



T.Y.B.A. (Education)

PAPER - VI

Education Evaluation

Revised Syllabus w.e.f. academic year 2005-2006

For IDE Students applicable from 2006-2007

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TYBA
PAPER VI- EDUCATION EVALUATION

- 1. Concept of Educational Measurement and Evaluation.**
 - (a) Meaning, nature, purpose of educational measurement and evaluation,
 - (b) Relation between measurement and evaluation,
 - (c) Types of evaluation – Formative and Summative

- 2. Educational Objectives**
 - (a) Bloom's taxonomy
 - (b) Learning outcomes (specifications)
 - (c) Learning experiences – Meaning and types,
 - (d) Relationship between objectives, learning experience and evaluation.

- 3. Tools of Evaluation :**
 - (a) Characteristics of a good measuring Instrument- Validity, Reliability, Objectivity – Meaning and types.
 - (b) Types of measuring Instrument
 - (i) Examination
 1. Oral
 2. Practical
 3. Written – essay and objective questions.
 4. Open book
 - (ii) Observation Techniques
 1. Checklist, 2. Rating Scale.

- 4. Testing :**
 - (a) Construction of a test,
 - (b) Norm-referenced and criterion-referenced,

- 5. Internal and External Assessment :**
 - (a) Problems related to external assessment – Planning, assessment and conduct of examinations.
 - (c) Internal assessment – Meaning, significance, areas, merits and limitations,
 - (d) Recording and reporting.

- 6. Interpretation of Result :**
 - (a) Graphical Representation – Histogram, Frequency Polygon, Pie chart – uses, and limitations.
 - (b) Tabular Representation
 - (i) Measures of Central Tendency – uses and limitations.
 - (ii) Measures of Variability –
Standard Deviation – uses and limitations.

Practical Work:

20 Marks

1. Construction of an Achievement Test,
Constructing of a Rating Scale.
2. Report of Assessing opinions on any one of the following “
 - (i) Problems related to external examination.
 - (ii) Internal Assessment.
 - (iii) Abolition of examination.



PAPER VI – EDUCATIONAL EVALUATION (TYBA)

Books recommended for reference :

Taxonomy of Educational Objectives I – Cognitive Domain – Bloom B.

Taxonomy of Educational Objectives II – Affective Domain – Bloom B.

Evaluation in Schools – Dandekar W.N.

Educational Evaluation – Theory & Practice – Patel R. N.

Evaluation & University Tests – Patil N.K,

Measurement & Evaluation in Theory – Grenland N. E & Linn R. N.

Essentials of Evaluation & Measurement in Educational – Lulla B.P. et al.



CONCEPT OF EDUCATIONAL MEASUREMENT & EVALUATION

UNIT STRUCTURE

- 1.0 Objectives
- 1.1 Introduction
- 1.2 Concept of Measurement & Evaluation
- 1.3 Meaning of Educational Measurement and Evaluation
 - 1.3.1 Educational Measurement
 - 1.3.2 Educational Evaluation
- 1.4 Nature of Educational Measurement & Evaluation
 - 1.4.1 Nature of Educational Measurement
 - 1.3.2 Nature of Educational Evaluation
- 1.5 Purpose of Educational Measurement & Evaluation
 - 1.5.1 Purpose of Educational Measurement
 - 1.5.2 Purpose of Educational Evaluation
- 1.6 Relationship between Measurement & Evaluation
- 1.7 Types of Evaluation
 - 1.7.1 Formative Evaluation
 - 1.7.2 Summative Evaluation
- 1.8 Let us Sum up

1.0 Objectives

After reading this unit you will be able to :

- Define measurement & evaluation
- Explain the nature of measurement & evaluation
- State the purpose of measurement & evaluation
- Distinguish between measurement & evaluation
- Show the relation between measurement & evaluation
- Classify the types of evaluation
- Describe the importance of different types of evaluation in teaching learning process.

1.1 INTRODUCTION

Dear students, you have gone through the various study materials in 1st year & IInd year. In IInd year, you have studied educational psychology as one of your paper. So you know that educational psychology is the use of knowledge of psychology in the field of education. In this paper you will know about educational evaluation. Like educational psychology, Educational evaluation also the use of knowledge of evaluation in the field of education. In this paper you

will be able to realise how the knowledge of evaluation is used in the field of education. In this unit you will learn about educational measurement & evaluation with reference to its meaning, nature & purpose. You will also be able to realise the relation between measurement & evaluation. Besides this, you will also know about the types of evaluation used in the process of education.

Before discussing about educational measurement & evaluation we should first know what measurement & evaluation is? So first let us know about the concept of measurement & evaluation.

1.2 CONCEPT OF MEASUREMENT & EVALUATION :

All of you are familiar with the term measurement & evaluation. In our day to day life we are using these terms regularly. But if I will ask you give the example of measurement & evaluation, you will be in confuse. Because we sometimes use both the words as synonym. But there is some basic difference between these two words. To make it clear, let us take an example, you ask the shopkeeper to give you 2 meters of cloth. So what the shopkeeper will do? He will measure the cloth with the meter scale & cut 2 mt...for you. This is called as measurement. Then you will go to the cash counter to pay for it. How will you pay for it? The cashier will value the cloth as per the rate of one meter cloth? If the cost of one meter cloth is fifty rupees, then your cloth will cost hundred rupees. If the cost of one meter cloth is 100 rupees, it will cost 200 rupees. So the value of your cloth depends on the cost of the cloth. This valuing of the cloth is known as evaluation. This value depends on the quality. So when we judge the value, quality & worth of something, we evaluate it. When we measure the quantity in terms of its height, weight, length amount etc. We call it measurement.

Measurement is the assignment of numerals to objects or persons according to set rules.

These are three groups of persons. If you will be asked to count their number, you can count & assign number like 1, 2 & 3 for the group.

Evaluation is giving 'worth', 'value' or 'judgement' to objects or persons. Here, if you will judge the nature of the persons in the group like the persons in the third group are taller than the 2nd group & 1st group. The you evaluate their height.

Check your progress - 1

Define the following

Measurement

Evaluation

1.3 MEANING OF EDUCATIONAL MEASUREMENT & EVALUATION

1.3.1 Educational Measurement : We have already mentioned that educational measurement & evaluation is nothing but the use of knowledge of measurement & evaluation in the field of teaching & learning.

The regulatory definition of “ assigning a numerical quantity to - - -” we’ll serve in most educational applications. While instruments such as rulers and stopwatch can be used to determine height, speed & so on, many intellectual capacities like intelligence, achievement etc. must be measured indirectly. Thus tests are typically used to measure such dimensions as level of intelligence etc. This type of measurement is known as mental measurement or educational measurement. Then, tell me what is the difference between physical measurement & mental measurement ?

We have already discussed that we need scale, ruler, stopwatch etc. in physical measurement & tests like intelligence test, achievement test etc. to measure the intellectual capacities. So tell me if the weight of an object ‘A’ is 50 kg. & object ‘B’ is 100 kg., what is the relation between the two ? You may answer me that the object ‘B’ is two times heavier than the object ‘A’ or the object ‘A’ is half of the weight of the object ‘B’. Ok, now give me the answer of another question. In an Intelligence test ‘Sita’ is two times intelligent than ‘Geeta’. If you say yes, then you are wrong. But why ? Because like physical measurement, there is no absolute ‘zero’ value in mental measurement. If you score “zero” that does not mean that you have ‘zero’ intelligence. This is the basic difference between physical measurement & mental measurement. We measure with relative value in case of educational measurement. Let us give some definition.

According to J. Nihko (1983)

“Measurement is a procedure for assigning numbers to specified attributes or characteristics of person in a manner that maintains the real word relationship among persons with regard to what is being measured.”

According N. E. Grouland (1985)

“Measurement is the process of obtaining numerical description of the degree to which an individual possesses a particular characteristics. (Answer the question, “How much?”)

Educational evaluation on the other hand means to examine how far the educational objectives have been achieved. Evaluation is a systematic process. This means if the growth & progress of students is casual, uncontrolled & unsystematic then there is no place for evaluation. Secondly if tries to judge the growth & progress of students towards educational objectives. It is therefore, necessary to determine previously educational objectives.

So from the instructional point of view evaluation is defined as a systematic process of determining the extent to which educational objectives are achieved by pupils.

In general, it would seem preferable to reserve the term educational evaluation for application to abstract entities such as programmes, curricular & organisational variables. Evaluation is an activity primarily for those engaged in research & development.

Let us discuss some definitions. The International Dictionary of Education (1977) explains evaluation as :

“Evaluation is value judgement on an observation, “Performance test” or indeed any ‘data’ whether directly measured or inferred. For example if a pupil gains a score of 32 on a test of education, this measure is evaluated by placing a meaning on it relative to a standard, norm or some other situation. Thus the score may be “above average” “fail” or indicative of below or above average effort on the part of the individual or again that the score is ‘good’ for his/her age, but average for his/her particular class.”

According to N.E. Gronlund (1985) -

“Evaluation is a process that includes measurement & possibly testing but it also contains the notion of a value judgement. If a teacher administers a test to a class & computes the percentages of correct responses, measurement & testing have taken place. The scores must be interpreted which may mean converting them to values like As, Bs, & Cs and so on or judging them to be excellent, good, fair or poor. This process is evaluation because value judgements are made.”

1.4 NATURE OF EDUCATIONAL MEASUREMENT & EVALUATION

If we will analyse the above meaning & definition of educational measurement & evaluation, we will be able to know it's nature & characteristics.

1.4.1 Nature of Educational Measurement :

From the concept of educational measurement we can infer the following nature about it. They are :

- It is complex in nature. It can not directly measure like physical measurement.
- It does not possess a true zero. It is not expressed in equal units.
- Interval scale is used in educational measurement.
- Interpretations are not scientific in nature.
- Interpretations made with compare to some norms, so it is relative measurement.

1.4.2 Nature of Educational Evaluation :

- Education is a continuous process.
- It includes academic & non academic subjects.
- Evaluation involves measurement, but it is broader than measurement.
- Evaluation in its broader concept includes examination of academic & non academic aspects of education.
- It is a procedure for improving the product.
- It discovers the need of an individual & designs the learning experiences.

1.5 PURPOSES OF EDUCATIONAL MEASUREMENT & EVALUATION

1.5.1 Purposes of Educational Measurement :

On the basis of the nature of measurement, Education Measurement has the following two main purpose. They are

- To measure the maximum performance &
- To measure the typical performances.

The purpose of educational measurement is to measure the maximum performance means to determine the person's ability through different tests like attitude & achievement tests etc. Here the child is motivated to do some work.

In typical performance, the purpose is to determine what a person will do under natural conditions. Here the child is not motivated to do anything. He does accordingly his interest. For example a pupil who knows the rules of good sportsmanship may refuse to abide by them. Here, he can do it, but he is not interested to do it. This is his typical behaviour. You can give a number of example of this type. A child may have the ability to solve mathematics, but he does not solve it due to lack of interest in it.

So the purpose of educational measurement is to measure the maximum performance & typical performance of pupil.

1.5.2 Purpose of Evaluation

Evaluation plays an important role in many facts of the school programme. It contributes directly to the teaching learning process. It is used in classroom instruction, programmed instruction, curriculum development, marking & reporting, guidance & counselling school administration & research.

According to J.H. Ahman and M.D. Glock (1954) the overall purpose of evaluation will be “to provide information to enable each pupil to develop according to his potential within the framework of the educational objectives of the school.”

According to Bloom (1971) the purpose of evaluation are :

- to discover the extent of competence which the student has developed in initiating organizing and improving his day to day work and to dignose his strength & weaknesses with a view to further guidance.
- to predict the educational practices which a particular student teacher can best participate in or organise.
- to certify the student’s degree of proficiency in a particular educational practice at the end of a career.

In order to achieve the ultimate objectives of education, evaluation has the following main four purposes.

- Classifying students in classes or sections of a class according to their knowledge or ability in some subject areas.
- Diagnosing the individual student’s educational weaknesses in order to plan remedial work for him & to revise teaching strategy for him.
- Assending pupil’s progress from time to time.
- Predicting student’s future academic success.

The purpose of evaluation in teaching can be best understood from it’s role. The role of evaluation is presented diagrammatically for your clear understanding.

Purpose of Evaluation in Teaching

Prepare Instructional objectives

↓

Pre-assess Learner’s needs

↓

Provide relevant instruction

1. Monitor learning progress

2. Diagnose learning difficulties

↓

Evaluate Intended outcomes

↓

Improvement of learning & instruction purposes	Marking & Reporting to parents for	Uses of results other school
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The purpose of evaluation is different in different situations. Therefore evaluation techniques should be selected in terms of the purposes to be served.

Check your progress - II

Write two purposes of -

- i) Educational Measurement &
- ii) Educational Evaluation

1.6 RELATION BETWEEN MEASUREMENT & EVALUATION

Till now you have got a clear idea of the term measurement & evaluation, their meaning, nature & purpose. From this you can say what is the relation between these two terms. If you can answer to the following questions, you can easily know about the relation between measurement & evaluation.

The questions are :

- Are evaluation & measurement synonym?
- Are evaluation & measurement totally different?
- Are evaluation & measurement related to each other?

Evaluation & measurement are not synonym. But as is common with terms that are part of our general vocabulary, there is some confusion concerning the meaning of these terms. Sometimes they are used as synonym. For example when teacher administers achievement test he might say either measuring or evaluating achievement with little regard for the specific meaning of the two terms.

In some cases evaluation is used as a collective term for those appraisal methods that do not depend on measurement. This use of the two terms distinguishes evaluation as qualitative descriptions of pupil behaviour from measurement which are quantitative descriptions.

When we analyse the meaning of both the terms, we understand the relation & difference between these two terms. From the meaning it is clear that evaluation is much more comprehensive & inclusive term than measurement, which is limited to quantitative descriptions of pupils, that is, the results of measurement are always expressed in numbers. For example 'Geeta' correctly solved

30 of the 40 arithmetic problems. It does not include qualitative descriptions of Geeta's work. For example it does not describe that her work was neat or her score is better than before or her position in the group.

Evaluation on the other hand may include either quantitative or qualitative descriptions of pupils or both. In addition evaluation always includes value judgements concerning the desirability of the result. In the above example, evaluation describes that Geeta is making good progress in arithmetic. The following diagram shows the comprehensive nature of evaluation and the role of measurement in the evaluation process.

EVALUATION = Quantitative descriptions (measurement) and/or
Qualitative descriptions (non measurement) plus value

1.7 TYPES OF EVALUATION

One of the distinctive features of the evaluation process is the use of a wide variety of procedures. These may be classified and described in many different ways, depending on the frame of reference used. The way tests & other evaluation techniques are used in class-room instruction also provides a convenient framework for describing evaluation procedures. One such classification system follows the sequence in which evaluation procedures are likely to be used in class-room instruction. On the basis of the sequence in which evaluation procedures are used in class-room, evaluation is classified into the following categories :

- Placement evaluation
- Formative evaluation
- Diagnostic evaluation &
- Summative evaluation

1.7.1 Types of Evaluation

Formative evaluation is used to monitor learning during instruction. Its purpose is to provide continuous feedback of both pupil and teacher concerning learning successes and failures.

Feedback to pupils provides reinforcement of successful learning & identifies the specific learning errors that are in need of correction.

Feedback to the teacher provides information for modifying instruction & for prescribing group & individual remedial work.

In this type of evaluation the teacher is expected to prepare special tests for each unit or chapter of instruction. It is most helpful for the immediate decision making. It helps in daily interaction

between students & teachers. It's success & effectiveness depends on the skills of the teacher. Besides tests, observational techniques are also used to evaluate regularly.

1.7.2 Summative Evaluation

Summative evaluation typically comes at the end of a course or unit of instruction. It's purpose is to determine the extent to which the instructional objectives have been achieved. It is used primarily for assigning course grades or for certifying pupil mastery of the intended learning outcomes.

The techniques used in summative evaluation are determined by the instructional objectives. But they typically include -

- teacher made achievement tests
- ratings on various types of performance &
- evaluation of products

Although the main purpose of summative evaluation is grading or the certification of pupil achievement. It also provides information for judging the appropriateness of the course objectives and the effectiveness of the instruction.

The following table describes briefly about the formative & summative evaluation. The purpose, functions, methods & instruments of both the evaluation procedure presented nicely in a tabular form. The table will give you a clarity on the use of both the evaluation procedure. You also will be to know the relation & differences between the two types of evaluation. Formative evaluation helps only the purpose is different, so the method & instruments are also different. Let us see the table.

Table - 1

Brief description of formative & summative evaluation		
Characteristics	Formative	Summative
Purpose	To monitor	
Progress of students by getting feedback to check final status of students		
Content focused	Detailed Narrow Scope	General Board Scope
Methods	Daily assignments Observations	
Frequency	Tests Projects	
Functions	Daily Weekly, quarterly etc.	
grades or	Determine learning progress provide feedback for reinforcement of learning, Correct learning errors	
	Determine end of course achievement Assigning	
Certifying mastery of objectives		

Illustrative Instruments	Teacher made mastery test custom made test from test publishers observational techniques
	Teachers made survey tests performance rating scales product scales

Check the progress - III

Match the Group

A

B

Formative Evaluation

i) To diagnose learning difficulties

Summative Evaluation

ii) To monitor learning progress

iii) Assignment of grades

iv) To determine the possession of pre-requisite skills.

1.8 LET US SUM UP :

In this unit we have studied detailed about measurement & evaluation & their uses in education.

Evaluation plays an important role in the school. It is an integral part of the instructional program and it provides basic information for a variety of educational decisions. The main emphasis in educational evaluation, however is the pupil & his or her learning progress.

Formative evaluation used in class-room instruction to determine learning progress and summative evaluation to determine the end-of-course achievement.

The evaluation process includes both measurement & non-measurement techniques for describing changes in pupil performance as well as value judgements concerning the desirability of the changes.

Form an instructional point of view evaluation is a systematic process of determining the extent to which instructional objectives are achieved by pupils.

Unit end Exercise :

Q. 1. What is measurement ? Explain it's nature & function.

Q. 2. What is evaluation ? Explain its types.

Q. 3. Write notes on -

i) Formative evaluation

ii) Summative evaluation

iii) Difference between measurement & evaluation.

Q. 4. Explain the meaning & purpose of educational evaluation.

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New York
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CONCEPT OF EDUCATIONAL MEASUREMENT & EVALUATION

UNIT STRUCTURE

- 2.0 Objectives
- 2.1 Introduction
- 2.2 Bloom's Taxonomy
- 2.3 Learning Outcomes
- 2.4 Learning Experiences
 - 2.4.1 Meaning of Learning experiences
 - 2.4.2 Types of learning experiences
- 2.5 Relationship between objectives, learning experiences & evaluation
- 2.6 Let us Sum up

2.0 OBJECTIVES :

After reading this unit you will be able to :

- Define Taxonomy
- Explain Bloom's Taxonomy
- Differentiate Bloom's Taxonomy from other taxonomy
- Describe learning outcomes
- Describe learning experiences &
- Show the relationship among objectives, learning experiences & evaluation.

2.1 INTRODUCTION :

Educational objectives plays a key role in the educational process. It makes clear what learning outcomes we expect from one teaching. A clear description of the intended outcomes of instruction aids in selecting relevant materials & methods of instruction. It also helps in monitoring pupils learning progress, selecting or constructing appropriate evaluation procedures and in conveying instructional intent to others.

The purpose of this chapter is to help you learn about instructional objectives & it's relation with learning outcomes, learning experience & evaluation.

2.2 BLOOM'S TAXONOMY :

One extremely useful guide for developing a comprehensive list of educational objectives is the Taxonomy of Educational objectives.

The word taxonomy is derived from a Greek word 'taxis' - plural, taxa - meaning "arrangement" "division". It is originally associated with biology. It refers to a system of classifying animals and plants, typically by division, class, order, family, germs & species. But in education it just means any systematic organisation. One of the most famous is B. S. Bloom's (1956) taxonomy of educational objectives. Prof. B.S. Bloom of the University of Chicago (USA) is the pioneer in this field. He was the editor of the first volume of Taxonomy of educational objectives (1956) produced by an American committee of College & University examiners. This taxonomy first divides objectives into three major areas like :

- Cognitive domain, which is concerned with knowledge outcomes and intellectual abilities and skills.
- Affective domain, which is concerned with attitudes, interest, appreciation & modes of adjustment and
- Psycho-motor domain, which is concerned with motor skills.

Each of these domains is further divided into categories & subcategories. Bloom presented his taxonomy related to cognitive domain, Krathwohl related to affective domain & Simpson related to psychomotor domain. All the three domains of the taxonomy classified the objectives in a same hierarchical pattern from simple to complex level.

2.2.1 Cognitive domain :

The major categories of the cognitive domain include :

- Knowledge
- Comprehension
- Application
- Analysis
- Synthesis &
- Evaluation

Knowledge :

Knowledge is defined as the remembering of the previously learned material. This may involve the recall of a wide range of material, from specific facts to complete theories, but all that is required is the bringing to mind of the appropriate information. It represents the lowest level of learning outcomes in the cognitive domain. For example under this objectives one is expected to know common terms, specific facts, basic concepts, principles, methods & procedures.

Comprehension :

Comprehension is defined as the ability to group the meaning of material. This may be shown by translating material from one form another by interpreting material and by estimating future trends.

These learning outcomes go one step beyond the simple remembering of material and represent the lowest level of understanding.

For example - Interpretes Charts, graphs etc.

Application :

Application refers to the ability to use learned material in new and concrete situations. This may include the application of such things as rules, methods, concepts, principles, laws & theories. Learning outcomes in this area require a higher level of understanding than those under comprehension.

For example - Constructs charts & graphs

Analysis :

Analysis refers to the ability to break down material into its component parts so that it's organisational structure may be understood. This may include the identification of parts, analysis of the relationships between parts, and recognition of the organizational principles involved. Learning outcomes here represent a higher intellectual level than comprehension & application because they require an understanding of both the content and the structural form of the material.

For example - Distinguishes between fact & inferences.

Synthesis :

Synthesis refers to the ability to put parts together to form a new whole. This may involve the production of a unique communication (theme or speech), a plan of operations (research proposals) or a set of abstract relations (scheme for classifying information). Learning outcomes in this area stress creative behaviours, with major emphasis on the formulation of new patterns or structures.

For examples - write a creative short story

Evaluation :

Evaluation is concerned with the ability to judge the value of material (statement, novel, poem, research report) for a given purpose. Judgements are to be based on definite criteria. These may be internal criteria (organisation) or external criteria (relevance to the purpose) and the student may determine the criteria or be given them. Learning outcomes in this area are highest in the cognitive hierarchy because they contain elements of all of the other categories, thus value judgements based on clearly defined criteria.

For example - Judges the value of a work. (Art, music, etc)

Check your Progress - I

Q. 1. Write the level of objectives under cognitive domain from simple to complex order.

- Q. 2. i) Write the derived meaning of taxonomy.
 ii) Who was the editor of the first volume of taxonomy of educational objectives ?
 iii) Write the meaning of taxonomy with reference to
 (a) Biology &
 (b) Education

Q. 3 Match the group

A	B
Knowledge	Identification of parts
Understanding	Writing a creative story
Application	Knows common facts
	Translating material
	Construction of charts
	Judging the art

2.2.2 Affective domain :

The affective domain included those objectives which are concerned with changes in interests attitudes and values and the development of appreciations and adjustments.

The major categories of affective domain include :

- Receiving
- Responding
- Valuing
- Organization and
- Characterization by a value or value complex

Receiving :

Receiving refers to the student's willingness to attend to particular phenomena or stimuli (class-room activities, textbook, music etc.) From a teaching standpoint, it is concerned with getting, holding, area range from the simple awareness that a thing exists to selective attention on the part of the learner. Receiving represents the lowest level of learning outcomes in the affective domain. Under the objective students are expected to listen attentively, to show sensitivity to social problem etc.

Responding :

Responding refers to active participation on the part of the student. At this level he not only attends to a particular phenomenon. but also reacts to it in some way. That means a person is actively involved in it. Learning outcomes in this area emphasizes.

- Acquiescence in responding (read assigned material)
- Willingness to respond (voluntarily reads beyond assignment)
- Satisfaction in response (reads for pleasure or enjoyment)

The higher levels of this category includes those instructional objectives that are commonly classified under interest.

Valuing :

Valuing is concerned with the worth or value a student attaches to a particular object, phenomenon or behaviour. This ranges in degree from the more simple acceptance of a value to the more complex level of commitment. Learning outcomes in this area concerned with behaviour that is consistent and stable enough to make the value clearly identified. Instructional objectives that are commonly classified under attitudes & appreciation would fall into this category. This includes :

- Acceptance of a value (desires to improve group skills)
- Preference for a value (assumes responsibility for the effective functioning of the group)
- Commitment to a certain point of view (demonstrates commitment to social improvement)

Organization :

For situations, where more than one value is relevant, the need arises for the organisation. Organisation is concerned with bringing together different values, resolving conflicts between them, and beginning the building of an internally consistent value system. Thus the emphasis is on comparing, relating and synthesizing values. Learning outcomes concerned with :

- Conceptualisation of each individual for improving human relations and
- Organisation of a value system. (develops a vocational plan that satisfies his need for both economic security & social services)

Characterisation by a value or value complex :

At this level of the affective domain, the individual has a value system that has controlled his behaviour for sufficiently long time for him to have developed a characteristic life style. Thus the behaviour is pervasive, consistent and predictable. Learning outcomes at this level cover a broad range of activities but the major emphasis is on the fact that the behaviour is typical or characteristic of the student. Instructional objectives that are concerned with the student's general pattern of adjustment (personal, social, emotional) would be appropriate here. For example - demonstrates self reliance in working independently maintains good health habits & practices co-operation in group activities etc.

Check your progress - II

Q.1 Write the level of objectives under affective domain both in ascending order & descending order

2.2.3 Psychomotor domain :

The psychomotor domain includes those objectives which are concerned with manual and motor skills. The educational objectives under this domain are :

- Preception
- Set
- Guided response
- Mechanism
- Complex over response
- Adaptation
- Origination

Preception :

The first level is concerned with the use of the sense organs to obtain clues that guided motor activity. For example relates music to a particular dance step.

Set :

Set refers to readiness to take a particular type of task. This category includes mental set, physical set & emotional set. Preception of cues serves as an important pre-requisite for this level. For example demonstrating proper bodily stance for batting a ball.

Guided Response :

Guided response is concerned with the early stages in learning a complex skill. It includes imitation & trial & error. Adequacy of performance is judged by an instructor or by a suitable set of criteria. For example - reporting an act demonstrated by the instructor.

Mechanism :

Mechanism is concerned with performance act where the learned responses have become habitual and the movements can be performed with some confidence and proficiency. Learning outcomes at this level are concerned with performance skill of various types, but the movement problems are less complex than at the next higher level.

For example - writing smoothly & legibly.

Complex overt Response :

Complex overt Response is concerned with the skillful performance of motor acts that involve complex movement patterns. Proficiency is indicated by a quick, smooth, accurate performance, requiring a minimum of energy. Learning outcomes at this level include highly co-ordinated motor activities. For example - operating a power saw skillfully.

Adaption :

Adaption is concerned with skills that are so well developed that the individual can modify movement patterns to fit special requirements or to meet a problem situation.

Example : Modifying swimming strokes to fit the roughness of the water.

Origination :

Origination refers to the creating of new movement patterns to fit a particular situation or specific problem. Learning outcomes at this level emphasize creativity based upon highly developed skills.

Example - Designing a new dress style.

All the objectives under the three domain can be represented in the following diagrammatic form to show that they all are responsible to develop the child behaviour.

Check your progress - III :

Q. 1. Identify the following activities & name the level of objectives under which it comes.

For example -

- i) Relates music to a particular dance step - Perception
- ii) Writing smoothly & legibility
- iii) Operating a power saw skillfully
- iv) Designing a new dress style

2.3 LEARNING OUTCOMES :

In preparing instructional objectives it is possible to focus on different aspects of instruction. Some teachers prefer to state the objectives in terms of what they are going to do during instruction.

For example -

- Demonstrate to pupils how to use the microscope

This statement clearly indicates what the teaching activity is, but it is less clear concerning the intended learning outcomes. Literally speaking the objectives has been achieved when the demonstration has been completed - whether or not the pupils have learned anything. Therefore a more desirable way to state objectives is in terms of what we expect pupils to be able to do at the end of instruction. Here, in this example, after demonstrating how to use the microscope, we might expect pupils to be able to do the following :

- Identify the parts of the microscope
- List the step to be followed in using the microscope
- Describes the precautions in adjusting the micro-scope
- Demonstrate skill in using the microscope

Statements such as these direct attention to the pupils and to the types of performance they are expected to exhibit as a result of the instruction shifts our focus from teacher to the pupil and from the learning experience to the learning outcomes. This shift in focus makes clear the intent of our instruction and sets the stage for evaluating pupil performance we are willing to accept as evidence that the instruction has been successful.

When viewing instructional objectives in terms of learning outcomes, it is important to keep in mind that we are concerned with the products of learning rather than the process of learning. The relation of instructional objectives (Product) to learning experiences (Process) is shown by the following diagram.

Pupil → learning experience (Process) → Learning outcomes (Product)	
Study of cell structure of plants	knowledge of parts of cell
skill in using microscope	
in laboratory	Ability to write accurate reports of scientific observation

From the above discussion we can clearly get the idea that learning outcomes is an intended outcome of instruction that has been stated in terms of specific and observable pupil performance. A set of specific learning outcomes describes a sample of the types of performance learners will be able to exhibit when they have achieved a general instructional objective.

2.4.1 Types of learning outcomes

Although the specific learning outcomes resulting from a course of study may run into the hundreds, most of them can be classified under a relatively small number of headings. Any such classification is of necessity arbitrary, but it serves a number of useful purposes. It indicates types of learning outcomes that should be considered, it provides a framework for classifying these outcomes and it directs attention towards changes in pupil performance in a variety of areas.

The following list of type of outcomes delineates the major areas in which instructional objectives might be classified. The more specific areas under each type should not be regarded as exclusive, but they are merely suggestive of categories to be included. They are –

1. Knowledge
 - i) Terminology
 - ii) Specific facts

- iii) Concepts & procedure
 - iv) Methods & procedure
2. Understanding
- i) Concepts & principles
 - ii) Methods & Procedures
 - iii) Written material–graphs, maps & numerical data
 - iv) Problem situation
3. Application
- i) Factual information
 - ii) Concepts & Principles
 - iii) Methods & Procedures
 - iv) Problem solving skills
4. Thinking skills
- i) Critical thinking
 - ii) Scientific thinking
5. General skills
- i) Laboratory skills
 - ii) Performance skills
 - iii) Communication skills
 - iv) Computational skills
 - v) Social skills
6. Attitudes
- i) Social attitudes
 - ii) Scientific attitudes
7. Interests
- i) Personal interest
 - ii) Educational interest
 - iii) Vocational interest
8. Appreciation
- i) Literature, art & music
 - ii) Social & scientific achievements
9. Adjustments
- i) Social adjustments
 - ii) Emotional adjustments

A cursory glance at this list reveals the wide variety of learning outcomes that can be considered when one is developing a list of instructional objectives for a particular course. Not every teacher will identify objectives in all of these areas. To determine the nature

of the learning outcomes to be emphasized in a particular set of instructional objectives the following criteria to be considered are :

- the age level of the pupils
- the subject matter area &
- the philosophy of the school

In general, however, we need to expand our view of expected learning outcomes so that all logical outcomes of a course are included in the list of objectives.

2.3.2 Stating the Specific Learning Outcomes :

Each general instructional objective must be defined by a sample of specific learning outcomes to clarify what pupils can do to demonstrate that they have achieved the general objectives. Unless the general objectives are further divided in this manner, they will not provide adequate direction for teaching or testing.

Statement of specific learning outcomes are easier to write and more clearly convey instructional intent. If each statement begins with an action verb that indicates definite, observable responds. For example – identifies, defines etc. Such statements make clear the types of pupil performance. We are willing to accept as evidence that the general instructional objectives has been achieved. For example – A statement “writes the textbook definition of a term” would be appropriate for the instructional objectives “knows basic terms” but not for “understands basic terms”. “For this statement the statement defines the term in his own words” would be more relevant. It would be more clear from the following lists of some specific learning outcomes under the heading of general instructional objectives.

1. Understands the meaning of terms
 - 1.5 Defines the terms in his own words
 - 1.5 Identifies the meaning of a term in context
 - 1.5 Differentiates between proper & improper usage of a term
 - 1.5 Distinguishes between two similar terms on the basis of meaning
 - 1.5 Writes an original sentences using the term

2. Demonstrates skills in critical thinking
 - 2.5 Distinguishes between fact & opinion
 - 2.5 Distinguishes between relevant & irrelevant information
 - 2.5 Identifies the limitations of given data
 - 2.5 Formulates valid conclusions from given data.

So, Learning outcomes should be stated using the following steps :

- List beneath each general instructional objective a representative sample of specific learning outcomes that

describes the terminal performance pupils are expected to demonstrate.

- Begin each specific learning outcome with an action verb that specifies observable performance.
- Check that specific learning outcomes is relevant to the general objectives.
- Includes sufficient number of specific learning outcomes.

2.4 LEARNING EXPERIENCES :

Children learn by feeling, thinking & acting, Learning results from the active participation of children in the stimulus situation which the teacher provides in the class. Learning outcomes is possible through learning experiences. Learning experience is not a part of a syllabus, nor is it a unit or teaching point. It is the interaction of the learner and the situation provided by the teacher. Each of the learning experiences modifies the behaviour of the students. For example, a student is asked to locate Delhi on the map of India, he does so. This is a learning activity. By doing so he understands that

- Delhi is the northern part of India
- It is on the Bank of the river Yamuna etc.

These after effects are called learning experiences. Due to these learning experiences he will be able to explain about the location of Delhi on the map. This is called as learning outcomes.

2.4.1 Types of learning experiences :

On the basis of the experiences learning experiences can be classified into two categories

- Direct learning experiences
- Indirect learning experiences

Direct Experiences :

Direct Experience means first hand experiences. Experiences gained through the sense organs are first hand experiences. These experiences are expressed by symbolic words. For example when the teacher teaches the part of the flowers, if he shows the sample of a flower & shows its parts then the students get the experiences are called as direct experiences. The teacher may teach the same lesson through a diagram & picture of a flower & its parts. But this is called as indirect experience. Some of the examples of direct experiences are :

- Consisting models or charts
- Experimenting with physical & chemical materials
- Drawing figures, painting models etc.

Indirect Experiences

Indirect experiences are second hand experiences. Here also we get the experiences through our sense organs, but here we do not get direct

experience of the objects or events. For example : a teacher can not able to give the direct experience of earthquake while teaching. But he can create the thrill among students by describing his own experience. Some more examples are :

- Reading accounts or descriptions on the magazines, journals, newspapers etc.
- Observing pictures, maps, charts, models etc.
- Listening to lectures, talks etc.

We may not completely separate the activities as direct or indirect. Some experiences are also combinations of both direct & indirect experiences. For example preparing a chart gives direct experience of doing skill, observing a chart though coming under indirect experiences but it needs direct observation.

2.4.2 Characteristics of a good learning experience

Learning experiences may be direct or indirect. But it should be selected by the teacher taking into consideration the following characteristics :

- It should be directly related to behavioural objectives.
- It should be meaningful.
- It should satisfy the psychological need of the learner
- It should be appropriate to the maturity level of the learner
- It should be related to life situations
- It should be intensive
- It should be varied, rich in content & novel
- It should be related to the availability of material and time

2.4.3 Sources of learning experiences :

You may till now understand the idea that learning experience can only be gained in the class-room by the learning activity of the teacher. But you will surprise by knowing that school is only one of the various sources from where you are getting the learning experiences. As you learn from different sources, so the learning experiences has different sources.

They are –

- Home
- School
- Society
- Peer group
- Visits & excursions
- Exhibitions
- Experiments
- Audio visual Aids
- Sports & games
- Co-curricular activities
- Library &
- Mass media etc.

2.5 RELATIONSHIP BETWEEN OBJECTIVES, LEARNING EXPERIENCES & EVALUATION

There is a circular relationship between objectives, the teaching learning process and evaluation. One needs to set tentative objectives & employ an educational strategy to reach those objectives that is provide learning experiences for students. Then he should measure the degree of attainment of objectives with the help of variety of evaluation procedures. On the basis of the attainment of objectives the learning experiences can also be evaluated. Like this the learning experience & evaluation procedure can be refined till the achievement of objectives or the objectives can be refined according to the learning outcomes achieved. Till the realisation of objectives this cycle continues. The following diagrams shows the circular relationship among the objectives, learning experiences & evaluation.

Check your progress - IV

Q. 1. Write two examples of

- (a) Direct learning experience &
- (b) Indirect learning experiences

Q. 2 Write any five important sources of learning experiences.

Q. 3 Which criteria should be considered to determine the nature learning outcomes in a particular set of instructional objectives ?

2.6 LET US SUM UP :

Educational objectives make clear what learning outcomes we expect from our teaching. They describe our instructional intent in terms of the types of performance pupils are expected to demonstrate as a result of instruction. One extremely useful guide for developing a comprehensive list of instructional objectives is the taxonomy of educational objectives by Bloom. Objective are divided into three major areas

- Cognitive domain
- Affective domain &
- Psychomotor domain.

Instructional objectives will function most effectively in pupil evaluation if special efforts are made to construct or select evaluation instruments that relate closely to the intended outcomes

Learning experiences modifies the behaviour of the students. Learning experiences may be of

- direct learning experience &
- Indirect learning experience

Whatever may be its types, it should be selected by the teacher properly. Besides schools, learning experiences also gained from different sources like home, playground, library etc. so educational objectives are inter-related with learning activities, learning experiences, learning outcomes & evaluation procedure. So the educational objectives should be made with special efforts which will enable to fulfill the purpose of education immediately & ultimately.

Unit end exercises :

Q. 1 Explain the Bloom's taxonomy of educational objectives.

Q. 2 What are the different types of learning experiences ? Explain with examples.

Q. 3 State the relationship among objectives, learning experiences & evaluation with a suitable example.

Q. 4 Write short notes on :

(a) Sources of learning experiences

(b) Level of objectives under affective domain

(c) Steps of stating learning outcomes

(d) Difference between learning experiences & learning outcomes.

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TOOLS OF EVALUATION

UNIT STRUCTURE

- 3.0 Objectives
- 3.1 Introduction
- 3.2 Characteristics of a Good Measuring Instrument :
Validity, Reliability & Objectivity
- 3.3 Schematic Design of Forms of evaluation
- 3.4 Types of measuring instrument :
Examination Observation, Techniques, Checklist and Rating Scale

3.0 OBJECTIVES :

After reading this unit you will be able to :

- State the meaning of validity, reliability and objectivity.
- Explain the factors affecting validity.
- Explain the advantages and limitations of oral exam.
- Enlist the ways to assess practical exam.
- Compare Essay type and objective type of tests
- State the concept of observation
- Explain the advantages and limitations of checklist

3.1 INTRODUCTION :

Evaluation of student behaviour is an intergral part of any teaching task. Evaluation implies passing judgement on activities performed by individuals. It is therefore, imperative for teachers to be well versed with the techniques of evaluation. The techniques may be broadly classified as subjective and objective.

3.2 CHARACTERISTICS OF A GOOD MEASURING INSTRUMENT

A good measuring instrument must meet certain minimum requirements before it is deemed to be reliable. These qualities are planning, validity, reliability, objectivity. Discriminating power, Adequacy, Usability, Comparability & Utility.

Criteria :-

1. A good must actually measure what it is supposed to measure (validity).
2. It must measure accurately & consistently (reliability)
3. It must be fair to the students (objectivity)
4. It must be long enough to do the job (adequacy)
5. It must be easy to use (utility)
6. It must pick out the good and the poor separately (discrimination)

All these factors are interdependent. They affect each other.

(a) **Validity** : The validity of the test may be defined as

1. The accuracy with which a test measures. Whatever it is supposed to measure or
2. The efficiency with which a test measures, what it attempts to measure or
3. The accuracy with which a test reliably measures what is relevant.

Validity refers to truthfulness. How far it measures whatever it is supposed to measure. A test is valid if it meets the purpose for which it is designed.

An evaluation procedure is valid to the extent that it provides an assessment of the degree to which pupil have achieved. L.O's, content & L. experiences. Validity is affected by all the other characteristics of the measuring instrument. Validity is a matter of a degree. It may be high, moderate or low. It does not exist on an all or none basis.

Eg. The result of a Geometry test may have a high validity for indicating local reasoning, a moderate validity for indicating skill in drawing figures a and low validity for indicating computational skills.

Validity is specific rather than general . A test may be valid for one specific purpose but not for another. Valid for one specific group of students but not for another. Eg. An ordinary foot ruler may be valid for measuring the length of a segment in centimeter but not valid measuring same in fraction of a centimeter or valid for drawing a segment but not for drawing circle. Eg. An achievement test in Geography for V std. in Gujrat may not be valid for V Std. Students in other states because content may be different.

Types of Validity :

Content : How well our test samples represent the content.

Concurrent : How closely test scores are correlated with present situations.

Predictive : How well test scores predict future behaviour.

Constructive : How well our test seems to measure a hypothesized trait.

FACTORS AFFECTING VALIDITY :

1. Unclear Direction : If directions do not clearly indicate to the pupil how to respond to test items, the validity of the test is reduced.

2. Reading Vocabulary : If the reading vocabulary is poor, the students fail to reply to the test item, even if they know the answers. It rather becomes a reading comprehension test for them and the validity decreases.

3. Difficult Sentence Construction : If a sentence is so constructed as to be difficult to understand, students would be confused which will affect the validity of the test.

4. Poorly Constructed Test Items : Reduces the validity of a test. Eg. The Gitanjali was written in (many answers)

5. Use of inappropriate items : With the help of objective type items, the pupils power of organizing matter cannot be judged. By written test items the pupils correct pronunciation cannot be judged. The use of such inappropriate items lowers validity.

6. Medium of Expression : English, as the medium of expression and response for non-english medium students create many serious problems such tests instead of measuring L.O's in a subject measure primarily the knowledge of English which ultimately affect the validity.

7. Difficulty level of items : Too easy or too difficult items would not discriminate among pupils and hence validity will be lowered.

8. Influence of Extraneous factors : Extraneous factors like the style of expression, legibility, spelling, handwriting length of the answer, method of organizing the matter & halo effect influences the validity of a test. Eg. If a student scores less mark due to lack of neatness while answering a test item in algebraic equations it does not tell truth therefore, it is not valid.

9. Inappropriate Time limit : In a speed test if no time limit is given, the results will be invalidated. In a power test an appropriate time limit will lower its validity.

10. Inadequate Coverage : Inadequate sampling lowers validity. Eg. Essays.

11. Inadequate Weightage : To sub topic or objectives or various forms of questions will reduce the validity.

12. Quiz Items : Sometimes students because of their inability to understand a test item guess and respond. This will lower the validity. Thus whenever a test measures something other than what it is supposed to its validity goes down.

(b) Reliability : It is defined as “The degree of consistency with which the test measures what it does measures”

Eg. If a watch regularly goes two minutes ahead then it is not valid because it does not measure what it is supposed to measure (accurate time) but it is reliable because it consistently goes 2 mins. ahead. A test score is called reliable when it is believed to be stable and trustworthy

Methods of Estimating Reliability :

Reliability is expressed by a coefficient of correlation called the reliability coefficient.

1. Test Retest Method : The same test is given to the two groups on two occasions and the correlation coefficient between the two sets of scores is determined.

2. Parallel Forms Method : To parallel forms the test are given to the same group on two occasions and correlation between the scores on the two forms is calculated.

3. Split Half Method : The test is divided into two as equivalent in difficulty and in content for each individual two scores of these two halves are obtained. Correlation between the halves is determined.

Factors Influencing Reliability :

1. Method : The method used in obtaining data on reliability affects the reliability. Coefficient.

2. Interval : With any method involving two testing occasion the longer the interval of time between two test administrations, the lower the coefficient will tend to be.

3. Test Length : Adding equivalent items makes a test more reliable. Eg. A test of 40 items is more reliable than a test of 10 items and less reliable than a test of 100 items. This is due to the fact that a longer test will provide a more adequate sample being measured and then scores are apt to be less influenced by chance factors.

4. Group Range : The test is more reliable when applied to a heterogeneous group rather than homogeneous because of narrow range of ability (wide range of ability)

5. Difficulty of the Items : Too easy or too difficult tests for a group will tend to be less reliable because the difference among the students in such tests is narrow.

6. Objectivity of Scoring : The more subjectively a measure is scored, the lower its reliability, but objectivity should not be confused with reliability. Eg. A true/false list has a high objectivity but is unreliable because of chance factor.

7. Ambiguous Wording of Items : When questions are interpreted in different ways at different times by the same students, the test becomes less reliable.

8. Inconsistency in Test Administration : Inconsistency in test administration such as deviations in timing, procedure, instructions etc. Fluctuations in interest, attention of the pupils etc. make a test less reliable.

9. Optional Questions : If options are provided the same students may not attempt the same items on second administration therefore the reliability will be reduced.

(c) Objectivity :

A test is objective when the examiner's personal judgment does not affect the scoring. Objectivity in a test makes for the elimination of biased opinion or judgement by the person who scores it. A measuring instrument is said to be highly objective if the score assigned by different scorers is not affected by the scorer's personal opinion or bias.

Objective types of test items are highly objective while essay type items are highly subjective. Objectivity is a pre-requisite of reliability and hence of validity. Objective judgements are accurate and hence tend to be reliable.

The objectivity of a test can be increased by -

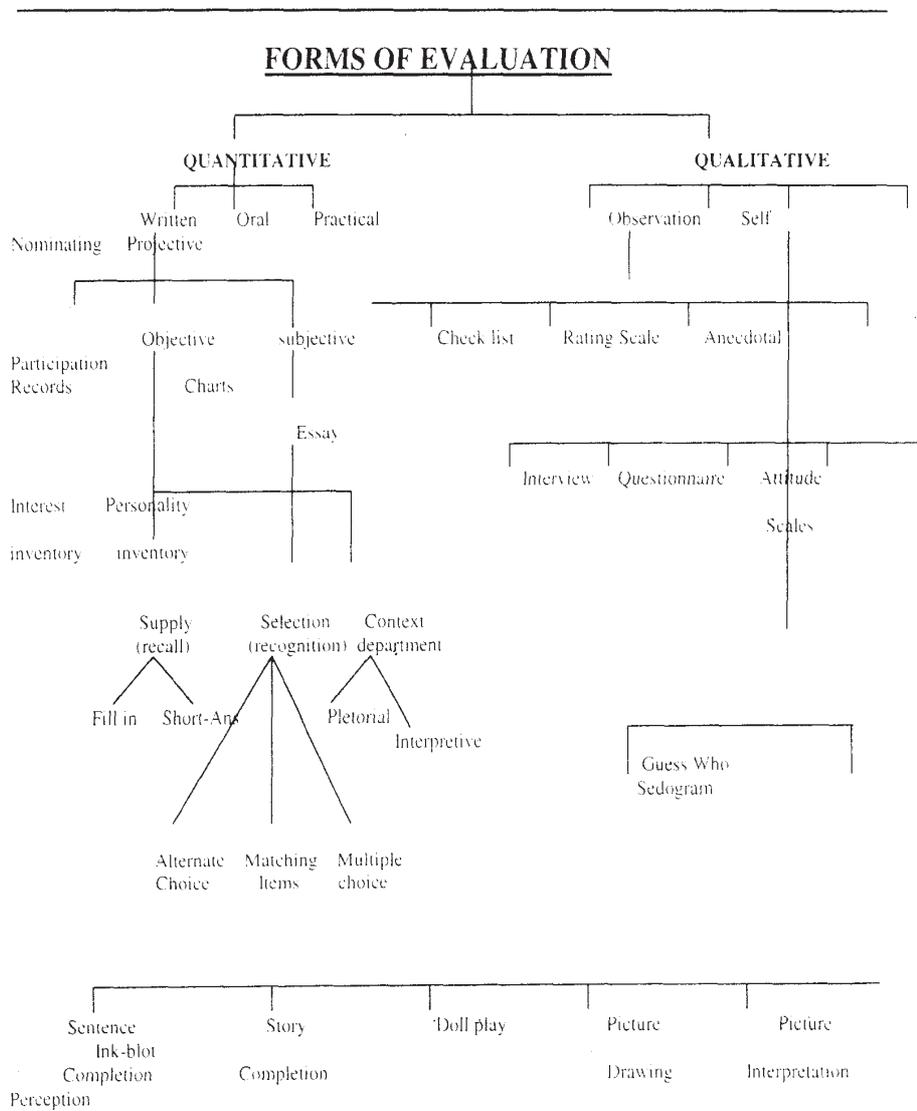
1. Using more objective type test items.
2. Making essay type test items more unambiguous, well constructed giving specific directions which would establish a framework within which students can operate.
3. Preparing a marking scheme and a scoring key.
4. Setting realistic standards.
5. Asking two examiners to evaluate and using the average of the two scores as the final score.

The objectivity may be expressed with the correlation coefficient. The coefficient of correlation between scores assigned to a group of papers by the same examiners on two occasions is called the coefficient of objectivity.

Check Your Progress

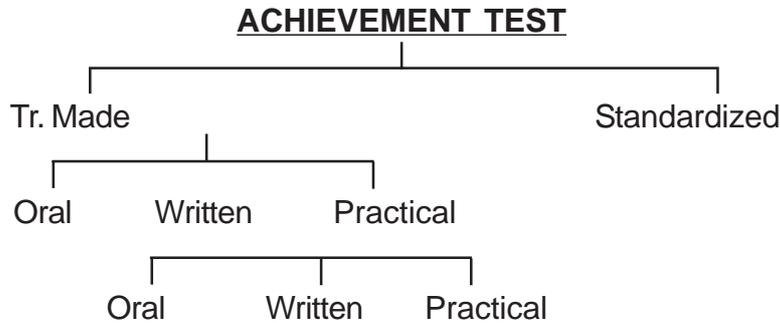
- Q. 1 What is meant by Validity ? Name any five factors that affect validity.
- Q. 2 Why is Reliability called consistency of an instrument ?
- Q. 3 How can objectivity of an test item be increased ?

3.3 SCHEMATIC DESIGN OF FORMS OF EVALUATION



ACHIEVEMENT TEST

This test that measure the achievement of an individual after a period of learning is called achievement test.



3.4 TYPE OF MEASURING INSTRUMENT

(a) ORAL EXAM A kind of a Performance Test

It involves two persons - Examiner & Examinee, face to face
 The examiner asks questions, the examinee attempts to answer them.
 The examiner probes further questions OR accepts the answer. Finally he/she judges the quality of the answer and grades/marks the examinee accordingly.

Features

- ❖ It involves contact & interaction to make it more personal and humane than a written exam.
- ❖ It is not just a series of haphazard questions & answers but requires expertise and experience.
- ❖ To improve objectivity more than one examiner is present forming a panel.

Objectives of an oral Exam

- ❖ To demonstrate spontaneity of thought & communication.
- ❖ To be analytical & use the divergent approach to problems.
- ❖ To compare & contrast
- ❖ To inculcate regular study habits.
- ❖ Shifting the emphasis of mere transimission of knowledge to use & apply it.

- ❖ To remove fear psychosis and develop positive attitude towards evaluation procedures.
- ❖ To reduce the stress & strain of written exams.

Merits of an oral Exam :

- ❖ Helps the teacher to know the level of knowledge of the pupils.
- ❖ Helps in continuous evaluation
- ❖ Objectives such as oral expression, pronunciation, reaction can be evaluated adequately
- ❖ Permits free-response by the students
- ❖ Good for the students who have not mastered writing
- ❖ Informal nature, avoids fear.
- ❖ Students can ask clarification (Remarks & Rephrasing)
- ❖ For the physically handicapped students
- ❖ Economical

Limitations of an Oral Exam :

- ❖ Limited content sampling
- ❖ Low reliability due to inadequate sampling

Subjectivity

Personal bias

Knowledge of the examiner

- ❖ Unless responses are recorded they cannot be used for future reference.
- ❖ Time consuming
- ❖ Questions put to different students may have different difficulty level. Therefore, comparability cannot be obtained.
- ❖ A complete picture of abilities cannot be obtained.

Suggestions for Improvement

- ❖ Decide the objectives and the content to be evaluated
- ❖ Evaluate only those objectives, which cannot be evaluated through other exams.
- ❖ Plan questions judiciously
- ❖ Decide on the method of grades
- ❖ Questions should be of almost the same type.

Aspects to be Assessed

- ❖ Pronunciation
- ❖ Grammatically correctness
- ❖ Vocabulary and Usage.

- ❖ Ideational content and it's organization
- ❖ Delivery (speech)
- ❖ Manner (style)
- ❖ Effect (result)

Methods

- ❖ Conversation
- ❖ Short speech
- ❖ Questions & answers (viva, interview)

Content

- ❖ Course
- ❖ Day-to-day life experiences
- ❖ Current affairs
- ❖ Hobbies & Interests

Overcoming Error

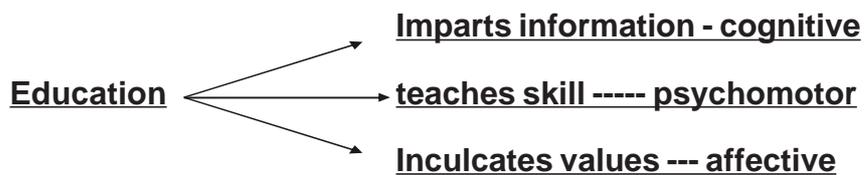
- ❖ Pooling in the rating of more than one judge
- ❖ Define the extent to which rating has to be done
- ❖ Judges are selected on the basis of the mastery & expertise

(b) PRACTICAL EXAM

Used for subjects in which pupils are taught to follow specific procedure and/or create some products.

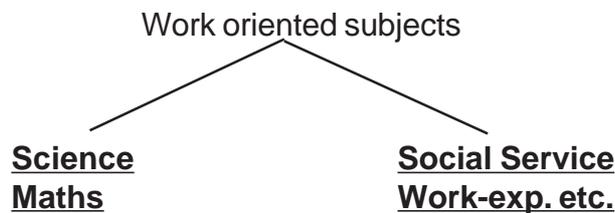
Need

Education is a three-fold process

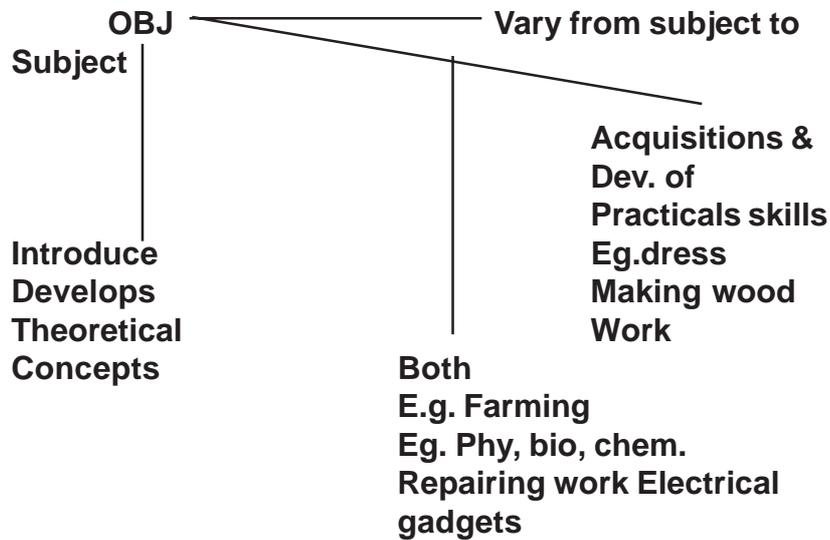


Recommendations of the Kohthari

Commission

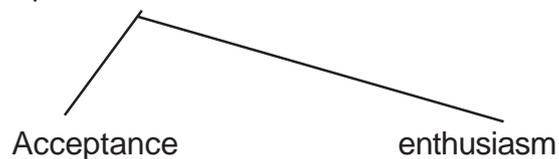


Therefore the need of practical exam in work oriented subjects.



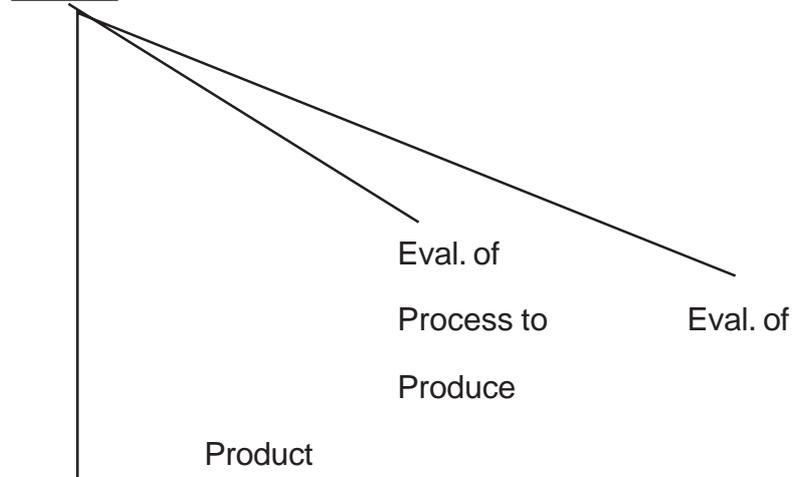
Aspects of practical work

- Skill in observation & recording of data
- Ability to assess & interpret data
- Ability to plan procedures of solving problems
- Manipulative skill
- Attitudes towards practical work



Methods of evaluation

- Set exercises (presenting practical problem)
- Project work
- Course work (community work, s.u.p.w.)
- Oral questions
- Observation or impression (teaching aids prepn)

TYPES

Measure desired results quality.
 Und. & kn (performance tests)
 Pre-requisite to skills
 (Identification tests)

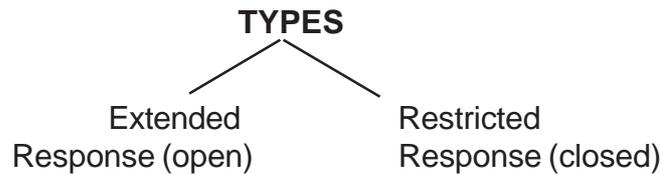
Check your progress

- Q. 1 Give the meaning of oral exam
 Q. 2 State the advantages and limitations of Oral Exam.
 Q. 3 Why are practical Exam needed ?
 Q. 4 What are the methods of evaluating practical exam ?

(c) Written

ESSAY TEST : It refers to any written test that requires an examinee to write a sentence, a paragraph, or longer description and that demand a subjective judgement about its quality and completeness when it is scored.

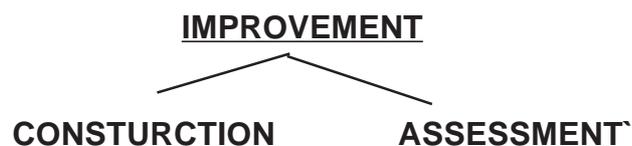
DEFINITION : "A relatively free written response to a problem situation in which the written answer intentionally or unintentionally reveal evidence regarding the functioning of pupil's mental powers as they have been modified by a particular set of learning experiences" --- Wrightstone.

**MERITS :**

- Only device to judge the qualitative aspect of written verbal expression.
- Ability to recall factual information, convey, organize, interpret analyse.
summerize can be judged. Emphasis is more on functioning of higher mental abilities rather than possession of knowledge.
- Develop good study habits (Ref. Work)
- Applicable to all school subjects
- Easily, prepared and administered
- All the degrees of comprehensiveness possible (liberty to respond)
- Initiative, originality, imagination and creativity develops
- Eliminates the guessing factor.

MERITS :

- Limited content sampling (low validity)
- Subjective in scoring (low validity)
- Affected by extraneous factors like handwriting, spelling, neatness, length of the ans objectivity)
- Halo-Effect-based judgement based on previous impressions
- The mood of the examiner
- Horn effect- Improper comparison of answers of different pupils results in improper grading
- Ambiguous wording of the Qs. Leads to bluffing
- Time consuming
- Varying standards of the examiners during assessment



CONSTRUCTION :

- Restrict the use of essay Qs. To those objects which cannot be measured by objective tests.
- Qs. Should be written in such a way so as to elicit desired response (clarity, unambiguity)
- Clear directions
- Give adequate time & thought to prepare
- Establish a framework within which pupils operate (scope, length)
- Options to be avoided (difficult to construct Qs. of equal difficulty level,
Confusion in selection by the pupils)
- Large number of Qs, requiring short ans. Is preferred to few long ans. (large content sampling, blessedness for quality is reduced easy to elicit desired response)
- Liberal time limit to be provided (power test to speed test)
- Provide necessary training to the pupils in responding to essay Qs.
- If more no. of objectives are to be tested, decide the due weightage.

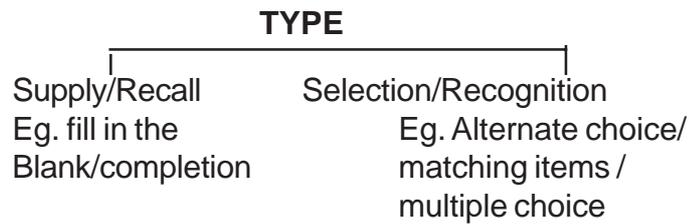
ASSESSMENT :

- Model ans to be given (marking scheme)
- Decide the objectives to be measured
- Grade same Q. for all the papers at a time (minimizes the horn effect & brings consistency in scoring)
- Grade the paper anonymously (reduced halo effect)
- Mechanics of presentation (style, spelling legibility etc.) should be judged separately from the subject - matter and only if the prior instructions are given.
- The one who sets the paper should possibly assess.
- Once assessment begins, standards should not be changed

- When important decisions regarding selection for awards or scholarships are to be based on the results, obtain two or more rating.

OBJECTIVES TYPE TEST

DEF : It refers to any written test that requires the examinee to select the correct answers from among one or more of several alternatives or supply a word or two and that demands an objective judgment, when scored.



ADV

- Large content sampling
- Objective in scoring
- Saves time during assessment
- Minimize halo & horn effect
- Eliminates extraneous factors.

Limitations

- Objectives like, ability to organise, logical presentation etc cannot be measured.
- Construction of items consumes time
- Encourages guessing
- Printing cost increases

Guidelines :

- Test only important facts/knl. & not the trivial details.
- Construct the items (Qs.) acc. To the age and maturity level the pupils.
- Avoid the use of inappropriate vocabulary for clarity.
- Use quantitative words rather than qualitative like many, few, high etc. to avoid vagueness.
- Avoid lifting items directly from the text books (minimizes rote learning)

- Each items should possess one & only one ans.
- Avoid negative Qs. (change in thought process)
- Irrelevant clues to the correct ans. To be avoided.
- Avoid inter-dependent items (When ans. of one item is required as a condition to solve the other ans.)

FILL IN THE BLANKS (SUPPLY/RECALL)

In this answer can be given by a word, phrase, or a symbol it is usually used for

Testing Knl. Of names, dates etc.

Guidelines :

- Blank should be for uniform length
- Avoid more than two or three blanks in one item
- Each item should have only one specific ans.

ALTERNATE - CHOICE SECTION / RECOGNITION

It consists of a statement or a question to which examinee judges to be -

- 1) True or false
- 2) Yes or No
- 3) Right or wrong
- 4) Relevant or irrelevant
- 5) Correct or incorrect
- 6) Valid or invalid

Guidelines :

- Partly true partly false statement should not be used
- Avoid true/false statements longer or shorter than the other
- Random occurrence of T/F statements should be written
- Correction formula to be used for guessing.

THE MATCHING ITEMS (SELECTION/RECOGNITION)

It consist of two parallel columns with Qs./ Date / Object / Events etc. in one column being matched with Ans. / events / functions / causes etc. in the other column. The items in the column for which a match is wanted are called.

PREMISES

and the items in the column from which the selection is made and called

RESPONSES.

Guidelines

- Include more alternatives in the response column
- Use homogeneous material to increase validity
- Indicate in the directions the basis for matching the items
- All the items should be on one page.

MULTIPLE CHOICE (SELECTION/RECOGNITION)

It consists of a problem and a list of suggested solutions. The problem may be in the form of a question or an incomplete statement, it is called the **STEM** of the item and the list of suggested solutions are called **ALTERNATIVES**. The correct alternative is called the **ANSWER** or the **KEY** and the remaining alternatives are called **DESTRUCTORS**.

Guidelines

- Each item should have 4 to 5 alternatives
- All the alternatives should be of homogeneous in nature
- The correct ans. should not be comparatively long or short than the destructors.
- Correct ans should follow random pattern.

COMPARISION OF ESSAY / SA / OBJECTIVE TESTS

AREAS	ESSAY	OBJECTIVE
Length of the answers Content coverage	Lengthy answer Poor sampling	A word or a tick mark Larger content coverage
Assessment	Subjective	Objective
Construction of items	Ambiguity due to improper wordings	Un ambiguous
Nature of the answers	Scope for writing irrelevant answers	Only one correct answer
Achievement of Objectives	Objective of higher mental abilities are tested	Mostly Knl. Or Sometimes UND Objectives are tested

Check your progress

- Q.1 What are the advantages and limitations of Essay types tests ?
 Q. 2 How would you improve in the construction of essay type tests ?
 Q. 3 State the guidelines to write objective type of tests.

(d) OPEN BOOK EXAMINATION

CONCEPT : In the open book examination system students have the freedom to consult the textbook, reference book and other reading material to answer question set by examining agencies or the educational institutions. Of course, this can be done within the prescribe time.

Objective :

1. To reduce considerably if not remove altogether the emphasis laid on memory in the existing system.
2. To make the examination more comprehensive in nature by providing for testing of higher cognitive abilities.
3. To inculcate regular study habits among students.
4. To upgrade the teaching-learning process by shifting the emphasis from mere transmission of information to the development of abilities that would help the students in their later life.
5. To remove the 'fear psychosis' among students and help them positive attitude towards examinations.
6. To rid the examination system of the several stresses and strains that afflicts it at present.

Further it pointed out that the following abilities and skills can be acquired by the studnets through the open book examination system :

- (i) Competency to consult reference books
- (ii) Development of self study habits.
- (iii) Development of abilities of the examines to marshall the data call out information from different sources and apply knowledge to solve different problem.
- (iv) Development of habits to spend more and more time in libraries and mediate on what they have read to encourage creative abilities.
- (v) Development of the capacity to present relevant materials in logical sequence.
- (vi) Development of the ability of self-exploration and self appreciation.

Advantages claimed over Traditional System of Examination

1. The system is free from pre-examination tensions.
2. Copying and others malpractices would become unnecessary.
3. Bazari notes become irrelevant and as a consequences the racket in guide writing and publishing would become unprofitable.
4. The emphasis is shifted from memorizing to the reviewing of the material and as much more well directed and varied efforts become necessary to meet the examination challenge which is not possible in the traditional closed book examination system.

Limitations :

1. The Development of self-study habits may not be attained by this system. Rather the students may not have any incentive to study before the examination because of their access to reference books and other materials at the examination centres.
2. The concept of standard textbooks and reading material may vary from place and person to person.
3. In the context of growing number of students appearing in the examination, it may be difficult to provide enough reading material for consultation.
4. The reduction of malpractices may not be achieved because of the possibility of consultation among students in the examination halls will be made easier.
5. The problem of training teachers to prepare students for this type of system and of preparing question papers poses serious difficulties.

Suggestions for the Implementation of the open book examination system

1. The open book examination system should be tried out experimentally at an internal examination only.
2. To begin with open book system should be assigned a maximum of 20-25% weighted.
3. In the beginning open book system may be introduced at the 10+2 stage.
4. Number of students in the classes should be controlled.
5. Adequate financial allocation should be made for the enrichment of libraries.
6. Question banks suited to this system should be developed in all subjects.
7. Related conceptual material on open book examination should be disseminated.

8. Reference material and teachers handbooks should be prepared through workshops.
9. Indepth orientation programme for teachers should be organized. These programmes should cover :
 - (i) Preparing objective based questions
 - (ii) Methodology of developing library usages habits.
 - (iii) Paper setting & type of questions to be set in the open books system.
 - (iv) System of evaluation of answer scripts in the open book examination.
10. Training students in the use of library material

Check your progress

Q. 1 Open book exam has advantages over traditional exam. Discuss.

(II) OBSERVATION

Defn : Systematic method of observing recording and analyzing of behaviour by directly perceiving the individual or group.

FEATURES :

- Measurement without instrument
- Though the use of observation, an objective description of individual in their actual inter relationship with each other and with their environment is secured.
- Observation technique consists in the observation of the every day behaviour for definite period of time & the recording of the occurrence of non-occurrence or specified & objectively defined form of behaviour.

Adv.:

- Being a record of the actual behavior. It is more reliable & objective.
- As it is in a natural situation, it is more useful than in a test situation.
- Can be used with children of all age group.
- No special equipments/instruments required (less expensive)
- Adaptable to both individual as well as group
- Frequent observation would provide continues monitoring of the progress.
- A quicker method of diagnosing the problem on the spot
- Provides supplementary information

Limitations :

- Scope for personal prejudices & bias of the observer

- Interpretation is affected by the subjectivity
- Records may not be 100% accurate because of the time-lag.
- Only overt behaviour is revealed therefore true feelings cannot be judged.

SUGGESTIONS FOR VALID OBSERVATION :

- Plan, what to be observed
- Distribute short observations over a period of time
- Observe students in their regular activities
- Coordinate teaching & observations.
- Record immediately
- Delay interpretation until all the information is gathered.

CHECK LIST

A prepared list of items, to which the respondent replies by selecting one the choices offered to him.

A sample behavioural problem check list

No.	Student Trendes	Roll Nos.			
		1	2	3	4
		Y/N	Y/N	Y/N	Y/N
1.	Home assignments done regularly?				
2.	Is punctual?				
3.	Is slow in reading?				
4.	Is lazy?				

Characteristics :

- It records facts not judgements.
- List of items may be continuous or divided into groups of related items.
- It systematizes and facilitates the recording of information
- It ensures consideration of all important aspects of the act involved.
- Focuses attention on specified traits.
- Allows inner-individual comparison on a common set of traits.

USES

- At the primary level
Eg. Maths skill check list.

Items	
1. Identification of nos. 1-100	Y/N
2. Count nos. 1-100	

- Evaluating those performance skills that can be divided into a series of specific Actions Eg. B.Ed. Project
- To evaluate products (contains characteristics of the finished products)
Eg. Ed. Instructional material
- Used in the area of personal-social development for recording evidence of growth.

RATING SCALE To quantify an observation

Rating is the form applied to the expression of opinions or judgment regarding some situation, object or character. Opinions are usually expressed on a scale of values. Ratings helps the judgements to be quantified. On a rating scale, instead of merely indicating the presence or absence of a trait, it indicates the degree to which it is present it helps the teacher to rate students on various characteristics.

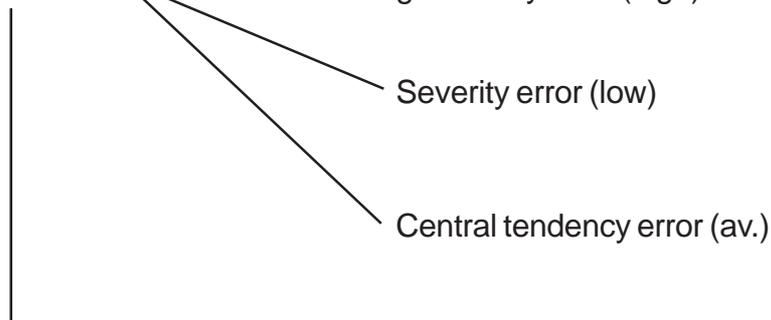
Rating Scale of assessing personality traits

No.	Traits	V. good	Good	Av	Poor	V. Poor
1	Initiative					
2	Leadership					
3	Self-Confidence					
4	Integrity					
5	Coordination					

Very Often	Excellent	Strongly agree
Often	Very good	Agree
Sometimes	Good	Undecided
Rarely	Need improvement	Disagree
Never	Poor	Strongly disagree

ADVANTAGES

- Direct observation towards specify aspect of behavior
- Provides common frame of reference for comparing all on the same set of Traits
- Provide a convenient method for recording the observers judgement.
- Can be used with a large number of students
- Economical
- Flexible
- Comprehensive
- Reduces subjectivity in observational method.

LIMITATIONS**Personal bias**

Tendency to rate all individuals at approximately the same position on the scale.

Halo Effect

Raters's general impression of the person influences the rating of the Individual's characteristics

❖ Logical Error

When two characteristics are rated more/less alike.

- Eg. (i) intelligence and achievement
 (ii) Giftedness with poor social adjustment
 (iii) Good handwriting and intelligence

❖ **Ambiguity**

Refers to the wording and the meaning of the traits that are measured.

❖ **Attitude of the rater**❖ **Opportunity for adequate observation****Check your progress**

Q. 1 State the advantages of observation

Q. 2 When is checklist used ?

Q. 3 What are the limitations of Rating scale ?

Summary

In this unit we discussed the essential criteria of a good measuring instrument i.e. Validity, Reliability and Objectivity. Second Section of the unit comprised of forms of evaluation i.e. Oral, Practical, Written and open book. Lastly Observation technique and its two tools i.e. checklist and rating scale were discussed.

Unit End Exercise

Q. 1 Discuss the meaning and factors affecting validity.

Q. 2 An instrument without reliability is meaningless. Justify.

Q. 3 Why are oral exam more advantageous over written exam ?

Q. 4 Explain the aspects to be assessed in the practical exam.

Q. 5 Compare essay type tests with objective type tests w.r.t. construction of questions and assessment of answers.

Q. 6 State the advantages of observation.

Q. 7 Openbook Exam is the need of the hour. Justify

Q. 8 A teacher must use rating scale. Why ?

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TESTING

UNIT STRUCTURE

- 4.0 Objectives
- 4.1 Introduction
- 4.2 Relationship between Norm Referenced Tests & Criterion Reference Tests
- 4.3 Constructing Criterion Referenced Achievement Test & Norm Reference
- 4.4 Uses of criterion Referenced Tests
- 4.5 Uses of Norm Referenced Tests
- 4.6 Check your progress

4.0 OBJECTIVES :

After reading this unit you will be able to :

- Know the procedure of constructing a test
- Show the relationship between Norm Referenced test & Criterion Referenced Achievement Test
- Explain the uses of Norm Referenced test & Criterion Referenced Achievement Test

4.1 INTRODUCTION :

The purpose of testing is to provide objective data that can be used along with subjective impressions to make better educational decisions. These are 2 main types of tests used to make educational decisions. They are Norm Referenced test & Criterion Referenced Tests.

A Norm Reference Test yields information by which a student can be compared to other similar students. The information gives performance of a large number of students who are being tested. A Criterion Referenced Test gives information about a student's level of proficiency in or mastery of some skill. The student's performance is compared to a standard of mastery which is called a criterion or an absolute standard. From this it is possible to decide whether the student needs to work more or less on certain skills. It does not rank or place the student as compared to others.

4.2 Relation between Norm Reference Tests & Criterion Reference Tests

General Purpose of Testing	To gather information to help us make better decisions about
Specific information desired	Place or rank compared Level of Proficiency to a norm compared to a standard or criterion of mastery
Types of test required	Norm Referenced Tests Criterion Reference Test

It is important to identify the type of information required before administering a test. The focus of a normative scores on individual. The focus of a criterion reference score is on what the individual can do. A single test score can be interpreted in both ways. A criterion referenced test is constructed to get measurements that are interpretable in terms of specified performance standards. The basic distinction between the two is in the interpretation. To be meaningful, any, test score must be related the test content as well as the scores of other individuals. A typical norm referenced achievement test is a s survey instrument covering a board domain. A typical crieterion referenced test would cover only one domain or even a specific domain.

4.3 CONSTRUCTING CRITERION REFERENCED ACHIEVEMENT TEST & NORM REFERENCED TEST & NORM REFERENCED ACHIEVEMENT TEST

There are times when one has to diffentiate among individuals. There are 2 different goals or objectives in achievement testing : i) to discriminate among individuals according to their degrees of achievement & ii) to discriminate between those who have & those who have not reached set standards. Traditional techniques of test construction are developed assuming that the purpose of the test is to discriminate among individuals. If the purpose of the test is to compare each individual to a standard then it does not matter if individuals differ from each other. So the crieteria of a measuring instrument for a norm-referenced measure are not important for criteion-referenced measures. A test for criterion referenced interpretation often samples a limited number of objectives than a norm referenced one.

4.4 USES OF CRITERION REFERENCED TESTS :

Criterion referenced measurement is gaining importance due to emphasis on behavioral objectives, programmed learning & individualized learning & learning theory which suggest that all individuals can learn anything given time as well as the increased interest in certification & the belief that norm referencing increases unhealthy competition & causes damage to the self esteem of the low scorers. Traditionally the principal use of criterion referenced measurement is in mastery tests. Mastery connotes an either/or situation (the individual has achieved mastery over the objective or has not achieved it). Such mastery tests are used in individually programmed Instruction. Such Programs are made up of units or modules in a hierarchy, each based on one or more instructional objectives. Each individual has to work on a unit till he has achieved specific minimum level of achievement. He is then said to have mastered the unit.

Them instructional decisions about a student are not dependent on how his performance compares to others. If he has performed adequately, he is allowed to move forward. If not, he has to restudy the material till he masters it. Minimum competency testing is an area where cutting scores are set & the degrees of performance above the cut of score, are not required for promotion, gradation or certification decisions.

Criterion referenced measures may be useful to evaluate (or make decisions about) instructional programs. These are useful in a classroom too. It is necessary to diagnose specific difficulties along with certain instructional treatments necessary in teaching situations. Criterion referenced tests are narrower in scope & may not give a clear idea about an individual's general performance on a particular objective. Criterion referenced tests are useful in broad survey of educational accomplishments such as National Assessment of Educational Progress etc.

4.5 USES OF NORM REFERENCED TESTS :

Most achievement testing is based on norm referenced approach. It is useful in aptitude testing, to make differential prediction & in achievement testing. Often a test is used to give a reliable rank order of students. Students need recognition for any accomplishment. Norm referenced tests are useful in decision making. For vocational & educational planning, students need to compare with others. Norm referenced tests are also used in selection decisions. Standardized norm referenced tests are broader in focus than criterion referenced tests & are more useful

for providing a broad overview of achievement levels in a given subject matter. They are better for monitoring the general progress of a student, a class or a school. Some feel that norm referenced tests are insensitive to teaching. Norm reference tests are necessary for program evaluation. Criterion referenced tests, being narrower in focus than norm referenced tests, can be considered an advantage i program evaluation especially if we want to know how effective a program is in comparison to other programs.

Both norm referenced tests & crieterion Referenced Tests are necessary for wise decision making. For guidance, both types are used. Criterion reference tests are important in achievement testing while aptitude, interest, personality, inventories etc. are norm referenced. So for selection decisions, norm referenced tests are preferred. For classification decisions, both are used. For placement & certification decision, criterion referenced tests are used more often. For testing of achievement of objectives which encourage maximum development of the student, norm referenced test is better. For instructional decision making, both norm referenced & criterion referenced tests are used. Mastery tests are used in Individualized Programmed Instruction.

<u>Dimension</u>	<u>Norm Referenced Test</u>	<u>Criterion Referenced Test</u>
Average no. of students who get an item right	50%	80%
Compares student's	performance of others	standards indicative of mastery performance to
Breadth of content sampled		Broad, covers many objectives narrow, covers few objectives.
Comprehensiveness of		shallow, one or 2 items per comprehensive, 3 or more items content sampled objective per objective
Variability	Since the meaningfulness of	Meaning of the score this score depends on its relative depend on comparison with position with others, more the other but on the

Variance or spread. Too hard easy items are avoided Distractor options may be used.	<p> criterion, So spread/variability, the better variability may be minimal. Item construction Items are chosen to promote Items are chosen to reflect Criterion behaviour or too emphasis is on identifying domain of relevant responses. </p>
Reporting & Interpreting Scores are used	<p> Percentile ranks & Standard No. succeeding or falling is used. </p>

4.6 CHECK YOUR PROGRESS

1. Explain clearly the concept of Norm referenced Tests.
2. How are norm referenced tests constructed ? What are the uses of such tests ?
3. Explain the concept of Criterion referenced Tests.
4. How are criterion referenced tests constructed ? What are the uses of such test ?

Bring out clearly the difference between Norm Referenced Tests & Criterion Referenced Tests.



INTERNAL & EXTERNAL ASSESSMENT

UNIT STRUCTURE

- 5.1 Introduction to Problem related to external examination
- 5.2 Planning - Problems related to planning
- 5.3 Problems related to assessment
- 5.4 Problems related to conducting
- 5.5 Conclusion & check your progress
- 5.6 Introduction to Internal Assessment
- 5.7 Meaning of Internal Assessment
- 5.8 Importance of Internal Assessment
- 5.9 of Internal Assessment
- 5.10 Weightage to items of internal assessment
- 5.11 Merits of Internal assessment
- 5.12 Limitations & check your progress
- 5.13 Conclusion & check your progress
- 5.14 Introduction to recording & reporting
- 5.15 Uses of recording & reporting
- 5.16 Guiding principles for reporting
- 5.17 Types of reporting system
- 5.18 Conclusion & check your progress

5.0 OBJECTIVES

After reading this unit you will be acquainted with

- (i) Problems related to external examination with respect to planning, assessment and conduct of examination
- (ii) Meaning of internal assessment and its place in the education system
- (iii) that can be part of internal assessment
- (iv) Uses of the recording and reporting system to the teachers, parents and administrators
- (v) Types of the reporting system

Problems related to External Examination

5.1 INTRODUCTION :

Examinations have been in existence from times immemorial. Examinations are considered as good servants as they help to evaluate the achievements of our students. They are great touchstone for measuring the amount of knowledge acquired or the degree of skill achieved.

But at the same time examinations have distributed the examiners almost from the day of origin. They have been a way of life from

time immemorial. 'A necessary evil' is how an examination is termed.

Examination is viewed as one which distorts knowledge in that they make the student believe that only what is examined is important.

In our country there is a common examination conducted for all students of a region at the end of high school or secondary stage and higher secondary stage. Such examinations or external examination is viewed as a 'scoring' board which will enable the pupils smooth entry into the area of their choice.

Surprisingly what was started with a view to facilitate mass education, is bogged down today with whole lot of problems. The problems faced by the external examination can be viewed under the category of (1) Planning, (2) Assessment (3) Conduct

5.1 (1) Planning :

(a) Lack of Definite Aim :

Our external examinations are not geared to the realization of specific objectives. The same external examination serves different purposes like passing a course, admission to the next course, passport to employment, discovering individual capacities, securing, scholarship etc with the result that it becomes invalid for any purpose.

(b) Lack of instructions with respect to transaction of the curriculum and prescribing Syllabi.

Each institution teaches the curriculum as per one's own interpretation. As a result of which the scope of different topics varies from school to school. Instructions should be provided through prescribed syllabi, so that teachers & administrators can clearly visualize the learning outcomes.

(c) Lack of experts :

There is dearth of experts who possess the necessary technical competence to set the papers.

(d) Lack of planning :

Appropriate through scientific planning on scientific lines is required to supply paper setters with designs of question papers indicating weightage to instructional objectives, areas of content, different types of questions, along with a the scheme of sections & patterns of options.

(e) Lowering of educational standard :

According to the secondary education commission (1952-53), the external examination determines not only the content but also the methods of teaching, in fact the entire approach to education. But teachers adopt the trick of the trade to improve the result i.e. the idea of exam, the sole aim - CRAM

5.3(2) ASSESSMENT

(a) Element of subjectivity :

Subjective attitude of examiners influence the marks of individual and leads to a great variability in marking.

(b) Inter- examiner variability

Examiners differ widely in their standard of marking

(c) Disorted distribution of marks

This is seen on account of lack of expertise on the part of the examiner. One finds concentration of marks at the average score.

(d) Variation in the distribution of marks in different subjects

(e) Checking of papers by inexperienced examiners due to ineffective administrative machinery

(f) Faulty tabulation : Due to overload of correlation of papers one find there is faulty checking / assessment as well as faulty tabulation.

5.4 CONDUCTING

(1) Difficulty in maintaining confidentiality :

Confidentiality with respect to setting, printing and distribution of a papers need to be maintained. Supplying these papers to examination centre requires a large human force and hence at times confidentiality may be at state.

(2) Malpractice practised during conduct of the examination :

Copying at times mass copying is attempted with the help of teachers. Invigilators are threatened for the purpose of copying changing and inserting of answer sheets is done with help of examiners.

(3) Appointment of personnel for examination work

Superintendents invigilators and other staff has to be appointed for pair conduct of examinations Due to lack of human resource and due to lack of appropriate financial motivator, it becomes difficult to find and dedicated people to do this work.

5.5 CONCLUSION

In spite of all these problems the external examination has its own place in our system of education. This is due to the fact that our education system supports a large number of entrants as compared to the number of people employed.

Check your progress

(1) What are the problems encountered in the planning/assessment/ conducting of external examination.

5.6 INTERNAL ASSESSMENT : INTRODUCTION

Public examination dominates the school programme tremendously. As a result of this domination, there is a feeling among the students that the outcome of the annual examination alone will push them forward & will pull them down. All sorts of corrupt practices and mass copying threats to irregulars, tribes and what not, are likely to prevail

To remedy this situation, educationists have introduced the concept of internal assessment.

5.7 WHAT IS INTERNAL ASSESSMENT ? (MEANING)

Internal assessment means assessing the child/student within the confines of an institution for the development/progress showed by him in the cognitive, affective and psychomotor areas of his personality.

5.8 IMPORTANCE OF INTERNAL ASSESSMENT

Student development is a many faceted phenomenon, For all round development of a pupils personality it is necessary to provide learning experience and then to evaluate all the aspects of physical, mental emotional social and academic growth. Many techniques are required for measuring these varied facts of the total personality. The external written examination can at the most test the depth of understanding and range of knowledge, But there are many learning outcomes such as ability to handle instruments capacity of handwork, leadership qualities and oral communication skills which cannot be tested through written examination. These skills can be assessed best of all by the teachers who deals with the students regularly throughout the year. It is here that internal assessment has an important role to play.

- (i) In education evaluation play an important role. It has become an integral part of the instructional programme. The total concept of educational evaluation includes not only quantitative assessment but also qualitative assessment and value judgement. This cannot be done by any external body or board of examination alone. Internal assessment can be helpful here.
- (ii) During the course of teaching - learning process a variety of educational decisions are taken. Without a regular and systematic internal assessment, these decisions cannot be given effect
- (iii) The main emphasis in evaluation is the pupils progress in learning, in cognitive, affective an psychomotor activities. Therefore, internal assessment help the pupil to develop a favourable attitude towards day to day activities eg. daily assignments group projects study habits etc.
- (iv) On the basis of the feedback that the teacher gets from the internal assessment through the various tools, he can change his techniquess of teaching to suit the learning ability of the students and thereby make his teaching effective
- (v) Objectives of affective domain (objectives related to attitude, interest and appreciation) and psychomotor domain skills and long ranged objectives require for their achievement a long process of continuous observation, testing and recording. Therefore one requires internal assessment.
- (vi) Attitudinal reports along with academic report will motivate the pupils towards better personality and character to improve their efficiency
- (vii) It allows the education department to judege the effectiveness of its various programmes.
Eg. SUPV, Value education, SALSEP Programme
- (viii) Internal assessment allows the use of diagnostic and remedial teching.

5.9 AREAS OF INTERNAL ASSESSMENT

Internal assessment should help a teacher to answer questions such as :

- (a) Is Geeta progressing well in various school subjects ?
- (b) Does she participate in co-curricular activities such as debates, dramatic, sports, excursion and other group activities
- (c) Is developing qualities such as co-operation, initiative peseverance, consideration for other etc.
- (d) Is she regular in completing daily assignments ?
- (e) Does Geeta read books from the library? Has she developed interest in reading ?
- (f) Has she developed proper study habits.

(g) Has she developed laboratory skills?

(h) can she write poems ?

The areas of internal assessment help to answer these questions

Areas of Internal assessment are :

- (i) **Academics** : To see achievement of pupils in various academic subjects which is done through periodic test (unit test, term test oral test laboratory work, library work and term papers The teachers i.e. subject teacher should give the test during one of her teaching periods so that the school routine will not be disturbed.
- (ii) **Study Habits** : Home work is generally given in all subejects. Some weighted should be given to the performance of students who do it regularly. Assignments should be given & checked
- (iii) **Participation in sports/CCA**:Participation in three items from athletics. Participate in at least two activities in any of the special fields namely music, drawing, elocution exhibition mimicry dramatics story telling, school magazines and any other projects undertaken by the class.
- (iv) **Oral work** Recitation of prose passages, poems etc. should be made obligatory, Development of oratoryabilities.Performance should be assessed at least once in each term.
- (v) **Laboratory Work** : Qualities such as accuracy, neatness, regularly etc. should be observed in the lab work. One test may be held in each term.
- (vi) **Library work** : A student is expected to read books and develop interest in reading. It should maintain a record of what he reads. He should write in about ten lines the description of every book that he reads.
- (vii) **Personality traits** : Traits such as co-operation, initiative, honesty, leadership, perseverance, confidence etc.should be observed and assessed.

5.10 WEIGHTAGE TO ITEMS OF INTERNAL ASSESSMENT

Due weightage should be given to the different items mentioned above. Below is a sample of distribution of marks.

A) Subject wise / Academic Assessment

Unit Tests	25
Two term tests	25
Performance (practical) Tests/Class tests	10
Homework & class work	10
Term papers	10
Assignments (in every subject)	20
	100

(B) Assessment of Co-curricular Activities

Library work	20
Sports game	20
Debate, elocution drawing music etc (at least two activities)	20
Study circle	
Visits (excursions educational visits, like etc.)	20
	100

A student must obtain minimum score of 50 in order to gain promotion to the next class.

(c) Assessment of Personality traits

Here, assessment in terms of scores is not possible, Various grades may be assigned to different traits as suggested below.

TRAIT S	VERY MUCH					NOT AT ALL
	A	B	C	D	E	
Co-operation						
Intiativeness						
Honesty						
Leadership						
Followership						
Perseverance						
Confidence						

More traits can be added

5.11 MERITS OF INTERNAL ASSESSMENT

- (i) No undue weightage is given to the final or annual or external examination. This is logical, psychological and scientific
- (ii) Proper study habits are likely to be developed Eg. (a) Students will be engaged in study throughout the year. (b) They will be more regular, alert, sincere in their studies eg. - in classroom homework, assignments (c) Undue emphasis on eleventh hour preparations in most of the cases cramming will be reduced to the minimum.
- (iii) Participation of pupils will be increased.

- (iv) Internal assessment minimises anxiety and nervous breakdown on the part of students which otherwise are possible at the time of the final examination.
- (v) Internal assessment gives us a comprehensive picture of pupils' progress.
- (vi) Internal assessment helps to diagnose the weakness and strength of pupils. On the basis of this remedial teaching is possible.
- (vii) It can be used as a good device for motivating students.
- (viii) Internal assessment brings about a change in the attitude, interests and appreciation of pupils and teaches towards school programmes.
- (ix) Internal assessment gives an ample opportunity to the teacher to assess his/her own students. It is completely in accordance with the principle "The teacher who teaches should assess."
- (x) If internal assessment has a considerable weightage in the promotion of a student in the next higher standard, not only the teacher but students as well as parents would feel more responsible for the entire syllabus during the entire year.

5.12 LIMITATIONS OF INTERNAL ASSESSMENT

Though internal assessment is a powerful tool in the hands of a teacher, it is likely to be subjected to some of the following disadvantages :

- (i) Internal assessment may be misused by a teacher to pressurise the pupils and the parents.
- (ii) It can cause a great harm in the hand of an inexperienced, insincere, inefficient and dishonest teacher.
- (iii) Criteria should be decided and followed by every institution. If this is not done, then there is a likelihood of the internal assessment being misused by every institution.
- (iv) It will lose its validity if favoritism, personal prejudices and subjectivity in assessment are rampant.

5.13 CONCLUSION

In an ideal situation, 100 percent internal assessment does have a place in the teaching-learning process, but in practice, it is not so because of some very serious limitations. Internal assessment may not replace the external examination, but it can very well supplement it. External examinations came into existence only when teachers failed to carry the responsibility of assessing their pupils objectively, honestly and free from prejudice.

Check yourself

- (i) Why is internal assessment necessary ?
- (ii) What are the merits and limitations of internal assessment?

(iii) Enumerate the areas that you would include in a comprehensive plan of internal assessment?

(iv) Prepare a plan of internal assessment by showing weightage to different areas of internal assessment.

RECORDING AND REPORTING :

5.14 INTRODUCTION

Recording and reporting pupils' progress is one of the most frustrating aspects of teaching. There are many factors to consider and so many decisions to be made.

It is important to remember that reporting pupils' progress cannot be separated from the procedures used in evaluating pupil learning and development.

5.15 USES OF RECORDING AND REPORTING

Recording and reporting systems are used to serve a variety of purposes in schools:

- (i) Instructional uses
- (ii) Reporting to parents
- (iii) Administration

(i) Instructional uses :

The main purpose of recording and reporting should be the improvement of pupil learning and development. Therefore, reports should clarify

- the instructional objectives
- indicating pupils' strengths and weaknesses in learning
- Providing information concerning the pupils' personal and social development.
- Motivate the pupils

Even if day-to-day evaluation in the form of class tests/unit tests, ensures effective pupil learning, but still the pupils do need a periodic summary of their learning progress.

(ii) Reporting to Parents :

Informing the parents and guardians of the children's progress is the basic function of the reporting system.

These reports should keep the parents informed of their wards' progress in learning. This will help the pupils to understand the objectives of the school and how well their children are achieving the intended learning outcome of a particular programme. This also

ensures the parents co-operation in conducting the school programme.

Information regarding their child's success and failures and special problems enables parents to give them the emotional support and the required encouragement.

Such information also enables the parents to provide sound educational and vocational guidance.

Therefore the reports should contain adequately all the information and details as parents can comprehend & use them.

(iii) Administration and Guidance

Reports are used to determine promotions, graduations, awarding honours, athletic ability and for reporting to admission to other courses and prospective employees.

5.16 GUIDING PRINCIPLES FOR REPORTING

- Report children's growth and development in every domain.
- Language familiar to the parents should be used. Use simple language.
- Words that can be misinterpreted may be avoided.
- Include those point about which parents have considerable interests.
- It should reflect the philosophy of the school.
- Describe the child as an individual and stress his progress in terms of his own capacity.
- Justify the weaknesses that are pointed out.
- Structure the report in such a manner that maximum utilization of the information is done by teachers.
- There should be space for the parents to write remarks.
- It should reflect a positive note of the teacher's attitude towards the child.
- Make a duplicate copy of every report.

- Anticipate the nature of responses which are likely to result from the report and be prepared to meet the criticism that may be made.

The reporting system should be a co-operative effort of both parents and teachers.

5.17 TYPES OF REPORTING SYSTEM :

1. Letter grade system :

It is the most traditional form. It assigns a single letter grade. Eg. 'A', 'B', 'C', 'D', 'F' for each subject. In some cases a single number is used instead of a letter. Eg. '5', '4', '3', '2', '1'. This system is concise and convenient. The marks are easily averaged. They are useful in predicting future achievements.

2. Pass - Fail system :

It is two category system where there is just a pass or a fail. It is used in elementary schools and also high school and colleges.

The intention of this system is to encourage students to explore new areas.

3. Checklist of objectives

Many progress reports have a list of objectives to be checked or rated. It is mostly common at the pre-primary & primary stage.

- Eg : 1) Reading - There are 4 categories to be checklisted.
- (a) Reads with understanding
 - (b) Finds out meaning of new words & uses them in sentences
 - (c) Reads well to others
 - (d) Reads independently for pleasure
- 2) Arithmetic
- (a) Uses fundamental processes
 - (b) Solves problems involving reasoning
 - (c) To accurate in work
 - (d) Works at a satisfactory rate

4. Letters to Parents :

This method provides greater flexibility in reporting pupil progress to parents. Letters makes it possible to report on the unique strengths and weaknesses and learning needs of each pupil. It suggest specific plans for improvement. In addition on the letter can included detailed progress in all areas of development.

4. Parent-teacher conference :

It is a flexible procedure that provides for two way communication between home and school. Beside receiving a report from the teacher, the parent can also provide information regarding the child out of the school life.

5.18 CONCLUSION :

For effective teaching-learning process appropriate system of recording and reporting will enable the teachers, parents and pupils to work together in co-operation.

Check your progress

- (1) What are the uses of the reporting system ?
- (2) What are the guiding principles that you will keep in mind for planning an effective system of reporting ?
- (3) Enumerate the different types of reporting system.

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DINTERPRETATION OF RESULT

UNIT STRUCTURE

- 6.1 Objective
- 6.2 Introduction
- 6.3 Meaning of the term data
 - 6.3.1 Organisation of data
 - 6.3.2 Tabulation of data
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 - 6.3.4 Check your progress - 1
- 6.4 Graphical Representation of Data
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- 6.8 MEDIAN
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 - 6.8.4 Uses and Limitations
- 6.9 Measures of Variability
 - 6.9.1 Standard Deviation
 - 6.9.2 Uses and Limitations
- 6.10 Unit End Exercises.

6.1 OBJECTIVES

After going through the first part of this unit you will be able to

- Understand the meaning of data
- Appreciate the organisation of data
- tabulate the data provided in a meaningful way
- understand the graphical representation of data
- understand the uses and limitation of histogram, frequency polygon and pie graph.

calculate mean from ungrouped data
 calculate median from grouped data
 understand the interpretation of Mean and Median
 calculate Median from grouped data & interpret
 understand the uses and limitation of Mean
 understand the meaning of dispersion
 define standard deviation in your own words

6.2 INTRODUCTION

A teacher is interested in knowing about the performance and progress of his/her pupils. The teacher may want to compare one group with another one individual with another etc. this requires the knowledge of elementary statistical methods, which involve a numerical treatment of the collected data and which help us interpret psychological and educational measurements. "Statistics may be called the science of counting". "Statistics may be called the science of averages" - A I Bowley

In order to evaluate the learner we need to administer series of tests to the class and score them. These scores are often used without interpreting them. In order to interpret these scores we must tabulate them in an orderly manner and tabulate various statistical measures from the same.

This unit will emphasise on tabulation and graphical representation of data, central tendency (Mean, Median and Mode) - its uses limitations and relationship and uses and limitations of standard deviation as measure of variability.

6.3 THE MEANING OF THE TERM 'DATA'

The dictionary meaning of the term data means 'facts'. In a wider sense, the term data denotes evidence or facts describing a group or situation.

6.3.1 ORGANISATION OF DATA

Test experiments and survey studies in education and psychology provide us valuable data, in the form of numerical scores. These scores or data have little meaning for the investigator. In order to make this data more meaningful we must organise or arrange them in some systematic way. The organisation and arrangement of data into groups are called classes and are presented in a tabular form along with the numbers of observations (frequency) in each group.

6.3.2 TABULATION OF DATA

It is difficult to interpret or know the frequency of a particular score when the given data is large. (By frequency of a score we mean the number of times the score is separated in the given series) Therefore we group the numerical data into some arbitrarily chosen classes or groups. For this purpose scores are distributed into groups of scores and each score is allotted a place in the respective group or class. In this form we can see how many times a particular score or group of scores occur in the given series of data. This is known as frequency of a score or group of scores. Such a frequency table gives a better picture of the distribution of data and helps us to understand certain vital characteristics of the data.

Let us see an example,

Example 1

Table 6.1 Scores on an achievement test (25 stores)

75	75	77	67	72	81	68	65	
86	73	67	823	76	76	70	83	
71	63	72	72	61	67	84	69	64

Studying the above scores we may be able to find the lowest and the highest score and thus determine the range within which the score lie. However the overall performance of the group is difficult to interpret. Hence the above scores should be grouped and tabulated for better understanding.

Table 6.2 TABULAR FORM

CLASS INTERVAL	FREQUENCY
60-64	3
65-69	6
70-74	7
75-79	4
80-84	4
85-89	1
TOTAL	25

The class interval represents the scores and the frequency denotes the number of students.

The marks in assending or descending order with their corresponding frequencies in a tabular representations are called frequency distribution.

6.3.3 How to construct a Frequency Distribution table

Let us learn the systematics process by taking the data of 40 B.A. students in an achievement list given in table no. 6.3 Example : 2

TABLE 6.3, Scores of Achievement test

78, 70, 52, 55, 61, 73, 80, 35, 42, 36
 39, 77, 81, 72, 79, 69, 62, 70, 57, 49
 78, 70, 43, 42, 37, 65, 69, 83, 66, 56
 59, 83, 63, 44, 46, 63, 71, 52, 59, 65

Step 1 : FINDING THE RANGE : Range of the given series of data is found by first identifying the lowest score and the highest score. Then subtract the lowest score from the highest score. In the example given in table 6.3 the range of distribution is $83 - 35 = 48$

Step 2 : DETERMINING THE CLASS INTERVAL

To get an idea of the size of the classes i.e. class interval, the range is divided by the desired class number. Thus the formula for finding out the class interval is
$$\frac{\text{Range}}{\text{No of desired classes}}$$

The number of classes or groups depends on the number of scores in a given series. We usually have 6 to 20 classes of equal length. The length of class interval preferred is 2, 3, 5 or 10 units.

We must aim at selecting a proper class interval. In this example the number of classes desired is 10

$$\text{Class interval (i)} = \frac{\text{Range}}{\text{No of desired classes}}$$

$$i = \frac{48}{10} = 4.8 \text{ i.e. the nearest whole number is } 5$$

Step 3 : WRITING THE CONTENTS OF THE FREQUENCY DISTRIBUTION

For this purpose three columns are drawn

- In the first column we must write all the classes of the distribution either in ascending or descending order. In this example the lowest class taken is (35-39) and subsequently the higher classes (40-44), (45-49) etc. up to (80-84).
- In the second column the scores given in the data are taken one by one and tailed in their respective classes as shown in the table 6.4. These tally marks of each class interval are counted and written in the third column. The counted numbers in the third column are called the frequencies of that class.
- The total of the third column should be equal to the number of individual whose scores have been tabulated. In the given example shown in table 6.4 the total number of frequencies (N) i.e. 40 agrees with the total number of students.

Table 6.4 FREQUENCY DISTRIBUTION

CLASS INTERVAL	TALLIES	FREQUENCIES
35-39		04
40-44		04
45-49		02
50-54		02
55-59		05
60-64		04
65-69		05
70-74		06
75-79		04
80-84		04
TOTAL FREQUENCIES (N) = 40		

6.3.4 Check Your Progress

1. What is the meaning of data ?
2. What are the steps of construction of frequency distribution.
3. Tabulate the following 40 scores into a frequency distribution using an appropriate class interval.
30, 35, 36, 58, 54, 53, 50, 52, 39, 49
33, 36, 34, 57, 55, 38, 39, 51, 48, 46
37, 54, 52, 53, 39, 47, 44, 41, 43, 40
52, 53, 38, 51, 39, 46, 45, 40, 42, 41

6.4 GRAPHICAL REPRESENTATION OF DATA

6.4.1 MEANING OF GRAPHICAL REPRESENTATION OF DATA

A graphic representation is the geometric image of a set of data. It is mathematical picture. The data which has been shown in the tabular form may be presented in pictorial form by using a graph.

6.4.2 GRAPHICAL REPRESENTATION OF UNGROUPED DATA

For the data not grouped into a frequency distribution i.e. the ungrouped data we usually make use of the following graphical representation.

1. BAR GRAPH or BAR DIAGRAM
2. CIRCLE GRAPH or PIE DIAGRAM
3. PICTOGRAMS
4. LINE GRAPHS.

6.4.3 BAR GRAPH : Here the data is represented by bars because the variable is discrete and cannot be compared in terms of magnitude.

Class Obtained	No. of Students
Distinction	05
First Class	10
Second Class	28
Pass Class	04
Fail	03
	N = 50

Data represents the results of a particular class.

Example : 3

Drawing

The bars are equally spaced and are of same width on the horizontal axis. The height of the bars are proportionate to the respective frequencies.

6.4.4 CIRCLE GRAPH OR PIE DIAGRAM : The data is represented through the section or portion of a circle and it covers 360° . The frequencies are equated to 360° and the angles corresponding to component parts are calculated. After determining the angles required sectors are drawn.

Table 6.6 Example : 4

WORK EXPERIENCE

Area of	No. STUDNETS	ANGLE OF THE CIRCLE
<i>PHOTOGRAPHY</i>	06	$\frac{6}{120} \times 360 = 18^\circ$
<i>CLAYMODELLING</i>	30	$\frac{30}{120} \times 360 = 90^\circ$
<i>KITCHENGARDENING</i>	48	$\frac{48}{120} \times 360 = 144^\circ$
<i>DOLLMAKING</i>	12	$\frac{12}{120} \times 360 = 36^\circ$
<i>BOOKBINDING2</i>	4	$\frac{24}{120} \times 360 = 72^\circ$
<i>TOTAL</i>	120	

The numerical data is converted into angles of a circle using the formula.

6.5 GRAPHICAL REPRESENTATIONS OF GROUPED OF DATA

The graphs used to represent the grouped data or the frequency distribution are

- (a) HISTOGRAM
- (b) FREQUENCY POLYGON
- (c) FREQUENCY CURVE
- (d) CUMULATIVE FREQUENCY CURVE

6.5.1 HISTOGRAM

It is the most common form of graphical representation of frequencies and the corresponding class interval.

The points to be considered to draw a histogram are :

- (i) The actual lower limits of the class interval are taken on X-axis. As per table 6.4 the actual limits of the class intervals will be (34.5 - 39.5), (39.5 - 44.5) (44.5- 49.5) so on.
- (ii) Frequencies are plotted on the Y-axis.
- (iii) Adjacent rectangles are constructed wherein the base of each rectangle is the length of the class interval and the height of the rectangle is the length of the class interval.
- (iv) The area of the Histogram represents the total frequency over the class interval.

HISTOGRAM BASED ON THE DATA GIVEN IN Table 6.4

6.5.2 FREQUENCY POLYGOE (I) A frequency polygon can be plotted by taking the midpoint of each class interval on the X-axis and its corresponding frequencies on the Y-axis,

- (ii) The various points are joined by straight lines.
- (iii) To complete the polygon hypothetical class intervals with zero frequencies are taken into consideration.

Frequency polygon can be plotted on a histogram if the mid points of the upper base of the rectangles are connected by straight lines.

6.5.3 Uses and Limitations :

Pie graph and Bar graph : Bar graph used when the variables are not continuous and the data is ungrouped. When the data is in the grouped form i.e. frequency distribution then Histogram and frequency polygon can be used.

Histogram is mainly used when comparison of various frequency distribution is not required.

Frequency polygon can be used when comparison of various frequency distribution is required. It is possible to superimpose more than one frequency polygon on the same graph.

Limitations of Histogram

1. The assumptions that the scores are evenly distributed within the class interval produces a larger error when N is small than when N is large.
2. It is difficult to superimpose more than one Histogram on the same graph.
3. Comparisons of several frequency distribution cannot be done easily.

Limitation of frequency polygon

1. The assumption that all the scores within a class interval fall at the mid-point of the interval produces a larger error when N is large.
2. The part of the area lying above any given interval cannot be taken as proportional to the frequency of that class interval due to the irregularities in the frequency surface.
3. It is less precise than the histogram i.e. in term of area, the frequency upon each interval.

6.5.4 Check Your Progress - 2

1. What are the differences between Histogram and frequency polygon ?
2. Plot a histogram and a frequency polygon based on the frequency distribution tabulated in question number three of CYPI
3. What are Bar graph ?
4. What are pie diagrams ?

6.6 MEASURES OF CENTRAL TENDANCY :

If we take the achievement scores of the students of a class and arrange them in a frequency distribution, we will find that there are very few students who either score very low or very high. The scores of most of the students lie somewhere between the highest and the lowest scores of the whole class. This tendency of a group about distribution is called central tendency and the typical score lying between the extremes and shared by most of the students is referred to as a measure of central tendency.

According to Tate "Central Tendency is a sort of average or typical values of the items in the series and its function is to summarise the series in terms of this average value".

Types of measures of central tendency are :

(a) MEAN (b) MEDIAN (c) MODE

6.7 MEAN : It is the simplest but most useful measure of central tendency and can be defined as the sum of all the values of the items in a series divided by the number of items. It is designated by the symbol 'M'.

6.7.1 Calculating Mean for ungrouped data

When raw data are given the mean is calculated by adding all these values and dividing by the total number.

Example : 5 Table : 6.7

Calculate Mean for the scores given below

27, 30, 33, 32, 29, 26, 25, 41, 40, 33

$$Mean = \frac{\sum X}{N} = \frac{27 + 30 + 33 + 32 + 29 + 26 + 25 + 41 + 40 + 33}{10}$$

$$\frac{316}{10} = 31.6$$

6.7.2 Calculating Mean for Grouped data (Data in the form of frequency distribution)

(A) GENERAL METHOD : When grouped frequency distribution is given, the Mean is calculated using the formula.

$$Mean = \frac{\sum f.X}{N}$$

Where X = Mid point of the class interval

f = frequency

N = Total number of cases.

Example : 6

Calculate the Mean for the following data.

Table 6.8 CLASS INTE

CLASS INTERVAL	FREQUENCY	MID POINT	F-X
56-58	3	57	171
53-55	4	54	216
50-52	5	51	255
47-49	7	48	336
44-46	6	45	270

$$Mean = \frac{\sum fX}{N} = \frac{1248}{25}$$

$$Mean = 49.92$$

(B) SHORT CUT METHOD (ASSUMED MEAN METHOD)

Here we locate a class that lies almost at the middle of distribution. Its end point is taken as the Assumed Mean (A.M.) Deviation from this class interval is calculated like class intervals above and below

it by subtracting the A. M. from the mid-point of the class interval and dividing by the size of the class-interval. Multiply the frequency and corresponding duration of the class interval.

Find the sum of f. d

Apply the formula for calculating the Mean

$$i.e. Mean = A.M + \frac{\sum f \cdot d}{N} \times i$$

Class interval	Frequency f. d	Mid point	deviation d
56-58	3	57	2
53-55	6		
	4	54	1
50-52	4		
	5	51	0
47-49	0		
	7	48	-1
44-46	-7		
	6	45	-2
	-12		
N=25	$\sum f \cdot d = -9$		

$$Mean = A.M + \frac{\sum f \cdot d}{N} \times i$$

$$= 51 + \frac{(-9)}{25} \times 3$$

$$= 51 - \frac{27}{25}$$

$$= 51 - 1.08$$

$$Mean = 49.92$$

6.7.3 INTERPRETATION

Mean is an average which represents an entire distribution of the scores made by a group thereby giving us a concise description by the performance of the group as a whole

6.7.4 USES AND LIMITATIONS OF MEAN

1. Mean is used when accurate and reliable measures of central tendency is needed.
2. Mean is calculated when we need to calculate other statistical measures like standard deviation, coefficient of correlation.
3. When the scores are equally distributed symmetrically around the central point mean is calculated.

Limitations are :

1. As the skew ness of the distribution increases the reliability of the mean decreases.
2. Since it is calculated from all the items, too large or too small item may be highly misleading and affect the mean.
3. Even if a single item is missing Mean cannot be calculated.
4. Mean can be used when data is in the form of absolute scores and not grades/Ranks/ order of students.
5. Mean cannot be calculated in the case of open-end-table.

6.8 MEDIAN

If the items of a series are arranged in ascending or descending order of magnitude, the measures or value of the central item in the series is termed the Median. A median is the average of position and is represented as Md.

6.8.1 Calculating Median for Ungrouped data

Median can be obtained by finding out the $(n+1)/2$ the term when scores are arranged in ascending or descending order.

Example : 7

Find the median for the scores given below

20, 22, 21, 23, 25

Arrange the scores in ascending or descending order

20, 21, 22, 23, 25

There are FIVE scores in all

$$\text{The } \left(\frac{n+1}{2} \right) \text{th i.e. } \frac{5+1}{2} = \frac{6}{2} = 3 \text{rd item}$$

The 3 rd item in the series is 22. Therefore the median = 22.

Example 8 : Find the Median for the given scores

16, 18, 26, 28, 32, 34, 35, 37

There are eight scores in all.

The $\frac{n+1}{2}$ th item

$$\text{i.e. } \frac{8+1}{2} = \frac{9}{2} = 4.5 \text{th item will be the median}$$

4th item is 28 and the 5th item is 32

$$\text{Therefore } \frac{28+32}{2} = \frac{60}{2} = 30$$

Median is 30

6.8.2 Calculating Median for Grouped data

Calculate the Median for the given frequency distribution

Class Interval	Frequency
70-79	3
60-69	5
50-59	4
40-49	12
30-39	10
20-29	6
10-19	8
0-9	2

$$\text{Median} = L + \left(\frac{\frac{N}{2} - F}{f} \right) \times i$$

L = Exact lower limit of the median class

N = Total number of cases

F = Total frequencies that lie below the median class

f = frequency of the Median class

i = length of the class interval

To calculate Median (i) find the value of N/2

In this example it is $50/2 = 25$

(ii) Find the class interval in which the 25th case lies. Count the frequency from the lowest class interval. In this example it will be $2+8+6+10=26$

The N/2 cases lies in the class interval (30 - 39) and is called the Median class.

(iii) Apply the data in the given formula to find the Median.

$$\begin{aligned}
 \text{Median} &= L + \frac{\left(\frac{N}{2} - F\right)}{f} \times i \\
 &= 29.5 + \frac{\left(\frac{50}{2} - 16\right)}{10} \times 10 \\
 &= 29.5 + \frac{(25 - 16)}{10} \times 10 \\
 &= 29.5 + 9 \\
 &= 38.5
 \end{aligned}$$

6.8.3 Interpretation : Median is an average of position. It is the value or point on the score scale that separates the top half of the series from the bottom half. "Median is the point below which 50% of the cases lie.

6.8.4 Uses and limitations

- Uses are (i) When the exact mid-point of the distribution is desired median is calculated
(ii) Median is not affected by extreme scores, therefore when a series contains extreme scores median is most representative central measure.
(iii) Median can be used in case of an open end distribution.
(iv) Median can be calculated graphically.

Limitations are :

- (1) It is not suitable for further algebraic treatment.
- (2) When there are wide variation between the values of different items a median may not be representative of the series.

6.8.5 Check your progress 3

- (1) What is the formula to calculate Mean using assumed mean method ?
- (2) What is the formula to calculate the median of a given frequency distribution ?
- (3) What are the uses of Mean and Median ?
 - 1) 1)
 - 2) 2)
 - 3) 3)

- (4) Calculate the Median of the given set of score
36, 31, 32, 39, 28, 41, 43, 35, 27, 25

6.9 MEASURES OF VARIABILITY

The measures of central tendency give us an idea of the general achievement of the group as a whole. They do not show how the individual scores are spread out. There is a tendency for a data to be dispersed, scattered or show variability around the average. The tendency of the measures of the attributes of a group to deviate from the average or central value is known as dispersion or variability. All the measures of variability represent distances rather than points and the larger they are the greater is the variability of the scores.

The four measures of variability are :

- (1) Range (2) Quartile deviation (3) Average Deviation (4) Standard Deviation

6.9.1 STANDARD DEVIATION

Standard deviation of a set of scores is defined as the square root of the average of the squares of the deviations of each score from the Mean

Standard deviation is also called root mean square deviation and is denoted by 'σ' (sigma)

$$\sigma = \sqrt{\frac{\sum(X - M)^2}{N}}$$

$$OR \sigma = \sqrt{\frac{\sum x^2}{N}}$$

X = individual score

M = Mean of the given set of scores

x = deviation of each score from the mean.

6.9.2 Uses and limitations

Standard deviation is regarded as the most stable and reliable measure of variability as it employs mean for its computation. It is the master measure of variability and is algebraically treated for correlational work and is further statistical analysis.

The only limitation is that the extreme values affect it to a great extent.

For interpreting the value of measure of dispersion we must understand that greater the value of ' σ ' the more scattered are the scores from the mean.

UNITY END EXERCISES :

1. Calculate Mean of the following frequency distribution and interpret the result.

Class Interval	80-84	85-89	90-94	95-99	100-104	105-109	110-114	Total
Frequency	2	4	8	10	3	2	1	30

(Leave space)

2. Calculate the Median of the following frequency distribution and interpret the result.

Class Interval	45-47	42-44	39-41	36-38	33-35	30-32	29-25	24-26	Total
Frequency	1	4	6	5	7	3	2	1	N=30

(Leave space)

3. Define standard Deviation
4. Based on the above frequency distribution plot a Histogram and a frequency polygon.

SUGGESTED READINGS

1. Mangal, S. K. (2004), " Statistics is Psychology and Educaiton", Prentice - Hall of India Private Limited, New Delhi 110001.
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 3. GARETT, H. E. and WOODWORTH, R. S. (1985), "STATISTICS IN PSYCHOLOGY AND EDUCATION", VAKILS FEFFER AND SIMOND LTD., Ballard Estate, Mumbai - 38.
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