CHAPTER III
It has been observed in the study of the related literature that the different research workers have studied the various relationships between physical fitness, motor activities and academic achievement and intelligence of different age groups.

1) **Objective:**

   In this research project the effect of physical fitness in terms of physical achievement is to be seen through experimental technique, as against the correlation approach taken so far.

ii) **Objectives and Hypothesis:**

   1. To test whether the I.O's of the high achievers in Physical achievement (as a whole) are significantly different than the I.Q's of the low achievers in Physical Achievement.

   2. To test whether the I.O's of the high achievers in Running are significantly different than the I.O's of low achievers in Running.

   3. To test whether the I.O's of the high achievers in Pull Ups are significantly different than the I.O's of low achievers in Pull Ups.

   4. To test whether the I.O's of the high achievers in Jump and Reach are significantly different than the I.O's of low achievers in Jump and Reach.

   5. To test whether the I.O's of the high achievers in Long Jump are significantly different than the I.O's of low achievers in Long Jump.

   6. To test whether the I.O's of the high achievers in Ball Throw are significantly different than the I.O's of low achievers in Ball Throw.
To achieve the objective cited above, students have been selected by using the methods of Stratified Random Sampling as under:

Out of 26 districts in the State of Maharashtra 3 districts of the Western Maharashtra, viz. Bombay, Kolaba and Thana have been randomly selected. The schools lying in these districts are then selected randomly as under:

a) Collection of data:

- **Bombay**

- **Kolaba**
  1) Janata Vidyalaya, Khopoli.

- **Thana**
  1) Abhinav Vidya Mandir, Kalyan
  2) Dr. Bedekar Vidya Mandir, Thana
  3) Jnyan Mandir, Kalyan, Thana
  4) M. H. High School, Thana
  5) Nutan Vidyalaya, Kalyan, Thana
  6) Sharada Mandir, Kalyan, Thana.

From amongst these, 444 boys have been selected randomly, from the age groups of 13 to 16 years of age. The distribution of the 444 students according to the ages is given in Table 1.
TABLE NO. 1

Distribution of students according to ages.

<table>
<thead>
<tr>
<th>Age (in years)</th>
<th>Number of students</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>153</td>
</tr>
<tr>
<td>14</td>
<td>112</td>
</tr>
<tr>
<td>15</td>
<td>121</td>
</tr>
<tr>
<td>16</td>
<td>58</td>
</tr>
<tr>
<td>TOTAL</td>
<td>444</td>
</tr>
</tbody>
</table>

b) Classification of the Boys:

For the classification according to physical ability groups Age, Height and Weight of every boy was needed.

A form was prepared to collect the information about the boys as given below.

Form to classify the Boys

Name of the School: ____________________________

Name of the Class-teacher: ____________________ Std. ___ Div.

Name of the Monitor: ________________________ Date _______

<table>
<thead>
<tr>
<th>AGE</th>
<th>HEIGHT</th>
<th>WEIGHT</th>
<th>Total</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The said information about the boys was collected from the schools. According to marking table of Dr. P.M.Joseph every boy was given marks to his Age, Height and Weight. Then as per the individual's total of these marks a group was assigned to him. Following table was used to assign the groups:

**Table to assign the groups**

<table>
<thead>
<tr>
<th>Groups</th>
<th>Total marks given to Age, Ht. &amp; Wt.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elementry (A)</td>
<td>9 and below</td>
</tr>
<tr>
<td>Sub-Junior (B)</td>
<td>10 to 14</td>
</tr>
<tr>
<td>Junior (C)</td>
<td>15 to 24</td>
</tr>
<tr>
<td>Sub-Senior (D)</td>
<td>25 to 34</td>
</tr>
<tr>
<td>Senior (E)</td>
<td>Over 35</td>
</tr>
</tbody>
</table>

c) Marking of Test items:

The boys were given five physical achievements as mentioned below:

1. **Running** (for groups A & B - 50 yds, dash for groups C, D & E - 75 yds, dash. Time measured in Seconds).
2. **Pull-ups** (measured in number)
3. **Jump & Reach** (measured in inches)
4. **Long Jump** (measured in feet)
5. **Ball Throw** (measured in feet)

According to the Tables given by Dr. P.M.Joseph every boy was given the marks to his physical achievement as per his group.
d) **Why these Test items?**

Activities selected as test items, measure basic physical abilities like strength, power, agility and flexibility, endurance. When a boy possesses certain basic physical abilities he is supposed to be physically fit. In other words this basic physical fitness is measured in terms of his actual physical achievement in that particular test.

e) **Physical Abilities and the Test items:**

From the study of the related literature it has been found that these activities measure a specific physical ability as mentioned below:

1. Running - dash = speed, explosive power of legs.
2. Pull-ups = Dynamic strength, endurance.
3. Jump and Reach = Static leg power and leg strength
   - i) Correlation found between static leg power and leg strength by Vertical Jump i.e. Jump & Reach is \( R = 0.64^3 \)
   - ii) Significant correlation by Hans \(^4\) between back leg dynamometrical strength & Jump & Reach.
4. Long Jump = Leg power and leg strength.
5. Ball Throw = Flexibility and Agility.

Knowing this, following five Physical Achievements Tests were given:
iv) Five Test Items:

**FIRST TEST - RUNNING**

*Procedure*: The boy was asked to stand at the starting line (See Photograph No.1) The words of caution were given as 'On your marks'. And when he was found to be ready he was given the words of action - as an order to run - "Set - go". Then at the same time a handkerchief was moved. The movement of the handkerchief was seen by the time-keeper (who was standing at the finishing line - Photo No.3) and at once he started the watch. As soon as the boy crossed the finishing line time-keeper stopped the watch (Photo No.3). Noted the time in seconds and asked the record-keeper to write it down.

Every boy was to run the distance as per his group. The boys who were in groups A and B were to run 50 yards dash. The boys from groups C, D & E were to run 75 yards dash.

Timing of the every boy was recorded and marks were given according to his performance. (For various stages in the running see figures on page ).

**SECOND TEST - PULL UPS**

*Procedure*: The boy held up the bar with overhand grip. (See the figure) He did not move or have a swing on the horizontal bar (popularly called as single bar). He used to hang himself off from the ground with his arms and legs fully extended. (See the Photo No.4)

Then he lifted up his body by bending his arms (legs straight) He brought his chin near the bar (See the photo No.5 & figure)
"on your marks"  "set"  "off"  R'thigh is pulled through fast.
- Drive off the block

RUNNING

on the track (leg drive...)

stride
bend knee (on the track)

RUNNING

at the finish
TEST II PULL-UPS

STRAIGHT ON THE BAR

CHINNING UP
PULL UP

Straight on the bar

Chinning UP
This was counted as one complete pull up. Then he came down by extending his arms straight. Again he was asked to complete the pull-ups as many as he can. The total number of pull-ups was counted and recorded against his name.

These pull-ups were given the marks according to his group.

(According to the tables given by Joseph P.M.).

**THIRD TEST - JUMP AND REACH**

**Procedure**: The boy stood with his arms extended facing against the wall - with a small piece of chalk. (See Photo No.6 and the figure). He marked a horizontal line on the board. Then he was allowed to bend his knees. He jumped trice and had the marks on the same board. While marking on the board he was asked to jump as high as possible and at the same time he was to have the 'chalk mark' on the board (See the Photo No.7 and the figure).

The distance from the first standing mark and the highest mark was supposed to be his 'reach'. It was measured in inches (See the photo No.6). It was written against his name as his jump and reach.

This jump and reach was given the marks according to his group as per the marking tables.

**FOURTH TEST - LONG JUMP**

**Procedure**: The boy stood on the run-way, facing towards the jumping pit. When his number was announced he was to run and have the long jump in the pit. He was to jump from the take off
TEST III JUMP & REACH

→ MARK FIRST

JUMP & REACH

HIGH

→ MEASURING

THE JUMP
JUMP and REACH

Stand & mark

Jump & mark
TEST IV  LONG JUMP

> JUMPING A DISTANCE

MEASURING THE JUMP
LONG JUMP

hitting the board  drive up & forward  

—in the air—

leg shoot
line (see the figure). He was given three chances. The best jump out of his three trials was measured;' (see Photo No. 10) recorded against his name. The recorded jump was given marks according to marking tables.

FIFTH TEST - BALL THROW:

Procedure: The boy stood with the fully inflated football either in his right hand or left hand. (See the figure "Standing Distance") He was not allowed to run and throw. But he was to take a swing (see the figure 'turn' and photo No. 11 & 12) and throw the ball from behind the marked line. The landing of the ball was marked. The boy was given three chances. His best performance was noted as his record. The distance between the standing line and the point where the ball touched the ground first, was measured. This was supposed to his record. It was given the marks according to the marking tables.

All the boys were given understanding that they are to go under all the five tests in a particular sequence. The order of the tests was as follows:


After completing all the five tests the marks given to all the tests were totalled up. And these marks (out of 50) were supposed to be his marks of physical achievement.
BALL THROW

Standing stance  turn-  side view  front view
v) INTELLIGENCE TEST:

Dr. Oak's Intelligence test was given to these boys. There are 95 questions in the test and the time given for this test was only 35 minutes. The test was conducted according to the instructions given in the Dr. Oak's test hand-book.

According to the scores of the individual the I.Q. was assigned to each boy as per the prepared tables by Dr. Oak.

After conducting both the tests of physical achievement and intelligence specific statistical procedure was followed as mentioned in the next part of this Chapter.
vi) **STATISTICAL METHODOLOGY**


   i) Mean \[ \bar{x} = \frac{\sum x}{N} \] (Formula (1), p. 27)

   ii) S. D. \[ s = \sqrt{\frac{\sum x^2}{N} - \left(\frac{\sum x}{N}\right)^2} \] (Formula 12, p. 50)

   iii) SE of mean \[ SE = \frac{s}{\sqrt{N}} \] (Formula p. 165)

2. The observations have been grouped into High achievers and low achievers on the basis of quartiles as under:

   - High: Above \( Q_3 \) (Third Quartile)
   - Low: Below \( Q_1 \) (First Quartile)

   The Quartiles are computed by using the formula given by Garret H.E. (1962) on p. 44

   \[ Q_1 = l + \frac{\frac{3}{4}N - \text{Cumf}}{F} \times i \]

   \[ Q_3 = l + \frac{\frac{3}{4}N - \text{Cumf}}{F} \times i \]

3. For comparison of significance of difference between the means of I.Q.'s of high and low achievers the techniques of analysis of variance as given by Garret H.E. (1962) on p. 280-281 has been used.
CHAPTER III

METHODOLOGY

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