

BASIC CONCEPTS OF MEASUREMENT, ASSESSMENT & EVALUATION

Measurement

As a student teacher at the secondary level, you are expected to understand the meaning of the term 'measurement'. "**Measurement is a process of assigning numbers to individuals or their characteristics according to specific rules.**" (Eble and Frisbie, 1991,). This is very common and simple definition of the term 'measurement'. You can say that measurement is a quantitative description of one's performance. Gay (1991) further simplified the term as *a process of quantifying the degree to which someone or something possessed a given trait, i.e., quality, characteristics, or features.*

You can generalize these definitions as measurement provides a quantified description of any trait, characteristics, or ability. For example, Mohan has scored 58 marks in a particular examination and Ahmad has scored 59, their individual scores are the measurement of their performance on a particular test. Similarly you can use the examples of weight and height of learners in your class. If, you measure their height in centimeters and weight in kilograms, you are assigning numerals (i.e. 125 cm. or 45 kg.) using some specific rules (i.e. height in centimeters and weight in kilograms). You can perform the following activity in your class to understand the concept of measurement in a better way:

- ❖ Measurement assigns a numeral to quantify certain aspects of human and non-human beings.
- ❖ It is numerical description of objects, traits, attributes, characteristics or behaviours.
- ❖ Measurement is not an end in itself but definitely a means to evaluate the abilities of a person in education and other fields as well.
- ❖ Nature of measurement and assessment vary for various traits or attributes of the students to deal with.

By now you might have understood the concept of measurement. Let us discuss the scales of measurement:

Scales of measurement: Whenever we measure anything, we assign a numerical value. This numerical value is known as scale of measurement. *A scale is a system or scheme for assigning values or scores to the characteristics being measured (Sattler, 1992).* Like for measuring any aspect of the human being we assign a numeral to quantify it, further we can provide an order to it if we know the similar type of measurement of other members of the group, we can also make groups considering equal interval scores within the group.

These are called as measurement in different scales. There are mainly four scales of measurement, namely;

- ❖ **Nominal**
- ❖ **Ordinal**
- ❖ **Interval and**
- ❖ **Ratio**

Nominal scale: In nominal scale, a number is assigned for characterizing the attribute of the person or thing. That caters no order to define the attribute as high-low, more-less, big-small, superior-inferior etc. In nominal scale, assigning a number is purely an individual matter. It is nothing to do with the group scores or group measurement. It is therefore, measurement in nominal scale has limited meaning, even if some experts do not consider it as a measurement. As discussed earlier, any student achievement related scores (scores in subjects) or other measurement like height, weight, etc. are the examples of nominal measurement.

Statistics such as frequencies, percentages, mode, and chi-square tests are used in nominal measurement.

Ordinal scale: Ordinal scale is synonymous to ranking or grading. It includes the characteristics of a nominal scale and provides an order to the measurement, like; when we know the achievement scores of students in a group, we can arrange them either in ascending (lowest to highest) or descending (highest to lowest) order. We can also interpret the result like; who stood first, second, 10th in the group, even the last one in the group. In ordinal scale, we can use the statistics such as median (measures of central tendency), quartile and percentile measures, correlation in rank difference method, and non-parametric tests.

Interval scale: Interval scale carries all the characteristics of earlier scales like nominal and ordinal and added with an arbitrary zero point. That is, there is no absolute zero-point or true zero point. In this scale, we can group the scores into equal intervals like, scores within the intervals of: 0-5; 5-10; 10- 15; 15-20; 20-25; 25-30 etc. This is also called as equal interval scale as the size of the classes are equal, i.e. size of the class 0-5 is 5; 5-10 is 5; 10-15 is 5; 15-20 is also 5. As there is no absolute zero point in this measurement and the existing zero value is an arbitrary one, that's why all types of measurement done in education and social sciences are usually done by the interval scale.

The statistics like mean, standard deviation, product moment correlation, t-test and f-test can be used in interval scale.

Ratio scale: Ratio scale is called as the highest scale in measurement. It carries all the characteristics of earlier discussed scales with a true or absolute zero point. As there is absolute zero point in this measurement, we can say that zero height means no height. But in the case of interval scale, we cannot say that zero intelligence means no intelligence. All types of measurements conducted in Physical Sciences such as Physics, Mathematics, etc. are done by ratio scale. Ratio scale are almost non-existence in psychological and educational measurement except in the case of psycho-physical measurement. All mathematical applications – addition, subtraction, multiplication and division can be done in ratio scale.

All statistical techniques are permissible with ratio scale.

PROCESS OF MEASUREMENT: Measurement is a process which involves certain common steps in all the fields including education. As a teacher you should be aware of this process so that you can follow the same during teaching learning process. Measurement process involves three steps as follows:

Step-1 : Identifying and defining attributes

As a teacher it should be clear to you that you never measure anything or person, you always measure a quality or attribute of that thing or person. You may measure height or intelligence level of a person, temperature of boiling water, etc. there may be some attributes which are easily observable and measurable whereas there may be some complex or abstract properties also, which

are commonly termed as **constructs**. When you are going to measure any abstract construct like intelligence, honesty, etc. you have to identify certain characteristics which you will use to quantify these constructs. For example, for measuring intelligence, you may measure performance of an individual on various abilities as described by multiple intelligence theory.

Step-2 : Determining the set of operations to isolate and display the attribute

The second step is to develop a procedure to find out and invent a set of operations which will isolate the attribute of interest and display it. There are attributes like length or weight for which you can use well standardized scales, but if you are measuring intelligence, or honesty or any dimension of personality, you have to determine the set of operations; this is called operationalizing the attribute or operational definition. For example, operational definition of intelligence may be like 'in this measurement, IQ refers to the score obtained by an individual on a standard test XYZ.'

Step-3: Quantifying the attribute

The third step of the measurement process is assigning numerals to quantify the aspect of measurement or the attribute. This quantification helps in communicating about the attribute more efficiently and precisely. If quantification has been done according to a set of rule (this is known as scale), you can apply mathematical operations for making the measurement more meaningful. For example, you can decide heights will be measured in centimeters or inches, in pounds or kilograms, etc. or you will use a five point or three point scale to measure any behavioral attribute.

ASSESSMENT

Let us move towards another key concept i.e. assessment. Some teachers use assessment and evaluation interchangeably. For example, when you think of CCE, it is continuous comprehensive evaluation but under CCE you have to undertake formative and summative assessment. Therefore, it is essential to clarify the doubts and understand the term 'assessment'. Let us understand the term assessment clearly so that we can differentiate between the two.

Assessment is **“a systematic procedure for collecting information that can be used to make inferences about the characteristics of people or objects (AERA, et. al., 1999)”**. Assessment is referred as “a process of collecting evidence and making judgments relating to outcomes”. It is said that assessment has a narrower meaning than evaluation but a broader meaning than measurement. In its derivation, the word assess means “to sit beside” or “to assist the judge”, it reflects that assessment is a process of gathering data and fashioning them into an interpretable form; judgment can be made on the basis of this assessment.

If you think of classroom assessment, you can say that when a teacher observe the learners in the process of learning, collect feedback on their learning, improve his/her teaching-learning strategy to facilitate them for maximum learning, s/he is doing assessment. In connection to measurement, you can say that measurement is a process of quantifying attributes, and assessment is the process of collecting the quantified information about the attributes and interpreting it. Let us see the following example:

Ms. Preeti is a secondary school teacher. She conducted a unit testing all the sections of class IX in her school. It was a 20 marks objective type test. She collected and assessed all the answer scripts. She compiled the scores class wise and also made some groups like above average, average and below average. She returned the answer scripts with remarks like your performance is average/below average/above average. She also identified some topics where a large number of

learners were not responded well or made mistakes. She decided to provide additional activities for those topics in order to facilitate learners.

Based on above passage, mark in front of following statement, weather it was measurement or assessment?

1. Preeti assigned 1 mark for correct answer and 0 for the wrong one.
2. Preeti calculated total score of each learner.
3. Preeti categorized learners' performance as below average, average and above average.
4. Preeti identified the topics/areas where learners have not performed well.

In the above example, you can easily identify that statements 1 and 2 belong to measurement and statements 3 and 4 belong to assessment.

Assessment is considered as a part of the teaching-learning process and often categorized as ***assessment of learning, assessment for learning and assessment as learning***. Let us elaborate each category to understanding it.

Assessment of learning: It basically focuses on learners' achievement against some predefined outcomes and standards. Sometimes, it is referred to as summative assessment. Generally, teachers undertake this type of assessment at the end of a Unit or term or semester in order to grade or rank the learners. According to New South Wales Educational Standards Authority (NSWESA), assessment of learning:

- ❖ Is used to plan future learning goals and pathways for students;
- ❖ Provides evidence of achievement to the wider community, including parents, educators, the students themselves and outside groups; and
- ❖ Provides a transparent interpretation across all audiences.

Assessment for learning is practiced by teachers during their teaching-learning process. Its main objective is to improve teaching and enhance learning by facilitating learners. It takes place along with teaching-learning process in the classroom. It is more frequent and mostly unstructured, also referred as 'formative assessment'.

According to NSWESA, assessment for learning:

- ❖ Reflects a view of learning in which assessment helps students learn better, rather than just achieve a better mark;
- ❖ Involves formal and informal assessment activities as part of learning and to inform the planning of future learning;
- ❖ Includes clear goals for the learning activity;
- ❖ Provides effective feedback that motivates the learner and can lead to improvement;
- ❖ Reflects a belief that all students can improve;
- ❖ Encourages self-assessment and peer assessment as part of the regular classroom routines;
- ❖ Involves teachers, students and parents reflecting on evidence; and
- ❖ Is inclusive of all learners.

Assessment as learning: When learners are asked to assess their performance on their own, they use various assessment techniques and strategies to assess themselves. This practice helps learners to identify their knowledge gaps, adopt appropriate learning strategy and use assessment as tool for new learning.

According to NSWESA, assessment as learning:

- ❖ Encourages students to take responsibility for their own learning;

- ❖ Requires students to ask questions about their learning;
- ❖ Involves teachers and students creating learning goals to encourage growth and development;
- ❖ Provide ways for students to use formal and informal feedback and self-assessment to help them understand the next steps in learning; and
- ❖ Encourages peer assessment, self-assessment and reflection.

EVALUATION

Let us discuss about evaluation, which is a broader concept as compared to measurement and assessment. Evaluation is “*a systematic process of collecting and analyzing data in order to determine whether, and to what degree, objectives have been, or are being, achieved* (Gay, 1991)”. It leads to decision making.

As a teacher, you should understand that “*the purpose of evaluation is to make a judgment about the quality or worth of something*. (Ebel and Frisbie, 1991)”

In assessment you try to find out, the level of achievement or performance of a learner. But in evaluation your focus is, how good the performance or the level of performance. You can say that evaluation is a process of value judgment. It is also used to refer to the product or outcome of the process. You can say that “measurement and assessment are the means and evaluation is the end”. In the process of evaluation, measurement is the first step, assessment comes next and when value judgment is added to it, it becomes evaluation.

Let us further elaborate the concept of evaluation. According to Bebbly (1977). Evaluation as “*the systematic collection and interpretation of evidence leading as a part of process to a judgment of value with a view of action*”.

If you analyze this definition, you can identify four key elements of evaluation as follows:

- ❖ Systematic collection of evidence
- ❖ Its interpretation
- ❖ Judgment of value
- ❖ A view of action

Let us try to understand the above terms used.

Systematic collection implies that whatever information is gathered, should be acquired in a systematic and planned way with some degree of precision.

Information gathered systematically should be carefully analyzed and **interpreted**; superficial observations may lead to wrong interpretation.

Judgment of value takes evaluation far behind the level of mere description of what is happening, but requires judgments about the worth of an endeavor.

A view of action means every decision has a specific reference to action. It may be conclusion oriented or decision oriented.

CHARACTERISTICS OF GOOD EVALUATION

As a teacher whenever you are involved in the evaluation process, you should ensure that evaluation should have following characteristics, which are often termed as “elements of a good evaluation”.

Validity: A valid evaluation is one which actually tests what is set out to test

i.e., one which actually measures the behavior described by the objective (s), under scrutiny.

Reliability: It is a measure of consistency with which the question, test or examination produces the same result under different but comparable conditions.

A reliable evaluation mechanisms independent of the characteristics of individual evaluator.

Practicability: Evaluation procedure should be realistic, practical and efficient in terms of their cost, time taken and ease of application.

Fairness: Evaluation must be fair for all learners. This can be possible by accurate reflecting of range of expected behaviors as desired by the course objectives.

Usefulness: Evaluation should be useful for all learners. Feedback from evaluation must be made available to learners and help them to prove their current strengths and weaknesses.

THE PURPOSES OF EVALUATION

According to Oguniyi (1984), educational evaluation is carried out from time to time for the following purposes:

- ❖ To determine the relative effectiveness of the programmed in terms of students' behavioral output.
- ❖ To make reliable decisions about educational planning.
- ❖ To ascertain the worth of time, energy and resources invested in a programme.
- ❖ To identify students' growth or lack of growth in acquiring desirable knowledge, skills, attitudes and societal values.
- ❖ To help teachers to determine the effectiveness of their teaching techniques and learning materials.
- ❖ To help motivate students to learn more as they discover their progress or lack of progress in given tasks.
- ❖ To encourage students to develop a sense of discipline and systematic study habits.
- ❖ To provide educational administrators with adequate information about teachers' effectiveness and school need.
- ❖ To acquaint parents or guardians with their children's performance.
- ❖ To identify problems that might hinder or prevent the achievement of set goals.

- ❖ To predict the general trend in the development of the teaching-learning process;
- ❖ To ensure an economical and efficient management of scarce resources.
- ❖ To provide an objective basis for determining the promotion of students from one class to another as well as the award of certificates.
- ❖ To provide a just basis for determining at what level of education the possessor of certificate should enter a career.