, for students weakest in gross body coordination; and (3) Exer-Genie run, for students weakest in circulatory-respiratory endurance.

\textsuperscript{15} Trademark of the Exer-Genie Inc., Fullerton, California.
Subjects were subjected to the following course outline on odd-numbered class days:

**Run in place.**—All subjects on odd class days performed the run in place on the gymnasium floor at a pace of seventy to eighty steps per minute. Each time the right foot contacted the floor constituted one step. The length of this activity was progressively increased each two weeks by one minute, i.e., first two weeks, one minute; second two weeks, two minutes; and third two weeks, three minutes.

**Exer-Genie Big Four.**—On odd class days all subjects performed the Big Four exercise in the gymnasium with the use of the Exer-Genie Exerciser as described in the manual.\(^\text{16}\) Repetitions were progressively increased each three weeks, beginning with one repetition the first week and two repetitions the fourth week.

Subjects were subjected to the following course outline on even-numbered class days:

**Bench jump.**—On even class days subjects weakest in explosive power as measured by the test item standing broad jump, performed the bench jump. A dressing-room bench, twelve inches wide and eighteen inches high, was used. Subjects jumped from a side position by picking both feet up

\(^{16}\)Instructional Manual for Exer-Genie Exerciser (Fullerton, California, 1966), pp. 8-9.
and placing them simultaneously over the bench. The number of jumps was progressively increased by five each week, beginning with ten jumps the first week and ending the training period with thirty-five jumps. Each movement across the bench constituted one jump.

Medicine ball passes.—On even class days, individuals weakest in gross body coordination, as measured by the test item softball throw for distance, performed the following passes with a nine-pound medicine ball, (a) two-handed chest pass and (b) one-handed push pass. The number of passes was progressively increased by three each week, beginning with ten passes and ending the sixth week with twenty-five passes.

Exer-Genie run.—On even class days individuals weakest in circulorespiratory endurance, as measured by the 600-yard run-walk test, executed the running exercise by using the Exer-Genie Exerciser as described in the Exer-Genie Manual. The maximum length of the run was fifty feet. The resistance was adjusted with regard to the size and strength of the individual. The running time was progressively increased by five seconds each two weeks, beginning with a run of ten seconds and ending the training period with a run of twenty seconds. Repetitions were increased by one each three weeks,

\[17\textit{Ibid.}, \textit{p. 11.}\]
i.e., one repetition for weeks one, two and three and two repetitions for weeks four, five, and six.

Cross country run.—All subjects ran on even class days a distance marked off on an intramural field. The distance was progressively increased each week. The first week subjects ran 440-yards; second week, 660 yards; third week, 880 yards; fourth week, 1320 yards; fifth week, 1 mile; and sixth week, 1-1/4 miles.

Basketball.—All subjects in the experimental groups participated in basketball each class period. Each group was divided into four subgroups or teams. Two courts were provided for playing games. Time of activity ranged from fifteen to twenty minutes per class period. A work schedule was devised and was carefully followed by each instructor.18

Description of Instruments Used in the Study

**AAHPER Youth Fitness Test**

Validity of the AAHPER Youth Fitness Test is dependent upon the adequacy of a panel of experts in the field of physical education who constructed the test in 1957. The test has been administered to over twenty-five million boys

18 See Appendix G.
boys and girls between the ages of five and twelve. In 1960, test norms were compiled for college men.

Correlational and factor analysis methods were applied by Ponthieux and Barker to the seven items of the AAHPER Youth Fitness Test. They discovered that three factors are identified: circulorespiratory endurance, which is loaded with a .51 by the 600-yard run-walk; gross body coordination is represented by the softball throw only and with a loading of .49; and dynamic strength, or explosive power, which is loaded heavily by the standing broad jump with a .80 loading.

In a reliability test related to high school boys by Stein, the correlation of the 600-yard run-walk was .74. The softball throw, .93, and the standing broad jump, .90, were significant at greater than the .001 level.

Fleishman, from a study of 201 navy recruits with an average age of 18 years, 3 months, reported the reliability

---

21 See Appendix H.
of the softball throw to be .93 and the reliability of the standing broad jump to be .90.  

Data collected for the study were related to three factors of physical fitness: (1) gross body coordination, measured by the softball throw, (2) explosive power, determined by the standing broad jump, and (3) circulorespiratory endurance, measured by the 600-yard run-walk.

Wear Attitude Scale Form A for Physical Education

The Wear Attitude Scale for physical education was constructed in 1950 by Wear. In 1955, equivalent forms were designed and tested "for use in appraising attitude changes resulting from brief experiences." The reliability of Form A and Form B was .94 and .96, respectively. According to Wear, "The validity of this instrument rests largely on logical foundations."

---

27 Ibid., p. 115.
28 Wear, op. cit., p. 114.
Treatment of Data

Hypotheses were examined and statistically tested in the null form. A $t$-ratio test for large independent groups was employed to determine the tenability of each hypothesis. Hypotheses were rejected at the 5 per cent level of significance. Raw scores for each individual were kept on four inch by six inch cards and transferred to IBM cards for computation at the North Texas State University Computer Center, Denton, Texas.
CHAPTER IV

PRESENTATION AND ANALYSIS OF DATA

Students from eight sections of activity physical education were ranked on performance of three items of physical fitness, the standing broad jump, the softball throw, and the 600-yard run-walk. The lowest thirty-three students of each section constituted a pool from which four groups of subjects were selected by use of a table of random numbers to participate in one of four programs of physical education within their respective sections. The groups which contained 127 subjects were determined to be statistically similar on each of the physical fitness test items and on the Wear Attitude Scale Form A for physical education. The study was completed by 103 subjects.

A posttest on each item was administered at the end of a six-week training period. A mean gain score was calculated for each test item for each group. All hypotheses of the study were statistically treated in the null form by Fisher's t for independent samples. The .05 level of confidence was selected as the level for rejection of the null hypotheses.

Results of the Study

Data collected for the study are related to three factors of physical fitness. These are (1) explosive power,
(2) gross body coordination, and (3) circulorespiratory endurance. The data pertaining to the above factors were collected by use of three selected physical fitness test items. These were (1) the standing broad jump, recorded in inches; (2) the softball throw, recorded in feet; and (3) the 600-yard run-walk, recorded in seconds. Data pertaining to attitude toward physical education were obtained by use of the Wear Attitude Scale Form A for physical education, recorded in raw score.

The results of the study are shown in Tables III through VI. Table III contains the data collected for the four groups by the standing broad jump fitness test item.

### TABLE III

**PRETEST AND POSTTEST MEANS AND STANDARD DEVIATIONS AND MEAN GAINS FOR GROUPS I, II, III, AND IV ON THE STANDING BROAD JUMP**

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>Pretest</th>
<th></th>
<th></th>
<th>Posttest</th>
<th></th>
<th></th>
<th>Mean Gains</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Means</td>
<td>S.D.</td>
<td>Means</td>
<td>S.D.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I(^a)</td>
<td>23</td>
<td>81.35</td>
<td>6.72</td>
<td>87.61</td>
<td>6.44</td>
<td>6.26</td>
<td></td>
<td></td>
</tr>
<tr>
<td>II(^b)</td>
<td>24</td>
<td>85.71</td>
<td>9.16</td>
<td>87.92</td>
<td>8.74</td>
<td>2.21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>III(^c)</td>
<td>27</td>
<td>84.52</td>
<td>6.88</td>
<td>88.37</td>
<td>6.33</td>
<td>3.85</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV(^d)</td>
<td>29</td>
<td>83.66</td>
<td>7.84</td>
<td>86.90</td>
<td>7.63</td>
<td>3.24</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^a\)Adaptive activities program in a homogeneous class.

\(^b\)Adaptive activities program in heterogeneous classes.

\(^c\)Regular program activity in a homogeneous class.

\(^d\)Regular program activity in heterogeneous classes.
The pretest mean for Group I on the standing broad jump test was 81.35 inches. The posttest mean was 87.61 inches. The mean gain was 6.26 inches. This mean gain was significant at greater than the .001 level of confidence.

The pretest mean for Group II on the standing broad jump test was 85.71 inches. The posttest was 87.92 inches. The mean gain of 2.21 inches was not significant at the .05 level of confidence.

The pretest mean for Group III on the standing broad jump test was 84.52 inches. The posttest mean of 88.37 inches provided a gain of 3.85, which was significant at greater than the .001 level of confidence.

The pretest mean for Group IV on the standing broad jump test was 83.66 inches. The posttest mean of 86.90 inches indicated a gain significant at greater than the .01 level of confidence.

Tabulation of the data collected by the softball throw for the four groups is presented in Table IV.

As may be viewed in Table IV, all the groups experienced a mean loss on the posttest administration of the softball throw. The loss for each of Groups I, II, and III was significant at greater than the .05 level of confidence. The loss of 1.48 feet by Group IV was not significant at the .05 level of confidence.
TABLE IV
PRETEST AND POSTTEST MEANS AND STANDARD DEVIATIONS AND MEAN GAINS FOR GROUPS I, II, III, AND IV ON THE SOFTBALL THROW

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>Pretest</th>
<th>Posttest</th>
<th>Mean Gains</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>23</td>
<td>168.26, 29.90</td>
<td>163.22, 29.37</td>
<td>-5.04</td>
</tr>
<tr>
<td>II</td>
<td>24</td>
<td>173.79, 33.94</td>
<td>165.63, 33.41</td>
<td>-8.17</td>
</tr>
<tr>
<td>III</td>
<td>27</td>
<td>177.81, 26.31</td>
<td>169.22, 28.03</td>
<td>-8.59</td>
</tr>
<tr>
<td>IV</td>
<td>29</td>
<td>174.17, 35.11</td>
<td>172.69, 31.06</td>
<td>-1.48</td>
</tr>
</tbody>
</table>

aAdaptive activities program in a homogeneous class.
bAdaptive activities program in heterogeneous classes.
cRegular program activity in a homogeneous class.
dRegular program activity in heterogeneous classes.

The data collected by use of the 600-yard run-walk test item are presented in Table V.

The pretest mean for Group I on the 600-yard run-walk test item was 116.57 seconds. The posttest mean was 114.70 seconds. The mean gain was 1.87 seconds. The difference was not significant at the .05 level of confidence.

The pretest mean for Group II on the 600-yard run-walk test was 123.17 seconds. The posttest mean was 112.79 seconds. The mean gain was 10.38 seconds. This difference was significant at greater than the .01 level of confidence.

The pretest mean for Group III on the 600-yard run-walk test was 114.92 seconds. The posttest mean was 112.70
TABLE V

PRETEST AND POSTTEST MEANS AND STANDARD DEVIATIONS AND MEAN GAINS FOR GROUPS I, II, III, AND IV ON THE 600-YARD RUN-WALK

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>Pretest Means</th>
<th>S.D.</th>
<th>Posttest Means</th>
<th>S.D.</th>
<th>Mean Gains</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>23</td>
<td>116.57</td>
<td>11.43</td>
<td>114.70</td>
<td>8.79</td>
<td>1.87</td>
</tr>
<tr>
<td>II</td>
<td>24</td>
<td>123.17</td>
<td>16.72</td>
<td>112.79</td>
<td>9.67</td>
<td>10.38</td>
</tr>
<tr>
<td>III</td>
<td>27</td>
<td>114.92</td>
<td>13.83</td>
<td>112.70</td>
<td>9.78</td>
<td>2.22</td>
</tr>
<tr>
<td>IV</td>
<td>29</td>
<td>115.55</td>
<td>10.66</td>
<td>118.45</td>
<td>11.12</td>
<td>-2.90</td>
</tr>
</tbody>
</table>

aAdaptive activities program in a homogeneous class.
bAdaptive activities program in heterogeneous classes.
cRegular program activity in a homogeneous class.
dRegular program activity in heterogeneous classes.

seconds. The difference was a mean gain of 2.22 seconds, which was not significant at the .05 level of confidence.

The pretest mean for Group IV on the 600-yard run-walk test was 115.55 seconds. The posttest mean was 118.45 seconds. The difference was not significant at the .05 level of confidence.

A presentation of the data collected by the Wear Attitude Scale Form A for physical education is presented in Table VI.

The pretest mean for Group I on the Wear Attitude Scale Form A was 114.00 points. The posttest mean was 113.65 points. The mean loss of .35 points was not significant at the .05 level of confidence.
TABLE VI
PRETEST AND POSTTEST MEANS AND STANDARD DEVIATIONS AND MEAN GAINS FOR GROUPS I, II, III, AND IV ON THE WEAR ATTITUDE SCALE FORM A

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>Pretest Means</th>
<th>Pretest S.D.</th>
<th>Posttest Means</th>
<th>Posttest S.D.</th>
<th>Mean Gains</th>
</tr>
</thead>
<tbody>
<tr>
<td>I\textsuperscript{a}</td>
<td>23</td>
<td>114.00</td>
<td>14.57</td>
<td>113.65</td>
<td>12.41</td>
<td>- .35</td>
</tr>
<tr>
<td>II\textsuperscript{b}</td>
<td>24</td>
<td>114.67</td>
<td>14.85</td>
<td>119.67</td>
<td>15.06</td>
<td>5.00</td>
</tr>
<tr>
<td>III\textsuperscript{c}</td>
<td>27</td>
<td>113.00</td>
<td>10.43</td>
<td>116.78</td>
<td>15.19</td>
<td>3.78</td>
</tr>
<tr>
<td>IV\textsuperscript{d}</td>
<td>29</td>
<td>114.07</td>
<td>10.96</td>
<td>113.79</td>
<td>12.91</td>
<td>- .29</td>
</tr>
</tbody>
</table>

\textsuperscript{a}Adaptive activities program in a homogeneous class.  
\textsuperscript{b}Adaptive activities program in heterogeneous classes.  
\textsuperscript{c}Regular program activity in a homogeneous class.  
\textsuperscript{d}Regular program activity in heterogeneous classes.

The pretest mean for Group II on the Wear Attitude Scale Form A was 119.67 points. The mean gain of 5.00 points was significant at greater than the .05 level of confidence.

The pretest mean for Group III was 113.00 points. The posttest mean was 116.78 points. The mean gain of 3.78 points was not significant at the .05 level of confidence.

The pretest mean for Group IV was 114.07 points. The posttest mean was 113.79 points. The mean loss was not significant at the .05 level of confidence.
Findings Related to the Hypotheses

Hypothesis I.—It was hypothesized that the mean gain in physical fitness for a group of low-physically-fit subjects participating as a homogeneous class in an adaptive activities program will be significantly greater, as measured by each of three selected items from the AHPER Youth Fitness Test, than the mean gain for a group of low-physically-fit subjects participating in heterogeneous classes of an adaptive activities program.

The results of two methods of grouping students in physical education classes with regard to three factors of physical fitness were compared by analysis of the data collected by use of three physical fitness test items. An analysis of the data is presented in Table VII.

TABLE VII
MEAN GAIN SCORES AND t VALUES BETWEEN GROUPS I AND II ON THREE PHYSICAL FITNESS TEST ITEMS

<table>
<thead>
<tr>
<th>Test Item</th>
<th>Group I* (N = 23) Mean Gains</th>
<th>Group II** (N = 24) Mean Gains</th>
<th>Fisher's t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standing Broad Jump</td>
<td>6.26</td>
<td>2.21</td>
<td>2.67***</td>
</tr>
<tr>
<td>Softball Throw</td>
<td>-5.04</td>
<td>-8.17</td>
<td>.72</td>
</tr>
<tr>
<td>600-Yard Run-Walk</td>
<td>1.87</td>
<td>10.38</td>
<td>2.77***</td>
</tr>
</tbody>
</table>

*Adaptive activities program in a homogeneous class.

**Adaptive activities program in heterogeneous classes.

***p < .05.
Statistical analysis of the difference between Group I and Group II in mean gains in explosive power, as measured by the standing broad jump, revealed a \( t \) value of 2.78. This gain, which was in the direction of Group I, was significant at greater than the .02 level of significance. The null hypothesis of no difference in the results of two methods of grouping with regard to explosive power was therefore rejected.

Statistical analysis of the difference between Group I and Group II in mean gains in gross body coordination, as measured by the softball throw, revealed a \( t \) value of .72. This difference was not significant. The null hypothesis of no difference in the results of two methods of grouping with regard to gross body coordination was therefore accepted.

Statistical analysis of the difference between Group I and Group II in mean gains in circulorespiratory endurance, as measured by the 600-yard run-walk, revealed a \( t \) value of 2.77. This gain, which was in the direction of Group II, was significant at greater than the .01 level of significance. The null hypothesis of no difference in the results of two methods of grouping with regard to circulorespiratory endurance was therefore rejected. However, the difference was in the opposite direction of the research hypothesis.

Hypothesis II.—It was hypothesized that a group of low-physically-fit subjects participating as a homogeneous class in an adaptive activities program will show a
significantly greater mean gain on the Wear Attitude Scale Form A for physical education than will a group of low-physically-fit subjects participating in heterogeneous classes of an adaptive activities program.

The results of two methods of grouping students in physical education classes with regard to attitude toward physical education were compared by analysis of the data collected by the Wear Attitude Scale Form A. An analysis of the data is presented in Table VIII.

TABLE VIII

MEANS, MEAN GAIN SCORES AND THE t VALUE BETWEEN GROUPS I AND II ON THE WEAR ATTITUDE SCALE FORM A FOR PHYSICAL EDUCATION

<table>
<thead>
<tr>
<th>Groups</th>
<th>Pretest Means</th>
<th>Posttest Means</th>
<th>Mean Gains</th>
<th>Fisher's t***</th>
</tr>
</thead>
<tbody>
<tr>
<td>I* (N = 23)</td>
<td>114.00</td>
<td>113.65</td>
<td>-.35</td>
<td>1.71</td>
</tr>
<tr>
<td>II** (N = 24)</td>
<td>114.67</td>
<td>119.67</td>
<td>5.00</td>
<td></td>
</tr>
</tbody>
</table>

*Adaptive activities program in a homogeneous class.

**Adaptive activities program in heterogeneous classes.

***A t value of 2.02 is required for significance at the .05 level.

Statistical analysis of the difference between Group I and Group II in mean gains in attitude toward physical education, as measured by the Wear Attitude Scale Form A, revealed a t value of 1.71. This difference was not significant. The null hypothesis of no difference in the
results of two methods of grouping with regard to attitude toward physical education was therefore accepted. The difference was in the direction of Group II. It was significant at greater than the .09 level of significance.

Hypothesis III.—It was hypothesized that the mean gain in physical fitness of low-physically-fit subjects participating as a homogeneous class in an adaptive activities program will be significantly greater, as measured by each of three selected items from the AAHPER Youth Fitness Test, than the mean gain of a group of low-physically-fit subjects participating as a homogeneous class in a regular program activity.

The results of two programs of physical education with regard to three factors of physical fitness were compared by analysis of the data collected by use of three physical fitness test items. An analysis of the data is presented in Table IX.

Statistical analysis of the difference in mean gains between Group I and Group III in explosive power, as measured by the standing broad jump, revealed a $t$ value of 1.63. This difference was not significant. The null hypothesis of no difference in the results of two programs of physical education with regard to explosive power was therefore accepted.

Statistical analysis of the difference between Group I and Group III in mean gains in gross body coordination, as
TABLE IX
MEAN GAIN SCORES AND t VALUES BETWEEN GROUPS I AND III ON THREE PHYSICAL FITNESS TEST ITEMS

<table>
<thead>
<tr>
<th>Test Item</th>
<th>Group I* (N = 23) Mean Gains</th>
<th>Group III** (N = 27) Mean Gains</th>
<th>Fisher's t***</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standing Broad Jump</td>
<td>6.26</td>
<td>3.85</td>
<td>1.63</td>
</tr>
<tr>
<td>Softball Throw</td>
<td>-5.04</td>
<td>-8.59</td>
<td>.85</td>
</tr>
<tr>
<td>600-Yard Run-Walk</td>
<td>1.87</td>
<td>2.22</td>
<td>.12</td>
</tr>
</tbody>
</table>

*Adaptive activities program in a homogeneous class.

**Regular program activity in a homogeneous class.

***A t value of 2.01 is required for significance at the .05 level.

measured by the softball throw, revealed a t value of .85. This difference was not significant. The null hypothesis of no difference in the results of two programs of physical education with regard to gross body coordination was therefore accepted.

Statistical analysis of the difference between Group I and Group III in mean gains in circulorespiratory endurance, as measured by the 600-yard run-walk, revealed a t value of .12. This difference was not significant. The null hypothesis of no difference in the results of two programs of physical education with regard to circulorespiratory endurance was therefore accepted.

Hypothesis IV.—It was hypothesized that a group of low-physically-fit subjects participating as a homogeneous
class in an adaptive activities program will show a significantly greater mean gain on the Wear Attitude Scale Form A for physical education than will a group of low-physically-fit subjects participating as a homogeneous class in a regular program activity.

The results of two programs of physical education with regard to attitude toward physical education were compared by analysis of the data collected by use of the Wear Attitude Scale Form A. An analysis of the data is presented in Table X.

**TABLE X**

MEANS, MEAN GAIN SCORES AND THE $t$ VALUE BETWEEN GROUPS I AND III ON THE WEAR ATTITUDE SCALE FORM A FOR PHYSICAL EDUCATION

<table>
<thead>
<tr>
<th>Groups</th>
<th>Pretest Means</th>
<th>Posttest Means</th>
<th>Mean Gains</th>
<th>Fisher's $t$***</th>
</tr>
</thead>
<tbody>
<tr>
<td>I* (N = 23)</td>
<td>114.00</td>
<td>113.65</td>
<td>- .35</td>
<td>1.55</td>
</tr>
<tr>
<td>III** (N = 27)</td>
<td>113.00</td>
<td>116.78</td>
<td>3.78</td>
<td></td>
</tr>
</tbody>
</table>

*Adaptive activities program in a homogeneous class.

**Regular program activity in a homogeneous class.

***A $t$ value of 2.01 is required for significance at the .05 level.

Statistical analysis of the difference between Group I and Group III in mean gains in attitude toward physical education, as measured by the Wear Attitude Scale Form A, revealed a $t$ value of 1.55. This difference was not significant. The null hypothesis of no difference in the results
of two programs of physical education with regard to attitude toward physical education was therefore accepted. The higher mean gain was in the direction of the regular program activity.

Hypothesis V.—It was hypothesized that the mean gain in physical fitness for a group of low-physically-fit subjects participating as a homogeneous class in an adaptive activities program will be significantly greater, as measured by each of three selected items from the AAHPER Youth Fitness Test, than the mean gain for a group of low-physically-fit subjects participating in heterogeneous classes of a regular program activity.

The results of (1) two methods of grouping students in physical education classes and (2) two programs of physical education with regard to three factors of physical fitness were compared by analysis of the data collected by use of three physical fitness test items. An analysis of the data is presented in Table XI.

Statistical analysis of the difference between Group I and Group IV in mean gains in explosive power, as measured by the standing broad jump, revealed a t value of 2.07. This difference, which was in the direction of Group I, was significant at greater than the .05 level of significance. The null hypothesis of no difference in the results of (1) two methods of grouping and (2) two programs of physical
TABLE XI
MEAN GAIN SCORES AND t VALUES BETWEEN GROUPS I AND IV ON THREE PHYSICAL FITNESS TEST ITEMS

<table>
<thead>
<tr>
<th>Test Item</th>
<th>Group I&lt;sup&gt;a&lt;/sup&gt; (N = 23) Mean Gains</th>
<th>Group IV&lt;sup&gt;b&lt;/sup&gt; (N = 29) Mean Gains</th>
<th>Fisher's t&lt;sup&gt;c&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standing Broad Jump</td>
<td>6.26</td>
<td>3.24</td>
<td>2.07&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>Softball Throw</td>
<td>-5.04</td>
<td>-1.48</td>
<td>.86</td>
</tr>
<tr>
<td>600-Yard Run-Walk</td>
<td>1.87</td>
<td>-2.90</td>
<td>1.62</td>
</tr>
</tbody>
</table>

<sup>a</sup>Adaptive activities program in a homogeneous class.

<sup>b</sup>Regular program activity in heterogeneous classes.

<sup>c</sup>A t value of 2.01 is required for significance at the .05 level.

<sup>d</sup>p < .05.

education with regard to explosive power was therefore rejected. This finding was consistent with the finding related to Hypothesis I, which was presented in Table VII.

Statistical analysis of the difference between Group I and Group IV in mean gains in gross body coordination, as measured by the softball throw, revealed a t value of .86. This difference was not significant. The null hypothesis of no difference in the results of (1) two methods of grouping and (2) two programs of physical education with regard to gross body coordination was therefore accepted.

Statistical analysis of the difference between Group I and Group IV in mean gains in circulorespiratory endurance, as measured by the 600-yard run-walk, revealed a t value of
1.62. This difference was not significant. The null hypothesis of no difference in the results of (1) two methods of grouping and (2) two programs of physical education with regard to circulorespiratory endurance was therefore accepted.

**Hypothesis VI.**—It was hypothesized that a group of low-physically-fit subjects participating as a homogeneous class in an adaptive activities program will have a significantly greater mean gain on the Wear Attitude Scale Form A for physical education than will a group of low-physically-fit subjects participating in heterogeneous classes of a regular program activity.

The results of (1) two methods of grouping students in physical education classes and (2) two programs of physical education were compared by analysis of the data collected by use of the Wear Attitude Scale Form A. An analysis of the data is presented in Table XII.

Statistical analysis of the difference between Group I and Group IV in mean gains in attitude toward physical education, as measured by the Wear Attitude Scale Form A, revealed a t value of .02. This difference was not significant. The null hypothesis of no difference in the results of (1) two methods of grouping students in physical education classes and (2) two programs of physical education with regard to attitude toward physical education was therefore accepted.
TABLE XII

MEANS, MEAN GAIN SCORES AND THE t VALUE BETWEEN GROUPS I AND IV ON THE WEAR ATTITUDE SCALE FORM A FOR PHYSICAL EDUCATION

<table>
<thead>
<tr>
<th>Groups</th>
<th>Pretest Means</th>
<th>Posttest Means</th>
<th>Mean Gains</th>
<th>Fisher's t***</th>
</tr>
</thead>
<tbody>
<tr>
<td>I* (N = 23)</td>
<td>114.00</td>
<td>113.65</td>
<td>-.35</td>
<td>.02</td>
</tr>
<tr>
<td>IV** (N = 29)</td>
<td>114.07</td>
<td>113.80</td>
<td>-.28</td>
<td></td>
</tr>
</tbody>
</table>

*Adaptive activities program in a homogeneous class.

**Regular program activity in a homogeneous class.

***A t value of 2.01 is required for significance at the .05 level.

Hypothesis VII.—It was hypothesized that the mean gain in physical fitness for a group of low-physically-fit subjects participating in heterogeneous classes of an adaptive activities program will be significantly greater, as measured by each of three items from the AAHPER Youth Fitness Test, than the mean gain for a group of low-physically-fit subjects participating as a homogeneous class in a regular program activity.

The results of (1) two methods of grouping students in physical education classes and (2) two programs of physical education with regard to three factors of physical fitness were compared by analysis of the data collected by use of three physical fitness test items. An analysis of the data is presented in Table XIII.
TABLE XIII
MEAN GAIN SCORES AND t VALUES BETWEEN GROUPS II AND III ON THREE PHYSICAL FITNESS TEST ITEMS

<table>
<thead>
<tr>
<th>Test Item</th>
<th>Group II&lt;sup&gt;a&lt;/sup&gt; (N = 24) Mean Gains</th>
<th>Group III&lt;sup&gt;b&lt;/sup&gt; (N = 27) Mean Gains</th>
<th>Fisher's t&lt;sup&gt;c&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standing Broad Jump</td>
<td>2.21</td>
<td>3.85</td>
<td>1.12</td>
</tr>
<tr>
<td>Softball Throw</td>
<td>-8.17</td>
<td>-8.60</td>
<td>.10</td>
</tr>
<tr>
<td>600-Yard Run-Walk</td>
<td>10.38</td>
<td>2.22</td>
<td>2.76&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>a</sup>Adaptive activities program in heterogeneous classes.

<sup>b</sup>Regular program activity in a homogeneous class.

<sup>c</sup>A t value of 2.01 is required for significance at the .05 level.

<sup>d</sup>p < .05.

Statistical analysis of the difference between Group II and Group III in mean gains in explosive power, as measured by the standing broad jump, revealed a t value of 1.12. This difference was not significant. The null hypothesis of no difference in the results of (1) two methods of grouping students in physical education classes and (2) two program of physical education with regard to explosive power was therefore accepted.

Statistical analysis of the difference between Group II and Group III in mean gains in gross body coordination, as measured by the softball throw revealed a t value of .10. This difference was not significant. The null hypothesis of no difference in the results of (1) two methods of grouping...
students in physical education classes and (2) two programs of physical education with regard to gross body coordination was therefore accepted.

Statistical analysis of the difference between Group II and Group III in mean gains in circulorespiratory endurance, as measured by the 600-yard run-walk, revealed a t value of 2.76. This gain, which was in the direction of Group II, was significant at greater than the .01 level of confidence. The null hypothesis of no difference in the results of (1) two methods of grouping students in physical education classes and (2) two programs of physical education with regard to circulorespiratory endurance was therefore rejected.

**Hypothesis VIII.**—It was hypothesized that a group of low-physically-fit subjects participating in heterogeneous classes of an adaptive activities program will show a significantly greater mean gain on the Wear Attitude Scale Form A for physical education than will a group of low-physically-fit subjects participating as a homogeneous class in a regular program activity.

The results of (1) two methods of grouping students in physical education classes and (2) two programs of physical education with regard to attitude toward physical education were compared by analysis of the data collected by use of the Wear Attitude Scale Form A. An analysis of the date is presented in Table XIV.
TABLE XIV

MEANS, MEAN GAIN SCORES AND THE $t$ VALUE BETWEEN GROUPS I AND III ON THE WEAR ATTITUDE SCALE FORM A FOR PHYSICAL EDUCATION

<table>
<thead>
<tr>
<th>Groups</th>
<th>Pretest Means</th>
<th>Posttest Means</th>
<th>Mean Gains</th>
<th>Fisher's $t$***</th>
</tr>
</thead>
<tbody>
<tr>
<td>II* (N = 24)</td>
<td>114.67</td>
<td>119.67</td>
<td>5.00</td>
<td>.41</td>
</tr>
<tr>
<td>III** (N = 27)</td>
<td>113.00</td>
<td>116.78</td>
<td>3.78</td>
<td></td>
</tr>
</tbody>
</table>

*Adaptive activities program in heterogeneous classes.

**Regular program activity in a homogeneous class.

***A $t$ value of 2.01 is required for significance at the .05 level.

Statistical analysis of the difference between Group II and Group III in mean gains in attitude toward physical education, as measured by the Wear Attitude Scale Form A, revealed a $t$ value of .41. This difference was not significant; however, as may be viewed in Table XIV, both of these groups experienced a rather large mean gain on the attitude scale. The null hypothesis of no difference in the results of (1) two methods of grouping students in physical education classes and (2) two programs of physical education with regard to attitude toward physical education was therefore accepted.

Hypothesis IX.--It was hypothesized that the mean gain in physical fitness for a group of low-physically-fit subjects participating in heterogeneous classes of an adaptive
activities program will be significantly greater, as measured by each of three selected items from the AAHPER Youth Fitness Test, than the mean gain for a group of low-physically-fit subjects participating in heterogeneous classes of a regular program activity.

The results of two programs of physical education with regard to three factors of physical fitness were compared by analysis of the data collected by use of three physical fitness test items. An analysis of the data is presented in Table XV.

TABLE XV

MEAN GAIN SCORES AND t VALUES BETWEEN GROUPS II AND IV ON THREE PHYSICAL FITNESS TEST ITEMS

<table>
<thead>
<tr>
<th>Test Item</th>
<th>Group II(^a) (N = 24) Mean Gains</th>
<th>Group IV(^b) (N = 29) Mean Gains</th>
<th>Fisher's t(^c)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standing Broad Jump</td>
<td>2.21</td>
<td>3.24</td>
<td>.72</td>
</tr>
<tr>
<td>Softball Throw</td>
<td>-8.17</td>
<td>-1.48</td>
<td>1.64</td>
</tr>
<tr>
<td>600-Yard Run-Walk</td>
<td>10.38</td>
<td>-2.90</td>
<td>4.57(^d)</td>
</tr>
</tbody>
</table>

\(^a\)Adaptive activities program in heterogeneous classes.

\(^b\)Regular program activity in a homogeneous class.

\(^c\)A t value of 2.01 is required for significance at the .05 level.

\(^d\)P < .001.

Statistical analysis of the difference between Group II and Group IV in mean gains in explosive power, as measured by the standing broad jump, revealed a t value of .72. This
difference was not significant; however, this finding is consistent with the data presented in Table XIII, whereby the direction of the mean gain in explosive power was in the direction of the group participating in the regular program activity. The null hypothesis of no difference in the results of two programs of physical education with regard to explosive power was therefore accepted.

Statistical analysis of the difference between Group II and Group IV in mean gains in gross body coordination, as measured by the softball throw, revealed a $t$ value of 1.64. This difference was not significant. The null hypothesis of no difference in the results of two programs of physical education with regard to gross body coordination was therefore accepted. Although both groups showed a loss on the softball throw test, the group participating in the regular program experienced the lesser decline. This finding was supported by the data presented in Table X. In each instance the regular program activity was more successful in maintaining gross body coordination, as measured by the softball throw.

Statistical analysis of the difference between Group II and Group IV in mean gains in circulorespiratory endurance, as measured by the 600-yard run-walk, revealed a $t$ value of 4.57. This difference, which was in the direction of Group II, was significant at greater than the .001 level of confidence. The null hypothesis of no difference in the
results of two programs of physical education with regard to circulorespiratory endurance was therefore rejected. This finding supports the data presented in Tables III and XII; that is, heterogeneity and an adaptive program each appeared to be conducive to improving circulorespiratory endurance, as measured by the 600-yard run-walk.

**Hypothesis X.**—It was hypothesized that a group of low-physically-fit subjects participating in heterogeneous classes of an adaptive activities program will show a significantly greater mean gain on the Wear Attitude Scale Form A for physical education than will a group of low-physically-fit subjects participating in heterogeneous classes of a regular program activity.

The results of two programs of physical education with regard to attitude toward physical education were compared by analysis of the data collected by use of the Wear Attitude Scale Form A. An analysis of the data is presented in Table XVI.

Statistical analysis of the difference between Group II and Group IV in mean gains in attitude toward physical educations, as measured by the Wear Attitude Scale Form A, revealed a $t$ value of 1.79. This difference was not significant. The null hypothesis of no difference in the results of two programs of physical education with regard to attitude toward physical education was therefore accepted. The difference, which was in the direction of the adaptive
TABLE XVI
MEANS, MEAN GAIN SCORES AND THE t VALUE BETWEEN GROUPS II
AND IV ON THE WEAR ATTITUDE SCALE FORM A FOR
PHYSICAL EDUCATION

<table>
<thead>
<tr>
<th>Groups</th>
<th>Pretest Means</th>
<th>Posttest Means</th>
<th>Mean Gains</th>
<th>Fisher's t***</th>
</tr>
</thead>
<tbody>
<tr>
<td>II* (N = 24)</td>
<td>114.67</td>
<td>119.67</td>
<td>5.00</td>
<td>1.79</td>
</tr>
<tr>
<td>IV** (N = 29)</td>
<td>114.07</td>
<td>113.79</td>
<td>- .28</td>
<td></td>
</tr>
</tbody>
</table>

*Adaptive activities program in heterogeneous classes.
**Regular program activity in a homogeneous class.
***A t value of 2.01 is required for significance at the .05 level.

activities program, was significant at about the .08 level of confidence. This finding offered added support to the finding related to Hypothesis I. Table VIII presented data, however not highly significant, which favored participation in heterogeneous classes with regard to attitude toward physical education.

Hypothesis XI.--It was hypothesized that there will be no significant difference in mean gain in physical fitness, as measured by each of three selected items from the AAHPER Youth Fitness Test, between a group of low-physically-fit subjects participating as a homogeneous class in a regular program activity and a group of low-physically-fit subjects participating in heterogeneous classes of a regular program activity.
The results of two methods of grouping students in physical education classes with regard to three factors of physical fitness were compared by analysis of the data collected by use of three physical fitness test items. An analysis of the date is presented in Table XVII.

**TABLE XVII**

MEAN GAIN SCORES AND *t* VALUES BETWEEN GROUPS III AND IV ON THREE PHYSICAL FITNESS TEST ITEMS

<table>
<thead>
<tr>
<th>Test Item</th>
<th>Group III* (N = 27) Mean Gains</th>
<th>Group IV** (N = 29) Mean Gains</th>
<th>Fisher's <em>t</em>**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standing Broad Jump</td>
<td>3.85</td>
<td>3.24</td>
<td>.44</td>
</tr>
<tr>
<td>Softball Throw</td>
<td>-8.60</td>
<td>-1.48</td>
<td>1.80</td>
</tr>
<tr>
<td>600-Yard Run-Walk</td>
<td>2.22</td>
<td>-2.90</td>
<td>1.82</td>
</tr>
</tbody>
</table>

*Regular program activity in heterogeneous class.

**Regular program activity in heterogeneous classes.

***A *t* value of 2.01 is required for significance at the .05 level.

Statistical analysis of the difference between Group III and Group IV in mean gains in explosive power, as measured by the standing broad jump, revealed a *t* value of .44. This difference was not significant. The null hypothesis was therefore accepted.

Statistical analysis of the difference between Group III and Group IV in mean gain in gross body coordination, as measured by the softball throw, revealed a *t* value of 1.80.
This difference was not significant. The null hypothesis was therefore accepted. Although both groups experienced a decline in the softball throw, Group IV had the smaller loss.

Statistical analysis of the difference between Group III and Group IV in mean gains in circulorespiratory endurance, as measured by the 600-yard run-walk, revealed a t-value of 1.82. This difference was not significant. The null hypothesis was therefore accepted.

The findings related to the above hypothesis support the findings by Lockhart and Mott.1 They found that simply grouping low ability girls in a fundamentals physical education class produced no significant skill improvement.

Hypothesis XII.—It was hypothesized that a group of low-physically-fit subjects participating as a homogeneous class in a regular program activity will show a significantly greater mean gain on the Wear Attitude Scale Form A for physical education than a group of low-physically-fit subjects participating in heterogeneous classes of a regular program activity.

The results of two methods of grouping students in physical education with regard to attitude toward physical education were compared by analysis of the data collected

---

by use of the Wear Attitude Scale Form A. An analysis of the data is presented in Table XVIII.

**TABLE XVIII**

MEANS, MEAN GAIN SCORES AND THE $t$ VALUE BETWEEN GROUPS III AND IV ON THE WEAR ATTITUDE SCALE FORM A FOR PHYSICAL EDUCATION

<table>
<thead>
<tr>
<th>Groups</th>
<th>Pretest Means</th>
<th>Posttest Means</th>
<th>Mean Gains</th>
<th>Fisher's $t$***</th>
</tr>
</thead>
<tbody>
<tr>
<td>III* (N = 27)</td>
<td>113.00</td>
<td>116.78</td>
<td>2.22</td>
<td>1.42</td>
</tr>
<tr>
<td>IV** (N = 29)</td>
<td>114.07</td>
<td>113.79</td>
<td>-.28</td>
<td></td>
</tr>
</tbody>
</table>

*Regular program activity in a homogeneous class.

**Regular program activity in heterogeneous classes.

***A $t$ value of 2.01 is required for significance at the .05 level.

Statistical analysis of the difference between Group III and Group IV in mean gains in attitude toward physical education, as measured by the Wear Attitude Scale Form A, revealed a $t$ value of 1.42. This difference was not significant. The null hypothesis of no difference in the results of two methods of grouping with regard to attitude toward physical education was therefore accepted.
CHAPTER V

SUMMARY, FINDINGS, AND IMPLICATIONS

The problem of this study was the determination of the relationship between four selected programs of physical education and (a) physical fitness and (b) attitude toward physical education among low-physically-fit freshman and sophomore male college students.

The primary purpose of this study, which was stated more fully in Chapter I, was to compare the effects, in terms of three specific criteria, of (1) an adaptive activities program in a homogeneous class, (2) an adaptive activities program in heterogeneous classes, (3) a regular program activity in a homogeneous class, and (4) a regular program activity in heterogeneous classes.

The four programs were compared in terms of three factors of physical fitness: explosive power, as measured by the standing broad jump; gross body coordination, as measured by the softball throw; and circulorespiratory endurance, as measured by the 600-yard run-walk. Attitude toward physical education, as measured by the Wear Attitude Scale Form A, was an additional dependent variable.

Beginning in the fall semester of 1968, 465 male freshman and sophomore students enrolled in eight sections of
activity physical education in the North Texas State University Department of Physical Education performed the three selected items of the AAHPER Youth Fitness Test and the Wear Attitude Scale Form A.*

Subjects within each section were ranked on each of the three fitness pretest items and an average rank was computed for each subject. From each section the thirty-three students lowest in average rank were identified for possible participation in the study. This population of low-physically-fit students constituted a pool from which four groups were selected by use of a table of random numbers to participate in programs within their respective sections.

Group I, which consisted of thirty-one subjects, was randomly selected to participate in an adaptive activities program¹ as a homogeneous class. Group II consisted of thirty-one subjects randomly identified in the low-physically-fit segments of three of the remaining seven sections. Subjects who formed this group were assigned to participate in and adaptive activities program² within their respective heterogeneous sections. Group III contained thirty-one subjects from one of the remaining four sections who were randomly selected to participate in a regular program activity of basketball³ as a homogeneous class. The

¹See Appendix F. ²See Appendix F. ³See Appendix G.
remaining three sections contained the population within which thirty-three subjects were randomly identified to form Group IV. Subjects from this group participated in a regular program activity of basketball within their respective heterogeneous sections.

A test for homogeneity among the groups provided evidence of similarity on each of the pretest variables mentioned above. All classes met three fifty-minute periods each week during the six weeks period of the study. Upon completion of the training period, the four test items were re-administered to the 103 subjects who completed the study.

Each hypothesis was statistically treated in the null form by the t test for large independent groups. Null hypotheses were rejected when the .05 level of significance was reached.

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

1. It was hypothesized that the mean gain in physical fitness for a group of low-physically-fit subjects participating as a homogeneous class in an adaptive activities program would be significantly greater, as measured by each of three selected items from the AAHPER Youth Fitness Test, than the mean gain for a group of low-physically-fit subjects

See Appendix G.
participating in heterogeneous classes of an adaptive activities program.

When the results of two methods of grouping in an adaptive activities program were compare, it was found that homogeneous grouping was significantly superior in the improvement of explosive power. Therefore, the null hypothesis was rejected at greater than the .05 level of confidence.

Heterogeneous grouping was significantly superior, however, in the improvement of circulorespiratory endurance. The null hypothesis was therefore rejected at greater than the .05 level of confidence. However, it had been anticipated that the group participating as a homogeneous class would show the greater improvement.

There was no significant difference found between the two methods of grouping with regard to gross body coordination. Although both the homogeneously grouped and the heterogeneously grouped subjects experienced a decline on the softball throw test, the group which participated as a homogeneous class declined less.

2. It was hypothesized that the mean gain in physical fitness of low-physically-fit subjects participating as a homogeneous class in an adaptive activities program would be significantly greater, as measured by each of three selected items from the AAHPER Youth Fitness Test, than the mean gain of a group of low-physically fit subjects participating as a homogeneous class in a regular program activity.
When the results of the two programs of physical education in homogeneous classes were compared, it was found that the adaptive activities program which contained Group I was slightly, but insignificantly, superior to the regular program activity of basketball which contained Group III in the improvement of explosive power. The null hypothesis was therefore accepted. The same program was slightly, but insignificantly, superior in the maintenance of gross body coordination. Although both groups experienced a decline on the softball throw test, Group I declined less. However, the null hypothesis was accepted.

The regular program activity of basketball produced a slight, but insignificant, advantage in mean gain in circulor respiratory endurance. The null hypothesis was therefore accepted.

3. It was hypothesized that the mean gain in physical fitness for a group of low-physically-fit subjects participating as a homogeneous class in an adaptive activities program would be significantly greater, as measured by each of the three selected items from the AAHPER Youth Fitness Test, than the mean gain for a group of low-physically-fit subjects participating in heterogeneous classes of a regular program activity.

When the results of homogeneous grouping and an adaptive activities program, which contained Group I, and heterogeneous grouping and a regular program activity of basketball, which contained Group IV, were compared, it was found that Group I
improved significantly in explosive power. Therefore, the null hypothesis was rejected at greater than the .05 level of confidence.

Also there was a slight, but insignificant difference found in favor of Group I in the improvement of circulorespiratory endurance. The null hypothesis was therefore accepted.

Although both groups experienced a decline on the softball throw test, Group I declined less. However, the null hypothesis was accepted.

4. It was hypothesized that the mean gain in physical fitness for a group of low-physically-fit subjects participating in heterogeneous classes of an adaptive activities program would be significantly greater, as measured by each of the three items from the *AAHPER Youth Fitness Test*, than the mean gain for a group of low-physically-fit subjects participating as a homogeneous class in a regular program activity.

When the results of heterogeneous grouping and an adaptive activities program, which contained Group II and homogeneous grouping and a regular program activity of basketball, which contained Group III, were compared, it was found that Group II gained significantly more in circulorespiratory endurance. Therefore, the null hypothesis was rejected at greater than the .05 level of confidence.

Since no significant difference was found between the groups in the improvement of explosive power, the null
hypothesis was accepted. There was, however, a slight difference in mean gain on the standing broad jump in favor of Group II.

Although both groups experienced a decline on the soft-ball throw test, the difference was not significant. Therefore the null hypothesis was accepted.

5. It was hypothesized that the mean gain in physical fitness for a group of low-physically-fit subjects participating in heterogeneous classes of an adaptive activities program would be significantly greater, as measured by each of the three selected items from the AAHPER Youth Fitness Test, than the mean gain for a group of low-physically-fit subjects participating in heterogeneous classes of a regular program activity.

When the results of the two groups of subjects which participated in heterogeneous classes of either an adaptive activities program (Group II) or a regular program activity of basketball (Group IV) were compared, it was found that Group II showed a significant advantage in the improvement of circulorespiratory endurance. The null hypothesis was therefore rejected at greater than the .01 level of confidence.

However, no significant difference was found between the two groups with regard to explosive power. Although there was a slight mean gain on the standing broad jump test in favor of Group IV, the null hypothesis was accepted.
Although both groups experienced a decline on the softball throw test, Group IV declined less. However, the null hypothesis was accepted.

6. It was hypothesized that there would be no significant difference in mean gain in physical fitness, as measured by each of three selected items from the AAHPER Youth Fitness Test, between a group of low-physically-fit subjects participating as a homogeneous class in a regular program activity and a group of low-physically-fit subjects participating in heterogeneous classes of a regular program activity.

When the results of the two methods of grouping in a regular program activity of basketball were compared, it was found that there were no significant differences between the two methods of grouping with regard to improvement in the three factors of physical fitness. Therefore, the null hypotheses were accepted.

However, homogeneous grouping was slightly superior in the improvement of explosive power. It also produced a relatively higher gain in circulorespiratory endurance. Although both groups experienced a decline on the softball throw test, the group which participated in heterogeneous classes declined less.

A summary of the findings with respect to the hypotheses pertaining to attitude toward physical education is as follows:
1. It was hypothesized that a group of low-physically-fit subjects participating as a homogeneous class in an adaptive activities program would show a significantly greater mean gain on the Wear Attitude Scale Form A for physical education than would a group of low-physically-fit subjects participating in heterogeneous classes of an adaptive activities program.

There was no significant difference found between the two groups in mean gain in attitude toward physical education. Therefore, the null hypothesis was accepted.

2. It was hypothesized that a group of low-physically-fit subjects participating as a homogeneous class in an adaptive activities program would show a significantly greater mean gain on the Wear Attitude Scale Form A for physical education than would a group of low-physically-fit subjects participating as a homogeneous class in a regular program activity.

There was no significant difference found between the two groups in mean gain in attitude toward physical education. Therefore, the null hypothesis was accepted.

3. It was hypothesized that a group of low-physically-fit subjects participating as a homogeneous class in an adaptive activities program would have a significantly greater mean gain on the Wear Attitude Scale Form A for physical education than would a group of low-physically-fit subjects participating in heterogeneous classes of a regular program activity.
There was no significant difference found between the two groups in mean gain in attitude toward physical education. Therefore, the null hypothesis was accepted.

4. It was hypothesized that a group of low-physically-fit subjects participating in heterogeneous classes of an adaptive activities program would show a significantly greater mean gain on the Wear Attitude Scale Form A for physical education than would a group of low-physically-fit subjects participating as a homogeneous class in a regular program activity.

There was no significant difference found between the two groups in mean gain in attitude toward physical education. Therefore, the null hypothesis was accepted.

5. It was hypothesized that a group of low-physically-fit subjects participating in heterogeneous classes of an adaptive activities program would show a significantly greater mean gain on the Wear Attitude Scale Form A for physical education than would a group of low-physically-fit subjects participating in heterogeneous classes of a regular program activity.

There was no significant difference found between the two groups in mean gain in attitude toward physical education. Therefore, the null hypothesis was accepted.

6. It was hypothesized that a group of low-physically-fit subjects participating as a homogeneous class in a regular program activity would have a significantly greater mean gain
on the Wear Attitude Scale Form A for physical education than would a group of low-physically-fit subjects participating in heterogeneous classes of a regular program activity.

There was no significant difference found between the two groups in mean gain in attitude toward physical education. Therefore, the null hypothesis was accepted.

Although all differences in this variable were insignificant when the results obtained by the four groups were compared, the mean gains in attitude toward physical education were found to be in the following order: Group II (subjects who participated in an adaptive activities program in heterogeneous classes) gained 5.00 points; Group III (subjects who participated in a regular program activity of basketball as a homogeneous class) gained 3.78 points; Group IV (subjects who participated in a regular program activity of basketball in heterogeneous classes) gained -.28 points; and Group I (subjects who participated in an adaptive activities program as a homogeneous class) gained -.35 points.

Weather conditions during the administration of the pre-test fitness items were ideal. During the administration of the posttest fitness items, although the weather was clear, the temperatures ranged approximately ten degrees below the pretest administration temperatures. The wind velocity fluctuated from ten to fifteen miles per hour. Even though the softball throw test was performed at a cross angle to the wind, there is the possibility that performance on the
test was affected somewhat. However, since all the groups
performed the test under nearly identical conditions, the
effect on the results of the test must be assumed to have
been equalized among the four groups.

Implications

Based on the findings of this study, the following
implications seemed warranted:

When explosive power is a specified weakness, the
student will probably show more improvement in this fitness
factor if he participates in a group comprised of students
with the same weakness and if the activities are planned with
regard to this fitness factor. Apparently, the adaptation
of activities to the specified weakness is of more importance
with regard to explosive power than the method of grouping
employed. However, if time and facilities are not available
for an adaptive activities program and a regular program
activity such as basketball is utilized, homogeneous ability
grouping appears to be more appropriate than grouping
heterogeneously with regard to improvement in explosive power.

Heterogeneous classes of a regular program, such as
basketball, appear to be inappropriate for the improvement
of explosive power. The implication is that students perform
more readily and more willingly in a team sport when they
are participating and competing with other students of near
equal ability, whereas the low ability students who partici-
pate in heterogeneous classes of a team sport appear to
perform less readily and less willingly; they appear to depend upon the high ability students to carry the load.

Circulorespiratory endurance will apparently be more susceptible to improvement in a physical education program in which the students are grouped heterogeneously in an adaptive activities program with regard to this fitness factor. When students perform individual activities, such as the cross country run and the Exer-Genie run, there is possibly a strong motivating factor which impels them to perform more nearly on the same level as the higher ability students with whom they are participating. However, when students are grouped homogeneously, more improvement may be expected when a team sport such as basketball is the content of the course.

When a positive change in attitude toward physical education is the goal of a physical education department, then the possibility of placing low-physically-fit students into heterogeneously grouped classes of adaptive activities should be considered. Apparently, when activities of an individual nature are utilized, students with a low-fitness level prefer to participate in classes which contain students of all fitness levels. However, attitude toward physical education may be positively affected when students participate as a homogeneous class in a regular program activity such as basketball. It appears that students participating
in a team sport activity such as basketball prefer to participate in a class with students of equal or nearly equal ability.

Attitude toward physical education is probably affected by variables other than ability grouping and program designs. For example, the time of day scheduled for participation, the personality of the instructor, the quality of the facilities and equipment and the length of the training period may be more influential on attitude change than the method of grouping and/or the program design. And too, such extraneous variables as the individual's health, religion, physical education background, hobbies and academic major may have equal influence upon the student's attitude toward physical education.

The results of this study suggest that physical educators cannot expect a high degree of success with regard to physical fitness and attitude toward physical education upon the basis of ability grouping alone. Apparently they must (a) identify individual's areas of physical weaknesses and (b) be prepared to adjust the content of the program to the specific fitness weaknesses.

The findings of this study suggest the need for further investigation with regard to the effects of ability grouping and program content upon physical fitness and attitude toward physical education. A study should be conducted to determine the effects of grouping and program designs upon the middle and the high-physically-fit groups in terms of physical fitness and attitude toward physical education. In
order to ascertain the effects of duration of training upon physical fitness and attitude toward physical education, a study should be conducted utilizing a full semester of training.

Evidently the programs compared in this study were not appropriate for the improvement of gross body coordination as measured by the softball throw. Therefore, further study is needed in this area of fitness. Since the softball throw has a low .49 factor loading on gross body coordination, it appears that the use of all seven items from the AAHPER Youth Fitness Test would supply a more valid measurement of gross body coordination. And furthermore, a more current measure of attitude toward physical education should be developed and utilized in further investigations of the nature of this study.

It is suggested that more significant results among the four programs compared in this study would be found if an activity less rigorous than basketball were used in the control group classes. The results of this study further suggest that no one program design alone is adequate for producing improvement in all the factors related to physical fitness and to attitude toward physical education.
APPENDIX A

ORIENTATION OF STUDENTS

Physical Education 116-- is one of eight sections selected to participate in a study to compare the results of four activity programs upon (1) physical fitness and (2) attitude toward physical education of freshman and sophomore male college students. Selected items from the AAHPER Youth Physical Fitness Test will be administered. The items are: (1) softball throw for distance, (2) standing broad jump, and (3) 600-yard run-walk. Responses to statements from the Wear Attitude Scale Form A for physical education will be used to determine student attitude toward physical education.

This program will continue for a period of six weeks. During this time your full cooperation will be necessary. It will be of extreme importance that your attendance be regular and punctual. At the termination of the experiment, students will be allowed to choose another activity.

STUDENT INFORMATION

Please fill in the following blanks:

Name: ___________________________ Student Number: ________

Age: Yrs. _____ Mos. ______

Classification: Fr. _____ Soph. _____ Jr. _____ Sr. _____

Freshman or Varsity Athlete: Yes _____ No _____

Is there any reason why you cannot participate in a normal physical education activities class? Yes _____ No _____

If your answer is yes, please explain your reason.

________________________________________________________________________

________________________________________________________________________
APPENDIX B

PHYSICAL EDUCATION ATTITUDE INVENTORY

Directions - Please Read Carefully: Below you will find some statements about physical education. We would like to know how you feel about each statement. You are asked to consider physical education only from the standpoint of its place as an activity course taught during a regular class period. No reference is intended in any statement to interscholastic or intramural athletics. People differ widely in the way they feel about each statement. There are no right or wrong answers.

You have been provided with a separate answer sheet for recording your reaction to each statement. (a) Read each statement carefully, (b) go to the answer sheet and (c) opposite the number of the statement place an "x" in the square which is under the word (or words) which best expresses your feeling about the statement. After reading a statement you will know at once, in most cases, whether you agree or disagree with the statement. If you agree, then decide whether to place the "x" under "agree" or "strongly agree." If you disagree, then decide whether to place the "x" under "disagree" or "strongly disagree." In case you are undecided (or neutral) concerning your feeling about the statement, then place an "x" under "undecided." Try to avoid placing an "x" under "undecided" in very many instances.

Wherever possible, let your own personal experience determine your answer. Work rapidly, do not spend much time on any statement. This is not a test, but is simply a survey to determine how people feel about physical education. Your answers will in no way affect your grade in any course. In fact, we are not interested in connecting any person with any paper—so please answer each statement as you actually feel about it. Be sure to answer every statement.

Permission to reproduce and use the Wear Attitude Inventory was granted by Dr. Carlos L. Wear, Associate Professor, Physical Education for Men, The University of Nebraska, Lincoln, Nebraska.
PHYSICAL EDUCATION ATTITUDE INVENTORY

Form A

1. If for any reason a few subjects have to be dropped from the school program, physical education should be one of the subjects dropped.

2. Physical education activities provide no opportunities for learning to control the emotions.

3. Physical education is one of the more important subjects in helping to establish and maintain desirable social standards.

4. Vigorous physical activity works off harmful emotional tensions.

5. I would take physical education only if it were required.

6. Participation in physical education makes no contribution to the development of poise.

7. Because physical skills loom large in importance in youth, it is essential that a person be helped to acquire and improve such skills.

8. Calisthenics taken regularly are good for one's general health.

9. Skill in active games or sports is not necessary for leading the fullest kind of life.

10. Physical education does more harm physically than it does good.

11. Associating with others in some physical education activity is fun.

12. Physical education classes provide situations for the formation of attitudes which will make one a better citizen.

13. Physical education situations are among the poorest for making friends.

14. There is not enough value coming from physical education to justify the time consumed.

15. Physical education skills make worthwhile contributions to the enrichment of living.
16. People get all the physical exercise they need in just taking care of their daily work.

17. All who are physically able will profit from an hour of physical education each day.

18. Physical education makes a valuable contribution toward building up an adequate reserve of strength and endurance for everyday living.

19. Physical education tears down sociability by encouraging people to attempt to surpass each other in many of the activities.

20. Participation in physical education activities makes for a more wholesome outlook on life.

21. Physical education adds nothing to the improvement of social behavior.

22. Physical education class activities will help to relieve and relax physical tensions.

23. Participation in physical education activities helps a person to maintain a healthful emotional life.

24. Physical education is one of the more important subjects in the school program.

25. There is little value in physical education as far as physical well-being is concerned.

26. Physical education should be included in the program of every school.

27. Skills learned in a physical education class do not benefit a person.

28. Physical education provides situations for developing desirable character qualities.

29. Physical education makes for more enjoyable living.

30. Physical education has no place in modern education.
<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Undecided</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strongly Agree</td>
<td>Agree</td>
<td>Undecided</td>
<td>Disagree</td>
</tr>
<tr>
<td>---</td>
<td>----------------</td>
<td>-------</td>
<td>-----------</td>
<td>----------</td>
</tr>
<tr>
<td>27.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>29.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX C

INSTRUCTIONS FOR AAHPER YOUTH PHYSICAL FITNESS

TEST ADMINISTRATION

Pupils jump from the surfaced runway leading to the running broad jump pit and land in the sand filled pit. Pupils stand with the toes just behind the take-off line with feet slightly spread. In preparation for jumping the arms swing backward and the knees bend. The jump is executed by simultaneously extending the knees and swinging the arms forward.

Each pupil will be allowed three jumps. Measurement will be made with a metal tape from the take-off to part of body that touches the ground nearest the take-off line. The best jump of the three trials will be recorded in feet and inches to the nearest inch.

SOFTBALL THROW

Pupils will throw a regulation (12-inch) softball. A conventional marked football field (five-yard intervals) will be used as a throwing area. The pupil throws the ball while remaining within two parallel lines six feet apart. Pupils will be placed into pairs; one pupil will throw and his partner will record the mark. Upper classmen will serve as spotters and ball retrievers.

Each pupil will throw three overhand throws. The best throw of the three will be measured to the point of landing. The distance will be recorded to the nearest foot.

600-YARD RUN-WALK

The distance will be marked on a regulation 440 yard track. Pupils will be paired before running. One-half the group will be spotters while the other one-half is running. Each spotter will listen for his partner's time as the times are called out by the official timer at the finish line.

Walking is permitted, but the object is to cover the 600 yards in the least possible time. A stop watch will be used and times will be recorded in minutes and seconds.
APPENDIX D

SCORE CARD FOR RECORDING TEST DATA

AAHPER YOUTH
PHYSICAL FITNESS TEST

NAME ____________________________  (Last)  (First)  (M.I.)
Soc. Sec. No. ____________________________

<table>
<thead>
<tr>
<th>Test</th>
<th>Score</th>
<th>%ile</th>
<th>Test</th>
<th>Score</th>
<th>%ile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standing Broad Jump</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Softball Throw</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>600-Yard Run-Walk</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

WEAR ATTITUDE SCALE FORM A

<table>
<thead>
<tr>
<th>Test (1)</th>
<th>Test (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Score</td>
<td>Score</td>
</tr>
</tbody>
</table>
APPENDIX E

SELECTED ACTIVITIES FOR GROUPS I AND II

Run in place.--All subjects on odd class days performed the run in place on the gymnasium floor at a pace of 70-80 steps per minute. Each time the right foot contacted the floor constituted one step. The length of this activity was progressively increased each two weeks by one minute, i.e., first two weeks, one minute; second two weeks, two minutes; and third two weeks, three minutes.

Exer-Genie Big Four.--On odd class days all subjects performed the Big Four exercise in the gymnasium with the use of the Exer-Genie Exerciser as described in the manual. Repetitions were progressively increased each three weeks, beginning with one repetition the first week and two repetitions the fourth week.

Bench jump.--On even class days subjects weakest in explosive power as measured by the test item standing broad jump, performed the bench jump. A dressing-room bench, twelve inches wide and eighteen inches high, was used. Subjects jumped from a side position by picking both feet up and placing them simultaneously over the bench. The number of jumps was progressively increased by five each week, beginning with ten jumps the first week and ending the training period with thirty-five jumps. Each movement across the bench constituted one jump.

Medicine ball passes.--On even class days, individuals weakest in gross body coordination, as measured by the test item softball throw for distance, performed the following passes with a nine pound medicine ball: (a) two-handed chest pass, and (b) one-handed push pass. The number of passes was progressively increased by three each week, beginning with ten passes and ending the sixth week with twenty-five passes.

Exer-Genie run.--On even class days, individuals weakest in circuiorespiratory endurance, as measured by the 600-yard run-walk test, executed the running exercise by using the Exer-Genie Exerciser as described in the Exer-Genie manual. The maximum length of the run was fifty feet. The resistance was adjusted with regard to the size and strength of the individual. The running time was progressively increased by
by five seconds each two weeks, beginning with a run of ten seconds and ending the training period with a run of twenty seconds. Repetitions were increased by one each three weeks, i.e., one repetition for weeks one, two, and three; and two repetitions for weeks four, five, and six.

Cross country run.--All subjects ran on even class days a distance marked off on an intramural field. The distance was progressively increased each week. The first week subjects ran 440 yards; second week, 660 yards; third week, 880 yards; fourth week, 1320 yards; fifth week, one mile; and sixth week, one and one-fourth miles.

Basketball.--All subjects in the experimental groups participated in basketball each class period. Each group was divided into four subgroups or teams. Two courts were provided for playing games. Time of activity ranged from fifteen to twenty minutes per class period. A work schedule was devised and was carefully followed by each instructor.
## APPENDIX F

### ACTIVITY SCHEDULE FOR GROUPS I AND II

<table>
<thead>
<tr>
<th>Class Day</th>
<th>Activity</th>
</tr>
</thead>
</table>
| 1         | Exer-Genie Big Four (1 repetition)  
Run in place (1 minute)  
Basketball |
| 2         | Independent Work:  
Bench Jump (10)  
Medicine Ball Passes: One Hand (10)  
Two Hand (10)  
Exer-Genie Run (1 repetition—10 seconds)  
Cross Country—440 yards  
Basketball |
| 3         | Exer-Genie Big Four (1 repetition)  
Run in place (1 minute)  
Basketball |
| 4         | Independent Work:  
Bench Jump (15)  
Medicine Ball Passes: One Hand (13)  
Two Hand (13)  
Exer-Genie Run (1 repetition—10 seconds)  
Cross Country—660 yards  
Basketball |
| 5         | Exer-Genie Big Four (1 repetition)  
Run in place (1 minute)  
Basketball |
| 6         | Independent Work:  
Bench Jump (15)  
Medicine Ball Passes: One Hand (13)  
Two Hand (13)  
Exer-Genie Run (1 repetition—10 seconds)  
Cross Country—660 yards  
Basketball |
| 7         | Exer-Genie Big Four (1 repetition)  
Run in place (2 minutes)  
Basketball |
<table>
<thead>
<tr>
<th>Class</th>
<th>Day</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Independent Work:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bench Jump (20)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Medicine Ball Passes: One Hand (16)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Two Hand (16)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Exer-Genie Run (1 repetition--15 seconds)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cross Country—880 yards</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Basketball</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Exer-Genie Big Four (1 repetition)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Run in place (2 minutes)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Basketball</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Independent Work:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bench Jump (25)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Medicine Ball Passes: One Hand (19)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Two Hand (19)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Exer-Genie Run (2 repetitions--15 seconds)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cross Country—1320 yards</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Basketball</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Exer-Genie Big Four (2 repetitions)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Run in place (2 minutes)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Basketball</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Independent Work:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bench Jump (25)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Medicine Ball Passes: One Hand (19)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Two Hand (19)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Exer-Genie Run (2 repetitions--15 seconds)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cross Country—1320 yards</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Basketball</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Exer-Genie Big Four (2 repetitions)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Run in place (3 minutes)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Basketball</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Independent Work:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bench Jump (30)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Medicine Ball Passes: One Hand (22)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Two Hand (22)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Exer-Genie Run (we repetitions--20 seconds)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cross Country—1 mile</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Basketball</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Exer-Genie Big Four (2 repetitions)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Run in place (3 minutes)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Basketball</td>
<td></td>
</tr>
<tr>
<td>Class Day</td>
<td>Activity</td>
<td></td>
</tr>
<tr>
<td>-----------</td>
<td>----------</td>
<td></td>
</tr>
</tbody>
</table>
| 16        | Independent Work:  
Bench Jump (35)  
Medicine Ball Passes: One Hand (25)  
Two Hand (25)  
Exer-Genie Run (2 repetitions—20 seconds)  
Cross country—1-1/4 miles  
Basketball |
| 17        | Exer-Genie Big Four (2 repetitions)  
Run in place (3 minutes)  
Basketball |
| 18        | Independent Work:  
Bench Jump (35)  
Medicine Ball Passes: One Hand (25)  
Two Hand (25)  
Exer-Genie Run (2 repetitions—20 seconds)  
Cross Country—1-1/2 miles  
Basketball |
APPENDIX G

BASKETBALL CLASS WORK PLAN

FOR ALL GROUPS

<table>
<thead>
<tr>
<th>Class Day</th>
<th>Activity</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, 2, 3</td>
<td><strong>Passing</strong></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>a. Two handed chest passes</td>
<td>3 min.</td>
</tr>
<tr>
<td></td>
<td>b. One handed baseball passes</td>
<td>3 min.</td>
</tr>
<tr>
<td></td>
<td>c. Three line passing</td>
<td>6 min.</td>
</tr>
<tr>
<td>2</td>
<td>Dribbling--dribble with right hand to mid-court and back to starting point with the left hand</td>
<td>3 min.</td>
</tr>
<tr>
<td>3</td>
<td>Shooting</td>
<td></td>
</tr>
<tr>
<td></td>
<td>a. Lay up shooting (Two groups)</td>
<td>5 min.</td>
</tr>
<tr>
<td></td>
<td>b. One handed jump shots</td>
<td>5 min.</td>
</tr>
<tr>
<td></td>
<td>c. Free throw shooting</td>
<td>5 min.</td>
</tr>
<tr>
<td>4</td>
<td>1. Lay up shooting</td>
<td>3 min.</td>
</tr>
<tr>
<td></td>
<td>2. Fast break drill (See Diagram A, page 133)</td>
<td>7 min.</td>
</tr>
<tr>
<td></td>
<td>3. One on one offensive and defensive drill work (Utilize both ends of the court)</td>
<td>10 min.</td>
</tr>
<tr>
<td></td>
<td>4. Give and go drill (See Diagram B, page 133)</td>
<td>10 min.</td>
</tr>
<tr>
<td>5</td>
<td>1. Fast break drill</td>
<td>5 min.</td>
</tr>
<tr>
<td></td>
<td>2. Two on two offensive and defensive drill work (Utilize both ends of the court)</td>
<td>10 min.</td>
</tr>
<tr>
<td></td>
<td>3. Figure eight shooting drill (Two stations) (See Diagram C, page 134)</td>
<td>10 min.</td>
</tr>
<tr>
<td></td>
<td>4. Individual shooting</td>
<td>5 min.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Class Day</th>
<th>Activity</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>1. Lay up shooting</td>
<td>3 min</td>
</tr>
<tr>
<td></td>
<td>2. Three on three offensive and defensive drill work (Utilize both ends of the court)</td>
<td>10 min</td>
</tr>
<tr>
<td></td>
<td>3. Split the post shooting (See Diagram D, page 127)</td>
<td>10 min</td>
</tr>
<tr>
<td></td>
<td>4. Fast break drill</td>
<td>3 min</td>
</tr>
<tr>
<td></td>
<td>5. Individual shooting</td>
<td>4 min</td>
</tr>
</tbody>
</table>

| 7, 8, 9  | 1. Lay up shooting                                | 5 min |
|          | 2. Figure eight shooting                          | 5 min |
|          | 3. Five on five offensive and defensive work (Utilize two stations) | 20 min |

The remaining three weeks of the six weeks experiment will be used for playing a triple round-robin basketball tournament. The instructor will divide the class into four equal teams: A, B, C, and D.

Two games should be played simultaneously. A won and lost record should be kept for the tournament. Each class day will constitute a game.

**TOURNAMENT SCHEDULE**

<table>
<thead>
<tr>
<th>Class Day</th>
<th>Team Vs Team</th>
<th>Team Vs Team</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>11</td>
<td>A</td>
<td>C</td>
</tr>
<tr>
<td>12</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>13</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>14</td>
<td>A</td>
<td>C</td>
</tr>
<tr>
<td>15</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>16</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>Class Day</td>
<td>Team Vs Team</td>
<td>Team Vs Team</td>
</tr>
<tr>
<td>-----------</td>
<td>--------------</td>
<td>--------------</td>
</tr>
<tr>
<td>17</td>
<td>A</td>
<td>C</td>
</tr>
<tr>
<td>18</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>C</td>
</tr>
</tbody>
</table>

**Note:** Time of participation for groups I and II will be adjusted with regard to the time remaining following the adaptive activities program.
BASKETBALL DRILLS

Diagram A

Order of rotation:
Position 1 to 4
Position 2 to 1
Position 3 to 2
Position 4 to 3

Diagram B

Symbols used for each diagram:

- Man breaking without the basketball
- Passed ball
- Man dribbling ball
- Shot ball
Figure-Eight Drill

Diagram C

Directions:
Group forms three lines. Ball is passed by man in center-line to either man breaking down the sidelines. Man who passes the ball will break behind the receiver. This order of play continues until the ball is in position for a lay-up shot by any one of the three men.

Split the Post

Diagram D

Directions:
Group forms two lines and one man is stationed at the free throw line. Ball is passed to the center man; the passer cuts in front of the center man while the offside man is cutting behind him and to the opposite side of the center man. The center has the option of passing the ball to either receiver for a lay-up shot or he may shoot the ball himself. The receivers rotate lines.

NOTE: Explanation of symbols are found on the previous page.
## APPENDIX H

### AAHPER YOUTH PHYSICAL FITNESS TEST

#### PERCENTILE SCORES FOR COLLEGE MEN

<table>
<thead>
<tr>
<th>Percentile</th>
<th>Broad Jump</th>
<th>Softball Throw</th>
<th>600-Yard Run-Walk</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>9' 6&quot;</td>
<td>315</td>
<td>1:12</td>
</tr>
<tr>
<td>95</td>
<td>8' 5&quot;</td>
<td>239</td>
<td>1:35</td>
</tr>
<tr>
<td>90</td>
<td>8' 2&quot;</td>
<td>226</td>
<td>1:38</td>
</tr>
<tr>
<td>85</td>
<td>7'11&quot;</td>
<td>217</td>
<td>1:40</td>
</tr>
<tr>
<td>80</td>
<td>7'10&quot;</td>
<td>211</td>
<td>1:42</td>
</tr>
<tr>
<td>75</td>
<td>7' 8&quot;</td>
<td>206</td>
<td>1:44</td>
</tr>
<tr>
<td>70</td>
<td>7' 7&quot;</td>
<td>200</td>
<td>1:44</td>
</tr>
<tr>
<td>65</td>
<td>7' 6&quot;</td>
<td>196</td>
<td>1:47</td>
</tr>
<tr>
<td>60</td>
<td>7' 5&quot;</td>
<td>192</td>
<td>1:49</td>
</tr>
<tr>
<td>55</td>
<td>7' 4&quot;</td>
<td>188</td>
<td>1:50</td>
</tr>
<tr>
<td>50</td>
<td>7' 3&quot;</td>
<td>184</td>
<td>1:52</td>
</tr>
<tr>
<td>45</td>
<td>7' 1&quot;</td>
<td>180</td>
<td>1:53</td>
</tr>
<tr>
<td>40</td>
<td>7' 0&quot;</td>
<td>176</td>
<td>1:55</td>
</tr>
<tr>
<td>35</td>
<td>6'11&quot;</td>
<td>171</td>
<td>1:57</td>
</tr>
<tr>
<td>30</td>
<td>6'10&quot;</td>
<td>166</td>
<td>1:59</td>
</tr>
<tr>
<td>25</td>
<td>6' 9&quot;</td>
<td>161</td>
<td>2:01</td>
</tr>
<tr>
<td>20</td>
<td>6' 7&quot;</td>
<td>156</td>
<td>2:05</td>
</tr>
<tr>
<td>15</td>
<td>6' 5&quot;</td>
<td>150</td>
<td>2:09</td>
</tr>
<tr>
<td>10</td>
<td>6' 2&quot;</td>
<td>140</td>
<td>2:15</td>
</tr>
<tr>
<td>5</td>
<td>5'10&quot;</td>
<td>125</td>
<td>2:25</td>
</tr>
<tr>
<td>0</td>
<td>4' 2&quot;</td>
<td>55</td>
<td>3:43</td>
</tr>
</tbody>
</table>
BIBLIOGRAPHY

Books


**Articles**


Garrett, I. eon, Sabi Mohammed, and Roy Pangle, "Four Approaches to Increasing Cardiovascular Fitness During Volleyball Instruction," Research Quarterly, XXXVI (December, 1965), 496-499.


Kirchner, Glenn and Don Glines, "Comparative Analysis of Eugene, Oregon, Elementary School Children Using the Kraus-Weber Test of Minimum Muscular Fitness," Research Quarterly, XXVIII (March, 1957), 16.


Olson, Willard C., "Ability Grouping Pros and Cons," The Education Digest, XXXII (September, 1966), 18.


Publications of Learned Organizations


Unpublished Materials


