

## Chapter 3

# Construction Of Achievement Tests

- ▶▶ *Meaning of Achievement Test*
- ▶▶ *Types of Achievement Test*
- ▶▶ *Teacher-Made Tests*
- ▶▶ *Standardised Tests*
- ▶▶ *General Principles of Test Construction*
  - *Planning the test*
  - *Preparing the test*
  - *Try-out of the test*
  - *Evaluating the test*

Evaluation plays an important role in the teaching learning process. The objective of evaluation is to provide a clear reliable and valid description about the pupil's achievement. For the above purpose classroom testing is necessary. Classroom tests provide relevant information about pupil's learning. Tests represent the total domain of achievement tasks. Therefore one should know about the term 'achievement' in school evaluation programme.

From common man's point of view achievement is pupil's scores on a particular class-room test. For example Mr. X has secured 50 in English and 60 in Mathematics. Generally we say that Mr. 'X' has a better achievement in Mathematics than English. But in real sense the term achievement is more broader than this. It means total learning attainments, accomplishments, and proficiencies that a student has acquired. Different educationists have defined the term as following.

**H.W. Bernard.** The concept of achievement involves the interaction of



three factors such as (i) aptitude for learning (ii) readiness for learning and (iii) opportunity for learning.

**C.V. Good.** Achievement is the accomplishment or proficiency performance in a given skill or body of knowledge.

Therefore it can be said that achievement implies the overall mastery of a pupil on a particular context. Any measuring instrument that measures the attainments or accomplishments of a pupil's achievement is called an achievement test.

Preparation of an achievement test for evaluating students' achievement is an important task. Therefore a teacher should know different types of achievement tests and how to prepare reliable, valid and useful class-room tests.

### TYPES OF ACHIEVEMENT TESTS

According to the process of construction and use, the class-room tests can be classified into different categories. But broadly it can be divided into two types:

(a) *Teacher-made Tests*

(b) *Standardized Tests.*

#### Teacher Made Tests :

As we have discussed, a teacher uses different forms of evaluation techniques in a class-room situation. A teacher-made test is one of the most valuable instruments in the hands of the teacher to solve this purpose. It is designed to solve the problems or requirements of the class for which it is prepared. It is prepared to measure the outcomes and content of local curriculum. It is very much flexible so that it can be adapted to any procedure and material. It does not require any sophisticated technique for preparation. It is easy to construct. As standardized tests are prepared to measure the learning objectives in general, so it is necessary to prepare teacher-made tests to suit the local objectives. In a teacher-made test, the test items, time limit, instructions and procedure of scoring vary from test to test. These tests may be written or oral in nature. In a teacher-made test, both objective type and essay type items can be included.

#### Standardized Test.

Standardized tests are carefully constructed tests which have uniformity of procedure in scoring, administering and interpreting the test results. Generally, these tests are "norm-referenced tests that measure the pupils' level of achievement in various content and skill areas by comparing their test performance with the performance of other pupils in some general reference group." In the Dictionary of Education C.V. Good has described a standardized



test is that "for which content has been selected and checked empirically for which norms have been established for which uniform methods of administering and scoring have been developed, and which may be scored with a relatively high degree of objectivity." From the above discussion we can determine the following characteristics of a standardized test.

- The test is developed by experts test specialists so that its items are of high technical quality.
- A clear instruction for administering and scoring the test is given. So that it maintains uniformity in administering and scoring.
- For the interpretation of test scores norms are provided in the test manual.
- Equivalent forms of tests are available.
- These tests possess high reliability coefficient, generally between .80 to .95

**Difference between Standardized Tests and Teacher-Made-Tests**

| Standardized Tests  | Teacher Made Tests  |
|---|---|
| <ul style="list-style-type: none"> <li>• Standardized tests are prepared by the educationists and test specialists.</li> <li>• Standardized tests are based on <u>uniform</u> curriculum in many institutions.</li> <li>• Standardized tests are concerned with the <u>whole field</u> of knowledge or ability.</li> <li>• <u>Norms</u> are given for comparing performance according to age, grade, place, sex etc.</li> <li>• Standardization is done in respect of four aspects—contents, procedures of administration, scoring and interpretation of test results.</li> <li>• It is useful in comparing achievement of individual or group in various fields of performance.</li> </ul> | <ul style="list-style-type: none"> <li>• Teacher-made tests are prepared by the class-room teachers.</li> <li>• It is for local use in some particular institutions.</li> <li>• It is concerned with limited or <u>specific field</u> of knowledge or <u>ability</u>.</li> <li>• No norms are given.</li> <li>• Teacher-made tests are not based on these aspects.</li> <li>• It tests individual attainment of knowledge in specific fields and attainment of specific aims of instruction.</li> </ul> |

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|---|---|
| <ul style="list-style-type: none"> <li>• It is possible to compare performance of various grades and institutions. (State or National level)</li> <li>• Standardized test is more time consuming and expensive.</li> <li>• These tests have satisfactory validity, reliability and objectivity.</li> <li>• These tests have proper difficulty index.</li> </ul> | <ul style="list-style-type: none"> <li>• It is possible to classify students according to their achievement in same school.</li> <li>• Teacher-made test is not so.</li> <li>• The validity, reliability and objectivity of teacher-made tests are questionable.</li> <li>• Teacher-made tests may not have proper difficulty index.</li> </ul> |
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### GENERAL PRINCIPLES OF TEST CONSTRUCTION

Evaluation process is an appraisal of the learning outcomes resulted by instruction. In order to make proper appraisal we need a valid, reliable and objective tool for measurement. So the selection of a tool or preparation of a standard tool for the process of evaluation is most important. For the above purpose we may prepare a standardized test or a teacher-made test. But while preparing a standardized test we must follow different principles of test construction. These steps and procedures help us to produce a valid, reliable and objective standardised test.

- Planning the test.
- Preparing the test.
- Try out the test.
- Evaluating the test.

#### ① PLANNING THE TEST

Planning of the test is the first important step in the construction. The main goal of evaluation process is to collect valid, reliable and useful data about the student. Therefore before going to prepare any test we must keep in mind, that (1) What is to be measured (2) What content should be included and (3) What types of test items are to be included. Therefore the first step includes three major considerations.

- Determining the objectives of testing.
- Preparing test specifications.
- Selecting appropriate item types.

**1. Determining the Objectives of Testing :** A test can be used for different purposes in a teaching learning process. It can be used to measure entry performance, the progress during the teaching learning process and to decide the mastery level achieved by the students.



Tests serve as a good instrument to measure the entry performance of the students. It answers to the questions, whether the students have requisite skill to enter into the course or not, what previous knowledge does the pupil possess. Therefore it must be decided whether the test will be used to measure the entry performance or the previous knowledge acquired by the student on the subject.

Tests can also be used for formative evaluation. It helps to carry on the teaching learning process, to find out the immediate learning difficulties and to suggest its remedies. When the difficulties are still unsolved we may use diagnostic tests. Diagnostic tests should be prepared with high technique. So specific items to diagnose specific areas of difficulty should be included in the test.

Tests are used to assign grades or to determine the mastery level of the students. These summative tests should cover the whole instructional objectives and content areas of the course. Therefore attention must be given towards this aspect while preparing a test.

**2. Preparing Test Specifications :** The second important step in the test construction is to prepare the test specifications. In order to be sure that the test will measure a representative sample of the instructional objectives and content areas we must prepare test specifications. So that an elaborate design is necessary for test construction. One of the most commonly used device for this purpose is 'Table of Specification' or 'Blue Print.'

### **Preparation of Table of Specification/Blue Print :**

Preparation of table of specification is the most important task in the planning stage. It acts, as a guide for the test construction. Table of specification or 'Blue Print' is a three dimensional chart showing list of instructional objectives, content areas and types of items in its dimensions. It includes four major steps.

- (i) Determining the weightage to different instructional objectives.
- (ii) Determining the weightage to different content areas.
- (iii) Determining the item types to be included.
- (iv) Preparation of the table of specification.

#### *Determining the weightage to different instructional objectives :*

There are a vast array of instructional objectives. We cannot include all in a single test. In a written test we cannot measure the psychomotor domain and affective domain. We can only measure the cognitive domain. It is also true that all the subjects do not contain different learning objectives like knowledge, understanding, application and skill in equal proportion.



Therefore it must be planned how much weightage to be given to different instructional objectives. While deciding this we must keep in mind the importance of the particular objective for that subject or chapter. For example we have to prepare a test in General Science for Class—X we may give weightage to different instructional objectives as following.

**Table 3.1. Showing weightage given to different instructional objectives in a test of 100 marks.**

| Objectives    | Weightage in % | No. of Questions (Marks) |
|---------------|----------------|--------------------------|
| Knowledge     | 20%            | 20                       |
| Understanding | 40%            | 40                       |
| Application   | 40%            | 40                       |

(ii) *Determining the weightage to different content areas.*

The second step in preparing the table of specification is to outline the content area. It indicates the area in which the students are expected to show their performance. It helps to obtain a representative sample of the whole content area. It also prevents repetition or omission of any unit. Now question arises how much weightage should be given to which unit. Some experts say that, it should be decided by the concerned teacher keeping the importance of the chapter in mind. Others say that it should be decided according to the area covered by the topic in the text book. Generally it is decided on the basis of pages of the topic, total page in the book and number of items to be prepared. For example if a test of 100 marks is to be prepared then, the weightage to different topics will be given as following.

Weightage of a topic

$$= \frac{\text{Total number of items/marks}}{\text{Total number of pages in the book}} \times \text{Number of pages in the topic.}$$

If a book contains 250 pages and 100 test items (marks) are to be constructed then the weightage will be given as following.

**Table 3.2. Table showing weightage given to different content areas.**

| Sl. No. | Topic                    | No. of Items/Marks | % of Items/Marks |
|---------|--------------------------|--------------------|------------------|
| 1.      | Topic No—1<br>Page—1—24  | 10                 | 10               |
| 2.      | Topic No—2<br>Page—25—55 | 12                 | 12               |



|    |                            |     |     |
|----|----------------------------|-----|-----|
| 3. | Topic No—3<br>Page—56—114  | 24  | 24  |
| 4. | Topic No—4<br>Page—115—218 | 42  | 42  |
| 5. | Topic No—5<br>Page—219—250 | 12  | 12  |
|    | Total                      | 100 | 100 |

(iii) *Determining the item types* : The third important step in preparing table of specification is to decide appropriate item types. Items used in the test construction can broadly be divided into two types like objective type items and essay type items. For some instructional purposes, the objective type items are most efficient where as for others the essay questions prove satisfactory. Appropriate item types should be selected according to the learning outcomes to be measured. For example when the out-come is writing, naming supply type items are useful. If the outcome is identifying a correct answer selection type or recognition type items are useful. So that the teacher must decide and select appropriate item types as per the learning outcomes.

(iv) *Preparing the Three Way Chart* : Preparation of the three way chart is last step in preparing table of specification. This chart relates the instructional objectives to the content area and types of items. In a table of specification the instructional objectives are listed across the top of the table, content areas are listed down the left side of the table and under each objective the types of items are listed content-wise. Table 3.3 is a model table of specification for X class science.

**Table 3.3 Table of Specification for Science (Biology) Class-X**

| Instructional Objectives<br>Content Areas | Knowledge |     |     |      | Understanding |      |      |      | Application |      |     |      | Total |
|---|-----------|-----|-----|------|---------------|------|------|------|-------------|------|-----|------|-------|
|   | SU.       | MC. | MT. | T.F. | SU            | M.C. | M.T. | T.F. | SU.         | M.C. | MT. | T.F. |       |
| 1. Food                                   | 0         | 1   | 0   | 1    | 1             | 1    | 0    | 2    | 2           | 1    | 1   | 0    | 10    |
| 1. Food Deficiency Diseases               | 1         | 0   | 1   | 0    | 2             | 1    | 1    | 1    | 1           | 2    | 1   | 1    | 12    |
| 3. Diseases due to overtake of food       | 1         | 2   | 1   | 1    | 2             | 3    | 2    | 3    | 4           | 2    | 2   | 2    | 24    |
| 4. Food yields                            | 2         | 3   | 1   | 2    | 6             | 2    | 7    | 2    | 6           | 3    | 6   | 2    | 42    |
| 5. Essentias for Good health              | 1         | 0   | 1   | 1    | 1             | 1    | 1    | 1    | 1           | 2    | 0   | 1    | 12    |
| Total                                     | 5         | 6   | 4   | 5    | 12            | 8    | 11   | 9    | 14          | 10   | 10  | 6    | 100   |

Note : SU = Supply Type, M.C. = Multiple Choice type items, M.T. = Matching type items, T.F. = True false items.

**PREPARING THE TEST:** After planning preparation is the next important step in the test construction. In this step the test items are constructed in accordance with the table of specification. Each type of test item need special



care for construction. In the forthcoming chapters we shall discuss the specific rules for constructing different types of test items. Here we shall discuss certain general rules for constructing test items. The preparation stage includes the following three functions.

- (i) Preparing test items.
- (ii) Preparing instruction for the test.
- (iii) Preparing the scoring key.

**Preparing the Test Items :** Preparation of test items is the most important task in the preparation step. Therefore care must be taken in preparing a test item. The following principles help in preparing relevant test items.

**1. Test items must be appropriate for the learning outcome to be measured :**

The test items should be so designed that it will measure the performance described in the specific learning outcomes. So that the test items must be in accordance with the performance described in the specific learning outcome. For example

Specific learning outcome—Knows basic terms

Test item—An individual is considered as obese when his weight is—more than the recommended weight.

**2. Test items should measure all types of instructional objectives across the whole content area :**

The items in the test should be so prepared that it will cover all the instructional objectives—Knowledge, understanding, thinking skills and motor skills. The specific learning outcomes and subject matter content being measured. When the items are constructed on the basis of table of specification the items become relevant.

**3. The test items should be free from ambiguity :**

The item should be clear. Inappropriate vocabulary and awkward sentence structure should be avoided. The items should be so worded that all pupils understand the task.

### Example

**Poor item :—**Where did Gandhi born ?

**Better :—**In which city did Gandhi born ?

**4. The test items should be of appropriate difficulty level :**

The test items should be proper difficulty level, so that it can discriminate properly. If the item is meant for a criterion-referenced test its difficulty level should be as per the difficulty level indicated by the statement of specification.



learning outcome. Therefore if the learning task is easy the test item must be easy and if the learning task is difficult then the test item must be difficult.

In a norm-referenced test the main purpose is to discriminate pupils according to achievement. So that the test should be so designed that there must be a wide spread of test scores. Therefore the items should not be so easy that everyone answers it correctly and also it should not be so difficult that everyone fails to answer it. The items should be of average difficulty level.

**5. The test item must be free from technical errors and irrelevant clues :**

Some times there are some unintentional clues in the statement of the item which helps the pupil to answer correctly. For example grammatical inconsistencies, verbal associations, extreme words (ever, seldom, always), and mechanical features (correct statement is longer than the incorrect). Therefore while constructing a test item careful steps must be taken to avoid most of these clues.

**6. Test items should be free from racial, ethnic and sexual biasness.**

The items should be universal in nature. Care must be taken to make a culture fair item. While portraying a role all the facilities of the society should be given equal importance. The terms used in the test item should have an universal meaning to all members of group.

**Preparing Instruction for the Test :** This is the most neglected aspect of the test construction. Generally everybody gives attention to the construction of test items. So the test makers do not attach directions with the test items. But the validity and reliability of the test items to a great extent depends upon the instructions for the test. N.E. Gronlund has suggested that the test maker should provide clear-cut direction about

- the purpose of testing.
- the time allowed for answering.
- the basis for answering.
- the procedure for recording answers.
- the methods to deal with guessing.

*Direction about the Purpose of Testing*

A written statement about the purpose of the testing maintains the uniformity of the test. Therefore there must be a written instruction about the purpose of the test before the test items.

*Instruction about the time allowed for answering*

Clearcut instruction must be supplied to the pupils about the time allowed for whole test. It is also better to indicate the approximate time required for