Construction and Validation of Achievement Test in Economics
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Abstract

Achievement tests measure the current status of individuals with respect to proficiency in given areas of knowledge or skill. Standardized achievement tests are carefully developed to include measurement of objectives common to many school systems. They measure knowledge of facts, concepts and principles. Achievement tests are primarily used in making classroom-level decisions and are designed with particular reference to the course objectives/learning goals of a specific class. The investigator conducted a study to construct and standardize the achievement test in Economics for XI standard by following certain steps. The investigator framed 90 items initially on the selected topics of Economics of class XI on the basis of the blue print prepared for the achievement test in the light of specific objectives. After the items were written the investigator consulted the language and subject experts for checking the items framed with respect to the faulty language or inadvertent defects in wording for and also to verify whether the items measure what was intended to be measured at the level of achievement. For trying out the preliminary draft of the achievement test, the test was given to the sample of 100 students of class XI. The difficulty value (DV) and discriminating power (DP) of the test items were determined by adopting Kelley's (1939) method. On the basis of the DV and DP the preliminary draft of the achievement test was modified. In total 70 items having difficulty value (DV) ranging from 0.20 to 0.75 and the items ranging from 0.20 to 0.90 on the discriminating power (DP) were retained.

Introduction: Achievement tests measure the current status of individuals with respect to proficiency in given areas of knowledge or skill. Standardized achievement tests are carefully developed to include measurement of objectives common to many school systems. They measure knowledge of facts, concepts and principles. Achievement tests are primarily used in making classroom-level decisions and are designed with particular reference to the course objectives/learning goals of a specific class. Such tests measure students' mastery of a particular instructional domain in order to make decisions regarding the advancement and/or competency of the students. The content of achievement tests can be derived from three different sources: the textbook, the course syllabus, and the class objectives. Such tests are considered to be criterion-referenced as students' scores are compared with the level of mastery achieved, rather than compared with other students; performance is measured according to an agreed-upon criterion or standard (Perrone, n.d.). Construction of test is the hardest job a researcher has to perform. Construction of test is methodical. A number of factors like area, the age group and the grade for which the test is to be developed, the test is designed for general purpose or some specific purpose determine the line of action while constructing an achievement test.

Objective of the Study:

- To construct and validate the achievement test in Economics for XI standard.

Methodology:

The investigator constructed and standardized the achievement test in Economics for XI standard by following certain steps which are discussed as below.

- Planning the test
- Preparation
- Try out of Preliminary Draft
- Item Analysis
- Final draft

- Establishing Reliability and Validity

1. Planning the Test:

It is the first and most important step in the test construction. The following aspects were kept in the mind for planning the test:

   (i) To whom is the test to be administered?
   (ii) What is to be measured?
   (iii) When is the measurement to take place?
   (iv) How to measure?

On the basis of the above mentioned issues it was decided that:

- The test is meant for the students of Economics studying in class XI.
- Achievement in Economics is to be measured and the objectives to be realized are knowledge, comprehension and application.
- The test will be comprised of very short answer and Objective Type Questions viz. Fill in the blanks, One Word Questions, True/ False and MCQs .

2. Preparation

Preparation of preliminary draft of a standardized test includes the following two stages:

   a) Item- Writing
   b) Item- Editing

2.1 Item Writing

Writing of items is an important step in the preparation of a preliminary draft. Item writing is not an easy task. It requires a great skill. The blue print is used as a guide for writing items for preliminary draft. The individual items should be written which measure instructional objectives.

The investigator framed 90 items on the following five topics of Economics of class XI on the basis of the blue print prepared for the Achievement test.

   1. Poverty
   2. Human capital
   3. Rural Development
   4. Inflation
   5. Infrastructure

Following points were kept in mind by the investigator while writing on items for preliminary draft.

- Each item should contain a single idea i.e one individual item should not overlap the others.
- Items should be simple and easily understandable.
- There should not be any fixed sequence in response.
- It should lay clear focus on the subject for which questions are to be prepared.
- Items should be clearly phrased so that their content, not the form, determines the response.
- The subjective and double baralled questions should be avoided.
- Content, vocabulary and complexity of the item should be appropriate.
- Items in the draft should be arranged from simple to complex.
- The mode of response should also match with the item written.
- The number of test items written should be more than double that are actually required for the test because those items which may not prove to be satisfactory need to be discarded and modified.

The investigator framed 90 items on the selected topics of Economics of class XI on the basis of the blue print prepared for the achievement test in the light of specific objectives as mentioned below.

Table 1: Topic-wise Specification Of Objectives

Sl. No.	Topic	Instructional Objectives
1	Poverty	- To enable students to define poverty. - To enable them to distinguish between types of poverty. - To enable them to apply the method to fix poverty line in India. - To enable them to list the causes of poverty in India. - To enable the students to examine the measures to remove

		poverty. ➢ Swaranjayanti Gram Swarojgar Yojna ➢ Samporna Gramin Rojgar Yojna ➢ Pradhanmantri Gramoday Yojna ➢ Samporna Gramin Rojgar Yojna ➢ Prime Minister's Rojgar Yojna ➢ Jai Prakash Rojgar Guarantee Yojna ➢ The Swaran Jayanti Shahri Rojgar Yojna ➢ Mahatma Gandhi National Rural Employment Guarantee Scheme • To enable them to critically examine the poverty alleviation programmes undertaken by the Government. • To enable students to know about Twenty point programme.
2	Human Capital	• To enable students to define Human capital. • To enable students to differentiate human capital with physical capital and financial capital. • To enable students to list the sources of human capital formation. • To enable students to summarise the role of human capital formation in economic growth. • To enable students to critically examine the problems in human capital formation in India. • To enable students to know about the role of education in accelerating the human capital formation. • To enable students to explain the initiatives undertaken by the Govt. for the expansion of education. • To enable students to identify the problems in the expansion of education.
3	Rural Development	• To enable students to understand the concept of rural development. • To enable students to identify the key elements of rural development. • To enable students to define rural credit. • To enable students to classify the rural credits. • To enable students to distinguish the sources of rural credit. • To enable students to summarise the institutional sources of rural credit. • To enable students to comprehend the concept of agriculture marketing. • To enable students to critically examine the measures undertaken by the govt. to improve the market system. • To enable students to know about the non-farm areas of production. • To enable students to explain the importance of non-farm areas for the rural population.
4.	Inflation	• To enable students to define inflation. • To enable students to describe the indicators of inflation. • To enable students to locate the causes of inflation. • To enable students to illustrate the effects of inflation. • To enable students to inspect the government policies to check inflation. • To enable students to give suggestions to eradicate the problem of inflation.
5.	Infrastructure	• To enable students to define infrastructure.

		• To enable students to recognize the types of infrastructure.
		• To enable students to translate the role of infrastructure in economic development.
		• To enable students to evaluate the state of infrastructure in India.
		• To enable students to examine the state of energy as a component of economic infrastructure.
		• To enable students to interpret the state of health as a component of social infrastructure.
		To identify the challenges in the health services in India

Table 2: Objective-wise Blue Print of Achievement Test (First Draft)

Sl. No	Topic	Instructional Objectives				Total
		Knowledge	Comprehension	Application		
1	Poverty	6	8	4		18
2	Human Capital	6	8	4		18
3	Rural Development	6	8	4		18
4	Inflation	6	8	4		18
5	Infrastructure	6	8	4		18
	Total	30	40	20		**90**

Table 3: Topic-wise Distribution of Items of Achievement Test (First Draft)

Sl. No	Topic	Type of Item					Total
		MCQ	True/False	Fill in the Blanks	One Word Answer	Short Answer	
1	Poverty	3	4	3	4	4	18
2	Human Capital	3	4	3	4	4	18
3	Rural Development	3	4	3	4	4	18
4	Inflation	5	3	3	3	4	18
5	Infrastructure	3	5	3	3	4	18
	Total	17	20	15	18	20	**90**

2.2 Item Editing

After the items were written the investigator consulted the language and subject experts for checking the items framed with respect to the faulty language or inadvertent defects in wording for and also to verify whether the items measure what was intended to be measured at the level of achievement. After incorporating the suggestions of Economics teachers and the language experts, the preliminary draft was reframed. The difficult, ambiguous and faulty items were deleted. The draft now had 90 items.

3. Try- Out of Preliminary Draft

For trying out the preliminary draft of the achievement test, the test was given to the sample of 100 students of class XI, studying in Senior Scholars School, Pathankot and St. Thomas Senior Secondary School, Pathankot.

4. Item Analysis

Item analysis is an analysis of response made to 'teacher made tests' by the pupils in the class. It can be defined as a statistical procedure by which the appropriate items are selected for the final draft and poor items are rejected. It is a process of examining of the responses of the students in the sample group to each of the test item. Thus the process of determining the relative difficulty value (DV) and discriminating power (DP) of the test item is known as item analysis.

The difficulty value (DV) and discriminating power (DP) of the test items were determined by adopting Kelley's (1939) method. The following formulae were to used calculate the difficulty value (DV) and discriminating power (DP).

$$DV = (RU + RL) / N$$
$$DP = (RU-RL) / (N/2)$$

where:

RU = No. of correct responses in Upper group

RL = No. of correct responses in lower group

N = Size of Sample in Upper and Lower Groups

The DV and DP found on the basis of item analysis are given in the following tables.

Table 4: DV of items of the Achievement test

Sl. No.	DV	Frequency	Item No.	Remarks
1	Above 0.75	4	6, 17,44,54	Rejected
2	Between 0.20 and 0.75	85	1, 2, 3, 4, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16,18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 45, 46, 47, 48, 49, 50, 51, 52, 53, 55, 56, 57, 58 , 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90	Accepted
3	Below 0.20	1	5	Rejected

Table 4 shows that 85 items ranging from 0.20 to 0.75 were retained in the Achievement Test. 1 item having DV of below 0.19 and the 4 items having DV of above 0.75 were rejected.

Table 5: DP of Items of the Achievement Test

Sl. No.	DP	Frequency	Item Nos.	Remarks
1	Between 0.40 and 0.90	28	2, 8, 9, 13, 24, 27, 29, 31, 35, 36, 37, 39, 42, 45, 52, 53, 55, 56, 61, 62, 63, 66, 69, 71, 78, 80, 84, 85	Very Good Items
2	Between 0.30 and 0.39	11	12, 20, 22, 26, 32, 50, 60, 68, 81, 83, 90	Good but subjected to improvement
3	Between 0.20 and 0.29	34	1, 3, 4, 7, 14, 15,16,17, 21, 25, 40, 41,43, 44, 46, 47,48, 49, 51, 54, 59, 64, 65, 70, 72, 73, 75, 76,77, 79, 86, 87, 88, 89	Marginal Items subjected to modification
4	0.19 and below	17	5, 6,10, 11, 18, 19, 23,28, 30, 33, 34, 38, 57, 58, 67, 74, 82	Poor Items

Table 5 shows that 28 items were considered very good and no revision was required as the items have DP ranging from 0.40 to 0.90. So, these items were selected as such for the final draft. 11 items with DP ranging from 0.30 to 0.39 were good and needed little revision; 34 items between 0.20 and 0.29 did need to modify with respect to language and clarity. The remaining 17 Items which had DP 0.19 and below were rejected.

5. Final Draft:

On the basis of the DV and DP the preliminary draft of the achievement test was modified. In total 70 items having difficulty value (DV) ranging from 0.20 to 0.75 and the items ranging from 0.20 to 0.90 on the discriminating power (DP) were retained. Out of the 70, 39 items did not require any alteration.

31 items were accepted with some modification in the structure of items. The items were reframed later on. 20 items were detained on the basis of their DV and DP values. The items at S. No. 1, 2, 3, 4, 7, 8, 9, 12, 13, 14, 15, 16, 20, 21, 22, 24, 25, 26, 27, 29, 31, 32, 35, 36, 37, 39, 40, 41, 42, 43, 45, 46, 47, 48, 49, 50, 51, 52, 53, 55, 56, 60, 61, 62, 63, 64, 65, 66, 68, 69, 70, 71,72,73,75, 76, 77, 78, 79, 80, 81, 83, 84, 86, 87, 88, 89, 90 were, thus retained finally. The items at S. No. 5, 6, 10, 11, 17, 18, 19, 23, 28, 30, 33, 34, 38, 44, 54, 57, 58, 67, 74 and 82 were rejected. Thus, a total of 70 items were retained for the final draft of the achievement test.

Table 6:   Blue Print of Achievement Test (Final Draft)

Objective / Topic	Knowledge					Understanding					Application					Total
	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5	
Poverty	-	-	2 (1)	4 (1)	-	2 (1)	3 (1)	-	-	-	-	-	-	-	3 (2)	14
Human capital	-	-	1 (1)	3 (1)	-	2 (1)	3 (1)	-	-	-	-	-	-	-	3 (2)	12
Rural Develop-ment	-	-	3 (1)	3 (1)	-	3 (1)	2 (1)	-	-	-	-	-	-	-	3 (2)	14
Inflation	-	-	2 (1)	3 (1)	-	4 (1)	3 (1)	-	-	-	-	-	-	-	3 (2)	15
Infra-structure	-	-	2 (1)	3 (1)	-	3 (1)	4 (1)	-	-	-	-	-	-	-	3 (2)	15
Total	-	-	10	16	-	14	15	-	-	-	-	-	-	-	15	**70**

T1 : MCQ
T2 : True / False
T3 : Fill in the Blank
T4: One Word
T5: Short Answer

6. Establishing Reliability and Validity
6.1 Reliability
The reliability of a measuring instrument is the degree of consistency with which it measures whatever it is measuring. The more reliable the test is, the more confidence the researcher can have that the scores obtained from the administration of the test are essentially the same scores hat would be obtained if the test were re-administered.

Cattell (1964) defined reliability as the extent to which the test gives the same results with the same sample an different occasions.

Reliability in research is essentially a synonym for dependability, consistency and replicability over time, over instruments and over groups of respondents. It is concerned with precision and accuracy. For research to be reliable it must demonstrate that if it were to be carried out on a similar group of respondents in a similar context, then similar results would be found. A reliable instrument for a piece of research will yield similar data from similar respondents over time. There are different types of reliability; each determined in a different manner and each deals with a different kind of consistency.

For the present study, the reliability of the achievement test was formed by the Test-Retest method. The achievement test was administered to the same group after the gap of 24 days and the correlation between the two tests is found out to be 0.92 indicating the test to be reliable. The following formula was used to compute correlation:

$$r = \frac{\sum xy}{\sqrt{\sum x^2 \sum y^2}}$$

where;
r=reliability coefficient

x= deviation from Actual mean of X

y=deviation from Actual mean of Y

6.2   Validity of Achievement Test: Validity is an indispensable characteristic of measuring devices. Validity is the most important aspect of a test which can be defined as the degree to which a test is capable of measuring the achievements for which it is designed. The first essential quality of a valid test is that it should be highly reliable. In general, a test is valid if it measures what it claims to measure. A test however, does not possess universal and eternal validity. It may be valid for use in one situation but invalid if used in another. A test, which helps in making one decision in a particular research situation, may have no value at all for another.

   For the present study the content validity was demonstrated. To determine the content validity, the test items and the list of the outcomes were given to the panel of five subject experts to review the test items and comment on whether each item approximately matched to the content area specified. As the table of specifications and items were found to match adequately, the content validity of the achievement test was ascertained.

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