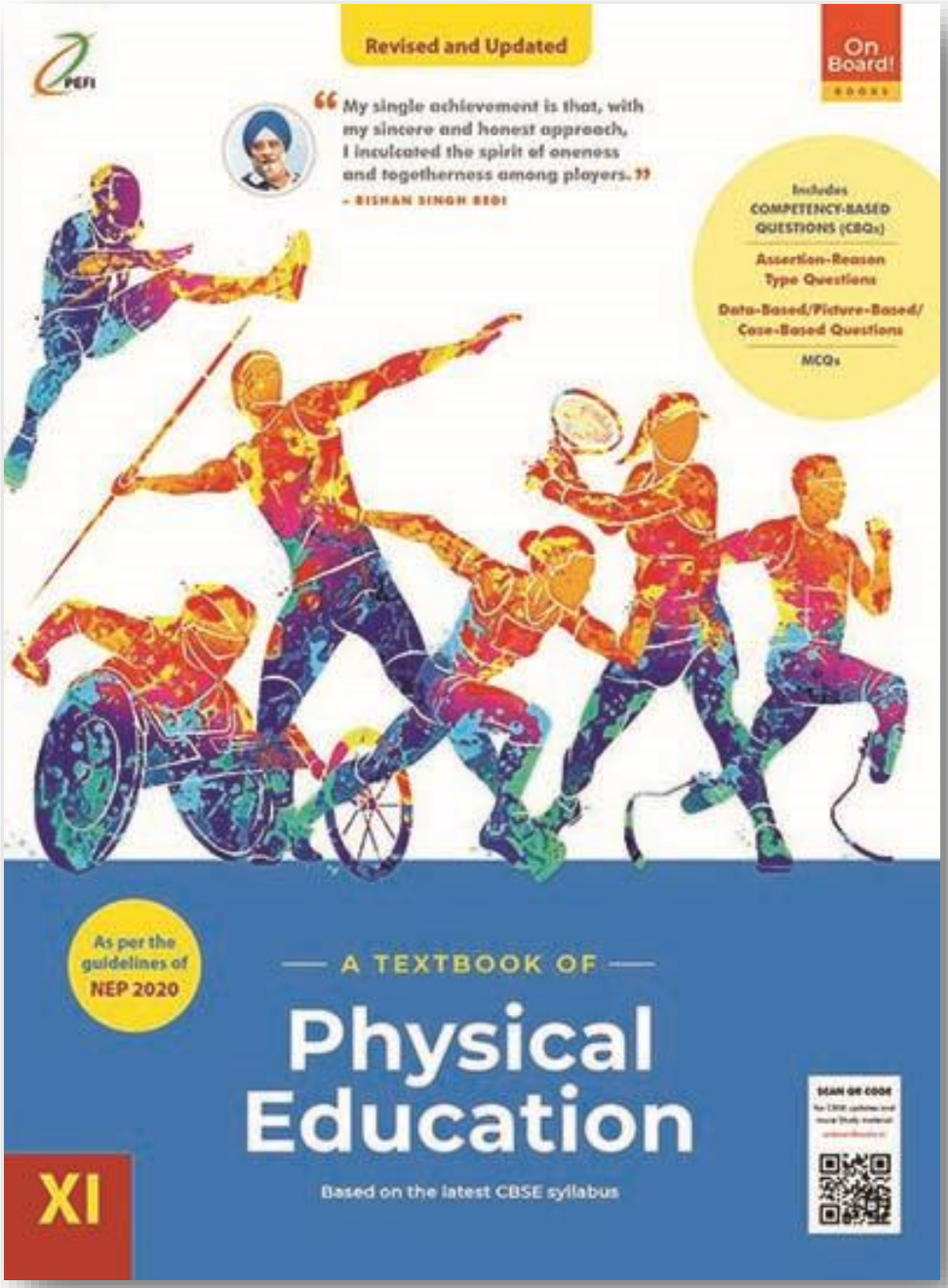

A Textbook of Physical Education Class 11

Chapter 7

TEST, MEASUREMENT AND EVALUATION

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DEFINE TEST, MEASUREMENT AND EVALUATION

On Board! BOOKS

Test

"*Test refers to any specific instrument, procedure or technique used by an administrator to elicit a response from the test taker*."

– H M Barrow and McGee

"*A test is a tool to evaluate the skill, knowledge, capacities or aptitudes of an individual or a group*."

– Webster Dictionary

Measurement

"*Measurement refers to the process of administrating a test to obtain quantitative data*."

– H M Barrow

"*Measurement aids evaluation process in which various tools and technique are used in collection of data*."

– Barry L Johnson and Jack Nelson

Evaluation

"*It is the process of education that involves collection of data from the products which can be used for comparison with preconceived criteria to make judgments*."

– H M Barrow and McGee

IMPORTANCE OF TEST, MEASUREMENT AND EVALUATION IN SPORTS

We can understand the importance of tests, measurements and evaluations in the field of sports and physical education from the following points:

1. **Classification of Athletes**:
2. **Identification of Skill Sets**:
3. **Improvement of Performance**:
4. **Motivation**:
5. **Goal Setting**:
6. **To Predict Performance Potential**:
7. **For Finding Out Athletes' Needs**:
8. **For Research Purposes**

CALCULATION OF BMI AND WAIST–HIP RATIO

Calculation of Body Mass Index (BMI)

Body Mass Index is a statistical measurement which uses an individual's height and weight for comparison so that their healthiness can be determined.

How to Calculate BMI

BMI can be calculated

using the following formula:

Body Mass Index (BMI)

$$= \frac{\text{Body weight}}{\text{Height} \times \text{Height}}$$

Refer to **Table 7.1 for** Body Mass Index (BMI) Table for Adults Page 107

Table 7.2 BMI Chart

Category	BMI
Underweight	BMI < 18.5
Ideal	BMI = 18.5 – 24.9
Overweight	BMI = 25 – 29.9
Obesity Class I	BMI = 30 – 34.9
Obesity Class II	BMI = 35 – 39.9
Extreme obesity	BMI > 40

Calculation of Waist–Hip Ratio (WHR)

Waist-hip ratio is the measurement of the waist circumference divided by hip circumference. For example, if an individual's waist measures 30 inches and the hips measure 42 inches, his waist-hip ratio is 0.71.

How to Calculate WHR

WHR can be calculated by measuring the circumferences of the waist (just above the belly button) and hips (at the widest part of the buttocks) using a measuring tape. The measurements are then used to calculate WHR as shown in the formula below:

$$\text{WHR} = \frac{\text{Waist circumference}}{\text{Hip circumference}}$$

Measurements are taken in inches or centimetres.

Both BMI and WHR should be taken together for a more accurate determination of health risk.

SOMATOTYPES (ENDOMORPHY, MESOMORPHY AND ECTOMORPHY)

There are three somatotypes currently used: *endomorphy*, *mesomorphy* and *ectomorphy*. They were classified by W H Sheldon.

Endomorphy

1. An endomorph is characterised by a soft and round body shape with short arms, legs and neck. They have a wide bone structure and their

body fat is distributed mainly on the arms and

thighs.

2. Endomorphs usually find it difficult to lose weight and are at greater risk of becoming obese as their metabolism is slower and thus capacity of fat storage higher than other body types.

3. Their muscles are underdeveloped and hidden under layers of fat.

4. They are prone to knee and feet problems and have a low centre of gravity.

5. As sports require agility and muscular strength, endomorphs, with their low energy levels, are not the best suited for sports that require a lot of endurance, speed and exertion, and many other points.

Mesomorphy

1. A mesomorph is lean and muscular with a flat abdomen. Their shoulders are broad, their arms and legs are proportionate and their bones and muscles are thick. Mesomorphy body type is often referred to as ‘athletic build’.

2. Mesomorphs are able to build muscles quickly and with greater ease. Their body fat is low and evenly distributed, although this will change for the worse if they do not exercise. They also burn fat quickly.

3. Mesomorphs have strong and agile bodies, good metabolism and respond well to exercise – attributes that fit the physiology of a sportsperson.

4. Mesomorphs can do strong cardio workouts, unlike endomorphs, and apply themselves to all types of powersports – weightlifting, bodybuilding, football, hockey, etc.

Ectomorphy

1. Tall and slender, ectomorphs have narrow shoulders and hips, flat chests and elongated limbs and muscles. Their joints are small

2. They have low fat content which is responsible for their thin and fragile appearance and find it difficult to gain weight and muscle mass due to fast metabolism.

3. An ectomorph's diet should be rich in calories and fat. However, it should be supplemented by cardio workouts and strength training exercise routines.

4. Sports suitable for ectomorphs include badminton, tennis, table tennis, gymnastics, track and field and so on

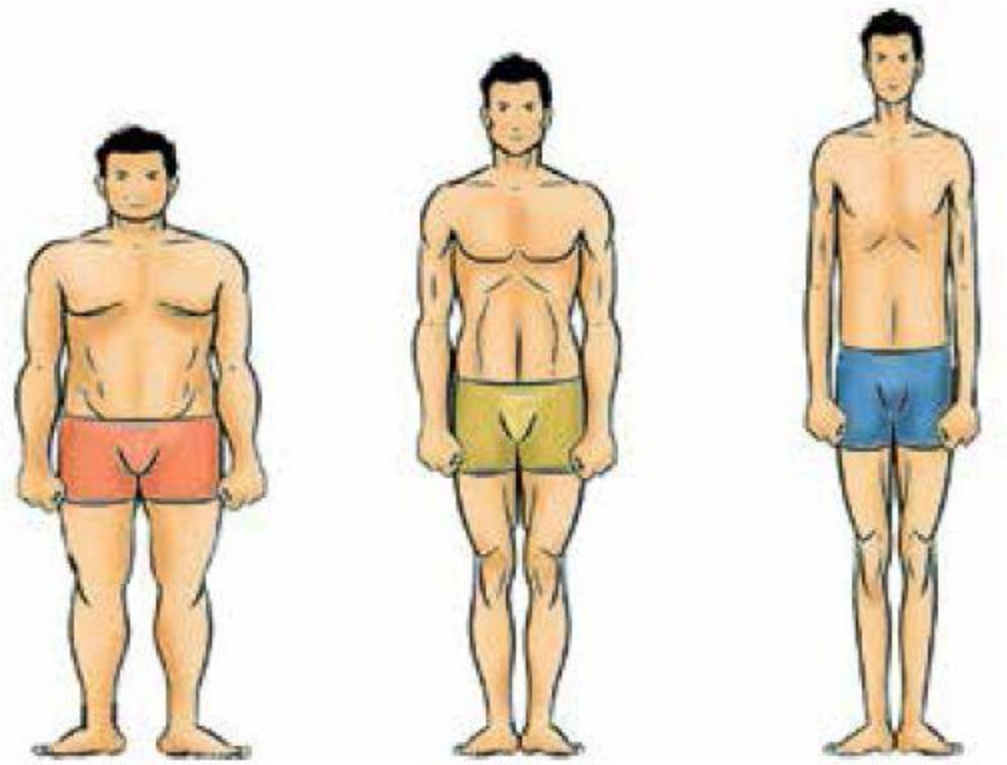

Figure 7.5 Somatotypes of individuals

Measuring Somatotype

1. Heath-Carter m easurement system is used for finding out the somatotype of a person. It includes ratings for all three somato types discussed above and it uses a range of anthropometric measurements in its calculation.

2. An individual is classified on a scale of 1 to 7 in each category, with 1 being the minimum rating and 7 being the maximum.

3. The three ratings together give a somatotype number, with endomorphy being the first score, followed by mesomorphy and ectomorphy.

4. Scores are plotted in a shield diagram, also known as a somatography, which represents the somatotype of the individual on a two dimensional scale.

5. It can be said that all individuals have some combination of all three somatotypes to a certain degree. If an individual has a score of 361 on the somatograph, it indicates that they are a mesomorph since 6 is a higher score than 3 or 1.

6. By using the results of a somatograph, athletes can be matched with suitable sports types. For example, a statistic of 375 is suitable for a footballer and 172 for a bodybuilder.

Measurement of Health Related Fitness

The fitness components that are directly related to health or, in other words, whose imbalance will create an ill-effect in the maintenance of good health, are termed as Health Related Fitness Components. Few of them are as follows:

- Cardiorespiratory endurance : VO2 Max test, Endurance Run/Walk (1 mile), Harvard step test, 1 mile Rockport test, 1.6 km run, 12 minute Cooper test, etc.
- Muscular strength: Partial push ups, weightlifting, pull ups, modified push ups, partial curl up, etc.
- Muscular endurance: Sit ups, push ups, pull ups, running on treadmill
- Flexibility: Sit and reach test, V-sit test, toe touch test, back stretch test.

Let us discuss these health related fitness tests developed by the Fit India Mission.

- **BMI:** Please refer to page 111 of the textbook.
- **Muscular Strength and Endurance:** *a. Partial Curl-up (Abdominal/Core Strength): b. Push ups for Boys/Modified Push ups for Girls (Muscular Endurance):*
- **Sit and Reach Test (Flexibility)**
- **600 M Run/Walk (Cardiovascular Endurance)**

SUMMARY

1. A test is a tool to evaluate the skill, knowledge, capacities or aptitudes of an individual or a group.
2. In the realm of physical education and sports, tests are an indispensable tool for proper planning and management towards achieving an objective or target by sportspersons, to monitor their improvement, and to re-evaluate their needs, strengths and weaknesses.
3. Measurement refers to the process of administrating a test to obtain quantitative data.
4. Numerical values let us see at a glance how much progress a sportsperson has made, how much is left to develop, and what limitations should be imposed.
5. Test, measurement and evaluation helps in setting goals for the students which involves using mental skills such as imagery which can help with skill learning, strategies, presentation and working through competitive anxiety.
6. BMI can be calculated using the following formula:

$$\text{Body Mass Index (BMI)} = \frac{\text{Body weight}}{\text{Height} \times \text{Height}}$$

SUMMARY...

7. An endomorph is characterised by a soft and round body shape with short arms, legs and neck.

8. Mesomorphs have strong and agile bodies, good metabolism, and respond well to exercise – attributes that fit the physiology of a sportsperson.

9. Sports suitable for ectomorphs include badminton, tennis, table tennis, gymnastics, track and field and so on.

10. In schools, growth charts are often put up in classrooms in order to help students see for themselves if their height, weight, etc. are normal for their age, or if they are overweight or underweight.

11. The fitness components that are directly related to health or, in other words, whose imbalance will create an ill-effect in the maintenance of good health, are termed as Health Related Fitness Components.