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A Study to Compare the Effect of Two Elementary Physical Education Programs on Physical Fitness

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401

A STUDY TO COMPARE THE EFFECT OF TWO ELEMENTARY PHYSICAL EDUCATION PROGRAMS ON PHYSICAL FITNESS

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CHAPTER I

THE PROBLEM AND DEFINITION OF TERMS

I. THE PROBLEM

The problem is to compare the effect of two elementary physical education programs on physical fitness.

The writer chose to confine the study to two fifth grade classes in the Naval Avenue Elementary School, Bremerton, Washington.

Purpose of This Study

It was the purpose of this study: (1) to compare the regular physical education program at the controlled fifth grade with an experimental physical education program of the other fifth grade; (2) to compare physical fitness of boys and girls of the two grades before and after the study; and (3) to study the effect of the programs on fifth grade fitness levels.

Importance of the Study

Elementary schools definitely need a national fitness program geared to the average boy and girl, one that will challenge all youngsters to participate in games and activities.

> Special consultants on youth fitness are aware in a general sort of way of the decline in the fitness of our people. In the 1951 test at Yale University, 51% of the class passed physical fitness tests. Those passing dropped to 43% in 1956 and 38% in 1960. (28:75)

The Eisenhower and Kennedy-Johnson administrations considered this an urgent national problem and appointed competent men to help bring our national fitness level on the up-swing. And before this job is over, this writer hopes that every American, not just the young but the old as well, will be as concerned about national physical fitness as he is about the fitness of his favorite athletic team. Dr. James B. Conant states this as his solution:

> I am ... convinced that, ideally, a period of physical education should be required for all pupils in grades 1 through 12 every day, though the length of the period might well be shorter in the lower grades. (17:13)

The basis of physical education is fitness, more than showy muscles. There is too much emphasis on that aspect already. In part, such emphasis may explain why so many students consider physical exercise beneath them. They claim they are more interested in developing their minds than their bodies. The writer feels the gymnasium and the playfield should be a developing ground to help promote youngsters' growth physically, stimulate their learning mentally, and help them to adjust emotionally and socially in our society--not just muscle building.

Most physical educators agree that there is a profound relationship between a sound body and a sound mind. The two may not always go together. Nevertheless, the mind cannot perform at its peak capacity unless the body cooperates. A sense of physical well-being helps give a person the spirit and the will to wade into a crisis, whether it be personal or national. It enables an individual to tackle serious problems with determination, and even a sense of humor, rather than back away and hide behind some quick and convenient rationalization.

Experience, often uncomfortable experience, has taught most adults the necessity of caring for their health. But for some unexplainable reason we don't transfer our learnings to our children. And as a result there is a definite lack of physical fitness in today's youth, as reported by the Kraus-Weber Physical Fitness Test.

Our young people are really not at fault. The gadget age in which we live makes it too easy for them to become a physical mess. Too often Johnny has nothing better to do than tinker with the jalopy dad has so considerately bought him. If he plans things right, he can park the car by the front door and escape walking. This is also true at many colleges and universities where the writer has observed students riding instead of walking to their classes.

It is the writer's conviction that there is a need to evaluate the elementary physical education programs of Washington State. From

the writer's experience in the field of elementary physical education, most programs throughout the state have been lax and incompetent in their elementary physical education programs.

Many schools throughout the country are re-evaluating their physical education programs. The type and extent of training decided on can determine the future fitness of many of our youth.

Teachers must keep in mind the urgent necessity to balance good physical education programs. Physical fitness is an important part of a good physical education program. However, it should not serve as the major objective of the entire program.

Limitations of the Study

1. The study was limited to the Naval Avenue Elementary School, Bremerton, Washington, during the 1968-69 school year.

2. The number of boys and girls was determined by the size of each class. The control group was composed of 13 girls and 10 boys, while the experimental group consisted of 12 girls and 14 boys that completed the tests.

3. The amount of time the boys and girls in the control group had scheduled for their physical education class was one 20-minute session per week. The experimental group participated in three 30-minute sessions on Monday, Wednesday, and Friday.

II. DEFINITIONS OF TERMS USED

Control group. This group participated in the normal physical education program offered at Naval Avenue Elementary School.

Experimental group. This group received a specialized program which would stress improvement in individual fitness levels.

Norms. The norms used were established by the Washington State Elementary School Physical Fitness Test 1966 and the Elder Physical (Motor) Fitness Test.

Physical Fitness. "A person who is physically fit possesses the strength and stamina to carry out his daily tasks without undue fatigue and still has enough energy to enjoy leisure and to meet unforeseen emergencies." (12:3)

III. OVERVIEW OF REMAINDER OF THESIS

Chapter II will contain related literature, the historical background of the development of measurement in physical education, a brief history of the Washington State Physical Fitness Test, as well as the Elder Physical Motor Fitness Test.

Chapter III will contain the procedures of investigation. It will explain the test items of the Washington State Physical Fitness Test and the Elder Motor Fitness Test. Chapter III will also describe the

groups to be tested and the type of program followed by each group.

Chapter IV will contain the analysis and results of the data.

Chapter V will contain the summaries, conclusions, and recommendations from the results of the entire testing program.

CHAPTER II

REVIEW OF LITERATURE

I. RELATED LITERATURE

"Thousands of people assemble each Saturday in the fall to sit in the stands and watch while less than 3% of all the male students enrolled in colleges and high schools battle it out on the playing field, and this three per cent dominate the facilities, teachers, and money in many schools." (16:17)

Such activity would be fine if it inspired more young men in the crowd to get out and play a game of touch football after the game was over. But, by and large, the game has exactly the opposite effect.

This lack of adequate physical education training in the schools has clearly affected the fitness of students.

> We should be disturbed that slightly more than a million out of six million young men examined for military service were found to be unfit.
>
> We should be disturbed that carefully conducted tests indicate that children and young people in Austria, Italy, Switzerland, Denmark, England, and Japan are physically superior to comparable groups in our country.
>
> We should be disturbed that tests administered to freshmen entering various colleges and universities point to a decline in recent years in some aspects of youth fitness.

> We should be disturbed that only about 28% of our schools have adequate physical education and health education. (17:12)

Fitness applies to girls as well as boys; most people immediately think in terms of the male and overlook the girls. Since approximately half the population are women, their needs for exercise and physical fitness are just as real as those of the men.

It is incredible, but a great number of American girls don't have sufficient strength to shoot a basketball or hold and swing a tennis racket.

It is recommended by the President's Council on Physical Fitness that:

> all students spend at least 15 minutes per day participating in sustained conditioning exercises and developmental activities designed to build vigor, strength, flexibility, endurance, and balance. In the remaining available time, a variety of activities should be provided. All physical education activities should be analyzed for their contributions to physical fitness. Special emphasis should be placed on the improvement of the individual child. (33:8)

> While elaborate facilities are not necessary to conduct programs which produce developmental outcomes, it should be recognized that achievement is directly related to standards governing the administration of the program. Good physical education programs produce good results. (33:10)

This fact was proved conclusively in a five-year study covering 2,648 high schools in 25 states. Pupil achievement in course objectives was directly proportional to the quality of the program. (5:47)

> Never in history has the United States been represented by a more gifted group of athletes in national and international competition. Yet we must not allow our pride in these few men to obscure the fact that over the past decades, the level of physical fitness of much of our citizenry has been far below any reasonable national standard. (23:163)

As a result of President Kennedy's program, some school superintendents were called by their local newspapers regarding what their school was doing to support this program and said, "Well, we've already allocated 40 minutes of the school day for this. We're for the President's program. We're going to support it, but we're already doing more than he asked." (26:34)

This simply is not the case. This writer knows of many schools that do not identify the underdeveloped child and fail to have 15 minutes of vigorous activity daily. The fact that they are assigned to class for 40 minutes does not prove that even 10 minutes of activity takes place. One of the big problems physical educators face today is that many instructors operate on the theory that a physical education period is one solely for recreation and play. As a result, the year-round program consists mainly of games. In the fall they play touch football; in the winter it is basketball; in the spring, softball. The quicker this type of situation is eliminated the quicker physical education will build a better name for itself in the education field.

In a recent interview with Dr. James Hoffner, Bremerton Superintendent of Schools, this writer asked several questions pertaining

to the type of over-all elementary physical education program in the Bremerton Elementary Schools. These were Dr. Hoffner's comments:

> In regard to an over-all elementary physical education program, the district has no formal structured program. The only programs being used are the motor-perceptual guide, prepared by administrators within the district, and this writer's program.

The writer asked of Dr. Hoffner, "What can we do to improve this program?" Dr. Hoffner replied:

> Physical fitness tests should be administered at least twice annually to our youngsters.

In discussing the various elementary physical fitness tests available Dr. Hoffner came to the conclusion the Washington State Elementary Physical Fitness Test, 1966, would be the most suitable. Kirchner stated that the above test is the easiest to administer in a relatively short period of time and with a maximum of ease. (25:1)

Dr. Hoffner stated:

> The Washington State Elementary School Physical Fitness Test should be administered at least twice annually. A record should be kept of the progress made from year to year. The district would like to have an itinerant teacher in this field, but at this time cannot afford the price of additional personnel.

When asked, "Are the schools stressing the over-all components of physical education which are: (1) physical fitness, (2) athletic skills, (3) rhythmic activities, and (4) apparatus?"Dr. Hoffner commented:

> The schools are not stressing the over-all components of physical education. The students are missing many of the steppingstones necessary for an adequate program. (19)

In a recent interview with Mr. Noel Flowers, Elementary Curriculum Consultant for the Bremerton Public Schools, this writer asked, "What kind of over-all elementary physical education program do we have in the Bremerton schools?" Mr. Flowers stated:

> There is no district program for elementary physical education. The program that exists varies from building to building and is dependent upon the individual teachers and principals and their knowledge and willingness to develop a program.

When this writer asked, "What can we do to improve this program?" Mr. Flowers stated:

> There is a definite need for an integrated program. I suggest that special emphasis be placed on in-service training for the elementary teachers. There is a need for teachers in the various buildings, through the help of the Health and Physical Education Council representative in each building, to propose ideas to improve the present physical education program.
>
> One of the best possible ways to improve the present program would involve the passing of a special school levy, stressing the need of physical education consultants. (18)

In a recent communication with Mr. Jim Adamson, Director of Physical Education and Athletics for the Moses Lake School District, concerning the type of program operating in their elementary schools, he had the following comments:

> Our program is one of the self-contained classroom. My role is to help teachers, especially in introducing new units, etc. I send out a suggested three-week lesson plan. My guess is that about 50% use at least a part of the suggestions, 25% do a pretty good job without help, and 25% do little, if anything. In regard to Physical Fitness, we have used the WAHPER Test locally in the fall and spring for several years.

> Our program, hopefully, stresses 5-8 minutes on fitness, some time for skills, and some for game-type activity each period with units of tumbling, trampoline, etc., included during the year. (2)

Efforts to improve physical fitness are underway in some schools which use a graded program built around body conditioning, calisthenics and gymnastics. La Sierra High School in Carmichael, California, is an example of this program. This school shows how America can be physically fit. The main objectives to the exercise program are to develop strength, endurance, power, agility, and balance.

Kirchner states:

> All teachers of physical education are confronted with a multiple purpose of providing vigorous physical activities, of teaching motor skills, and of providing experiences that will foster intellectual and social development. An analysis of the areas of contribution of physical fitness inherent in each respective activity shows that there is no single activity that can accomplish this task. Furthermore, no single activity can accomplish one or all of the objectives of a well-rounded physical education program. (25:28)

Weiss presents the notice that:

> It is more important to develop the habit of being physically active than to develop high levels of physical fitness. It is quite possible the overemphasis on physical fitness in the school can lead to less interest in physical activity later in life. Rather than place major emphasis on high levels of physical fitness, it is suggested that we raise fitness to moderate levels. Fitness at higher than moderate levels requires more time than can be spared from our important objectives of the physical education program (34:62)

To start a remedial program, there is a need to overcome many schools' use of sports facilities only for varsity teams. In others "the need is to reduce the class size, maximum 35." (33:11) In some schools there may be 36 to 100 students in one physical education class with one teacher in charge, sometimes with the help of a teacher who happens to have a planning period at the same time and is assigned to help. Other schools may need more frequent and longer physical education periods.

Many elementary school youngsters are not receiving enough allotted time for physical education. In 1919, specific requirements for elementary schools were established by the following statute:

> L. '19, p. 205, sec. 1. Physical education for common schools. After the first day of September, 1919, during periods averaging at least 20 minutes in each school day, every pupil attending the first eight grades of the public schools of the State of Washington shall receive as part of the required instruction therein such courses in physical education as shall be prescribed by the State Board of Education. Provided that individual pupils or students may be excused on account of physical disability or religious belief. (7:6)

The President's Council on Youth Fitness recommends for grades 1 - 6 one period per day, five days each week, minimum 30 minutes, exclusive of recess and time spent in dressing and showering. (33:11)

The Royal Canadian Air Force 5BX Exercise Plans for Physical Fitness is based upon a daily progressive 11-minute exercise plan. Once you have attained your recommended level of physical capacity,

if you are able to reach this level, only three periods of exercise per week will maintain this level of physical capacity. (29:66)

Adamson found that an after-school program of three ten-minute sessions per week devoted to strength building activities resulted in significant gains in strength within a period of one month. (1:22-25)

A recent study by Taddonio compared the physical fitness of two fifth grade self-contained classes--one with no physical education curriculum and the other with a progressively graded curriculum of fifteen-minute daily periods of calisthenics. This program was daily for four months and the students were measured on pre- and post-tests by the AAHPER Youth Fitness Test.

> Examination of post-experimental data for both the boys' groups and the girls' groups indicate that fifteen-minute daily periods of calisthenics in the intensity cited had little or no effect upon the physical fitness of fifth grade boys and girls. (32:278)

A study by Huntinger compared two groups of third grade children, one group of which used the first ten minutes of each physical education period, five days per week, for special exercises utilizing the horizontal ladder plus push-ups. The gains made by the experimental group were significantly superior to the control group for push-ups, chinning, and for pushing and pulling strength. No significant difference was observed for grip strength. (22:159-162)

An experiment by Fabricius contrasted the physical fitness development of fourth grade boys and girls who participated in a

thirty-minute, four-day-a-week elementary school physical education curriculum with a similar curriculum with the addition of calisthenics. After twenty-four weeks, both groups improved significantly in physical fitness with the experimental group improving significantly more than the control group. (15:135-140)

A study by Hunsicker and Reiff used the AAHPER Youth Fitness Test as the basis of comparison. The study investigated the changes in physical fitness levels between 1958 and 1965 of a random sampling of grades 5 - 12.

Hunsicker stated in his summary that the physical fitness level of public school children, grades 5 - 12, in 1965, was above that in 1958. (21:25)

> Today, a boy of 12 can throw a softball 10 feet farther, is better at sit-ups, the broad jump, and the 50-yard dash than his counterpart of 1958. Girls are also more physically fit. These were some of the conclusions of a University of Michigan study from 1958-1965. (20:2)

The report stated the increasing emphasis on physical education in elementary schools as reason for the improvement.

II. REVIEW OF MEASUREMENT IN PHYSICAL EDUCATION

Measurement in physical education can be traced back in time to Ancient Egyptian, Indian, Greek, and Roman sculptors in centuries B. C. Since that time when body proportion (anthropometry) was studied, the major emphasis in physical education has changed to the

development of greater importance upon physical ability.

> Tests in physical education have been used to rate pupils and to measure their progress for many years--at least as early as 1861 in the United States, when Hitchcock of Amherst reported studies based upon certain anthropometric measurements. Since then, after passing through several distinct but somewhat overlapping periods measurement has been used increasingly in this country. (9:13)

> Anthropometry, which dates back to the beginning of recorded history is the oldest type of body measurement used in education or in life. Over periods of time, concepts of ideal body proportions varied. For example, as the arts of civilization became more gentle, grace more than ruggedness appealed to the Greeks; and the ideal men became slender, graceful, and skillful.

> In the United States, anthropometric measurement was the first type of testing used in physical education. In 1861, Hitchcock, a pioneer in anthropometric devices, did a careful and extensive study of measurement of students at Amherst. Sargent did a similar study of American college students. (9:6)

Development of Strength Tests

> The shift of emphasis, about 1880, from symmetry and size to the measurement of the actual work of an individual was no doubt hastened by the invention of the spirometer and the dynamometer. (6:7)

> Dudley A. Sargent contended the capacity, and not size of muscles alone, should be given value in judging an individual's power and working capacity. For many years this idea remained dominant in physical education; then for a time it was forgotten; but now again it is being considered fundamental in physical education programs. (9:7)

Cardiovascular Efficiency

> With the invention of the ergograph in 1884 by Mosso of Italy, physiologists were enabled to study the nutritive functions of the body. As a result of these studies, the attention of physical educators turned from strength testing to methods of determining

> the cardiovascular efficiency of the body. E. C. Schneider designed tests to use in aviation during World War I to determine fatigue and physical condition. (9:8)

The fundamental reason why physiologists prefer circulatory-respiratory tests is pointed out by Schneider:

> Physiology then showed that physical exertion overtaxed the circulatory mechanism long before it exhausts the skeletal musculature--hence, strength tests do not permit us to draw satisfactory conclusions regarding the efficiency of the entire body--the fitness that the world at large is interested in is that of being in condition to do the day's job and to enjoy life to a ripe old age--the best measures of fitness are in normal load, crest-load and over-load. With a normal-load the oxygen account balances; with the crest-load it still balances, but the adaptive mechanisms, the breathing, the circulation, the blood and the unloading of oxygen are all working at top-notch capacity and are unable to further increase the delivery of oxygen; and with an over-load the oxygen account does not balance; it is overdrawn. An overdraft can be made good during a night of sleep, but if the sleep is inadequate and the loss is only partly made up and this goes on day after day, the resources of the body are gradually exhausted and the body develops what has been called "Slateness." (31:405)

Motor Ability Tests

> During the early years of this century, strength testing was not considered to be a good test of endurance. As a result, strength testing fell into disrepute. Further, the idea was developed that men became muscle bound by strength test practices--that these tests developed the "draft-horse" type of man. (6:9)

> Tests were then devised which measured speed and endurance, with strength as a minor factor. These tests utilized the elements of running, jumping, vaulting, climbing, and the like, arranged in batteries which were purported to measure "general athletic ability." (9:7)

Meyland of Columbia was the first to develop a comprehensive test utilizing the elements of running, jumping, vaulting, climbing, and the like.

> From 1913 on, a great wave of testing in physical education gradually swept the country. In 1914, Richards of Newark, N. J., worked out his Physical Education Efficiency Tests for Grade Schools. The Decathlon Test in California has done much to stimulate the testing of elementary school boys and girls. (6:11)

> The scientific construction of tests in the field of physical education is still so relatively recent that a willingness to use existing tests and to analyze them critically is essential to the growth of this movement and of the profession itself. (9:26)

III. THE WASHINGTON STATE ELEMENTARY SCHOOL PHYSICAL FITNESS TEST

In 1966, Dr. Glenn Kirchner revised the 1958 test battery which could be used to measure physical fitness of boys and girls of the elementary school age. The test was revised in order to make the norms current and applicable to today's elementary school pupils. The reason for developing such a test was twofold. First, there was a need for a valid and reliable test battery that would measure strength, endurance, power, and speed among children of elementary school age. Second, it was necessary to establish new norms for boys and girls six to twelve years of age.

In selecting the individual elements composing the battery, Kirchner chose twenty-one test variables: standing broad jump,

curl-up, chest raising, treadmill, four-count burpee, five-second run, bench push-up, sit-up, squat jump, bar hold--arms flexed, pull-up, right leg dig, elbow flexion, elbow extension, trunk flexion, 550-yard run-or-walk, 30-yard dash, and jump reach.

The final selection of each item in the battery was determined after twenty potential test items were tested. Only seventeen of these items were within the capabilities of elementary boys. Twelve items of the seventeen were retained since they had a coefficient of reliability and objectivity of .75 and above.

In the final phase of the construction of the test battery, the Wherry-Doolittle test selection method was used to determine the variables for the Washington State Elementary Physical Education battery which correlated .8723 with the composite external criterion; it also "correlated .811 with the AAHPER Youth Fitness Test." (24:647) Included in the final selection was the five-second run, standing broad-jump, curl-up, and squat jump. The bench push-up was added to the final selection in order to have a measurement of the strength and endurance of the arm and shoulder girdle muscles. The thirty-yard dash was substituted for the five-second run as a measure of speed. This was necessary because of the difficulty many elementary teachers found in the administration of the five-second run. Therefore, the final test battery was composed of the standing broad-jump, thirty-yard dash, bench push-up, curl-up, and squat jump. (30:12-14)

IV. APPRAISING THE ELDER PHYSICAL (MOTOR) FITNESS TEST

The problem in this study is to develop a physical (motor) fitness test which will measure individual status and progress with regard to the physical fitness objective of physical education.

The first objective is to determine the basic components of physical (motor) fitness. After authoritative opinions and factor analysis studies, the following eight factors were produced: (1) strength, (2) endurance, (3) power, (4) agility, (5) flexibility, (6) speed, (7) balance, and (8) body size and age.

> For this study, physical (motor) fitness is defined as a measure of the total personality in action with emphasis on the basic factors in physical fitness strength, endurance, power, agility, flexibility, speed and balance and the individual's status therein in comparison with norms for comparable individuals in respect to age, height, and weight. (13:1)

In the selection of tests to measure the eight components of physical (motor) fitness, five criteria applied: validity, reliability and objectivity, administrative feasibility, suitability and coverage. On this basis, a fourteen-item composite score criterion was determined.

Now it was necessary to select a practical, short battery of tests to measure the fourteen-item composite score criterion. The Wherry-Doolittle test selection method was utilized as a means of selecting the minimum number of tests with high validity. The following five tests were selected: (1) Floor Push-Ups, (2) Standing Broad

Jumps, (3) Trunk Flexion Forward, (4) Cozen's Dodge Run, (5) Squat Thrusts (20 seconds). These components accounted for 82.35 percent of all that is measured by the fourteen-item criterion.

For convenience, this five-item battery will hereafter be referred to as the P (M) F Test.

In determining the validity of the P (M) F Test, three criteria were selected as a measure of physical fitness: (1) Critical ratios, (2) Roger's Strength Index, and (3) Rogers' Physical Fitness Index. On the basis of comparisons it was proven that the three tests produce similar results.

The California Classification System devised by Cozens, Trieb, and Neilson was selected for use as the classification system because of its simplicity and it divided the subjects into six groups which are significantly different in terms of their means of each of the five tests comprising the P (M) F Test.

In construction of the rating scales, the P (M) F Test was administered to a sampling of boys. These data were compiled to obtain separate distribution of scores for each test and each classification group (A, B, C, D, E, and F).

With the completion of the construction of the rating scales of each class and test, the combined scores of the sampling who finished all five tests were changed to standard scores and totaled to give the P (M) F Test score for each subject. These scores were used in order

to make a rating scale to evaluate the total P (M) F Test score as well as those of the separate tests.

An individual composite, three-year cumulative score card will be maintained. These cards will designate the individual's proficiency level on each test component as one of the following: superior, good, average, fair, and low performance. In recording and interpreting scores it was suggested this test be taken nine times, three times each year. As a simple means of differentiating between years, each year should be circled with a different color. (13:1-9)

CHAPTER III

PROCEDURES OF INVESTIGATION

I. SECURING THE DATA

The method used to secure the necessary data for a thorough study in comparing the effects of the elementary physical education programs on physical fitness was to select elementary school physical fitness tests that were reliable and valid. Each test must be simple and readily adaptable to varying conditions in individual schools. Such factors as class size, inexpensive equipment, age of children, and student's interest must be considered. Finally, each test item must be easy to administer, inexpensive, and reasonably free of accidents or physical harm. The Washington State Physical Fitness Test and the Elder Physical (Motor) Fitness Test were selected as the main testing instruments in this study. In addition to administering the Elder Test in its entirety, this writer chose to use the Elder Physical Motor Fitness Test as a means to compare two components of the Washington State Physical Fitness Test. The two components used for comparison are the Dodge Run in the Elder Test compared to the 30-yard Dash in the Washington State Physical Fitness Test. This comparison was made in order to parallel speed and agility

in the Elder Test with only speed in the Washington Physical Fitness Test. The second component in the comparison is the Regular Floor Push-Up in the Elder Test compared to the Bench Push-Up in the Washington State Test. Both types of Push-Ups measure strength and endurance, but they are administered in different positions.

II. ORGANIZATION OF THE EXPERIMENT

Control and Experimental Group. The control group will have the regular physical education program offered consisting of minimum calisthenics, teaching skills and games. The other group in the study will be an experimental group where the youngsters will receive a specialized physical education program designed to promote better physical fitness, teaching skills and games.

Specialized physical education program. The basic objective of the specialized physical education part of the program is to improve the classes' performance on the physical fitness tests. This specialized program is a supplement to the regular physical education program. This writer chose to make a list of exercises that would improve the classes' level of performance on the May test. The largest majority of these exercises were chosen from the Physical Fitness Test Manual, 1966.

During the last two weeks of September, 1968, the Washington State Elementary School Physical Fitness Test, 1966, and the Elder

Physical (Motor) Fitness Test were administered to the fifth grade students at Naval Avenue Elementary School. After the scores had been recorded on individual score sheets, an analysis of the experimental group could be made. The diagrammatic illustration on page 26 (Table I) shows the percentage of scores which were below the average on the Washington State Elementary Physical Fitness Test. On the basis of the class score sheet, this writer could determine what areas of emphasis should be stressed. A class score sheet indicating the results of the post-test experimental group appears in the summary of the thesis.

In determining the areas of need, this writer chose to put greatest emphasis on the below-average scores. By examining the class score sheet, it was determined that areas of strength and speed for boys and girls, in addition to power for boys, were activities below average. In addition, the writer felt it was necessary to increase the over-all physical fitness score of the test items whether they be below or above the average.

> A student who has reached the mark of above average for each part of the test should not stop working or he'll get soft again. The exercise period is a "must"! That's the way to reach and hold on to a good score. (3:41)

At this point, the writer was hopeful that the proficiency level of the students would show marked improvement of all items following the administering of the May tests.

TABLE I

CLASS SCORE SHEET

WASHINGTON STATE ELEMENTARY PHYSICAL FITNESS TEST, 1966

Pre-Test Experimental Group

	POWER	STRENGTH & ENDURANCE			SPEED	TOTAL
	Standing Broad Jump	Bench Push-Ups	Curl-Ups	Squat Jump	30-yd. Dash	Physical Fitness
BOYS	85% below ave.	64% below ave.	36% below ave.	36% below ave.	100% below ave.	64% below ave.
GIRLS	25% below ave.	50% below ave.	42% below ave.	42% below ave.	83% below ave.	48% below ave.

Conditioning program. For the conditioning program this writer chose to use circuit training. In this program the class was divided into eight small groups. Two different exercise items were printed on eight large 12" x 18" tagboard posters which were mounted on the gymnasium wall. The posters were arranged in such a manner that the gymnasium was equally divided into eight exercise stations. The stations varied from one strenuous activity to a resting activity so the child would not have several hard activities followed by easy ones. Once the children were at their stations, they remained silent and quickly looked at the circuit activity. There were two activities on each poster. The activity at the top of each poster was part of Circuit number 1. The bottom activity on each poster was called Circuit number 2. The child had to listen carefully so that he would know what circuit he was concerned with. Changing of circuit numbers kept the students' interest high.

On the sound of the whistle, the children individually began their activity. The number of seconds spent on each activity depended upon the classes' current level of physical fitness. When the class was showing less physical fatigue the second allotment was increased. "Boys between the ages of 7 and 13 can develop remarkable endurance and rebound from fatigue with amazing ease." (11:70) It was found that approximately seven seconds changing time between stations produced the best results. During the seven seconds station change

the class rotated in a clockwise manner assuming their positions for the next activity. The whistle signaled the beginning and termination of an activity.

Exercises used in the conditioning program. The following exercises are designed to improve the over-all performance scores on the Washington State Elementary Physical Fitness Test and the Elder Physical Motor Fitness Test:

Exercises to increase coordination which help in bending and stretching the muscles and joints are the toe-touch, windmill, trunk flexion, arm circles, and jumping-jacks.

Exercises for strength are bent-arm push-ups, push-ups, seal walk, coffee grinder, sit-up and twist, rocker, head raiser, V-sit, and side arch.

Exercises to promote endurance are bent knee hop, squat thrusts, bear dance, running in place, and walk-run.

Exercises to increase speed are bicycle, rope jumping (two foot and one foot basic), quick starts, and fifty-yard dash.

Some of the exercises mentioned above may be helpful in furthering physical fitness in other areas.

III. INSTRUMENTS OF MEASUREMENT

Instructions for Administering the Washington State Elementary School Physical Fitness Test (1966)

TEST No. 1

STANDING BROAD JUMP

The purpose of this test is to measure power. The pupil assumes a squat position and jumps as far as possible from take-off line to the nearest heel position. This distance is measured to the nearest inch and recorded.

TEST No. 2

BENCH PUSH-UPS

The purpose of this test is to measure the strength and endurance of the forearm, the arm, and the shoulder girdle muscles. The pupil assumes a front leaning position with legs together grasping the nearest corners of a chair. It is necessary that the body form a straight line and be at right angles with the arms. The pupil's score is based upon the number of push-ups performed.

TEST No. 3

CURL-UPS

The purpose of this test is to measure the strength and endurance of the trunk flexor muscles. The pupil assumes a back lying

position with hands behind the neck. He keeps both knees close to his body, and his feet flat on the floor. The feet should be held firmly. The student rolls up to a sitting position. The score is the number of times the pupil sits up.

TEST No. 4

SQUAT JUMP

The purpose of this test is to measure the strength and endurance of the trunk and leg extensor muscles. The pupil is in a squat position with knees bent and arms loosely at his sides. The fingers are resting on the mat. The pupil jumps up approximately four inches above the mat, keeping his arms at his side. The number of jumps is recorded.

TEST No. 5

THIRTY-YARD DASH

The purpose of this test is to measure speed. The pupil takes a sprinter's position behind the starting line. At the signal "go" the pupil runs as fast as possible across the finish line. The score is recorded to the nearest tenth of a second.

Instructions for Administering the Elder Physical Motor Fitness Test

The following tests have been selected as a result of thorough and carefully executed research. Their individual and collective reliability and validity are established. Care should be given to insure their administration according to the rules set forth herein. (14:150)

Test Procedures

TEST 1

FLOOR PUSH-UPS

The subject assumes a leaning rest position with hands shoulder-width apart, fingers forward, weight resting on hands and toes and body straight. The back of the body from ankles to head must remain straight throughout the exercise.

From above position, subject bends his arms, keeping body straight and elbows close to sides, until his chest only touches the 1" x 3" x 5" block of wood placed on the floor underneath the center of his chest. Immediately upon touching the block of wood the subject returns to the starting position. No resting or undue shifting of hands and feet shall be permitted. Examiner shall audibly count the subject's correct push-ups. (14:150)

TEST 2

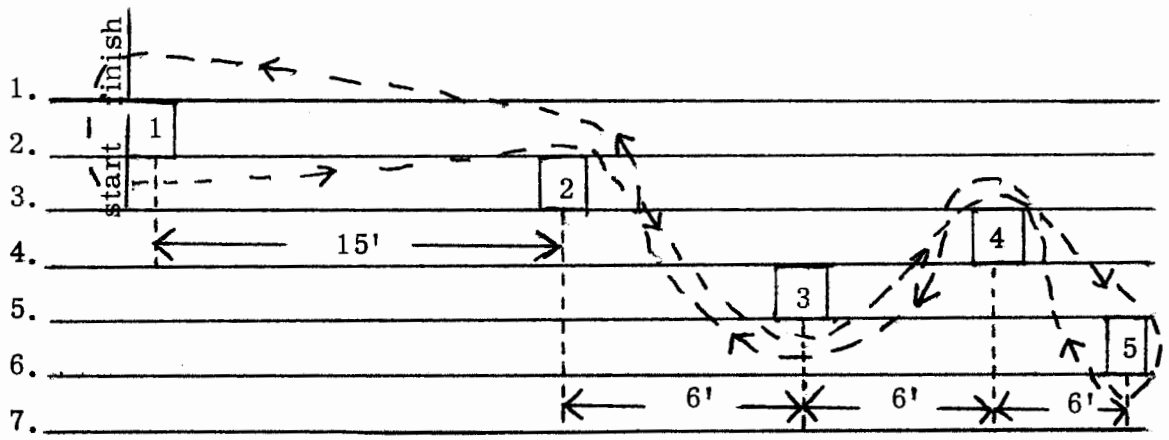
STANDING BROAD JUMP

This test is administered in the same manner as the Washington State Elementary School Physical Fitness Test.

TEST 3

DODGE RUN

Subject crouches behind the starting line (see diagram). On "Go" signal, contestant begins two complete trips along path indicated by dotted lines and arrows. The subject's score is the best of two trials recorded to the nearest tenths of a second.



-- two folding type chairs sitting back to back.

Measured from center to center of chair seats, the distance between 1 and 2 is 15 feet and all others, 6 feet. (14:152-53)

Nos. 1 to 7 - three foot lanes.

TEST 4

SQUAT THRUSTS

Subject stands "at attention." On "Go" signal the following four-part exercise is performed as rapidly as possible for 20 seconds. (1) Bend knees and hips and place hands on the floor within eight inches of the feet. This is called squat rest position. (2) Extend legs backward until body is straight from shoulders to heels. (3) Return to squat-rest position. (4) Stand up straight. Subject's score consists of four points for each complete exercise and one point for each quarter thereof completed in twenty seconds. Better of two trials shall be recorded.(14:154-55)

TEST 5

TRUNK FLEXION

Subject sits lengthwise on table with hands clasped at back of neck; legs are straight and spread, approximately 18 inches at ankles, to allow room for head to pass between knees during maximum forward trunk flexion. Keeping knees straight, subject slowly bends forward and downward. The minimum is measured between the subject's forehead and table top. The subject's score is the best of three trials recorded in inches and tenths. (14:155-56)

IV. HOW THE TESTS WERE ADMINISTERED

Kirchner suggested five factors that would be helpful in administration of the tests. In applying these factors, the tests would be given in a shorter period of time and with as little confusion as possible. (25:1)

Health Status

The students were physically able to take part in the physical education program. Health records of each student were checked. The students were found in good health. Students who recently returned to school because of sickness were administered the test the following week.

Pupil Orientation

The test items were thoroughly explained before the testing began. The pupils had a brief practice session before each test item was administered. At this time, the pupil performed one practice repetition for the teacher in order to insure the correct enactment of the test item.

Equipment

The following equipment was obtained before the tests were administered: stop watch, tape measure, four mats and chairs, masking tape, 1" x 3" x 5" block of wood, ten folding chairs, long

table, sliding wooden breath caliper, yardstick, line chalk, and individual score sheets. The score sheets were kept by the teacher.

Student Helper

For the purpose of saving time, two student helpers were used to help record scores on all the test items with the exception of the squat jump and trunk flexion. On these items, the boys recorded the scores for the girls, and vice versa. When dealing with the other items, a boy and a girl were selected to report the test scores to the administrator of the test. The scores were recorded in this manner with the intention of insuring a higher degree of accuracy as well as honesty by those participating in the test.

Space Requirements

The gymnasium in the elementary school in which the tests were administered was adequate for the administration of the tests with one exception. The thirty-yard dash was administered to the pupils on the playfield in order to provide the necessary distance for the test.

COLLECTION OF DATA

During the third week of September, 1968, the pupils were given the pre-tests at Naval Avenue Elementary School Gymnasium, Bremerton, Washington. At this time the pupils of the experimental

group were informed as to the purpose of the test as well as their function as participants. This writer explained to the control group that the tests in which they were participating were being conducted in order to measure their over-all level of physical fitness. Elementary students benefit greatly from a full battery of physical fitness tests, but the meaning of the tests and illustrations of them must always be given.

This writer gave an explanation to the experimental group. The explanation informed them they would be a part of a physical fitness program as part of their over-all physical education class. In addition, the experimental group was instructed that the first ten minutes of each physical education period would be spent on significant activities to further develop their physical fitness level. The physical education periods were scheduled for three times per week, being held on Monday, Wednesday, and Friday. These periods were held for approximately thirty minutes per scheduled meeting.

During the year, those pupils who left the district or who failed to complete the tests because of illness or who became physically disabled were consequently dropped from the physical fitness program.

The program continued for the duration of the year. The post-tests were administered the third week of May, 1969. At this time, the data were compiled for further study and analysis. These data were recorded through the testing program on individual mimeographed 5" x 8" score cards. (See appendix)

CHAPTER IV

RESULTS AND ANALYSIS OF DATA

Analysis of data will be discussed in this order: (1) Washington State Physical Fitness Test, Girls, (2) Washington State Physical Fitness Test, Boys, (3) Elder Physical Motor Fitness Test (Boys).

I. Washington State Elementary Physical Fitness Test, Girls

Results of pre-test. For the standing broad jump, the mean of the girls' control group was 40.92 inches; the mean of the experimental group was 51.25. The standard deviation of the two groups were 13.36 and 6.85 respectively. When the t was computed, a t of 2.35 was obtained. A t of 2.069 is needed to be significant at the .05 level of confidence. Therefore, there is a significant difference between the pre-tests of the two groups in favor of the experimental group at the .05 level.

Table II explains these computations.

TABLE II

COMPARISON OF MEAN, STANDARD DEVIATION, AND "t" OF THE CONTROL AND EXPERIMENTAL GROUPS

Pre-Test for Standing Broad Jump

	Mean	Standard Deviation	t	Level of Significance .01	.05
Control	40.92	13.36			
Experimental	51.25	6.85	2.35		Yes

Results of post-test. When the standing broad jump was administered in the post-test, the mean of the control group was 50.69 and of the experimental group 60.50. The standard deviations were 11.36 and 4.46. The "t" obtained between the two post-tests was 2.79 which again is significant at the .05 level of confidence. This is shown in Table III.

TABLE III

COMPARISON OF MEAN, STANDARD DEVIATION, AND "t" OF THE CONTROL AND EXPERIMENTAL GROUPS

Post-Test for Standing Broad Jump

	Mean	Standard Deviation	t	Level of Significance .01	.05
Control	50.69	11.36			
Experimental	60.50	4.46	2.79		Yes

Results of pre- and post-test control group. In determining the "t" between the pre- and post-test of the control group, the mean of the pre-test was 40.92 and of the post-test 50.69, or an increase of 9.67. The standard deviations were 13.36 and 11.36. The "t" obtained between the pre- and post-tests for the control group was 1.93 which is not a significant gain. This is shown in Table IV.

TABLE IV

MEAN, STANDARD DEVIATION, AND "t" OF THE CONTROL GROUP

Pre- and Post-Tests for Standing Broad Jump

	Mean	Increase	Standard Deviation	t	Level of Significance .01	.05
Pre-	40.92		13.36			
Post-	50.69	9.67	11.36	1.93		No

In determining the "t" of the pre- and post-test for the experimental group, the means were 51.25 for the pre-test and 60.50 for the post-test, which is an increase of 9.25, with a standard deviation of 6.85 and 4.46. The "t" obtained was 3.70 which is significant at the .01 level, a 2.819 being needed for significance. This is shown in Table V.

TABLE V

MEAN, STANDARD DEVIATION, AND "t"
OF THE EXPERIMENTAL GROUP

Pre- and Post-Tests for Standing Broad Jump

	Mean	Increase	Standard Deviation	t	Level of Significance .01	.05
Pre-	51.25		6.85			
Post-	60.50	9.25	4.46	3.70		Yes

The experimental group was significant in performance in the pre-test and post-test. The control group did not make a significant change between the pre- and post-test, while the experimental group did make a significant increase.

Results of pre-test. For the bench push-ups, the mean of the girls' control group was 45.46 inches; the mean of the experimental group was 45.42 inches. The standard deviation of the two groups were 9.40 and 1.94 respectively. When the "t" was computed, a "t" of .01 was obtained. A "t" of 2.069 is needed to be significant, so this is not a significant gain. This is shown in Table VI.

TABLE VI

MEAN, STANDARD DEVIATION, AND "t"
OF THE CONTROL AND EXPERIMENTAL GROUPS

Pre-Test for Bench Push-Ups

	Mean	Standard Deviation	t	Level of Significance .01	.05
Control	45.46	9.40			
Experimental	45.42	1.94	.01		No

Results of post-test. When the bench push-ups were administered in the post-test, the mean of the control group was 44.76 and of the experimental group 52.67. The standard deviations were 6.10 and 6.78 respectively. The "t" obtained between the two post-tests was 1.33, which is not a significant gain at the .05 level of confidence. This is shown in Table VII.

TABLE VII

MEAN, STANDARD DEVIATION, AND "t"
OF THE CONTROL AND EXPERIMENTAL GROUPS

Post-Test for Bench Push-Ups

	Mean	Standard Deviation	t	Level of Significance .01	.05
Control	44.76	6.10			
Experimental	52.67	6.78	1.33		No

Results of pre- and post-test control group. In determining the "t" between the pre- and post-test of the control group, the mean of the pre-test was 45.46 and of the post-test 44.76, or a decrease of .70. The standard deviations were 9.40 and 6.10. The "t" obtained between the pre- and post-tests for the control group was .10, which is not a significant gain. This is shown in Table VIII.

TABLE VIII

MEAN, STANDARD DEVIATION, AND "t" OF THE CONTROL GROUP

Pre- and Post-Tests for Bench Push-Ups

	Mean	Decrease	Standard Deviation	t	Level of Significance .01	.05
Pre-	45.46		9.10			
Post-	44.76	.70	6.10	.10		No

Results of pre- and post-tests experimental group. In determining the "t" of this group, the means were 45.42 for the pre-test and 52.67 for the post-test, or an increase of 7.25, with a standard deviation of 1.94 and 6.78. The "t" obtained was 3.42 which is significant at the .01 level, a 2.819 being needed for significance. This is shown in Table IX.

TABLE IX

MEAN, STANDARD DEVIATION, AND "t"
OF THE EXPERIMENTAL GROUP

Pre- and Post-Tests for Bench Push-Ups

	Mean	Increase	Standard Deviation	t	Level of Significance .01	.05
Pre-	45.42		1.94			
Post-	52.67	7.25	6.78	3.42	Yes	

The control and experimental groups did not achieve a significant gain in the pre-test and the post-test. The control group did not make a significant change between the pre- and post-tests while the experimental group did make a significant increase.

Results of pre-test. For the curl-ups, the mean of the girls' control group was 42.00, and the mean of the experimental group 55.25. The standard deviation of the two groups were 17.55 and 12.96 respectively. When the "t" was computed, a "t" of 1.88 was obtained. A "t" of 2.069 is needed to be significant at the .05 level of confidence. Therefore, there is not a significant difference between the pre-tests of the two groups. Table X explains these computations.

TABLE X

MEAN, STANDARD DEVIATION, AND "t"
OF THE CONTROL AND EXPERIMENTAL GROUPS

Pre-Test for Curl-Ups

	Mean	Standard Deviation	t	Level of Significance .01	.05
Control	42.00	17.55			
Experimental	55.25	12.96	1.88		No

Results of post-test. When the curl-ups were administered in the post-test, the mean of the control group was 46.92 and of the experimental group 62.16. The standard deviations were 9.62 and 8.78. The "t" obtained between the two post-tests was 3.98, which is significant at the .01 level of confidence. This is shown in Table XI.

TABLE XI

MEAN, STANDARD DEVIATION, AND "t"
OF THE CONTROL AND EXPERIMENTAL GROUPS

Post-Test for Curl-Ups

	Mean	Standard Deviation	t	Level of Significance .01	.05
Control	46.92	9.62			
Experimental	62.16	8.78	3.98	Yes	

Results of pre- and post-test control group. In determining the "t" between the pre- and post-test, the mean of the pre-test was 42.00 and of the post-test 46.92, or an increase of 4.92. The standard deviations were 17.55 and 9.62. The "t" obtained between the pre- and post-test for the control group was .76, which is not a significant gain. This is shown on Table XII.

TABLE XII

MEAN, STANDARD DEVIATION, AND "t" OF THE CONTROL GROUP

Pre- and Post-Tests for Curl-Ups

	Mean	Increase	Standard Deviation	t	Level of Significance .01	.05
Pre-	42.00		17.55			
Post-	46.92	4.92	9.62	.76		No

Results of pre- and post-tests of experimental group. In determining the "t" of the pre- and post-tests, the means were 55.25 for the pre-test and 62.16 for the post-test, or an increase of 6.91, with a standard deviation of 12.96 and 8.78. The "t" obtained was 1.47 which is not significant at the .05 level of confidence. Table XIII explains these computations.

TABLE XIII

MEAN, STANDARD DEVIATION, AND "t"
OF THE EXPERIMENTAL GROUP

Pre- and Post-Tests for the Curl-Ups

	Mean	Increase	Standard Deviation	t	Level of Significance .01	.05
Pre-	55.25		12.96			
Post-	62.16	6.91	8.78	1.47		No

There was no significant change between the control and experimental groups in the pre-test. The experimental group was significant in performance in the post-test. The control and experimental did not show a significant change between the pre- and post-test.

Results of pre-test. For the squat jump, the mean of the girls' control group was 48.00, and the mean of the experimental group was 51.42. The standard deviations of the two groups were 8.12 and 9.81 respectively. When the "t" was computed, a "t" of .91 was obtained. A "t" of 2.069 is needed to be significant at the .05 level of confidence. Therefore, there was no significant difference between the pre-tests of the two groups. Table XIV explains these computations.

TABLE XIV

MEAN, STANDARD DEVIATION, AND "t"
OF THE CONTROL AND EXPERIMENTAL GROUPS

Pre-Test for Squat Jump

	Mean	Standard Deviation	t	Level of Significance .01	.05
Control	48.00	8.12			
Experimental	51.42	9.81	.91		No

Results of post-test. When the squat jump was administered, the mean of the control group was 49.15 and of the experimental group 56.33. The standard deviations were 9.74 and 6.77. The "t" obtained between the two post-tests was 2.07. A "t" of 2.069 is needed to be significant at the .05 level of confidence. Therefore, there is a significant difference between the post-tests of the two groups in favor of the experimental group. This is shown in Table XV.

TABLE XV

MEAN, STANDARD DEVIATION, AND "t"
OF THE CONTROL AND EXPERIMENTAL GROUPS

Post-Test for Squat Jump

	Mean	Standard Deviation	t	Level of Significance .01	.05
Control	49.15	9.74			
Experimental	56.33	6.77	2.07		Yes

Results of pre- and post-tests of control group. In determining the "t" between the pre- and post-tests, the mean of the pre-test was 48.00 and of the post-test 49.15, or an increase of 1.15. The standard deviations were 8.12 and 9.74. The "t" obtained between the pre- and post-tests for the control group was .32, which is not a significant gain. This is shown in Table XVI.

TABLE XVI

MEAN, STANDARD DEVIATION, AND "t" OF THE CONTROL GROUP

Pre- and Post-Tests for Squat Jump

	Mean	Increase	Standard Deviation	t	Level of Significance .01	.05
Pre-	48.00		8.12			
Post-	49.15	1.15	9.74	.32		No

Results of pre- and post-tests experimental group. In determining the "t" of the pre- and post-tests for the experimental group, the means were 51.42 for the pre-test and 56.33 for the post-test, or an increase of 4.91, with standard deviations of 9.81 and 6.77. The "t" obtained was 1.37, which is not significant at the .05 level of confidence. This is shown in Table XVII.

TABLE XVII

MEAN, STANDARD DEVIATION, AND "t"
OF THE EXPERIMENTAL GROUP

Pre- and Post Tests for the Squat Jump

	Mean	Increase	Standard Deviation	t	Level of Significance .01	.05
Pre-	51.42		9.81			
Post-	56.33	4.91	6.77	1.37		No

The experimental group was significant in performance in the post-test. The control and experimental groups did not make a significant increase between the pre-test and the pre- and post-test.

Results of pre-test. For the 30-yard dash, the mean of the girls' control group was 41.00, the mean of the experimental group 45.17. The standard deviations of the two groups were 7.46 and 6.02 respectively. When the "t" was computed, a "t" of 1.48 was obtained. A "t" of 2.069 is needed to be significant at the .05 level of confidence. Therefore, there was not a significant gain. Table XVIII explains these computations.

TABLE XVIII

MEAN, STANDARD DEVIATION, AND "t"
OF THE CONTROL AND EXPERIMENTAL GROUPS

Pre-Test for 30-yard Dash

	Mean	Standard Deviation	t	Level of Significance .01	.05
Control	41.00	7.46			
Experimental	45.17	6.02	1.48		No

Results of post-test. When the 30-yard dash was administered in the post-test, the mean of the control group was 41.92 and of the experimental group 53.92. The standard deviations were 7.18 and 5.93. The "t" obtained between the two post-tests was 4.40. A "t" of 2.807 is needed to be significant at the .01 level of confidence. Therefore, there is a significant difference between the post-tests of the two groups in favor of the experimental group at the .01 level. Table XIX explains these computations.

TABLE XIX

MEAN, STANDARD DEVIATION, AND "t"
OF THE CONTROL AND EXPERIMENTAL GROUPS

Post-Tests for 30-Yard Dash

	Mean	Standard Deviation	t	Level of Significance .01	.05
Control	41.92	7.18			
Experimental	53.92	5.93	4.40	Yes	

Results of pre- and post-tests control group. In determining the "t" between the pre- and post-test of the control group, the mean of the pre-test was 41.00 and of the post-test 41.92, or an increase of .92. The standard deviations were 7.46 and 7.18. The "t" obtained between the pre- and post-tests for the control group was 1.55, which is not a significant gain. This is shown in Table XX.

TABLE XX

MEAN, STANDARD DEVIATION, AND "t"
OF THE CONTROL GROUP

Pre- and Post-Tests for the 30-Yard Dash

	Mean	Increase	Standard Deviation	t	Level of Significance .01	.05
Pre-	41.00		7.46			
Post-	41.92	.92	7.18	1.55		No

Results of pre- and post-test experimental group. In determining the "t" of the pre- and post-tests, the means were 45.17 for the pre-test and 53.92 for the post-test, or an increase of 8.75. The standard deviations were 6.02 and 5.93. The "t" obtained was 3.46, which is significant at the .01 level, a 2.819 being needed for significance. This is shown in Table XXI.

TABLE XXI

MEAN, STANDARD DEVIATION, AND "t" OF THE EXPERIMENTAL GROUP

Pre- and Post-Tests for the 30-Yard Dash

	Mean	Increase	Standard Deviation	t	Level of Significance .01	.05
Pre-	45.17		6.02			
Post-	53.92	8.75	5.93	3.46	Yes	

The control and experimental groups did not show significant gains in the pre-test. The experimental group was significant in performance in the post-test. The control group did not show a significant change between the pre- and post-test, while the experimental group did make a significant increase.

II. Washington State Elementary Physical Fitness Test, Boys

Results of pre-test. For the standing broad jump the mean for the boys' control group was 44.50; the mean of the experimental group 43.86. The standard deviations of the two groups were 8.39 and 5.82 respectively. When the "t" was computed, a "t" of .20 was obtained. A "t" of 2.074 is needed to be significant at the .05 level of confidence. Therefore, there is no significant gain. Table XXII explains these computations.

TABLE XXII

MEAN, STANDARD DEVIATION, AND "t" OF THE CONTROL AND EXPERIMENTAL GROUPS

Pre-Test for Standing Broad Jump

	Mean	Standard Deviation	t	Level of Significance .01	.05
Control	44.50	8.39			
Experimental	43.86	5.82	.20		No

Results of post-test. When the standing broad jump was administered in the post-test, the mean of the control group was 49.80 and of the experimental group 54.85. The standard deviations were 7.60 and 4.23. The "t" obtained between the two post-tests was 1.81, which is not significant at the .05 level of confidence. This is shown in Table XXIII.

TABLE XXIII

MEAN, STANDARD DEVIATION, AND "t"
OF THE CONTROL AND EXPERIMENTAL GROUPS

Post-Test for Standing Broad Jump

	Mean	Standard Deviation	t	Level of Significance .01	.05
Control	49.80	7.60			
Experimental	54.85	4.23	1.81		No

Results of pre- and post-test control group. In determining the "t" the mean of the pre-test was 44.50 and of the post-test was 49.80, or an increase of 5.30. The standard deviations were 8.39 and 7.60. The "t" obtained between the pre- and post-tests of the control group was 1.41, which is not a significant gain. Table XXIV explains these computations.

TABLE XXIV

MEAN, STANDARD DEVIATION, AND "t"
OF THE CONTROL GROUP

Pre- and Post-Test for the Standing Broad Jump

	Mean	Increase	Standard Deviation	t	Level of Significance .01	.05
Pre-	44.50		8.39			
Post-	49.80	5.30	7.60	1.41		No

Results of pre- and post-test experimental group. In determining the "t" the means were 43.86 for the pre-test and 54.85 for the post-test, or an increase of 11.04. The standard deviations were 5.82 and 4.23. The "t" obtained was 5.51 which is significant at the .01 level. A 2.779 is needed for significance. This is shown in Table XXV.

TABLE XXV

MEAN, STANDARD DEVIATION, AND "t" OF THE EXPERIMENTAL GROUP

Pre- and Post-Test for the Standing Broad Jump

	Mean	Increase	Standard Deviation	t	Level of Significance .01	.05
Pre-	43.86		5.82			
Post-	54.85	11.04	4.23	5.51	Yes	

The control and experimental groups did not make a significant improvement in the pre-test and post-test. The control group did not make a significant change between the pre- and post-test, while the experimental group did make a significant increase.

Results of pre-test. For the bench push-ups, the mean of the control group was 43.40, and the mean of the experimental group 46.50. The standard deviations were 12.90 and 9.85 respectively. When the

"t" was computed, a "t" of .61 was obtained, which is not a significant gain at the .05 level of confidence. See Table XXVI.

TABLE XXVI

MEAN, STANDARD DEVIATION, AND "t" OF THE CONTROL AND EXPERIMENTAL GROUPS

Pre-Test for Bench Push-Up

	Mean	Standard Deviation	t	Level of Significance .01	.05
Control	43.40	12.90			
Experimental	46.50	9.85	.61		No

Results of post-test. When the bench push-up was administered in the post-test, the mean of the control group was 45.60 and of the experimental group 52.86. The standard deviations were 11.13 and 8.76. The "t" obtained between the two post-tests was 1.64, which is not a significant gain at the .05 level of confidence. This is shown on Table XXVII.

TABLE XXVII

MEAN, STANDARD DEVIATION, AND "t"
OF THE CONTROL AND EXPERIMENTAL GROUPS

Post-Test for Bench Push-Up

	Mean	Standard Deviation	t	Level of Significance .01	.05
Control	45.60	11.13			
Experimental	52.86	8.76	1.64		No

Results of pre- and post-test control group. In determining the "t" between the pre- and post-test, the mean of the pre-test was 43.40 and of the post-test was 45.60, or an increase of 2.20. The standard deviations were 12.90 and 11.13. The "t" obtained between the pre- and post-tests for the control group was .39, which is not a significant gain. This is shown in Table XXVIII.

TABLE XXVIII

MEAN, STANDARD DEVIATION, AND "t"
OF THE CONTROL GROUP

Pre- and Post-Test for Bench Push-Up

	Mean	Increase	Standard Deviation	t	Level of Significance .01	.05
Pre-	43.40		12.90			
Post-	45.60	2.20	11.13	.39		No

Results of pre- and post-test experimental group. In determining the "t" the means were 46.50 for the pre-test and 52.86 for the post-test, or an increase of 6.36. The standard deviations were 9.85 and 8.76. The "t" obtained was 1.74, which is not significant at the .05 level, a 2.056 being needed for significance. This is shown in Table XXIX.

TABLE XXIX

MEAN, STANDARD DEVIATION, AND "t" OF THE EXPERIMENTAL GROUP

Pre- and Post-Test for Bench Push-Up

	Mean	Increase	Standard Deviation	t	Level of Significance .01	.05
Pre-	46.50		9.85			
Post-	52.86	6.36	8.76	1.74		No

The control and experimental groups did not show a significant gain in the pre-test and post-test. There was also no significant gain in the control and experimental groups in the pre- and post-tests.

Results of pre-test. For the curl-up the mean of the boys' control group was 46.00, and the mean of the experimental group 53.86. The standard deviations were 8.85 and 12.17 respectively. When the "t" was computed, a "t" of 1.75 was obtained. A "t" of 2.074 is needed to be significant at the .05 level of confidence.

Therefore, there was no significant gain between the pre-tests of the two groups. Table XXX explains these computations.

TABLE XXX

MEAN, STANDARD DEVIATION, AND "t"
OF THE CONTROL AND EXPERIMENTAL GROUPS

Pre-Test for Curl-Up

	Mean	Standard Deviation	t	Level of Significance .01	.05
Control	46.00	8.85			
Experimental	53.86	12.17	1.75		No

Results of post-test. When the curl-up was administered in the post-test, the mean for the control group was 47.90 and of the experimental group 60.07. The standard deviations were 9.60 and 9.50, and the "t" obtained between the two post-tests was 2.94, which is significant. A "t" of 2.819 is needed to be significant at the .01 level of confidence. Therefore, there is a significant difference between the two post-tests. This is shown in Table XXXI.

TABLE XXXI

MEAN, STANDARD DEVIATION, AND "t"
OF THE CONTROL AND EXPERIMENTAL GROUPS

Post-Test for Curl-Ups

	Mean	Standard Deviation	t	Level of Significance .01	.05
Control	47.90	9.60			
Experimental	60.07	9.50	2.94	Yes	

Results of pre- and post-test control group. In determining the "t" between the pre- and post-test, the mean of the control group was 46.00 and of the post-test 47.90, or an increase of 1.90. The standard deviations were 8.85 and 9.60. The "t" obtained between the pre- and post-test for the control group was .44, which is not a significant gain. Table XXXII shows these computations.

TABLE XXXII

MEAN, STANDARD DEVIATION, AND "t"
OF THE CONTROL GROUP

Pre- and Post-Test for the Curl-Up

	Mean	Increase	Standard Deviation	t	Level of Significance .01	.05
Pre-	46.00		8.85			
Post-	47.90	1.90	9.60	.44		No

Results of pre- and post-test experimental group. In determining the "t" the means were 53.86 for the pre-test and 60.07 for the post-test, or an increase of 6.21. The standard deviations were 12.17 and 9.50. The "t" obtained was 1.45, which is not a significant gain. This is shown in Table XXXIII.

TABLE XXXIII

MEAN, STANDARD DEVIATION, AND "t" OF THE EXPERIMENTAL GROUP

Pre- and Post-Tests for the Curl-Up

	Mean	Increase	Standard Deviation	t	Level of Significance .01	.05
Pre-	53.86		12.17			
Post-	60.07	6.21	9.50	1.45		No

The control and experimental groups did not show significant gains in the pre-test. The experimental group showed a significant gain in the post-test. The control and experimental groups did not make a significant change between the pre- and post-tests.

Results of pre-test. For the squat jump, the mean for the boys' control group was 44.70, the mean of the experimental group 55.29. The standard deviations of the two groups were 10.56 and 16.33 respectively. When the "t" was computed, a "t" of 1.85 was obtained which is not a significant gain. Table XXXIV explains these computations.

TABLE XXXIV

MEAN, STANDARD DEVIATION, AND "t"
OF THE CONTROL AND EXPERIMENTAL GROUPS

Pre-Test for Squat Jump

	Mean	Standard Deviation	t	Level of Significance .01	.05
Control	44.70	10.56			
Experimental	55.29	16.33	1.85		No

Results of post-test. When the squat jump was administered in the post-test, the mean for the control group was 44.90 and of the experimental group 59.71. The standard deviations were 6.62 and 12.46. The "t" obtained between the two post-tests was 3.62, which is significant at the .01 level of confidence. This is shown in Table XXXV.

TABLE XXXV

MEAN, STANDARD DEVIATION, AND "t"
OF THE CONTROL AND EXPERIMENTAL GROUPS

Post-Test for Squat Jump

	Mean	Standard Deviation	t	Level of Significance .01	.05
Control	44.90	6.62			
Experimental	59.71	12.46	3.62	Yes	

Results of pre- and post-test control group. In determining the "t" between the pre- and post-test, the mean of the pre-test was 44.70 and of the post-test 44.90, or an increase of .20. The standard deviations were 10.56 and 6.62. The "t" obtained between the pre- and post-tests for the control group was .05, which is not a significant gain. This is shown in Table XXXVI.

TABLE XXXVI

MEAN, STANDARD DEVIATION, AND "t" OF THE CONTROL GROUP

Pre- and Post-Test for Squat Jump

	Mean	Increase	Standard Deviation	t	Level of Significance .01	.05
Pre-	44.70		10.56			
Post-	44.90	.20	6.62	.05		No

Results of pre- and post-test experimental group. In determining the "t" the means were 55.29 for the pre-test and 59.71 for the post-test, or an increase of 4.42. The standard deviation of 16.33 and 12.46. The "t" obtained was .78, which is not a significant gain. This is shown in Table XXXVII.

TABLE XXXVII

MEAN, STANDARD DEVIATION, AND "t"
OF THE EXPERIMENTAL GROUP

Pre- and Post-Test for the Squat Jump

	Mean	Increase	Standard Deviation	t	Level of Significance .01	.05
Pre-	55.29		16.33			
Post-	59.71	4.42	12.46	.78		No

The control and experimental group did not make a significant gain in the pre-test. The experimental group made a significant gain in the post-test. The control and experimental group did not make a significant change in the pre- and post-test.

Results of pre-test. For the 30-yard dash, the mean of the boys' control group was 35.30, and the mean of the experimental group 40.43. The standard deviation of the two groups were 4.22 and 5.55 respectively. A "t" of 2.45 was obtained. A "t" of 2.074 is needed to be significant at the .05 level of confidence. Therefore, there is a significant difference between the pre-tests of the two groups in favor of the experimental group at the .05 level. Table XXXVIII explains these computations.

TABLE XXXVIII

MEAN, STANDARD DEVIATION, AND "t"
OF THE CONTROL AND EXPERIMENTAL GROUPS

Pre-Test for the 30-Yard Dash

	Mean	Standard Deviation	t	Level of Significance .01	.05
Control	35.30	4.22			
Experimental	40.43	5.55	2.45		Yes

Results of post-test. When the 30-yard dash was administered in the post-test, the mean of the control group was 40.20 and of the experimental group 48.50. The standard deviations were 6.29 and 8.61. The "t" obtained between the two post-tests was 2.61, which again is significant at the .05 level of confidence. This is shown in Table XXXIX.

TABLE XXXIX

MEAN, STANDARD DEVIATION, AND "t"
OF THE CONTROL AND EXPERIMENTAL GROUPS

Post-Test for the 30-Yard Dash

	Mean	Standard Deviation	t	Level of Significance .01	.05
Control	40.20	6.29			
Experimental	48.50	8.61	2.61		Yes

Results of the pre- and post-test control group. In determining the "t" the mean of the pre-test was 35.30 and of the post-test 40.20, or an increase of 5.90. The standard deviations were 4.22 and 6.29. The "t" obtained between the pre- and post-tests for the control group was 2.37, which is significant at the .05 level of confidence. This is shown in Table XL.

TABLE XL

MEAN, STANDARD DEVIATION, AND "t" OF THE CONTROL GROUP

Pre- and Post-test for the 30-Yard Dash

	Mean	Increase	Standard Deviation	t	Level of Significance .01	.05
Pre-	35.30		4.42			
Post-	40.20	5.90	6.29	2.37		Yes

Results of pre- and post-test experimental group. In determining the "t" the means were 40.43 for the pre-test and 48.50 for the post-test, or an increase of 8.07. The standard deviations were 5.55 and 8.61. The "t" obtained was 2.85. A "t" of 2.779 is needed to be significant at the .01 level of confidence. Therefore, there is a significant difference between the pre- and post-test in favor of the experimental group. Table XLI explains these computations.

TABLE XLI

MEAN, STANDARD DEVIATION, AND "t" OF THE EXPERIMENTAL GROUP

Pre- and Post-Test for the 30-Yard Dash

	Mean	Increase	Standard Deviation	t	Level of Significance .01	.05
Pre-	40.43		5.55			
Post-	48.50	8.07	8.61	2.85	Yes	

The experimental group was significant in performance in the pre-test and the post-test. The control group was significant in the pre- and post-test at the .05 level of confidence while the experimental group showed an increase at the .01 level of confidence on the pre- and post-test.

III. The Elder Physical Motor Fitness Test, Boys

For the standing broad jump, the mean of the boys' control group was 16.00, and the mean of the experimental group 16.29. The standard deviations of the two groups were 13.76 and 8.29 respectively. When the "t" was computed, a "t" of .05 was obtained. A "t" of 2.074 is needed to be significant at the .05 level of confidence. Therefore, there was no significant difference between the pre-tests of the two groups. Table XLII explains these computations.

TABLE XLII

MEAN, STANDARD DEVIATION, AND "t"
OF THE CONTROL GROUP

Pre-Test for Standing Broad Jump

	Mean	Standard Deviation	t	Level of Significance .01	.05
Control	16.00	13.76			
Experimental	16.29	8.29	.05		No

Results post-test. When the standing broad jump was administered in the post-test, the mean of the control group was 23.20 and of the experimental group 32.36. The standard deviations were 12.68 and 6.64. The "t" obtained between the two post-tests was 1.99, which is not significant at the .05 level of confidence. This is shown in Table XLIII.

TABLE XLIII

MEAN, STANDARD DEVIATION, AND "t"
OF THE CONTROL AND EXPERIMENTAL GROUPS

Post-Test for Standing Broad Jump

	Mean	Standard Deviation	t	Level of Significance .01	.05
Control	23.20	12.68			
Experimental	32.36	6.64	1.99		No

Results of pre- and post-test control group. In determining the "t" between the pre- and post-test of the control group, the mean of the pre-test was 16.00 and of the post-test 23.20, or an increase of 7.20. The standard deviations were 13.76 and 12.68. The "t" obtained between the pre- and post-tests for the control group was 1.15 which again is not a significant gain. This is shown in Table XLIV.

TABLE XLIV

MEAN, STANDARD DEVIATION, AND "t" OF THE CONTROL GROUP

Pre- and Post-Test for the Standing Broad Jump

	Mean	Increase	Standard Deviation	t	Level of Significance .01	.05
Pre-	16.00		13.76			
Post-	23.20	7.20	12.68	1.15		No

Results of pre- and post-test experimental group. In determining the "t" the means were 16.29 for the pre-test and 32.36 for the post-test, or an increase of 16.07. The standard deviations were 8.29 and 6.64. The "t" obtained was 5.47, which is significant at the .01 level, a 2.779 being needed for significance. This is shown in Table XLV.

TABLE XLV

MEAN, STANDARD DEVIATION, AND "t"
OF THE EXPERIMENTAL GROUP

Pre- and Post-Test for the Standing Broad Jump

	Mean	Increase	Standard Deviation	t	Level of Significance .01	.05
Pre-	16.29		8.29			
Post-	32.36	16.07	6.64	5.47	Yes	

The control and experimental group did not make a significant improvement in the pre-test and post-test. The control group did not make a significant change between the pre- and post-test, while the experimental group did make a significant increase.

Results of pre-test. For trunk flexion, the mean of the boys' control group was 54.80 and of the experimental group 54.79. The standard deviations of the two groups were 5.93 and 7.61 respectively. When the "t" was computed, a "t" of .003 was obtained, which is not a significant increase. Table XLVI explains these computations.

TABLE XLVI

MEAN, STANDARD DEVIATION, AND "t"
OF THE CONTROL AND EXPERIMENTAL GROUPS

Pre-Test for Trunk Flexion

	Mean	Standard Deviation	t	Level of Significance .01	.05
Control	54.80	5.93			
Experimental	56.10	5.54	.003		No

Results of post-test. When the trunk flexion was administered in the post-test, the mean of the control group was 56.10 and of the experimental group 59.29. The standard deviations were 5.54 and 6.58. The "t" obtained between the two post-tests was 1.23 which is not a significant gain at the .05 level. Table XLVII shows these computations.

TABLE XLVII

MEAN, STANDARD DEVIATION, AND "t"
OF THE CONTROL AND EXPERIMENTAL GROUPS

Post-Test for the Trunk Flexion

	Mean	Standard Deviation	t	Level of Significance .01	.05
Control	56.10	5.54			
Experimental	59.29	6.58	1.23		No

Results of pre- and post-test control group. In determining the "t" the mean of the pre-test was 54.80 and of the post-test 56.10, or an increase of 1.30. The standard deviations were 5.93 and 5.54. The "t" obtained between the pre- and post-tests for the control group was .48, which is not a significant gain. This is shown in Table XLVIII.

TABLE XLVIII

MEAN, STANDARD DEVIATION, AND "t" OF THE CONTROL GROUP

Pre- and Post-Test for the Trunk Flexion

	Mean	Increase	Standard Deviation	t	Level of Significance .01	.05
Pre-	54.80		5.93			
Post-	56.10	1.30	5.54	.48		No

Results of pre- and post-test experimental group. In determining the "t" the means were 54.79 for the pre-test and 59.29 for the post-test, or an increase of 4.50. The standard deviations were 7.61 and 6.58. The "t" obtained was 1.62, which is not significant at the .05 level of confidence. Table XLIX explains these computations.

TABLE XLIX

MEAN, STANDARD DEVIATION, AND "t"
OF THE EXPERIMENTAL GROUP

Pre- and Post-Test for the Trunk Flexion

	Mean	Increase	Standard Deviation	t	Level of Significance .01	.05
Pre-	54.79		7.61			
Post-	59.29	4.50	6.58	1.62		No

The experimental and control groups did not show a significant increase in the pre-test and post-test. There was also no significant gain in the control and experimental groups in the pre- and post-tests. The experimental group showed more improvement but not of significant value.

Results of pre-test. For the dodge run the mean of the boys' control group was 34.70 and of the experimental group 72.00. The standard deviations were 15.89 and 13.94 respectively. When the "t" was computed, a "t" of 5.70 was obtained. A "t" of 2.819 is needed to be significant at the .01 level of confidence. Therefore, there is a significant difference between the pre-tests of the two groups in favor of the experimental group at the .01 level. Table L explains these computations.

TABLE L

MEAN, STANDARD DEVIATION, AND "t"
OF THE CONTROL AND EXPERIMENTAL GROUPS

Pre-Test for the Dodge Run

	Mean	Standard Deviation	t	Level of Significance .01	.05
Control	34.70	15.89			
Experimental	72.00	13.94	5.70	Yes	

Results of the post-test. When the dodge run was administered in the post-test, the mean of the control group was 36.30 and of the experimental group 78.86. The standard deviations were 20.96 and 12.17. The "t" obtained between the two post-tests was 5.48, which again is significant at the .01 level of confidence. This is shown in Table LI.

TABLE LI

MEAN, STANDARD DEVIATION, AND "t"
OF THE CONTROL AND EXPERIMENTAL GROUPS

Post-Test for the Dodge Run

	Mean	Standard Deviation	t	Level of Significance .01	.05
Control	13.30	20.96			
Experimental	78.86	12.17	5.48	Yes	

Results of pre- and post-test control group. In determining the "t" the mean of the pre-test was 34.70 and of the post-test 36.30, or an increase of 1.60. The standard deviations were 15.89 and 20.96. The "t" obtained between the pre- and post-tests for the control group was .18, which is not a significant gain. This is shown in Table LII.

TABLE LII

MEAN, STANDARD DEVIATION, AND "t" OF THE CONTROL GROUP

Pre- and Post-Test for the Dodge Run

	Mean	Increase	Standard Deviation	t	Level of Significance .01	.05
Pre-	34.70		15.89			
Post-	36.30	1.60	20.96	.18		No

Results of pre- and post-test experimental group. In determining the "t" the means were 72.00 for the pre-test and 78.86 for the post test, or an increase of 4.86. The standard deviations were 13.94 and 12.17. The "t" obtained was 1.39 which is not a significant gain. Table LIII explains these computations.

TABLE LIII

MEAN, STANDARD DEVIATION, AND "t"
OF THE EXPERIMENTAL GROUP

Pre- and Post-Test for the Dodge Run

	Mean	Increase	Standard Deviation	t	Level of Significance .01	.05
Pre-	72.00		13.94			
Post-	78.86	4.86	12.17	1.39		No

The experimental group was significant in performance in the pre-test and the post-test. The control and experimental groups did not make a significant change between the pre- and post-tests. The experimental group showed more improvement than the control group in the pre- and post-test, but not at the .05 level of confidence.

Results of pre-test. For the squat thrusts, the mean of the boys' control group was 45.50 and the mean of the experimental group 30.86. The standard deviations of the two groups were 24.61 and 38.62 respectively. When the "t" was computed, a "t" of 1.09 was obtained. A "t" of 2.074 is needed to be significant at the .05 level of confidence. Therefore, there was no significant gain. Table LIV explains these computations.

TABLE LIV

MEAN, STANDARD DEVIATION AND "t"
OF THE CONTROL AND EXPERIMENTAL GROUPS

Post-Test for Squat Thrusts

	Mean	Standard Deviation	t	Level of Significance .01	.05
Control	45.50	24.61			
Experimental	30.86	38.62	1.09		No

Results of post-test. When the squat thrusts were administered in the post-test, the mean of the control group was 31.40 and of the experimental group 50.57. The standard deviations were 33.04 and 34.08. The "t" obtained between the two post-tests was 1.37, which is not significant at the .05 level of confidence. This is shown in Table LV.

TABLE LV

MEAN, STANDARD DEVIATION, AND "t"
OF THE CONTROL AND EXPERIMENTAL GROUPS

Post-Test for the Squat Thrusts

	Mean	Standard Deviation	t	Level of Significance .01	.05
Control	31.40	33.04			
Experimental	50.57	34.08	1.37		No

Results of pre- and post-test control group. In determining the "t" the mean of the pre-test was 45.50 and of the post-test 31.40, or a decrease of 14.10. The standard deviations were 24.61 and 33.04. The "t" obtained between the pre- and post tests for the control group was .01, which is not a significant gain. This is shown in Table LVI.

TABLE LVI

MEAN, STANDARD DEVIATION, AND "t" OF THE CONTROL GROUP

Pre- and Post-Tests for the Squat Thrusts

	Mean	Decrease	Standard Deviation	t	Level of Significance .01	.05
Pre-	45.50		24.61			
Post	31.40	14.10	33.04	.01		No

Results of pre- and post-test experimental group. In determining the "t" the means were 30.86 for the pre-test and 50.57 for the post-test, or an increase of 19.71. The standard deviations were 38.62 and 34.08. The "t" obtained was 1.37, which is not significant at the .05 level, a 2.056 being needed for significance. This is shown in Table LVII.

TABLE LVII

MEAN, STANDARD DEVIATION, AND "t" OF THE EXPERIMENTAL GROUP

Pre- and Post-Test for the Squat Thrusts

	Mean	Increase	Standard Deviation	t	Level of Significance .01	.05
Pre-	30.86		38.62			
Post-	50.57	19.71	34.08	1.37		No

The experimental and control groups did not show a significant increase in the pre-test and post-test. There was also no significant gain in the control and experimental groups in the pre- and post-tests. The experimental group showed more improvement in the pre-test, post-test, and pre- and post-test, but not of significant value.

Result of pre-test. For the push-ups, the mean of the boys' control group was 41.80, and the mean of the experimental group 44.00. The standard deviations of the two groups were 26.88 and 19.83 respectively. When the "t" was computed, a "t" of .21 was obtained. A "t" of 2.074 is needed to be significant at the .05 level of confidence. Therefore, there was not a significant difference between the pre-tests of the two groups. Table LVIII explains these computations.

TABLE LVIII

MEAN, STANDARD DEVIATION, AND "t"
OF THE CONTROL AND EXPERIMENTAL GROUPS

Pre-Test for the Push-Ups

	Mean	Standard Deviation	t	Level of Significance .01	.05
Control	41.80	26.88			
Experimental	44.00	19.83	.21		No

Results of post-test. When the push-ups were administered in the post-test, the mean of the control group was 48.90 and of the experimental group 56.93. The standard deviations were 27.04 and 17.11. The "t" obtained between the two post-tests was 1.78, which is not a significant gain. This is shown in Table LIX.

TABLE LIX

MEAN, STANDARD DEVIATION, AND "t"
OF THE CONTROL AND EXPERIMENTAL GROUPS

Post-Test for the Push-Ups

	Mean	Standard Deviation	t	Level of Significance .01	.05
Control	48.90	27.04			
Experimental	56.93	17.11	1.78		No

Results of pre- and post-test control group. In determining the "t" the mean of the pre-test was 41.80 and of the post-test 48.90, or an increase of 7.10. The standard deviations were 26.88 and 27.04. The "t" obtained between the two post-tests was .56, which is not a significant increase. This is explained in Table LX.

TABLE LX

MEAN, STANDARD DEVIATION, AND "t" OF THE CONTROL GROUP

Pre- and Post-Test for the Push-Ups

	Mean	Increase	Standard Deviation	t	Level of Significance .01	.05
Pre-	41.80		26.88			
Post-	48.90	7.10	27.04	.56		No

Results of pre- and post-test experimental group. In determining the "t" the means were 44.00 for the pre-test and 56.93 for the post-test, or an increase of 12.93. The standard deviations were 19.83 and 17.11. The "t" obtained was 1.78, which is not a significant gain. A "t" of 2.056 is needed for significance at the .05 level of confidence. See Table LXI.

TABLE LXI

MEAN, STANDARD DEVIATION, AND "t"
OF THE EXPERIMENTAL GROUP

Pre- and Post-Test for the Push-Ups

	Mean	Increase	Standard Deviation	t	Level of Significance .01	.05
Pre-	44.00		19.83			
Post-	56.93	12.93	17.11	1.78		No

The control and experimental groups did not show a significant gain in the pre-test and post-test. There was also no significant gain in the control and experimental groups in the pre- and post-tests. The experimental group showed more improvement in the pre-test, post-test, and pre- and post-test, but not of significant value.

TABLE LXII

LEVEL OF SIGNIFICANCE OF THE WASHINGTON STATE ELEMENTARY SCHOOL PHYSICAL FITNESS TEST, GIRLS

Test	Level of Significance .01	.05
I. Standing Broad Jump		
Pre-Test (Control vs. Experimental)		Yes
Post-Test (Control vs. Experimental)		Yes
Pre- and Post-Tests (Control Group)		N.S.
Pre- and Post-Tests (Experimental Gr.)		Yes
II. Bench Push-Ups		
Pre-Test (Control vs. Experimental)		N.S.
Post-Test (Control vs. Experimental)		N.S.
Pre- and Post-Tests (Control Group)		N.S.
Pre- and Post-Tests (Experimental Gr.)	Yes	
III. Curl-Ups		
Pre-Test (Control vs. Experimental)		N.S.
Post-Test (Control vs. Experimental)	Yes	
Pre- and Post-Tests (Control Group)		N.S.
Pre- and Post-Tests (Experimental Gr.)		N.S.
IV. Squat Jump		
Pre-Test (Control vs. Experimental)		N.S.
Post-Test (Control vs. Experimental)		Yes
Pre- and Post-Tests (Control Group)		N.S.
Pre- and Post-Tests (Experimental Gr.)		N.S.
V. Thirty-Yard Dash		
Pre-Test (Control vs. Experimental)		N.S.
Post-Test (Control vs. Experimental)	Yes	
Pre- and Post-Tests (Control Group)		N.S.
Pre- and Post-Tests (Experimental Gr.)	Yes	

TABLE LXIII

LEVEL OF SIGNIFICANCE OF THE WASHINGTON STATE ELEMENTARY SCHOOL PHYSICAL FITNESS TEST, BOYS

Test	Level of Significance .01	.05
I. Standing Broad Jump		
Pre-Test (Control vs. Experimental)		N.S.
Post-Test (Control vs. Experimental)		N.S.
Pre- and Post-Tests (Control Group)		N.S.
Pre- and Post-Tests (Experimental Gr.)	Yes	
II. Bench Push-Ups		
Pre-Test (Control vs. Experimental)		N.S.
Post-Test (Control vs. Experimental)		N.S.
Pre- and Post-Tests (Control Group)		N.S.
Pre- and Post-Tests (Experimental Gr.)		N.S.
III. Curl-Ups		
Pre-Test (Control vs. Experimental)		N.S.
Post-Test (Control vs. Experimental)	Yes	
Pre- and Post-Tests (Control Group)		N.S.
Pre- and Post-Tests (Experimental Gr.)		N.S.
IV. Squat Jump		
Pre-Test (Control vs. Experimental)		N.S.
Post-Test (Control vs. Experimental)	Yes	
Pre- and Post-Tests (Control Group)		N.S.
Pre- and Post-Tests (Experimental Gr.)		N.S.
V. Thirty-Yard Dash		
Pre-Test (Control vs. Experimental)		Yes
Post-Test (Control vs. Experimental)		Yes
Pre- and Post-Tests (Control Group)		Yes
Pre- and Post-Tests (Experimental Gr.)	Yes	

TABLE LXIV

LEVEL OF SIGNIFICANCE OF THE
ELDER PHYSICAL MOTOR FITNESS TEST, BOYS

Test	Level of Significance .01	.05
I. Standing Broad Jump		
Pre-Test (Control vs. Experimental)		N.S.
Post-Test (Control vs. Experimental)		N.S.
Pre- and Post-Tests (Control Group)		N.S.
Pre- and Post-Tests (Experimental Gr.)	Yes	
II. Trunk Flexion		
Pre-Test (Control vs. Experimental)		N.S.
Post-Test (Control vs. Experimental)		N.S.
Pre- and Post-Tests (Control Group)		N.S.
Pre- and Post-Tests (Experimental Gr.)		N.S.
III. Dodge Run		
Pre-Test (Control vs. Experimental)	Yes	
Post-Test (Control vs. Experimental)	Yes	
Pre- and Post-Tests (Control Group)		N.S.
Pre- and Post-Tests (Experimental Gr.)		N.S.
IV. Squat Thrusts		
Pre-Test (Control vs. Experimental)		N.S.
Post-Test (Control vs. Experimental)		N.S.
Pre- and Post-Tests (Control Group)		N.S.
Pre- and Post-Tests (Experimental Gr.)		N.S.
V. Push-Up		
Pre-Test (Control vs. Experimental)		N.S.
Post-Test (Control vs. Experimental)		N.S.
Pre- and Post-Tests (Control Group)		N.S.
Pre- and Post-Tests (Experimental Gr.)		N.S.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

I. SUMMARY

The purpose of this study was: (1) to compare the regular physical education program of the fifth grade with an experimental physical education program of another fifth grade; (2) to compare physical fitness of boys and girls of the two grades before and after the study; and (3) to study the effect of the programs on fifth grade fitness level with the established norms of the Washington State Elementary Physical Fitness Test.

The study was administered to the two fifth grades at Naval Avenue Elementary School, Bremerton, Washington. The control group had 10 boys and 13 girls, and the experimental group had 14 boys and 12 girls who completed the experiment. The mean, standard deviation, and "t" were computed for each test item in the test batteries. The data was analyzed to determine if there were a significant gain by either of the two groups or both.

Directly after the pre-test in September, 1968, the experimental group started its special fitness program. The program lasted

for thirty minutes, three times a week, with the first ten minutes of each period stressing vigorous exercises. The remaining time was spent on other physical education activities. The control group followed the normal physical education program which met once a week for twenty minutes.

The experiment lasted from September, 1968, to May, 1969, at which time the post-test was administered to both groups, using the previously administered fitness tests. The results of the pre-test, post-test, pre- and post-test control group, and pre- and post-test experimental group were statistically analyzed.

The Fisher "t" test of significance was used in each case. The pre-test and the post-test were given to determine whether there was a marked difference between (1) pre-test control group and pre-test experimental group, (2) post-test control group and post-test experimental group, (3) pre- and post-test control group, and (4) pre- and post-test experimental group.

Results of the Washington State Elementary Physical Fitness Test, Girls showed a significant difference in favor of the experimental group at the .01 level in bench push-ups pre- and post-, curl-ups post-test, thirty-yard dash post-test and pre- and post-test, and at the .05 level of confidence in the standing broad jump pre-test, post-test, pre- and post-test, and squat jump, post-test.

Results of the Washington State Elementary Physical Fitness Test, Boys showed a significant difference in favor of the experimental group at the .01 level in standing broad jump, pre- and post-test, curl-ups post-test, squat jump post-test, thirty-yard dash pre- and post-test, and at the .05 level of confidence in the thirty-yard dash pre-test, and post-test. There was a significant difference in favor of the control group at the .05 level in the thirty-yard dash pre- and post-test.

Results of the Elder Physical Motor Fitness Test, Boys showed a significant difference in favor of the experimental group at the .01 level in standing broad jump pre- and post-test, and dodge run pre-test and post-test.

In viewing the results of the comparison of two components of the Elder Physical Motor Fitness Test with the Washington State Elementary Physical Fitness Test, in which the two components used for comparison were the Dodge Run in the Elder Test compared to the 30-Yard Dash in the Washington State Test, the 30-yard dash in the Washington State Test showed superior in performance to the Dodge Run in the Elder Test post-test. The second component in the comparison is the regular floor push-up in the Elder Test compared to the bench push-up in the Washington State Test. Neither group showed a significant improvement on this test.

Table LXV shows the experimental group's percentage of scores which were below the average on the Washington State Elementary Physical Fitness Test, 1966, post-test. There was a definite increase in total physical fitness over the September pre-test.

II. CONCLUSIONS

The statistical data indicated a definite increase for the experimental group, but not always a significant gain, upon the physical fitness of fifth-grade boys and girls as measured by the Washington State Elementary Physical Fitness Test and the Elder Physical Motor Fitness Test. There were gains in the experimental and control group in all tests except for the squat thrusts, boys' control group, and bench push-ups, girls' control group.

A significant factor that this writer believes may have had some effect upon this study was the variation in the length of time allotted to each group for their physical education instruction. The control group participated in one 20-minute physical education period a week, while the experimental group participated in three 30-minute periods with the first 10 minutes of each period stressing vigorous activities.

This study has shown that the students following the specialized physical education program showed more improvement than the control

TABLE LXV

CLASS SCORE SHEET

WASHINGTON STATE ELEMENTARY PHYSICAL FITNESS TEST, 1966

Post-Test Experimental Group

	POWER	STRENGTH & ENDURANCE			SPEED	TOTAL
	Standing Broad Jump	Bench Push-Ups	Curl-Ups	Squat Jump	30-yd. Dash	Physical Fitness
BOYS	7% below ave.	43% below ave.	21% below ave.	36% below ave.	57% below ave.	33% below ave.
GIRLS	0% below ave.	50% below ave.	8% below ave.	33% below ave.	50% below ave.	28% below ave.

group. In most instances, this improvement was not a significant gain; however, there were significant increases in various instances.

A possible explanation for these results may be that the special physical education program for the experimental group stressing vigorous activity did not overload fifth grade boys and girls sufficiently to contribute significantly to physical fitness. In the opinion of this writer, the students from all outward appearances were physically taxed. In addition, the writer believes a daily physical education program would have been more beneficial to the students in preference to three periods a week.

In the opinion of this writer, the Washington State Elementary Physical Fitness Test and the Elder Physical (Motor) Fitness Test were easy to administer by one teacher and two student helpers.

III. RECOMMENDATIONS

Following are some recommendations to be considered:

1. A physical fitness program designed to achieve maximum results should be conducted daily for at least 10 minutes of each physical education period.

2. The Washington State Elementary Physical Fitness Test should be given twice a year, keeping cumulative physical fitness records on each student from grades one through six.

3. There is a definite need for a planned and uniform elementary physical education program throughout the school community.

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APPENDIX

TABLE LXVI

WASHINGTON STATE PHYSICAL FITNESS TEST (1966)

Name _____ Grade _____ Teacher _____
Last First

Age _____ Boy or Girl _____

Test Dates	POWER			STRENGTH & ENDURANCE									SPEED				
	No. 1 Standing Broad Jump			No. 2 Bench Push-Ups			No. 3 Curl-Ups			No. 4 Squat Jump			No. 5 30-Yard Dash			TOTAL PHYSICAL FITNESS	
	S	P	R	S	P	R	S	P	R	S	P	R	S	P	R	Points	Rating
Sept. 1968																	
May 1969																	

TABLE LXVII

ELDER PHYSICAL FITNESS TEST

Name _____ Grade _____ Teacher _____
Last First

Birth Date _____ _____
Month Year

	Exp.		Exp.	
Age	____	____	____	____
Height	____	____	____	____
Weight	____	____	____	____
Total	____	____	____	____
Class		____		____

PHYSICAL (MOTOR) FITNESS TEST	Sept. '68		May '69			
	1	T	2	T	3	T
Standing Broad Jump						
Trunk Flexion						
Dodge Run						
Squat Thrusts						
Push-Ups						
TOTAL SCORE						
RATING						
PROGRESS						
			Diff Rate		Diff Rate	

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