Chapter III

PROCEDURE

The Physical fitness programme is not an usual feature in Indian educational institutions. It is a common feeling that the physical fitness is for players only, general student body has to do nothing with it. Therefore, no physical fitness or motor fitness programmes are run in educational institutions. The physical fitness test batteries usually require vast play field, costly equipment and lots of time to organise them. The tests are also complicated and it is next to impossible for a physical education teacher to administer these tests single handed for the entire student population in any institution.

The purpose of this study was to find a solution for several difficult problems stated above. An attempt has been made to provide simple motor fitness test items with scales for easy assessment of performances.

In this chapter the procedures adopted for selection of test items, selection of subjects, demonstration and practice of tests, administration of tests and collection of data, training of researcher's assistants, tools used in the study and reliability of data have been explained in detail. The description of test items and statistical design have also been described.
Selection of Test Items

The tests requiring minimum possible equipment and space, least time consuming, involving natural motor movements and administratively simple were aimed at. Seeking advice from experts at the Lakshmibai National College of Physical Education, Gwalior, the following test items were included in the current study.

1. Stork Stand
2. Burpee
3. Sit and Reach
4. Bent Knee Sit up
5. Push up
6. Fifty Yard Dash
7. Standing Long Jump

The test items selected are not only befitted for motor fitness but also contribute to health related physical fitness.

Selection of Subjects

All the thirty-seven recognised Higher Secondary Schools and Intermediate Colleges of Varanasi township were visited through proper channel. Nine Higher Secondary Schools
Intermediate colleges of Varanasi town were excluded from the present study as they do not possess minimum open space to conduct two of the total eight tests namely Fifty Yard Dash and Nine Minute Run/Walk. Remaining twenty-eight Higher Secondary Schools/Intermediate Colleges were included in the study.

Four thousand seven hundred and fifty subjects belonging to twenty-eight different Higher Secondary School and Intermediate Colleges were picked up using the table of random numbers. The dates of birth of all the subjects were taken from the records of their respective schools and colleges. All the Principals were requested through a common circular to render their help to the researcher. They responded favourably and extended all possible co-operation especially in recording dates of birth, organising practice and collecting data.

**Demonstration and Practice of Tests**

Demonstration of all the eight tests included in the present study was given. The researcher visited all the twenty-eight schools/colleges one by one, and gave necessary demonstration to all the selected subjects, in the presence of respective physical education teacher/teachers. The rules and patterns of scoring governing each test were also fully explained.
In addition, short printed description of all the eight tests was given to the Principal, Vice Principal, Class Teachers, Subject Teachers, Physical Education Teachers, and subjects of all the concerned twenty eight institutions. The copies of the printed description were also placed on different notice boards.

Before the final test and collection of data, four weeks of practice in all the eight tests, included in the present study, was carried out. The practice was organised under the direct supervision of Researcher/Researcher’s Assistants/and respective Physical Education Teachers. The final test was conducted the following day of the last practice. Five minutes warming including jogging and free hand exercises for different parts of the body was also given to the subjects on each practice day.

The daily practice and later the final tests were conducted in the following order:

I  Stork Stand.
II Burpee.
III Sit and Reach.
IV Bent Knee Sit Up.
V  Push Up.
VI Fifty Yard Dash.
VII Standing Long Jump.

VIII Nine Minute Run/Walk.

During practice days, the heights and body weights of the subjects were recorded in metres and kilogrammes respectively. The subjects were asked to remove their shoes and chappals before their heights were taken. Similarly their shoes and heavy clothings like coats/blazers/pullovers etc. were also removed before they were weighed.

Administration of Tests and Collection of Data

On the following day of the last practice, the Researcher, with Assistants visited all the Higher Secondary Schools and Intermediate Colleges included in the study one after the other. Necessary equipment/materials were made available and arrangements to conduct the tests were completed well in advance. The tests were conducted in the afternoon. Each test item was demonstrated and its requirement were explained. The subjects were given five minutes of warming up before starting the tests. The researcher with the help of his assistants, and physical education teacher conducted all the eight tests in a pre set order and collected data.

Training of Researcher's Assistants

Five assistants helped the researcher in conducting all the eight tests and obtaining data. All the assistants
were trained and experienced teachers in physical education. Many trained teachers in physical education of concerned schools/colleges also came forward to assist the researcher. A clinic was organised for the assistants, and the interested teachers in physical education. Each and every aspect of each test included in the present study was fully discussed. Starting position, signal, correct execution and common faults in each test were explained. Handling and reading stop watch, measuring correct distance, reading measuring tape, blowing whistle correctly, and recording scores etc. were discussed in detail.

**Tools Used in the Study**

The researcher studied all possible scientific literature related to normative study of motor/physical fitness available at Banaras Hindu University, Varanasi and Lakshmibai National College of Physical Education, Gwalior. He went through the magazines, journals, periodicals and relevant books. In addition, he discussed each and every aspect with the guide and other experts available in Varanasi and at Lakshmibai National College of Physical Education, Gwalior.

The motor fitness variables comprising of agility, balance, cardio-respiratory endurance, flexibility, muscular strength, endurance, power, and speed have been included after long discussion. Similarly the exercises namely
burpee, stork stand, nine minute run/walk, sit and reach, bent knee sit-up, push up, standing long jump, and fifty yard dash, have been included due to their practical utility. These exercises do not require costly equipment/material, vast play field, too much time, and are easy to organise and administer.

Variables used in this study have been commonly used in almost all the motor/physical fitness study world wide. Universally accepted AAHPER Youth Fitness Test also includes these variables.

A pamphlet containing short description of all the eight exercises in Hindi was distributed to all the subjects and concerned authorities. The same was also put-up on different notice boards in different schools/colleges. This was done in order to get better response from the subjects and authorities.

Simple equipment like weighing machine, height measuring scale, measuring tape, stop watches, whistle, flags and a wooden cube to conduct sit and reach test were also used.

**Reliability of Data**

The reliability of data was ensured by establishing the reliability of the test items and tester's competency and instrument reliability.
A test is considered reliable if similar results are obtainable, when repeated by the same group under the similar conditions. Therefore, reliability may be taken as the repeatability of a test. Reliability is related to test performance itself.

There are different ways to establish reliability. Test-Retest Method is commonly accepted in motor/physical tests to establish reliability. Willgoose et al. Stein, Askew, Johnson and Nelson and Bosco and Gustafson have also recommended test-retest in physical performances. A test-retest can be given on the same day or on different days.

The present study is a normative study of motor fitness components. Therefore, test-retest method was used to establish the reliability of the tests included herein.

Reliability of the Test Items and Tester's Competency

The reliability of the items and the tester's competency was evaluated together. A sample of fifty subjects was taken randomly to establish the reliability. On the first day, the tests on all the motor fitness variables were conducted by a group of investigators. The following day the same team of investigators conducted the same tests on the same subjects under similar conditions. The test-retest co-efficient of correlation obtained for all the motor fitness variables is given below:
TABLE 1

RELIABILITY CO-EFFICIENT OF TEST-RETEST SCORES

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Name of the Test</th>
<th>N</th>
<th>Co-efficient of Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Stork Stand</td>
<td>50</td>
<td>.85*</td>
</tr>
<tr>
<td>2.</td>
<td>Burpee</td>
<td>50</td>
<td>.95*</td>
</tr>
<tr>
<td>3.</td>
<td>Sit and Reach</td>
<td>50</td>
<td>.96*</td>
</tr>
<tr>
<td>4.</td>
<td>Bent Knee Sit-up</td>
<td>50</td>
<td>.98*</td>
</tr>
<tr>
<td>5.</td>
<td>Push up</td>
<td>50</td>
<td>.98*</td>
</tr>
<tr>
<td>6.</td>
<td>50 Yard Dash</td>
<td>50</td>
<td>.90*</td>
</tr>
<tr>
<td>7.</td>
<td>Standing Long Jump</td>
<td>50</td>
<td>.88*</td>
</tr>
<tr>
<td>8.</td>
<td>9 Minutes Run/Walk</td>
<td>50</td>
<td>.92*</td>
</tr>
</tbody>
</table>

*Significant at .01 level.

From Table 1 it is clear that all the eight tests had shown very high reliability. Therefore, these tests were found very reliable. This also establishes that the tester's reliability was significantly high.

**Instrument Reliability**

The stop watches, steal tapes, weighing machine and height measuring stand were supplied by leading firms. Their reliability was ensured by the manufacturers. The same weighing machine and height measuring stand was used in recording the body weight and height of all the subjects respectively.
Description of Tests

Stork Stand

Objective

Stork stand is to measure the static balance.

Equipment

Stop Watch.

Description and Administration

The subject stands erect with medium stance, body weight equally distributed on both the feet, and hands placed on the trunk. The subject places the foot of the non-dominant leg on the inside of the supporting knee. On the signal 'Go' he raises the heel from the floor and maintains balance as long as possible without moving the ball of the foot from its initial position, or letting the heel touch the floor. Hands also remain on trunk during the test. The exact starting position and the execution is shown in Fig. 1 and 2.

Scoring

The score is the greatest number of seconds counted between the signal 'Go' and the balance lost. Three trials were given with the preferred foot. Only the highest score was recorded.
Fig. 1. Stork Stand - Starting Position.
Fig. 2. Hook Stand - Balancing Position.
The researcher demonstrated stork stand with due explanation and caution. He made it clear to the subjects that shifting balancing toe and removing hands from the trunk was not allowed. If any one did not comply, it would be assumed that he lost the balance and the score would be recorded accordingly.

Burpee

Objective

According to Johnson and Nelson agility may be defined as the physical ability which enables an individual to rapidly change body position and direction in a precise manner. Burpee if performed faster against shorter duration (a few seconds) measures the rapidity by which body changes its position. If it is performed for a longer duration for maximum repetitions, it measures general muscular endurance of the body. In the present study burpee is included to test the agility of the subjects. Burpee is also known as Squat Thrust.

Equipment

Stop Watch.

Description and Administration

The subject stands erect with narrow stance. On the signal 'Go' he (a) bends the knees and waist and places the hands on the floor in front of the feet (assumes squat position).
(b) thrusts the legs backward to a front leaning rest position, (c) returns to the squat position, and (d) comes back to original standing position. The subject continues this exercise as rapidly as possible maintaining correct positions at every stage until the signal 'stop' is given. The different positions are shown in Fig. 3, 4 and 5.

Scoring

The score is the number of the parts (a to d as described above) executed in 10 seconds. Positions a, b, c and d fetch 1, 2, 3 and 4 points respectively.

The researcher demonstrated burpee with due explanation. He cautioned the subjects about one point penalty for the following short comings:

a) If the feet moved for the thrust before hands were placed on the floor,

b) If the body especially the hips were not strait in the rearward position,

c) If the hands left the floor before the feet were drawn for squat position, and

d) If the stand was not erect with the head up.
Fig. 3. Burpee - Start and Finish.
Fig. 4. Burpee - Squating Position.
Sit and Reach

Objective

According to AAMPER the objective of Sit and Reach is to judge the flexibility of low back/hamstring.

Equipment

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normal reach is recorded. Now the subject stretches his hands forward as far as possible on the centimetre scale, holds his hands for one second and his maximum reach is recorded. The subject is not allowed to bend knees at any stage. Another subject is used as a helper to hold the knees down. The normal reach and maximum reach of the subject is shown in Fig. 5 and 7.
Sit and Reach

Objective

According to AAHPERD the objective of Sit and Reach is to judge the flexibility of low-back/hamstring.

Equipment

One mat and one plywood cube with 30 cm sides. The top side is extended 23 cm past the edge of the cube. The top side is marked in centimetres. The plywood cube was locally prepared exactly as per the specifications of AAHPERD.

Description and Administration

The subject sits on the mat with legs fully extended and touches front edge of the cube with the feet. The 23 cm extended top extends towards the subject. The subject keeps his back straight, places hands one on the top and the other on the scale and his normal reach is recorded. Now the subject stretches his hands forward as far as possible on the centimetre scale, holds his hands for one second and his maximum reach is recorded. The subject is not allowed to bend knees at any stage. Another subject is used as a helper to hold the knees down. The normal reach and maximum reach of a subject is shown in Fig. 6 and 7.
The scoring in sit and reach test is easily obtained by determining the maximum reach in centimeters and recording the results. Due to the test being administered to many subjects, the examiner should bend the subject’s body so that the distance between the two heels and the hips are about the same. The sit and reach test is simple and easy to administer and is a good test to screen for many athletes. A subject is asked to reach to the limit and hold the position until the examiner says ‘stop’. The examiner must be familiar with the procedure and the subject must be instructed to hold the position until the examiner says ‘stop’.

Fig. 6. Sit and Reach – Normal Reach Position.

Fig. 7. Sit and Reach – Maximum Reach Position.
**Scoring**

The scoring in sit and reach test is easily obtained by deducting normal reach from maximum reach.

The researcher demonstrated Sit and Reach Test with due explanation and caution. The subjects were warned not to bend their knees and use jerking action to record their maximum score. They were rather insisted to hold their maximum reach position for one second. They were also asked to remove their shoes and chappals.

**Description and Administration**

The subject assumes supine position on the mat. He bends the knees and brings the heels closer to the hips so that the distance between the two (heels and the hips) are about 30 to 40 cm. Hands are across the chest on opposite shoulders. A partner takes kneeling position and holds the ankle of the subject firmly. On the signal 'Go' the subject comes up, touches the thighs with his elbows and goes back to the starting position. This is counted one. The subject continues the same for one minute and tries to complete as many repetitions, as possible. The subject stops on the signal 'stop'. Incomplete and repetitions with restricted movements are not counted. The starting position and the 'sit up' position are shown in Fig. 8 and 9 respectively.
Fig. 8. Bent Knee Sit up - Starting Position.

Fig. 9. Bent Knee Sit up - Sit up Position.
Scoring

The score is the number of complete repetitions in one minute.

The researcher demonstrated Sit-up with due explanation and cautioned the subjects for incomplete sit-ups. He made it clear that repetitions with restricted movements would not be counted.

Push Up

Objective

Push up measures the endurance and strength of the arms and shoulder girdle.

Equipment

Mat.

Description and Administration

The subject assumes straight arm front leaning rest position. On the signal 'Go' the subject takes the body down until the chest touches that mat and pushes upward to come back to the starting position (straight arm support position). This is counted one. The body must be kept straight throughout the exercise. The chest must touch the mat and arms are fully extended while executing the exercise. The subject is expected to do as many push-ups as possible without any rest
or pause. The starting and deep down positions are shown in Fig. 10 and 11.

**Scoring**

The score is the total number of correct push-ups executed.

The researcher demonstrated the push-up with due explanation and warned that only correct executed push-ups would be counted. The subjects were reminded that body must be straight throughout the exercise, chest must touch the mat, arms must be fully extended at elbows and the push-ups must be executed continuously without any pause or rest.

**Fifty Yard Dash**

**Objective**

Fifty yard dash is to measure speed.

**Equipment and Facilities**

Two stop watches, two whistles lime powder and a suitable running area for the Fifty yard run and extended area for gradual stopping.
Fig. 10. Push up - Starting Position.

The researcher made sure that the line for the running the follow through was adequately clean and the starting and finish lines were marked with line. The subjects were assembled especially were also down possible.

Fig. 11. Push up - Deep Down Position.
Description and Administration

The subject takes standing start behind the starting line. The starter gives the commands "Readdy" and 'Go'. The starter also drops his hand with the command 'Go'. This helps the time keepers in recording accurate timing. The subject runs as fast as possible across the finish line. The start and finish of this test is shown in Fig. 12 and 13.

Scoring

The score is the time clocked to the nearest tenth of a second by the subject.

The researcher made sure that the area for the run and the follow through was adequately cleaned and the starting and finish lines were marked with lime. The subjects were assembled and briefed fully with the procedure of the test especially with the words of command of the starter. The subjects were also briefed that they would run in pairs and not low down before the finish line but continue running as fast as possible across the finish line.

Standing Long Jump

Objective

Standing Long Jump is to measure the power (explosiveness) of the muscles of lower limbs. It is also known as the
Fig. 12. Fifty Yard Dash - Start.

Fig. 13. Fifty Yard Dash - Finish.
athletic power of the legs in jumping forward.

**Equipment and Facilities**

Long jump pit, measuring tape and lime powder.

**Description and Administration**

The subject keeps his feet parallel to each other and behind the starting line (take off line), bends knees, swings the arms and jumps as far as possible. If he falls backward while landing, the measurement is taken between the take off line and the nearest break of the landing surface (surface broken by any part of the body). Three trials are given. The take off and landing positions are shown in Fig. 14 and 15.

**Scoring**

The score is the distance measured between the take off line and the nearest break of the landing surface. The distance is measured in metres and the best jump is considered as the score.

The researcher demonstrated standing long jump with due explanation to the subjects. The number of trials and the method of measurement were fully explained. The subjects were specially alerted against the foul take off and poor landing and were also informed that only the best jump would be consider
Fig. 14. Standing Long Jump - Take off.

Fig. 15. Standing Long Jump - Landing.
Nine Minutes Run/Walk

Objective

The Nine Minutes Run/Walk Test is to measure the cardio-respiratory fitness. The measurement of cardio-respiratory has become synonymous with the measurement of maximum oxygen capacity. The latter is not feasible for testing large number of subjects due to nonavailability of expertise and expensive equipment.

Equipment and Facilities

Open space, stop watch, one whistle, measuring tape, markers and lime powder.

Description and Administration

This test requires an open space like running track (any size of running track), football, hockey or handball field or any open space. A specific course is measured. The size of the course depends upon the availability of open space. Depending upon the size of the course, it is divided into quarters or eighths or tenths by placing markers. This helps the tester to determine quickly the exact distance covered in nine minutes.

A starting line is marked. Ten subjects are tested at a time. On the command 'Ready', the subjects stand behind the starting line and on the command 'Go', they start running
around the measured course. The time keeper also starts the stop watch with 'Go' command. The number of laps completed by each runner is counted. After the end of nine minutes, a long whistle is given. The runners stop and remain on their respective spots till the distance covered by them is measured and recorded. The total distance covered by each subject is easily calculated. Say the test is given on 400 metres track with 8 markers placed at equal intervals (each segment is $400 \div 8 = 50$ metres long). A subject completes 4 laps and stops 13 metres beyond the 4th marker. His total distance would be $400 \text{ metres} \times 4 + 50 \text{ metres} \times 4 + 13 \text{ metres} = 1813 \text{ metres}$.

The researcher kept the running course ready in every respect. The subjects got assembled and necessary instructions about the test were given. The subjects were especially advised to cover maximum distance possible within nine minutes, and to stop after hearing the long whistle and remain on their respective spots until the distance covered by them was recorded. The starting and finish positions are shown in Fig. 16 and 17.

**Scoring**

The score is the total distance covered in metres by a subject.
Fig. 16. Nine Minute Run/Walk - Start.

Fig. 17. Nine Minute Run/Walk - Finish.
**Statistical Design**

The present study was undertaken to establish motor fitness norms for classes nine and ten boys of Higher Secondary Schools and Intermediate Colleges of Varanasi township.

The researcher wished to develop Percentile Scales, 6 Sigma Scales and Hull Scales separately for each motor fitness variable included herein. He also attempted to find coefficient of co-relation of age, height and weight with all the motor fitness variables included in this study.