

UNIT- 7

Test, Measurement and Evaluation

Test

“A test is a tool which is used to evaluate the skill, knowledge, capabilities or aptitudes of an individual or a group.”

“A Test is a tool which is used to evaluate the quality, performance and reliability of the task completed by a person.”

Measurement

“Measurement is a collection of data and information about certain skill or level of fitness of an individual by using test and relevant techniques.”

“Measurement is about the collection of data about performance or task completed by a sports person by using a test.”

“Measurement refers to the process of administering a test to obtain quantitative data.”

Evaluation

“It is a systematic determination of a subject’s merit, worth and significance, using criteria governed by a set of standards.”

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

The most important aspect of evaluation is to determine the applicability, capability and achievement of the said objectives, its efficiency, effectiveness, impact and sustainability.

According to United Nations Evaluation Group (UNEG); -

“An evaluation is an assessment, as systematic and impartial as possible, of an activity, project, program, strategy, policy, topic, theme, sector, operational area, institutional performance....”

“It is a decision-making process which assists to make grade and ranking.”

Importance of Test, Measurement and Evaluation in Sports

- ✓ To frame the objectives.
- ✓ To help the selection of player.
- ✓ To help the evaluate the learners.
- ✓ To evaluate the teaching program.
- ✓ To know the capacities and abilities of players.
- ✓ To study the need of the participants.
- ✓ Help to conduct the research.
- ✓ Help to Achieve Aims and Objectives.
- ✓ Help to prepare norms and standards.
- ✓ Help to predict in advance the performance potentials of player.
- ✓ To help the individual game classification of player.

The four importance in the physical education field are given below of test, measurement & evaluation:

To frame the objectives:

Test and Measurement helps in setting the target or goal according to the need and requirement. By adopting the Test and Measurement techniques the physical education teachers get an accurate idea about the progress made by the students.

To evaluate the learners

In the field of physical education and sports Test and Measurement helps in collection of data which further helps in evaluating the learner’s ability separately. It also helps the sports person in enhancing his

sports performance.

To evaluate teaching program

Test and Measurement is a scientific tool which helps the teacher to adopt correct methodology upon the sportsman so that desired results may be achieved.

To discover the needs and requirements of the participants

Needs of the participants are correctly assessed by the scientific approach of Test and Measurement. It helps in knowing where more emphasis is needed so that target may be achieved.

Body Mass Index (BMI)

BMI of any individual can be calculated with the help of the following formula.

$$\text{Body Mass Index (BMI)} = \frac{\text{Body weight in KG}}{\text{Height} \times \text{Height in M}} \quad \text{Kg/m}^2$$

Here the weight of the individual's is measured in kilograms and the Height of that individual is taken in meter.

Example

Calculate the BMI of a male person whose body weight is 80 kg and his height is 1.60 m. Also state the category in which he falls?

Body weight = 80 kg, Height = 1.60 m

$$\text{Body Mass Index (BMI)} = \frac{\text{Body weight in KG}}{\text{Height} \times \text{Height in M}} \quad \text{Kg/m}^2 = 31.25 \text{ Kg/m}^2$$

He falls obesity type I.

BMI Table

Category	BMI
Underweight	< 18.5
Normal weight	18.5–24.9
Overweight	25.0–29.9
Obesity class I	30.0–34.9
Obesity class II	35.0–39.9
Obesity class III	> 40.0

Waist Hip Ratio (W.H.R.)

Waist-hip ratio is defined as the measurement of waist circumference divided by Hip circumference.

It is used as a risk factor assessment tool for heart diseases, Hypertension and Type-II diabetes. Excess body fat is considered a risk factor of deceases.

$$\text{Waste hip ratio (W.H.R.)} = \frac{\text{Body weight in KG} \times \text{Waist circumference (in inches)}}{\text{Hips circumference (in inches)}}$$

Example

If an individual (male) waist circumference measurement is 30 inches and hip circumference measurement is 44 inches. Then calculate his waist hip ratio. Also state the category of his health risk.

Waist circumference = 30 inches, Hip circumference = 44 inches = 0.68

It means the individual (male) is not at health risk. In case of male if the W.H.R. Is more than 1.00, than he is at the health risk.

Somatotypes (Endomorph, Mesomorph, Ectomorph)

Somatotypes means human body shape, and physique types. Somatotypes helps the physical education and sports teaches to classify the students for particular sports and games on the basis of physical, mental and practical aspects.

Somatotypes means human body shape and physique type.

According to W.H. Shielding,

human beings can be classified into three extreme body types i.e.

Endomorph

People with endomorph body structure have rounded physique. Their excessive mass hinders their ability to compete in sports. Suitable games weight lifting and power lifting.

Mesomorph

People with mesomorph body structure have thick bones and muscles with rectangular shaped body. They have larger and broader chest and shoulders can be top sports person in any sport.

Endomorph

These realism people because their muscles and limbs are elongated. They have flat chest and have less muscle mass. They have less strength but dominate endurance sports.

The procedure of measuring somatotypes is based on the classification by W.H. SHELDON

Endomorph

Such individuals have short arms and legs and rounded physique. The upper parts of arms and legs are significantly thicker than the lower parts. Their excessive mass hinders their ability to compete in sports.

Mesomorphs

Such individuals have balanced body compositions and athletic physique. They are able to increase their muscle size quickly and easily and have rectangular shapes body. Their chest and shoulders are broader in comparison to their waist line.

Ectomorphs

These individuals are generally slim because their muscles and limbs are elongated. As they have weak constitution of body and usually face difficulties in gaining weight. Their light body constitution makes them suited for aerobic activities like gymnastics.

Difference Between Endomorph and Mesomorph

Endomorph	Mesomorph
An individual has short	(i) An individual has balanced arms and legs. body composition.
An individual has rounded	(ii) An individual has athletic physique.
Under developed muscles	(iii) Strong muscles.
High fat storage	(iv) Fat evenly stored all over the body.
Pear shaped body	(v) Rectangular shaped body.
Less ability to compete	(vi) Can excel in sports.
They are less active.	(vii) They are capable of doing lot of activities.

Classification by Hippocrates

HIPPOCRATES was a famous physician of Greece.

Phlegmatic

(Weak, idle, passive, lethargic and spiritless, perform work very slowly)

Sanguine

(Physically fit, powerful, happy, enthusiasm)

Choleric

(Aggressive behaviour, physically strong, emotionally weak, hard workers)

Melancholic

(physically and mentally weak, pensive and pessimistic)

Classification by Ernest Kretschmer**Pyknic**

(round head and face, stocky and fatty, happy-go-lucky)

Asthenic

(tall and slim, weak body structure, talk less, hesitate to go into the crowd, lonely life, a smaller number of friends)

Athletic

(broad shoulders, strong body, powerful muscles, intelligent)

Measurement of Health-Related Fitness

Health related fitness is related with the development and maintenance of fitness components that can increase the level of health through prevention and remedies of various diseases. Health related fitness enhance one's ability to function efficiently and maintain a healthy life-style.

In this way, it can be said that health related fitness is very significant for all the individuals throughout our life.

There are following components of health-related fitness.

- ✓ Body composition
- ✓ Cardiorespiratory endurance.
- ✓ Flexibility
- ✓ Muscular Endurance
- ✓ Muscular strength

Body composition

The body composition means the amount of fat-free body weight. It is well known that a high percentage of body fat in relation to the total body weight is harmful and may lead to be obesity. From the health point of view, the normal percentage of body fat for young men and women should not exceed 15 and 25 percent, respectively.

Various methods for measuring body composition can be used by individuals, such as under water weighing, skin fold measurements and anthropometric measurements.

It means that for health-related fitness an individual should have ideal bodyweight and fat percentage.

Cardiorespiratory endurance

It is the maximum functional capacity of the cardiorespiratory system to carry on the work or physical activity involving large muscle group over an extended period.

Flexibility

It is the range of movements of joints. It is important for all individuals in daily life. It can be classified into passive flexibility and active flexibility. Active flexibility can be further classified into: Static flexibility and dynamic flexibility.

Flexibility can be measured with help of sit and reach test. active flexibility. Active flexibility can be further classified into static flexibility and dynamic flexibility. Flexibility can be measured with the help of "Sit and Reach Test".

Muscular Endurance

Muscular endurance is the ability of a muscle or group of muscles to repeat muscular contractions against a force or to carry on contraction over a maximum period. It can be measured by the number of sit-ups you can do correctly. It also measured by weight lifting etc. It is the ability of muscle or muscle group to repeat muscular contraction against a force over a maximum period. It can be measured by 'weight lifting' and sit-ups etc.

Muscular strength

It is the maximum amount of force that can be exerted by a muscle or muscle group against a resistance during a single contraction. It can be measured by pull-ups, weight lifting and push-ups etc. Muscular strength is the maximum amount of force that can be exerted by muscle or muscle group against the resistance during the single contraction.

Harvard Step Test

Harvard Step Test is a cardiovascular fitness test. It is also called Aerobic Fitness Test. It was developed by "Brouha in 1943.

Purpose

It is used to measure the cardiovascular fitness/Aerobic fitness by checking the recovery rate.

Equipment Requirement

A gym bench /box of 20 inches high for men & 16 inches for women, stopwatch and a tape

Procedure

Calculation of the Score: (100 x test duration in second)divided by (2 x sum of heart beats in recovery periods) Example: , if the total test duration was 300 seconds and the number of heart beats between 1 to 1.5 minutes was 70 then the fitness index score will be $100 \times 300 / 2 \times 240 = 62.5$

Advantages

(minimum equipment required, it required minimal cost, it is simple to set up and conduct)

Fitness index score =

$$\frac{(100 \times \text{test duration in sec.})}{(2 \times \text{sum of heartbeats in recovert periods})}$$

I.e. Test duration was 300 sec. And the number of heartbeats between: -

1 to 1.5m. =60

2 to 2.5 m. =50

3 to 3.5 m. = 40

So, fitness index score is =

$$\frac{(100 \times 300)}{(2 \times 150)} = 100 \text{ (excellent)}$$

Harvard Step Test Score

Fitness Scoring		Rating
Male	Female	
> 90.0	>86.0	Excellent
80.0-90.0	76.0-85.9	Good [Above Average]
65.0-79.9	61.0-75.9	Average
55.0-64.9	50.0-60.9	Below Average
<55	<50	Poor

Push Up [Boys]

Purpose

to measure the upper body strength and endurance to a boy

Procedure

after warm up, person take position for push up, hands, knees should not touch the mat/floor. Both the hands should be shoulder-width apart and elbows fully extended. The body from the knees, to the hips and to the shoulders should be in straight line. While in this position, the person should lower her upper

body, so that elbows may be bend to 90 degrees. Then the person back to the starting position. This is one repetition. The same process/action is repeated as per her capacities

Modified Push Up [Girls]

Purpose

to measure the upper body strength & endurance for girl

Procedure

after warm up, person take position for push up, hands, knees should touch the mat/floor. Both the hands should be shoulder-width apart and elbows fully extended. The body from the knees, to the hips and to the shoulders should be in straight line. While in this position, the person should lower her upper body, so that elbows may be bend to 90 degrees. Then the person back to the starting position. This is one repetition. The same process/action is repeated as per her capacities.

Partial Curl Up

Purpose

to test the strength & endurance of abdominal muscles.

Equipment

A flat clean mat, paper, pen.

Procedure

After warming up, subject lies in supine position on cushioned surface. feet should be 12 inches from the buttocks. Both the feet be slightly apart. The head should be in neutral position. In this starting position, the object curls up with a slow controlled movement, until the shoulders come off the cushioned surface/mat two inches, then back down again. One complete curl up, every three seconds. It should be a continuous process in a rhythm way as per capacities.

Advantages

- ✓ This test is simple and quick to perform.
- ✓ It requires minimum equipment.
- ✓ A number of subject/students be tasted at a time.

Sit and Reach Test

Purpose

measure the flexibility of your hamstrings and lower back.

Equipment

ruler, step (optional, you could make your own sit and reach box if keen too)

Procedure

If you have completed the home tests in order, you will be well warmed up by the time you are up to the sit and reach test. Otherwise, go for a jog and do some stretching. Remove your shoes and sit on a flat surface, legs extended in front of the body, toes pointing up and feet slightly apart, with the soles of the feet against the base of the step (if there is no step, just any flat surface will do). Place the ruler on the ground between your legs or on the top of the step. Place one hand on top of the other, then reach slowly forward. At the point of your greatest reach, hold for a couple of seconds, and measure how far you have reached. If you have trouble straightening your legs, get a friend to help by holding the knees down flush with the ground. See also video demonstrations of the Sit and Reach.