UNIT 4: TEST CONSTRUCTION AND STANDARDIZATION

UNIT STRUCTURE

4.1 Learning Objectives

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4.3 Meaning of Psychological Test

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4.1 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- define Psychological Test
- define Standardized Test
- highlight the principles of Test Construction
- explain the steps involved in Test Construction.

4.2 INTRODUCTION

Psychological Test is one of the most important tools used in measurement and evaluation. Psychological tests are very useful in the field of education and in various other fields of human activity. These tests are used to study intelligence, aptitude, achievement, and various other scholastic and non-scholastic traits of individual's personality. These tests help to determine the nature of individual differences among learners. Psychological tests are very useful in studying intellectual development as well as academic and non-academic personality characteristics that are associated with age and sex, personality characteristics of gifted, retarded,

or educationally backward, personality traits of the neurotics and psychotics. Educational institutions widely use psychological tests for the dual purpose of making various decisions and administrative policies and management of the institution. Psychological tests are also useful in providing educational and vocational guidance and counselling to students besides their use in employment, business, industry, and many other areas of work that affect the lives of many people. Since we have already discussed the history and concept of psychological test in detail in the previous unit, here we are going to focus on the meaning of standardized test, principle of methods of test construction.

4.3 MEANING OF PSYCHOLOGICAL TEST

A psychological test is a collection of some questions to be answered or tasks to be performed by the psychologist or teachers. Such collection of questions or tasks is used to measure intelligence, knowledge, skill, or other traits of personality of an individual or a group. This collection of questions or tasks (test) is required for the reason that intelligence, achievement, or other such trait or characteristic cannot be measured directly unlike the measurement of the objects of the physical world. Measurement of the objects of the physical world is direct and easy because such measurement can be done using universally acceptable standard tools and units. Conversely, psychological measurement that involves the measurement of knowledge, skill, aptitude, achievement, or any other trait of the personality cannot be measured until and unless they are manifest in the behaviour of man. Therefore, it is required to make the abstract trait or quality to be measured explicit in the behaviour of the individual so as to make it measureable, and hence some stimuli in the form of questions or tasks are given to the subjects or the person whose behaviour is being measured so that their responses could be observed, recorded and measured. The questions to be answered or the tasks to be performed are so selected or framed that the response of the testee to such question/task could make the trait to be measured explicit and measureable. Thus, a

psychological test may be understood as a set of carefully selected stimuli in the form of questions to be answered or tasks to be performed to elicit a sample of behaviour required to measure a particular psychological trait or characteristic. The definition given by psychologist Marshall is noteworthy in this context: "A psychological test may be defined as a pattern of stimuli, selected and organised to elicit responses which reveal certain characteristics in the person who takes them." However, this definition does not include all the features of a psychological test. Hence, some important definitions of psychological test are quoted below:

According to Frank S. Freeman, "A psychological test is a standardized instrument designed to measure objectively one or more aspects of a total personality by means of samples of verbal or non-verbal responses, or by means of other behaviours."

Psychologist Anastasi and Urbina have defined a psychological test as an objective and standardized measure of a sample of behaviour.

A.K.Singh stated that "A psychological or educational test is a standardized procedure to measure quantitatively or qualitatively one or more than one aspect of a trait by means of a sample of verbal or non-verbal behaviour.

In the words of McIntire and Miller, "Psychological tests are instruments that require the testee to perform some behaviour. The behaviour performed is used to measure some personal attribute, trait or characteristic - such as intelligence - that is thought to be important in describing and understanding the behaviour."

Analyses of the foregoing definitions of psychological test help us to conclude that a test consist of some items or tasks to be performed by the testee which elicit a sample behaviour of the testee. Such sample of behaviour indirectly reveals the personality trait or characteristic which is being measured.



CHECK YOUR PROGRESS

Q 1: Define psychological test.

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4.4 MEANING AND CHARACTERISTICS OF A STANDARDIZED TEST

A standardized test is a test that is administered, scored, and interpreted in the same way for all test-takers. A standardized test establishes uniformity of procedures for administration and scoring of the test. This uniformity of procedure is important to make the scores obtained by different persons comparable. According to L. J. Cronbach, a standardized test is one in which procedure, apparatus, and scoring has been fixed so that precisely the same test can be given at different times and places.

Following characteristics of a standardized test make its meaning more clear:

- A standardized test is administered under identical conditions, it does not matter where, when, by whom or to whom the test is administered, it is done in a similar way.
- A standardized test is always scored objectively and in a standard or consistent manner; the procedures for scoring a standardized test are specified so that different scorers arrive at the same scores for the same set of responses.
- A standardized test requires all test takers to answer the same questions in the same way.
- Scores obtained by different individuals or groups in standardized test can be compared in order to assess the relative performance of individual students or groups of students.
- Standardized tests are usually designed to measure relative performance of individuals or groups. Hence establishment of norms

for comparing the performance of individuals or groups forms an important part of a standardized test construction.

- The formulation of directions for a standardized test is a major part of its construction. Directions for standardized tests specify the materials to be used, time limits to be given, oral instructions and demonstrations to respondents, and all other details of the testing situation.
- Standardized tests are highly reliable and valid.

4.5 PRINCIPLES OF TEST CONSTRUCTION

Construction of psychological test and its standardization must be well planned and methodical. There are some fundamental principles that should be observed and guide the test-makers when constructing tests. Some of these important principles are as follows:

- Construction of psychological test must start with Proper Planning for the Test. While planning the test, the intended function of the test, the area, the specific objectives, type of test items and their effectiveness, cost and practicality must be considered.
- Another important principle of test construction involves the task of defining objectives in behavioural terms and in precise terms that will serve as a guide to testing.
- The content to be covered by the test should be clearly specified.
- A blueprint for test construction must be prepared. The blueprint should include the number of items to be included in the test under each topic of the content.
- The instruction to the candidate should be clear, unambiguous and precise.
- Tests must be constructed incorporating items that help in measuring all the instructional objectives.
- Use of test items must be appropriate for particular objectives. It must be seen that items can test higher mental abilities rather than simple recall of information.

- An important principle of test construction is to make the test reliable, valid and objective. A test is reliable when it gives consistent result, valid when it measures what it intends to measure, and objective when the score is free of influence of the person making the measurement.
- Items having answers with doubts, unimportant, meaningless and ambiguity must be avoided.
- Language of the items should be clear and straight forward. At the same time, the rules of rhetoric, grammar and punctuation should be strictly followed.
- Any item without clear cut answer must be avoided.
- Tricky questions or items should be avoided.
- Items which furnish the answers to other items must be avoided.



CHECK YOUR PROGRESS

Q 2: Write any two principles of test construction

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4.6 METHODS OF TEST CONSTRUCTION AND STANDARDIZATION

Test construction is a very complex and an extensive process. Various important factors must be considered when one wants to construct a psychological test. There are numerous points which are common to all types of tests which must be taken care of while constructing a test. Important among these factors or points are the area in which the test is to be constructed, the age group and the grade for which the test is to be made. Moreover, the general or the specific purpose to be served by the test must be considered. In addition to these points, certain important steps are to be followed while constructing a psychological test. Following are the important steps to be followed:

1. **Planning the Test:** The first important step in the test construction is planning of the test. In this step, the test constructor has to determine the objectives of testing besides considering other important things. An analysis of the curriculum or content relating to the topic on which the test is to be made, consideration of the target population for which the test is to be made, the limitations under which the test is to be constructed, the length and the nature of test items to be used, method of scoring and interpretation, etc are some important considerations that seek attention while planning for a test. Therefore, in the stage of planning the test maker has to follow the steps mentioned below:

- **Determination of the objectives of the test:** Psychological tests may be constructed with different purposes. The objectives of a psychological test may vary from the measurement of entry behaviour of the pupils, the effect of teaching on their performance during the course of their learning, to the measurement of their terminal behaviour. Moreover, psychological test may be made to measure different psychological attributes including intelligence, aptitude, interest, personality and the like. Therefore it is very important to decide with what purpose or objective the test is to be made at the very beginning of test construction. Only after determining the objectives clearly the next steps in test construction can proceed.
- **Preparation of the Blue-print:** The second important step to be taken by the test maker while planning his test is to prepare a blue print or the test-specifications. A test blueprint is a document that reflects the content of a test. It contains the instructional objectives, the questions or tasks to match the instructional objectives, and the learning domains and levels therein. Thus, a test blueprint is the plan that one creates and uses when building a test. The preparation of a blue print requires the following:
- **List all the topics** or units selected for testing and the time allotted for each topic or unit as shown in the following example:

Serial No	Topic/Unit	Period of instruction
1	The solar system	16
2	The water world	10
3	Food and nutrition	8
4	Means of communication	8
5	Our environment	12
	Total hours	54

- **Determine the weight-age or marks to different areas of content** by calculating the percentage to adjust marks for each topic, in the following manner:

Hour of instruction per topic ×100

Total hours

Serial No	Topic/Unit	Period of instruction	Calculation	Percentage
1	The solar system	16	16/54X100	29.6=30
2	The water world	10	10/54X100	18.5=18
3	Food and nutrition	8	8/54X100	14.8=15
4	Means of communication	8	8/54X100	14.8=15
5	Our environment	12	12/54X100	22.2=22
	Total hours	54		100

- **Determine the weight-age to different objectives** and the different types of items to be included, as shown in the following example:

Instructional objectives	Type of test items			Total
	Objective type	Short answer type	Essay type	
Knowledge	3			3
Understanding	10	7		17
Application	7	14	15	36
Analysis		7	15	22
Synthesis		7	15	22
Evaluation				
Total	20	35	45	100

- Preparation of the table of specification or **the blue print:**

Instructional Objectives / Topics	Knowledge			Understanding			Application			Total
	Very Short	Short	Essay	Very Short	Short	Essay	Very Short	Short	Essay	
The solar system	1	2		1	4			7	15	30
The water world	1			2					15	18
Food and nutrition	1			1	3		4	6		15
Means of communication	2	6		2	5					15
Our environment	1	2		3		15	1			22
Total	6	10		9	12	15	5	13	30	100

2. **Preparing the first draft of the test:** After planning for the test, preparing the first draft of the test on the basis of the blueprint is the second important step in test construction. In this step, item for the test instructions to the testee and the scoring key is prepared. Preparation of items for the test is the most important task that needs utmost care on the part of the test-maker. Following guidelines help in preparing items for a test:
   - Items must relate to the objectives of the test, i.e. items must measure the attribute or performance described in the specific learning outcomes or objectives.
   - Items must represent the whole content or area and all the instructional objectives.
   - Items should be clearly written and should not be ambiguous. Testee should easily understand the item.
   - The difficulty level of items should be of appropriate level.
   - Items must be grammatically correct and should not give any cue to testees.
   - Items without clear cut answer must not be included in the test.
   - Items containing answers to other items must be avoided.
   - Test items must be technically correct, i.e. reliable, valid and objective.

Another important aspect of test construction which goes hand in hand with the construction of test items is the preparation of instructions for the test. Technical qualities of a test like validity and reliability depend on the clarity of instructions to a great extent. Hence instructions for the test must clarify the purpose of the test, mention the time allotted for completing the test, provide clear directions to testees about how to answer the items, state how the answers to items would be recorded, and how to deal with the effect of guessing. At the same time the test maker has to prepare a scoring key and explain the method how to score the items.

Some test experts suggest that the preliminary draft of the test should be submitted to experts for their opinion and should be

administered to a small sample from the population and analyse their responses. This is called the small group try out of the test. The preliminary draft of the test may call for further modification in the light of experts' opinion and small group try out. Thus the preliminary draft is prepared for try out on a very large sample in the next step.

3. **Trying out the test:** Once the preliminary draft of the test is ready, it should be administered to a large and random representative sample of the population for which the test is constructed. The attempt to administer the test helps to determine the validity, reliability, and usability of the test. Moreover it helps to improve defective items and delete unnecessary ones. Trying out the test also helps in determining the difficulty and discriminating power of the items in the test. The sample on which the test is administered must be inclusive of poor, good and brilliant students. The physical and psychological condition should be normal. It must be seen that the testing condition is not affected by any unwanted factor. There should be proper invigilation and arrangement for sitting, lighting and other required conditions.

   After the administration of the test, the scoring of the test booklets should be done with the help of the scoring key and procedure prepared beforehand.

4. **Item analysis:** After the administration and scoring of the preliminary draft of the test, the task of analysing items starts. The main purpose of analysing items is to improve the quality of test items for future administration. The simple meaning of item analysis is determination of relative difficulty level and discriminating power of test items. Item analysis helps in discarding the items that are too easy or too difficult. Generally, an item is considered to be too easy when the item is attempted correctly by most the respondents and an item is too difficult when it is answered correctly by a few respondents only. Hence, only items with average or moderate difficulty level are retained for the final draft of the test. In addition to the task of determining the difficulty level of items, determining the

discriminatory power of the test items is another important task done by item analysis. Discriminating power of test items distinguish between good (students who know more) and bad (students who know less) students. If any item is answered correctly by an equal number of good as well as bad students then it should be understood that the item is not making any discrimination between good and bad students. On the other hand, if an item is answered correctly by more number of good students than bad students, then the item is discriminating between good and bad students.

The act of item analysis also includes the task of distracter analysis in case of multiple choice type items. A multiple choice type item presents some incorrect alternatives along with one correct alternative. The incorrect alternatives are called distracters. Distracter analysis is the process of determining if the alternatives could serve their purpose of distracting the respondents.



CHECK YOUR PROGRESS

Q 3: What is a Blueprint?

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Q 4: What is the main purpose of item analysis?

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5. **Preparing the final draft of the test:** Items selected on the basis of item analysis are put into the final draft of the test. Items with proper difficulty level and discriminating power are included in the final draft of the test. Clear instructions are given to the respondents for answering each item. On the basis of the administration of the preliminary draft of the test, time required for completing the test is determined and recorded.
6. **Standardization:** The last of test construction is standardization. The main purpose of this step is to determine the qualitative standard

and norms for the test. The main tasks involved in this step are as follows:

- Administering the final draft of test on a very large group of students,
- Scoring the test booklets and arranging the scores for analyses,
- Calculating Mean and other statistical values of the scores obtained by the testees,
- Determining the norm for the test on the basis of the statistical values of the scores,
- Determining the reliability of the test items,
- Determining the validity of the test items,
- Considering the various aspects of usability of the test,
- Preparing test manual or guidelines for administering the test.

Thus, the construction of a psychological test goes through the steps discussed above. (Further details about some of important steps like **item analysis** have been discussed in subsequent chapters.)



ACTIVITY 4.1

Prepare a blueprint taking any topic from any school subject.

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4.7 LET US SUM UP

After going through the unit, it can be summarized as-

- Psychological test is one of the most important tools used in measurement and evaluation.
- A psychological test is a collection of some questions to be answered or tasks to be performed by the testee. The questions to be answered or the tasks to be performed are so selected or framed that the response of the testee to such question/task could make the trait to be measured explicit and measureable. Thus, a psychological test may be understood as a set of carefully selected stimuli in the form of questions to be answered or tasks to be performed to elicit a

sample of behaviour required to measure a particular psychological trait or characteristic.

- A standardized psychological test is a test that is administered, scored, and interpreted in the same way for all test-takers.
- A standardized test is characterized by uniformity of procedures for administration and scoring of the test. Owing to its uniformity of procedure, the scores obtained by different persons on standardized test are comparable.
- Construction of psychological test and its standardization must be well planned and methodical. Some fundamental principles should invariably govern the construction of psychological tests. Every effort must be made to make the test valid, reliable, objective, and usable.
- Some important steps must be followed while constructing a psychological test. Important among these steps are:
  - Planning for the test
  - Preparing the first draft of the test
  - Trying out the test
  - Item analysis
  - Preparing the final draft of the test:
  - Standardization



4.8 FURTHER READING

1) Anastasi, Anne (1982): Psychological testing, Edition 5, illustrated. Macmillan,The University of Michigan.
2) Bloom, B.S. (1956): Taxonomy of Educational Objectives. Handbook I, Cognitive Domain, David McKay Co. Inc, New York.
3) Ebel, R.L. and Frisbel, D.A. (1979): Essential of Educational Measurement, 3rd Edition, Prentice Hall of India, New Delhi.
4) Gupta, S.P.(2009): Modern Measurement and Evaluations with Statistics, Sharda Pustak Bhavan, Allahabad
5) Sax, G. (1970): Principle of Educational Measurement and Evaluation, Wordsworth Pub. California.

6) Stanley & Hopkins (1966): Education and Psychological Measurement and Evaluation, Prentice Hall Pvt. Ltd. Eaglewood Cliff, New Jersey

4.9 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No 1: A psychological test is a collection of some questions to be answered or tasks to be performed by the testee. The questions to be answered or the tasks to be performed are so selected or framed that the response of the testee to such question/task could make the trait to be measured explicit and measureable. Thus, a psychological test may be understood as a set of carefully selected stimuli in the form of questions to be answered or tasks to be performed to elicit a sample of behaviour required to measure a particular psychological trait or characteristic.

Ans to Q No 2: Two important principles of test construction are: (i) Construction of psychological test must start with Proper Planning for the Test. While planning the test, the intended function of the test, the area, the specific objectives, type of test items and their effectiveness, cost and practicality must be considered. (ii) Another important principle of test construction is to make the test reliable, valid and objective. A test is reliable when it gives consistent result, valid when it measures what it intends to measure and objective when the score is free of influence of the person making the measurement.

Ans to Q No 3: A test blueprint is a document that reflects the content of a test. It contains the instructional objectives, the questions or tasks to match the instructional objectives, and the learning domains and levels therein. Thus, a test blueprint is the plan that one creates and uses when building a test.

Ans to Q No 4: The main purpose of item analysis is to improve the quality of test items for future administration. The process of item analysis involves determination of relative difficulty level and discriminating power of test items.



4.10 MODEL QUESTIONS

Short Questions (Answer each question in around 150 words)

Q 1: What do you mean by a standardized test?

Q 2: What is small group try out?

Q 3: What do you mean by item analysis?

Long Questions. (Answer each question in around 300-500 words)

Q 1: Enumerate the main principles of test construction.

Q 2: Explain the process of preparing a blue print for construction of a psychological test.

Q 3: Discuss the steps involved in test construction.

Q 4: Write about the tasks involved in standardizing a test.

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