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Albert H. Wright

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THE EVALUATION OF A JUNIOR HIGH SCHOOL TESTING PROGRAM

By

Albert H. Wright

A Thesis
Presented in Partial Fulfillment of the
Requirements for the Degree of
Master of Arts in Health and Physical Education

University of New Mexico
1955

This thesis, directed and approved by the candidate's committee, has been accepted by the Graduate Committee of the University of New Mexico in partial fulfillment of the requirements for the degree of

MASTER OF ARTS

E F Castetter
DEAN

5/25/1955
DATE

Thesis committee

Lloyd R. Burley
CHAIRMAN

George White

J. E. J. Harris

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CHAPTER I

INTRODUCTION

Physical education is an accepted part of education in most of the public schools in the United States. In the modern schools there is a tendency to provide essential facilities for the proper physical development of the students. It is up to the physical educators to capitalize on these opportunities and to bring about superior results. Physical education is considered highly desirable in the proper development of youth, but there is ample evidence of the need for continued study and research in order to best serve the pupils and to justify the confidence which the public has placed in this field.

In the administration of physical education it is important to be able to measure achievements. This should be accomplished by scientifically constructed tests. This study is a report of an experiment in achievement testing in a junior high school program of physical education for boys.

I. THE PROBLEM

Statement of the problem. It is the purpose of this study (1) to compare physical achievement scores of seventh, eighth, and ninth grade boys; (2) to compare physical achievement scores of the athletes and non-athletes in the eighth and ninth grades; and (3) to determine which events, if any, can be used to predict athletic performance.

Importance of the study. This study is important to physical educators working with junior high school boys. There is a need for adequate measurement of progress in physical achievement and also a need for ways in which instructors might predict athletic ability at this age level.

II. SOURCES OF THE DATA

The material for this study was collected by means of physical achievement tests given 996 boys over a period of three years at Ernie Pyle Junior High School, Albuquerque, New Mexico. Thirteen tests were given each spring as a part of the regular physical education program. The test results for three years were used. Scores for 315 ninth graders, 438 eighth graders and 243 seventh graders were studied. There were eighty-nine

Statement of the problem. [illegible]

this study (1) is [illegible]
of seventh, eighth, and ninth grade [illegible]
physical development [illegible]
athletes [illegible]
determine [illegible]
athletic [illegible]

Importance of [illegible]
to physical [illegible]
boys. There is [illegible]
progress in physical [illegible]
in which [illegible]
this age level.

[illegible]

The material for this study was [illegible]
of physical development [illegible]
period of three years in the [illegible]
Albuquerque, New Mexico. [illegible]
spring as a part of the regular physical education
program. The data for [illegible]
Scores for 15 [illegible]
seventh grade [illegible]

athletes and 226 nonathletes in the ninth grade group, and forty-three athletes and 395 nonathletes in the eighth grade group. Athletes were those pupils who had won athletic awards.

III. METHOD OF PROCEDURE

The following procedure was used in this study. First an analysis was made of published studies concerning achievement testing. Data for three years of testing at the Ernie Pyle Junior High School were procured and tabulated. The data were separated into seventh, eighth, and ninth grade groups and into athletic and nonathletic groups. The data were analyzed, results reported, and conclusions drawn.

IV. ORGANIZATION OF REMAINDER OF THE STUDY

The following is the organization of the remainder of the study. A review of the literature related to this study is presented in the next chapter. This is followed by a descriptive list of the tests used. An analysis of the data is presented in the next chapter. In the last chapter are the summaries, conclusions, and recommendations from these data. The bibliography concludes the study.

CHAPTER II

REVIEW OF RELATED LITERATURE

Many studies have been made measuring physical achievement through scientific testing. Most of these studies used high school or college subjects. Only a few studies using junior high school boys have been made.

In 1913, the Playground and Recreation Association of America, designed the Athletic Badge Test. Of this test Bovard and Cozens say:

> The test was designed with the idea of raising the standard of physical efficiency of the boys and girls of the nation. The tests purported to measure all-around skill and were not limited to any one particular type of achievement. The idea of progression from test to test was present as the subject grew older. One of the weak features of this test was that we do not know what the standard set means. Is this the median performance of a large number of boys and girls, is it what sixty, seventy-five, or eighty per cent can do, or just what does the standard represent? Another query is: does the test assume that the alternatives under each heading measure the same phase of physical ability?[1]

McCloy stated:

> Individual athletic events correlate highly with classifications. About the best of these seems to be the shot-put. In a group in which total points correlated .863 with classification, the shot-put correlated .846. A number of other track and field events such as the standing broad jump or a sprint

---

[1] John F. Bovard, Frederick W. Cozens, Tests and Measurements in Physical Education (Philadelphia: W. B. Saunders Company, 1930), pp. 81-82.

are really excellent classifiers.[2]

Wear,[3] in 1939, made a study to devise a practical and an easily administered test for adequately classifying junior high school boys into homogeneous groups for physical education activities. His test consisted of an obstacle run, made up of seven different stunts. He found in his statistical study that the best multiple correlation that could be obtained with four of these stunts was R .723. He found that no one stunt seemed to be much more important than another. The original seven stunts had a multiple correlation of R .777 which he found to be better than any combination involving only part of the battery.

Cozens,[4] developed a battery of tests to measure athletic ability of college men. It consisted of the following events:

1. Dip (on parallel bars).
2. Baseball throw for distance (twelve inch playground ball).
3. Football punt for distance.
4. Standing broad jump.

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[2] Charles Harold McCloy, Tests and Measurements in Health and Physical Education (New York: F. S. Crofts and Company, 1946), p. 163.

[3] Carols L. Wear, "The Construction of a Multiple Obstacle Run for Classifying Junior High School Boys into Homogeneous Groups for Physical Education Activities," The Research Quarterly, 11:116, May, 1940.

[4] Cozens, op. cit., p. 123.

are usually [illegible]

[illegible]

and an early adolescent [illegible]
junior high school [illegible]
physical [illegible]
obstacle [illegible]
found in the [illegible]
correlation [illegible]
stunts and [illegible]
be such [illegible]
stunts and [illegible]
found [illegible]
part of the [illegible]

[illegible]
athletic [illegible]
following [illegible]

1. [illegible]
2. [illegible]
3. [illegible]
4. [illegible]

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[2] [illegible] in Health [illegible] and Company, [illegible]

[3] [illegible] Obstacle [illegible] Components [illegible] The Research [illegible]

5. Quarter mile run.
6. Long dive.
7. Dodging.

These events best measure athletic ability when used in a battery. Raw scores were changed into T-scores and these scores were multiplied by weights to obtain the relative value each test contributed to the general quality. This battery of tests served as an index for classifying students physically as superior, above average, average, below average, and inferior.

Stansbury,[5] gave nineteen tests to 390 junior and senior high school boys. The tests to be used were: (1) the six elements of the Rogers strength test battery; (2) the Sargent jump; (3) the sixteen pound shot-put; (4) the obstacle race; (5) the baseball throw; (6) the eight pound shot-put; (7) the twenty foot rope climb; (8) the running high jump; (9) the running broad jump; (10) the seventy-five yard dash; (11) the diamond run; (12) the running hop, step, and jump; and (13) the standing broad jump. He selected from this group a battery composed of the following tests: the seventy-five yard dash; standing broad jump; eight pound shot; and the running high jump. He performed multiple correlations to find

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[5] Edgar Stansbury, "A Simplified Method of Classifying Junior and Senior High School Boys into Homogeneous Groups for Physical Education Activities," The Research Quarterly, 12:765, December, 1941.

the best combination of events to predict performance. The highest multiple correlation was found between the criterion (total points) and the battery consisting of eight pound shot, standing broad jump, and weight Ro .123 = .9058. Almost as high a multiple correlation was found between the criterion and the battery which consisted of eight pound shot and standing broad jump Ro .12 = .8975.

Cozens,[6] in 1937, collected data on ten strength tests and developed a number of combinations in the form of test batteries. The subjects were 250 unselected college men. These data were studied in relation to their usefulness in predicting general athletic ability, as a possible substitute for dips in Cozen's General Athletic Ability Test, and for the formulation of a short battery of tests for measuring strength. He found that the following strength tests could not be considered valuable for predicting general athletic ability in college men:

1. A combination of chins, dips, leg lift, knee resistance, and height, r = .666.
2. An empirical index of chins + dips + height, r = .592.
3. Roger's Arm Strength Index, r = .613.
4. Chins + dips, r = .592.

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[6] Frederick W. Cozens, "Strength Tests as Measures of General Athletic Ability in College Men," The Research Quarterly, 11:45, March, 1940.

the best combination of [illegible]
The highest [illegible]
criterion (total points [illegible])
eight pound shot, [illegible]
Ro .123 = .9038. [illegible]
was found between [illegible]
consisted of eight pound [illegible]
Ro .12 = .8975.

Cozens,[9] in 1927, [illegible]
tests and developed [illegible]
of test batteries. The [illegible]
college men. [illegible]
their usefulness [illegible]
as a possible [illegible]
Athletic Ability [illegible]
battery of tests [illegible]
the following [illegible]
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college men:

1. A combination of [illegible]
   resistance, [illegible]
2. An [illegible]
   r = .592.
3. Roger's Arm Strength [illegible]
4. Chins + dips, [illegible]

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[9] [illegible] Cozens, [illegible]
of General Athletic [illegible]
Quarterly, II:3, [illegible]

5. Roger's Short Strength Index, r = .583.
6. Roger's Strength Index (less lung capacity), r = .567.
7. McCloy's Arm Strength Index, r = .435.

McCloy's Arm Strength Index was found to be the only substitute for dips in the battery of general athletic ability tests. The increase in the multiple correlation coefficient was relatively small, R .972 to R .974. A short battery of five tests was formulated consisting of back lift, leg lift, arm push, chins, and dips. This battery showed an R of .982. Age, height and weight factors showed small negative regression coefficients and should not be used in any battery measuring the strength of college men.

Kistler,[7] found in his study that the opinions of a select group of experts in the field of physical education agreed that age, height, weight, body build, strength, skill, health, personality, and motor ability were the factors worthy of consideration in classifying junior and senior high school boys for physical education. Judging from standards of effectiveness and reliability, he found that a battery of tests composed of standing broad jump, Burpee Test, Shuttle Run, and the Classification Index appeared to be the best way of classifying for

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[7] J. W. Kistler, "The Establishment of Bases for Classification of Junior and Senior High School Boys into Homogeneous Groups for Physical Education," <u>The Research Quarterly</u>, 8:11, December, 1937.

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[7] J. W. Kistler, "The Establishment of Bases for Classification of Junior and Senior High School Boys into Homogeneous Groups for Physical Education," The Research Quarterly, VIII, December, 1937.

all around use. The eight pound shot appeared to be the best single item and all track and field events ranked high for classifying groups in physical education.

Johnson,[8] developed a physical skill test which he believed eliminated all elements which invalidate ordinary skill tests. He attempted to test native neuromuscular skill capacity. The purpose of his test was placement of students into homogeneous groups for the purpose of better adapting the physical program to the students' differences. The test was made up of a group of exercises involving various methods of locomotion. These exercises did not involve strength, speed, or endurance. The test was made up of the following: (1) Straddle Jump; (2) Stagger Skip; (3) Stagger Jump; (4) Forward Skip, holding opposite foot from behind; (5) Front Roll; (6) Back Roll; (7) Jumping Half-turns; (8) Front and Back Roll Combinations; (9) Jumping Half-turns, right and left alternately; (10) Jumping Full Turns. The test was given 1,500 subjects and he believed that the test measured native physical skill and that the test is an easy and valid way for sectioning of classes into homogeneous groups.

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[8] Granville B. Johnson, "Physical Skill Tests for Sectioning Classes into Homogeneous Units," <u>The Research Quarterly</u>, 3:128, March, 1932.

all around use. The [illegible]
the best single [illegible]
ranked high for [illegible]

Johnson, [illegible]
be believed [illegible]
ordinary and [illegible]
muscular skill [illegible]
placement of [illegible]
purpose of [illegible]
statements differences. [illegible]
of exercises involving [illegible]
Those exercises [illegible]
endurance. The test was made up of [illegible]
(1) Straddle [illegible]
(4) Forward [illegible]
(5) Front [illegible]
(6) Front and [illegible]
turns, right and [illegible]
The test was [illegible]
the test measure [illegible]
test is so easy and [illegible]
into homogeneous groups.

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3 [illegible]
Sectioning Classes [illegible]
Quarterly, [illegible]

Rogers,[9] in 1925, developed the Physical Fitness Index. He included tests that would measure most of the large muscles of the body. The complete test involved the following muscle groups: forearms; upper arms; shoulder girdle; back and legs. The Strength Index was the gross score obtained from six strength tests plus lung capacity. It was proposed to measure general athletic ability. The Physical Fitness Index was a score derived from comparing an achieved Strength Index with a norm based on sex, weight, and age. It was a measure of general physical fitness and indicated the capacity of the individual for physical activity.

Sargent,[10] developed a test consisting of a vertical jump into the air which was primarily a test of the ability of the body to develop power in relation to the weight of the subject. It was found that best results were obtained after the technique of the jump had been taught and the subjects had practiced the jump. This was strictly an athletic ability test.

Barrow,[11] in 1953, developed an easily administered

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[9] Frederick Rand Rogers, "Physical Capacity Tests in the Administration of Physical Education." New York: Bureau of Publications, Teachers College, Columbia University, 1926. 93 pp.

[10] Dudley A. Sargent, "Physical Tests of a Man," American Physical Education Review, 26:188, April, 1921.

[11] Harold M. Barrow "Test of Motor Ability for College Men," The Researh Quarterly, 25:253, October, 1954.

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[11] Harold M. Barrow "Test of Motor Ability for College Men," The Research Quarterly, 25:253, October, 1953.

test of motor ability for college men. Expert opinion, from leaders in the field of physical education, was used in the validation process. Eight factors of motor ability and twenty-nine items measuring those factors were chosen for the criterion. Two test batteries were found to have a high correlation with the criterion. The first test was a six item battery composed of the standing broad jump, softball throw, zig zag run, wall pass, medicine ball put, and the sixty yard dash. This battery yielded a multiple R of .950. The second battery consisted of standing broad jump, medicine ball put, and the zig zag run. These three items had a multiple R of .920

Larson,[12] using a criterion of motor ability composed of fifteen motor skills, constructed two general motor ability tests. One to be used for indoor and the other for outdoor testing. The indoor test consisted of the dodging run, chinning, dipping, and the vertical jump. The outdoor test consisted of the baseball throw for distance, chinning, bar snap, and the vertical jump. The multiple correlations with the criterion were: indoor test, R = .97; for the outdoor test, R = .98.

---

[12] Leonard A. Larson, "A Factor Analysis of Motor Ability Variables and Tests with Tests for College Men," <u>The Research Quarterly</u>, 12:499, October, 1941.

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[12] Leonard A. Larson, "A Factor Analysis of Motor Ability Variables and Tests with Tests for College Men," *The Research Quarterly*, 12:[illegible], October, 1941.

Clarke and Bonesteel[13] used the Strength Index to equate two teams in each of three high school physical education classes. A series of games in touch football, speedball, field hockey, and indoor soccer were played between the teams in each class. The subjects were not aware that they were participating in an experiment. The number of games won and lost by the equated teams was very evenly divided. Of sixty-four games played by all the teams in the four sports, twenty-nine or forty-five per cent, ended in ties. The greatest scoring difference between any two teams in all four sports was eight points, or 2.4 per cent of the total number of points scored by both teams. The least difference was three points or .9 per cent of the combined score of the two teams.

Alaspa[14] conducted a study to devise a test of basketball ability for high school and college men. Three basketball coaches assisted in determining the fundamentals which should be tested. The following battery of six tests were chosen: (1) Pivot, Pass, and Dribble; (2) Dribble and Shoot Test; (3) Shooting Test;

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[13] H. Harrison Clarke and Harold A. Bonesteel, "Equalizing the Abilities of Intramural Teams in a Small High School," The Research Quarterly, 6:193, March, 1935.

[14] Hugo Alaspa, "A Basketball Ability Test for High School and College Male Students," (unpublished Master's thesis, University of New Mexico, Albuquerque, New Mexico, 1949), 34 pp.

(4) Free Throw Test; (5) Jump and Reach; and (6) Speed Dribble Test.

Reliability was checked by testing and retesting twenty high school nonvarsity men. The coefficients of reliability for the tests were: Speed Dribble .84; Jump and Reach .87; Shooting .91; Free Throw .52; Dribble and Shoot .79; Pivot, Pass and Dribble .94.

The subjects chosen for the test were twenty University of New Mexico varsity or freshman basketball players, twenty varsity players from Albuquerque High School, and twenty nonvarsity men from each school.

In every test the mean scores of the varsity group from each school were significantly better than the scores of the nonvarsity group in either school at the one per cent level of confidence. The high school nonvarsity were significantly superior to the university nonvarsity in three events. The superiority of the university varsity over the high school varsity was not statistically significant at the one per cent level of confidence.

Kelson,[15] in 1951, developed a baseball classification plan for boys. He selected the following as essential to play baseball at the eight to twelve year age level: (1) batting ability; (2) ability to throw for distance;

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[15] Robert E. Kelson, "Baseball Classification Plan for Boys," The Research Quarterly, 24:304, October, 1953.

(4) Free Throw Test; (5) Jump and Reach; and (6) Speed Dribble Test.

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[15] Robert E. Nelson, "Baseball Classification Plan for Boys," The Research Quarterly, 24:[illegible], October, 1953.

(3) ability to throw for accuracy; (4) ability to catch fly balls; and (5) ability to catch ground balls. He found that the baseball throw for distance would be as good an index for classification purposes as any combination of the variables since the correlation with the rating was raised from .850 for the throw alone to only .853 for any combination of the variables.

Burley and Anderson[16] studied the relation between Jump and Reach test scores and intelligence test scores of 1,013 secondary school boys, the relation between the Jump and Reach test scores of athletes and nonathletes, and the relation between Jump and Reach test scores of seven sport groups. They found that the correlation between Jump and Reach test scores and intelligence test scores was .037. They also found that the athletes were significantly superior to nonathletes in Jump and Reach test performance and that the Jump and Reach test scores of seven athletic groups indicated that power was more closely related to performance in some sports than in others.

With the exception of the Clarke and Bonesteel, the Alaspa, and the Burley and Anderson studies, the

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[16] Lloyd R. Burley and Roy Lenard Anderson, "Relation of Jump and Reach Measures of Power to Intelligence Scores and Athletic Performance," The Research Quarterly, 26:28, March, 1955.

(3) ability to throw [illegible] fly balls and (5) [illegible] found that the baseball [illegible] good an index [illegible] combination of the [illegible] the batting [illegible] only .859 [illegible]

Burley [illegible] Jump and Reach [illegible] of 1,013 secondary [illegible] Jump and Reach [illegible] and the relation [illegible] seven sport [illegible] between [illegible] scores was [illegible] significantly [illegible] test performance [illegible] of seven athletic groups [illegible] closely related [illegible] others.

With the [illegible] the Allen, [illegible]

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[19] Hugh [illegible] "Relation of [illegible] Intelligence [illegible] Research Quarterly, [illegible]

items or batteries were not compared with any criterion of athletic ability.

CHAPTER III

TESTS USED IN THIS STUDY

The battery of thirteen tests used in this study were chosen and administered by two physical educators at Ernie Pyle Junior High School. They were not chosen with a study in mind, but as a means to separate classes into functional and equated groups and to aid the instructors in selecting personnel for interscholastic athletic teams. There was no time set aside to practice the tests but it was thought that most of the skills were involved in regular physical education class activities. For motivation purposes, an award certificate was presented to the pupil with the best score in each event for each grade. The following tests were used in this study:

1. Push-ups. The subject was instructed to lie on the floor, face down, body straight, arms bent, with the hands on the floor in front of the armpits. From this position, the subject straightened the arms until a front leaning rest position was reached. The body was then lowered and the arms straightened as many times as possible. Each raising of the body counted as one push-up.

2. Basketball Speed Test. The subject stood back

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1. Push-ups. The subject was instructed to lie on the floor, face down, body straight, arms bent, with the hands on the floor in front of the armpits. From this position, the subject straightened the arms until a front leaning rest position was assumed. The body was then lowered and the arms again straightened as many times as possible. Each straightening of the arms counted as one push-up.

2. Basketball Speed Test. The subject stood once

of the free throw line fifteen feet from the back board. On the signal "Go" the ball was thrown for the basket and each of the remaining throws was taken from the point at which the ball was recovered. The test was thirty seconds in duration. The score was the number of baskets made.

3. Fifty Yard Dash. The subjects took their marks using the customary crouching start. The starter used the commands, "Get on Your Marks," "Get Set," "Go." The subject's time was taken in seconds and tenths.

4. Baseball Throw. Lines, five feet apart, were marked off from forty to 300 feet beyond a restraining line. Scorers were stationed twenty feet apart. The subjects were allowed a starting run before throwing. Each subject had two throws and the best of the two was recorded.

5. Soccer Kick. The lines used in the baseball test were used in the soccer kick. The subject kicked from behind the restraining line, with no restrictions as to the number of steps, and attempted to make the ball land in the kicking area as far as possible from the restraining line. The best of two trials was recorded.

6. Potato Race. Five small blocks of wood were

of the free throw [illegible]
On the signal "Go" [illegible]
and each of the remaining [illegible]
at which the ball was [illegible]
seconds [illegible]
made.

3. [illegible] using the [illegible] the commands, "Get on your marks," [illegible] subject's time [illegible]

4. [illegible] marked off from [illegible] line. Scores were [illegible] subjects were allowed [illegible] Each subject [illegible] was recorded.

5. [illegible] that were used in the [illegible] from behind the restraining line [illegible] as to the number [illegible] land in the [illegible] restraining line. [illegible]

6. [illegible]

placed five feet apart, the first one being ten feet from the starting line. At the signal "Go" the subject started from behind the starting line, bringing the blocks in one at a time and placed them in a circular basket behind the starting line. The time was recorded in seconds and tenths.

7. Standing Broad Jump. The subjects stood with their feet several inches apart and just back of the take-off mark. The take-off was made from both feet and the subject jumped forward as far as possible landing on both feet. Distance was measured in feet and inches and the best of two jumps was recorded.

8. Basketball Free Throw. The subject stood back of the free throw line fifteen feet from the back board. The subject had ten free throws and the number made was recorded.

9. Base Running. The distance between bases was sixty feet. The subject started with the front foot on home base, facing first base. At the command "Go," he ran to first, second, third, and home touching each base in turn. The time was recorded in seconds and tenths.

10. Shot-put. The subjects put the shot from inside a circle seven feet in diameter. The shot was put

placed five feet apart, the first one being five feet from the starting line. At the signal "Go" the subject started from behind the starting line, picked up the blocks one at a time and placed them in a [illegible] behind the starting line. The time was recorded in seconds and tenths.

7. Standing Broad Jump. The subjects stood with their feet several inches apart and just back of the take-off mark. The take-off was made from both feet and the subject jumped forward as far as possible landing on both feet. Distance was measured in feet and inches and the best of two jumps was recorded.

8. Basketball Free Throw. The subject stood back of the free throw line fifteen feet from the basket. The subject was given five throws and the number made was recorded.

9. Base Running. The distance between bases was sixty feet. The subject started with one foot on home base, facing first base. At the command "Go," he ran to first, second, third, and home, touching each base in turn. The time was recorded in seconds and tenths.

10. Shot-put. The subject [illegible] from inside a circle seven feet in diameter. [illegible]

from the shoulder with one hand only and never brought behind the shoulder. The best of two puts was recorded in feet and inches. An eight pound shot was used.

11. Football Pass. The same area used for baseball throw and soccer kick was used. From an unlimited run the subject threw from behind a restraining line and attempted to throw as far as possible. The best of two throws was recorded in feet and inches.

12. Hop-Step-Jump. The subject stood on one foot just back of the take-off line, hopped forward on the same foot, stepped forward on the opposite foot, and leaped forward landing on both feet. From start to finish the performance was continuous without a pause. The best of two jumps was recorded in feet and inches.

13. Running Broad Jump. The subject used an unlimited run, taking off from or back of a take-off board, jumped into the air landing as far from the board as possible. The landing was made in a soft pit. The jump was recorded in feet and inches. The best of two jumps was recorded.

from the shoulder with one hand only and never brought behind the shoulder. The best of two puts was recorded in feet and inches. An eight pound shot was used.

11. <u>Football Pass</u>. The same area used for baseball throw and soccer kick was used. From an unlimited run the subject threw from behind a restraining line and attempted to throw as far as possible. The best of two throws was recorded in feet and inches.

12. <u>Hop-Step-Jump</u>. The subject stood on one foot just back of the take-off line, hopped forward on the same foot, stepped forward on the opposite foot, and jumped forward landing on both feet. From start to finish the performance was continuous without a pause. The best of two jumps was recorded in feet and inches.

13. <u>Running Broad Jump</u>. The subject used an unlimited run, taking off from or back of a take-off board, jumped into the air landing as far from the board as possible. The landing was made in a soft pit. The jump was recorded in feet and inches. The best of two jumps was recorded.

CHAPTER IV

ANALYSIS AND DISCUSSION OF THE DATA

This chapter presents an analysis and discussion of the material obtained by testing the physical education classes of Ernie Pyle Junior High School. The results were tabulated on the Ernie Pyle Junior High School Physical Achievement Score Card. This score card lists thirteen physical achievement tests.

I. ANALYSIS OF DATA

There were 996 boys tested over a period of three years and from the results of this testing, comparisons of physical achievement scores were made. The seventh grade was compared with the eighth and ninth grades, the eighth grade with the ninth grade, and the athletes and nonathletes in the eighth and ninth grades were also compared. When the scores of the tests had been collected, they were organized into frequency distribution tables. The scores for each event were tabulated for each grade. The means and standard deviations for the events were determined for each grade. The significance of the difference between the mean performance in each grade was determined for each event. Likewise, the significance of the differences between athletes and nonathletes were determined. The significance of these differences was

[illegible] IV

[illegible]

This chapter [illegible] of the material [illegible] classes of [illegible] were tabulated [illegible] Physical Achievement [illegible] thirteen physical [illegible]

[illegible]

There were [illegible] years and from [illegible] of physical achievement [illegible] grade was compared [illegible] eighth grade with [illegible] nonathletes in [illegible] compared. [illegible] they were [illegible] The scores for each [illegible] The means and standard [illegible] determined [illegible] difference between [illegible] determined for [illegible] the differences [illegible] determined. [illegible] determined by the formula $\frac{M_1 - M_2}{\sqrt{\sigma^2_{M_1} + \sigma^2_{M_2}}}$. Shown in Table I are the mean scores and standard deviations for the seventh and eighth grades. There was an increase in performance of the eighth graders over the seventh graders in all but one of the thirteen events (base running), and most of the differences proved to be statistically significant. The shot-put scores showed the greatest difference with a significance ratio of 16.+ followed by hop, step, and jump with 13.+, football pass 10.+, running broad jump 8.+, baseball throw 6.+, standing broad jump 5.+, soccer kick 4.+, base running 4.+, fifty yard dash 3.+, basketball free throw 2.34, basketball speed test 2.40, push-ups 2.18, and potato race with a ratio of 1.94.

Shown in Table II are the mean scores and standard deviations of the seventh and ninth grades. There is a continued increase in performance of the ninth graders over the seventh graders in each of the events and the increase was statistically significant. The shot-put showed the greatest difference with a significance ratio of 24.+ followed by basketball free throw 18.+, hop, step, and jump 17.+, football pass 16.+, basketball speed test 14.+, running broad jump 14.+, baseball throw 13.+, standing broad jump 11.+, fifty yard dash 10.+, soccer kick 9.+, push-ups 6.+, potato race 5.+, and base running

TABLE I

COMPARISON OF SEVENTH AND EIGHTH GRADE ACHIEVEMENT TEST SCORES

EVENT	Mean Score Seventh Grade	Mean Score Eighth Grade	St.Dev. Seventh Grade	St.Dev. Eighth Grade	Signif. Ratio
1. Push-ups	13.48	14.99	8.5	8.75	2.18
2. Basketball speed test	5.88	6.146	1.35	1.48	2.4
3. Fifty yard dash	8.62	8.3	1.12	1.45	3.55
4. Baseball throw	146.52'	160.85'	27.'	28.6'	6.6
5. Soccer kick	66.85'	73.65'	17.2'	20.2'	4.66
6. Potato race	21.7	21.354	2.2	2.59	1.94
7. Standing broad jump	5'0.823"	5'4.8"	8.4"	10."	5.+
8. Basketball free throw	1.928	2.08	.77	.84	2.34
9. Base running	15.534	16.47	2.06	3.2	4.7+
10. Shot-put	17'1.438"	22'.0	3.26'	4.55'	16.+
11. Football pass	64.015'	75.985'	12.85'	16.30'	10.+
12. Hop, step, jump	14.11'	16.425'	2.099'	2.27'	13.+
13. Running broad jump	9'8.14"	10'8.988"	1.57'	1.75'	8.+

TABLE II

COMPARISON OF SEVENTH AND NINTH GRADE ACHIEVEMENT TEST SCORES

EVENT	Mean Score Seventh Grade	 Ninth Grade	St.Dev. Seventh Grade	 Ninth Grade	Signif. Ratio
1. Push-ups	13.48	17.937	8.5	8.7	6.+
2. Basketball speed test	5.88	7.617	1,35	1.45	14.+
3. Fifty yard dash	8.62	7.688	1.12	.935	10.+
4. Baseball throw	146.52'	182.27'	27.'	32.'	13.+
5. Soccer kick	66.85'	83.06'	17.2'	23.'	9.+
6. Potato race	21.7	20.622	2.2	2.5	5.+
7. Standing broad jump	5'0.823"	5'9.44"	8.4"	10.2"	11.+
8. Basketball free throw	1.928	3.275	.77	.977	18.+
9. Base running	15.534	14.468	2.06	2.28	5.+
10. Shot-put	17'1.438"	25'0.852"	3.26'	4.45'	24.+
11. Football pass	64.015'	85.69'	12.85'	17.75'	6.+
12. Hop, step, jump	14.11'	17.73'	2.099'	2.7'	17.+
13. Running broad jump	9'8.14"	11'10.788"	1.57'	2.02'	14.+

with a ratio of 5.+.

Table III shows a comparison of the mean scores and standard deviations of the eighth and ninth grades. The ninth graders show an increase in performance in all the events over the eighth graders. The basketball free throw was the only event that did not prove to be significant. The basketball speed test proved to have the greatest difference with a significance ratio of 13.+ followed by shot-put 11.+, base running 10.+, baseball throw 9.+, running broad jump 8.+, football pass 7.+, fifty yard dash 7.+, hop, step, and jump 6.+, standing broad jump 6.+, soccer kick 5.+, push-ups 4.+, potato race 3.+, and basketball free throw with a ratio of 2.17.

Table IV shows the mean scores and standard deviations of the eighth grade athletes and eighth grade nonathletes. The athletes were superior to the non-athletes in all events and all but one event could be used to predict athletic ability. Basketball speed test showed the greatest difference with a significance ratio of 14.+ followed by fifty yard dash 11.+, basketball free throw 10.+, running broad jump 10.+, shot-put 9.+, base running 9.+, potato race 8.+, football pass 8.+, standing broad jump 7.+, baseball throw 7.+, hop, step, and jump 5.+, soccer kick 4.+, and push-ups with a ratio of 2.49.

with a ratio of 5.+.

Table [illegible] shows [illegible] and standard deviations [illegible] The ninth grade [illegible] all the events [illegible] free throw was [illegible] significant. The [illegible] the greatest difference [illegible] followed by [illegible] throw 9.+ [illegible] fifty yard dash [illegible] broad jump [illegible] race 3.+, and [illegible]

Table [illegible] deviations of [illegible] nonathletes. The [illegible] athletes in all events and [illegible] used to produce [illegible] showed the greatest difference [illegible] of 11.+ followed by [illegible] free throw [illegible] broad jump [illegible] base running 3.+, [illegible] race [illegible] standing broad jump [illegible] and jump [illegible] of 2.49.

TABLE III

COMPARISON OF EIGHTH AND NINTH GRADE ACHIEVEMENT TEST SCORES

EVENT	Mean Score Eighth Grade	Mean Score Ninth Grade	St.Dev. Eighth Grade	St.Dev. Ninth Grade	Signif. Ratio
1. Push-ups	14.99	17.937	8.75	8.70	4.+
2. Basketball speed test	6.146	7.617	1.48	1.45	13.+
3. Fifty yard dash	8.3	7.688	1.45	.935	7.+
4. Baseball throw	160.85'	182.27'	28.6'	32.'	9.+
5. Soccer kick	73.65'	83.06'	20.2'	23.'	5.+
6. Potato race	21.354	20.622	2.59	2.5	3.+
7. Standing broad jump	5'4.8"	5'9.44"	10."	10.2"	6.+
8. Basketball free throw	2.08	3.275	.84	.977	2.17
9. Base running	16.47	14.468	3.2	2.28	10.+
10. Shot-put	22.'	25.852'	4.55'	4.45'	11.+
11. Football pass	75.985'	85.69'	16.3'	17.75'	7.+
12. Hop, step, jump	16.425'	17.73'	2.27'	2.7'	6.+
13. Running broad jump	10'8.988"	11'10.788"	1.75'	2.02'	8.+

TABLE IV

COMPARISON OF EIGHTH GRADE ATHLETE AND NONATHLETE ACHIEVEMENT TEST SCORES

EVENT	Mean Score Eighth Ath.	Mean Score Eighth Nonath.	St.Dev. Eighth Ath.	St.Dev. Eighth Nonath.	Signif. Ratio
1. Push-ups	18.5	14.61	10.0	7.0	2.49
2. Basketball speed test	9.267	6.024	1.46	1.47	14.+
3. Fifty yard dash	7.185	8.382	.575	1.15	11.+
4. Baseball throw	191.91'	157.3'	29.4'	26.2'	7.+
5. Soccer kick	87.02'	71.114'	20.5'	19.7'	4.+
6. Potato race	19.11	21.5	1.55	2.635	8.+
7. Standing broad jump	6'1.09"	5'3.83"	7.2"	9.6"	7.+
8. Basketball free throw	3.3605	2.049	.8	.842	10.+
9. Base running	13.79	16.7	1.74	3.16	9.+
10. Shot-put	26'5.756"	20'3.3"	4.05'	4.365'	9.+
11. Football pass	94.42'	74.49'	14.75'	15.2'	8.+
12. Hop, step, jump	18.093'	16.24'	1.87'	2.26'	5.+
13. Running broad jump	12'8.8"	10'3.3"	1.36'	1.68'	10.+

Shown in Table V are the mean scores and standard deviations of the ninth grade athletes and ninth grade nonathletes. In every event the athletes were superior to the nonathletes in performance and all of the differences between events proved significant and therefore can be used to predict athletic ability. The greatest difference was in the fifty yard dash with a significance ratio of 19.+ followed by base running 14.+, basketball speed test 11.+, baseball throw 10.+, shot-put 8.+, football pass 8.+, hop, step, and jump 6.+, running broad jump 6.+, soccer kick 5.+, potato race 5.+, standing broad jump 4.+, push-ups 4.+, and basketball free throw with a ratio of 3.+.

TABLE V

COMPARISON OF NINTH GRADE ATHLETE AND NONATHLETE ACHIEVEMENT TEST SCORES

EVENT	Mean Score Ninth Ath.	Mean Score Ninth Nonath.	St.Dev. Ninth Ath.	St.Dev. Ninth Nonath.	Signif. Ratio
1. Push-ups	22.444	16.3585	10.3	9.25	4.+
2. Basketball speed test	9.523	7.2611	1.673	1.378	11.+
3. Fifty yard dash	7.114	8.879	.65	.95	19.+
4. Baseball throw	206.47'	171.39'	26.0	28.6	10.+
5. Soccer kick	93.78'	76.83'	27.6'	18.7'	5.+
6. Potato race	19.08	20.98	3.082	2.226	5.+
7. Standing broad jump	6'5".	5'9.124"	10."	9.92"	4.+
8. Basketball free throw	3.612	3.142	1.054	.913	3.+
9. Base running	13.427	16.7	2.08	2.68	14.+
10. Shot-put	28.93'	24.22'	4.55'	4.41'	8.+
11. Football pass	99.98'	80.995'	18.15'	15.0'	8.+
12. Hop, step, jump	19.214'	17.15'	2.63'	2.52'	6.+
13. Running broad jump	13'0.3314"	11'5.665"	2.2'	1.8'	6.+

II. DISCUSSION OF DATA

There was an increase in the physical achievement performance from the seventh grade through the ninth grade and it was found that this improvement was great enough to be statistically significant in most cases. It seems reasonable to assume that the advancing physical maturity of the child, the experience gained in taking the test, the training given in physical education classes and gained in play elsewhere would combine to improve performance in these tests.

It should be remembered that none of the events were practiced before testing. None of the track and field events were used in the physical education classes although some of the athletic group practiced some of the events during the track season. The soccer kick was included in the tests but only the goal keeper gained experience in using this skill while playing the game. Basketball was played on outdoor courts which might have hampered performance. Pupils had instruction in throwing during the regular program but as a rule only the best passers got to throw during a football game.

It was thought that large classes and the lack of equipment and facilities might have had something to do with the amount of improvement in skills. Even though each boy had an insignificant amount of time per period

to use a piece of equipment if the equipment were passed from hand to hand as rapidly as possible, the improvement was still considerable. With approximately twenty-four class periods devoted to each unit during a year it seemed that improvement in a skill requiring a specific facility or piece of equipment would not, perhaps, be great. It may be that more trials would have improved the reliability and have influenced the results.

The performance of athletes was superior to non-athletes and it is postulated that this might have been caused by the fact that athletes received more individual instruction than the regular physical education class personnel, because they are better conditioned, or because they may be more mature physically. It is notable that this superiority was significant as measured by the tests given. However, the tests given may not be adequate measures of all-round athletic ability.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

I. SUMMARY

The purpose of this study was to compare physical achievement scores of seventh, eighth and ninth grade boys, to compare physical achievement scores of the athletes and nonathletes in the eighth and ninth grades, and to determine which events, if any, could be used to predict athletic performance.

Thirteen physical achievement tests were given to 996 junior high school boys. The results were tabulated on the Ernie Pyle Junior High School Physical Achievement Score Cards. For detailed analysis the cards were separated into groups, the seventh grade, the eighth grade, and the ninth grades. Then the athletes were separated from the nonathletes in the eighth grade and the ninth grade.

The groups were compared with each other. The mean scores, standard deviations, and significance ratios were determined. The athletes surpassed nonathletes and each grade showed superiority over the previous grade in these tests. Statistically significant differences were found between the performance of athletes and nonathletes except for push-ups between the eighth grade athletes and

The purpose of [illegible] achievement [illegible] boys, to [illegible] athletes and [illegible] and to determine which [illegible] predict athletic [illegible].

Thirty-[illegible] to 395 junior high [illegible] lated on the [illegible] Achievement [illegible] were [illegible] grade, and the [illegible] separated from [illegible] ninth grade.

The groups were [illegible] mean scores, [illegible] were determined. [illegible] each grade [illegible] these tests. [illegible] found between [illegible] except for [illegible] nonathletes, and between the seventh and eighth grade except in the basketball free throw, potato race, basketball speed test, and push-ups, eighth and ninth except for the basketball free throw, and the ninth grade surpassed the seventh grade in all events.

The greatest differences between athletes and nonathletes were in the fifty yard dash, which had a significance ratio of 19.+ between the ninth grade athletes and nonathletes, and the basketball speed test which had a significance ratio of 14.+ between eighth grade athletes and nonathletes. All of the ratios between are great enough to be significant.

II. CONCLUSIONS

On the basis of the findings of this study, the following conclusions are drawn:

1. There is an increase in physical achievement performance from the seventh grade through the ninth grade.

2. The differences in most of the performances of the seventh, eighth, and ninth grades are statistically significant.

3. The performance of the athletes is superior to nonathletes.

4. The differences in the performances of athletes

and nonathletes is statistically significant.

5. At this age level it was possible to predict athletic ability from the tests used in this study.

III. RECOMMENDATIONS

The following recommendations are offered:

1. Improvements in the standards of physical education are urgently needed. Every school should have a way of measuring physical achievement for all students. This should be done at least once a year.

2. Physical education instructors should familiarize themselves with the existing types of physical achievement tests. By using these tests as guides, they should develop their tests to attain their own objectives.

3. In selecting events for the physical achievement test, the instructor should establish a criterion and the event or events should have a high correlation with the criterion before being accepted as effectively measuring the desired quality.

4. It is recommended that a similar study be made with a comparable group using standardized tests and standard scores to discover whether or not statistically significant differences might be found.

5. It is recommended that another experiment of the above type be made where the test skills are learned

and nonathletic statistically significant.

5. At this age level it was possible to predict athletic ability from the tests used in this study.

III. RECOMMENDATIONS

The following recommendations are offered:

1. Improvements in the standing of physical education are urgently needed. Every school should have a way of measuring physical achievement for all students. This should be done at least once a year.

2. Physical education instructors should familiarize themselves with the existing types of physical achievement tests. By using these tests as guides, they should develop their tests to attain their own objectives.

3. In selecting events for the physical achievement tests, the instructor should establish a criterion and the event or events should have a high correlation with the criterion before being accepted as effectively measuring the desired quality.

4. It is recommended that a similar study be made with a comparable group using standard [illegible] and standard scores to discover whether or not substantially significant differences might be found.

5. It is recommended that [illegible] the above type be made wider [illegible]

before testing in order to improve the reliability of the measures. It is further recommended that the reliability of each test item be established, and that more equipment be provided in order to afford opportunity for more practice in skills being taught.

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IMPORTANT!

Special care should be taken to prevent loss or damage of this volume. If lost or damaged, it must be paid for at the current rate of typing.