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Construction and Validation of Achievement Test In Science For Standard 8th

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ABSTRACT

Achievement test is tool for teaches for evaluation of students in school situation. It is a test of knowledge based, something learned. The main purpose of an achievement test is to determine one's knowledge in a particular subject. It helps in measuring the amount of success of an individual in specific field. In school environment it is used as an instrument to measure success of an individual in particular subject or group of subjects. The present study was conducted with the purpose to construct and validate an achievement test in science for 8 std. students of high school of Surendranagar district. The test consisted of 200 items covering all aspects of science text book of standard 8, published by Gujarat Rajya Shala Patya Pustak Mandal, Gandhinagar. After doing rigorous item analysis, 100 items were retained in the final version of the test. Test-retest reliability was calculated and value of coefficient of correlation was found to be 0.85. Validity of the achievement test was established by comparison with annual exam marks obtained in science, on the sample of about 110(boys and girls) . The correlation between them was found to be 0.79.

Keywords : Construction, Standardization, Science Achievement Test.

I. INTRODUCTION

The achievement test constitute an important tool in the school evaluation programme. It is necessary for the teacher to know for the pupil have attained in particular subject area. Achievement test also measure skills and knowledge learned in a given grade, usually through planned instruction and training. According to N. M. Dowie (1961), "Any test that measures the attainments or accomplishments of an individual after a period of training or learning is called an achievement test".

1. Objective of the study :

i. To construct and validate the achievement test in science for 8 std. To find the achievement in science with respect to the achievement test prepared and given by the researcher.

ii. To establish norms for achievement in science for students to 8th std.

iii. To study the sex differences with regard to achievement in science.

iv. To study the differences in achievement in science, among students from urban area, Taluka area rural are.

II. Methodology

The following steps were taken by the investigator during construction and standardization of the achievement test in science.

- Planning the test
- Preparation of the test
- Administration of the test/pilot testing/First tryout
- Final tryout of the test

- Preparing final form of test
- Standardization of test: Establishing reliability and validity

III. Planning the Test

Planning of a test is a first and very important step in the construction of an achievement test. A standardized achievement test needs very careful planning. For proper planning of the test, the investigator kept following aspects in mind such as: to whom, what, when, and how to measure. It includes designing the test and preparation of the blue print.

Designing of the test which includes important aspects such as objectives of the test, content of the test, nature of the test, scoring schemes, number of items, length of test, weight age to objectives, weightage to content to questions, allotment of time and marking scheme. In this achievement test, investigator had decided to prepare multiple choice questions (MCQs). After this a blue print was prepared keeping in view the content area and objectives of learning.

(a) Objective of the test:

This test was constructed on of the basis of the objectives of teaching, knowledge, understanding, skill and application from all the units of science text book of standard 8, published by Gujarat Rajya Shala Patya Pustak Mandal, Gandhinagr.

(b) Content of the test:

The achievement test covered the content from all the units of chemistry, physics and biology of science textbook of standard 8, published by Gujarat Rajya Patya Pustak Mandal, Gandhinagar

(c) Preparation of blueprint:

After designing, preparation of blueprint is the last stage of the planning of test. Blueprint is a detail plan of any action. Blueprint was prepared for the test construction in which three dimensions were included. (1) Aims (2) Subject-matter (3) Type of questions Here test constructer put various type of question in blue print.

On the basis of syllabus of std. 8th and part of it included in it, marks for each part was first fixed and also weightage to objective was fixed with the help of opinion of 12 subject experts and experienced teachers.

Table 1. Blue Print of Syllabus

Content	Unit	Knowledge	Understanding	Application	Skill	Total
CHEMISTRY	Carbon and its Compound	3	3	2	1	9
	Alternative Sources for energy	3	2	1	-	6
	Rocks,Minerals and Metals	2	2	1	3	8
	Synthatic Substances	2	2	1	-	5
	Atom and Atomic energy	3	2	2	1	8
PHYSICS	Pressure	2	2	1	-	5
	Light	3	3	1	3	10
	Magnetism	3	2	2	-	7
	Elecrtic Current	3	2	1	2	8
BIOLOGY	Micro	3	2	2	-	7

	Organism					
	Useful Plants and animals	2	2	1	-	5
	Adaptation and biological evolution	3	2	1	-	6
	Conservation of natural sources	3	2	3	-	8
	Agricultural method sand tools	3	2	3	-	8
	Total	**38**	**30**	**22**	**10**	**100**

Table 2. Distribution of Weightage to Content:

Content	Weightage	Percentage
Chemistry	36	36%
Physics	30	30%
Biology	34	34%
Total	**100**	**100%**

Table 3 : Weightage to Objective

Objective	Weightage	Percentage
Knowlwdge	38	38%
Understanding	30	30%
Application	22	22%
Skill	10	10%
Total	**100**	**100%**

Table 4. Disrtibutiton of Weightage to Content and Objective

Content	Knowledge	Understanding	Application	Skill	Weightage	Percentage
Chemisrty	11	9	5	5	30	30%
Physics	13	11	7	5	36	36%
Biology	14	10	10	-	34	34%
Total	**38**	**30**	**22**	**10**	**100**	**100%**

IV. Preparation of the Test

After careful preparation of the blueprint, items were written by the investigator for achievement test. The test item includes only multiple choice questions. The first version of the achievement test was prepared and it included 200 items from all the units of science text book of 8th std. Published by Gujarat Rajya Shala Patya Pustak mandal Gandhinagar. This version of the test was reviewed by the subject experts science teachers, language experts and specialists. Proposed items were edited, revised and rewritten to refine them as per directions of the experts. In this way, the first version of the achievement test was prepared and it included 200 items which were multiple choice in nature. Every statement has four alternatives, the students were asked to tick the right answer from four

alternatives. Prepartaion of Direction for scoring and Administration of the achievement test, clear and precise directions was prepared and scoring key was prepared in advance for the achievement test.

Administration of the Test/Pilot Testing/First Tryout:

The first version of the achievement test was administered to 120 students of 8th class from schools of urban area, Taluka area and rural area. This testing was done to know the difficulty level of the test and to remove language difficulty faced by the students. The answer key was collected from the students and after this, collected answer key was scored by the investigator with the help of scoring key. Each correctly marked response was given mark '1' and wrong attempted response '0' and their scores were collected for item analysis.

Item Analysis:

After scoring of test items, item analysis was done. Item analysis was conducted in order appraise the effectiveness of different items. For item analysis, the scores obtained were arranged in decreasing order in order to create two groups namely upper group (R_U) and lower group (R_L). Marks obtained by the first 27% students were considered as the students of upper group and the marks obtained by the last 27% students were considered as the students of the lower group. Item analysis includes following aspects,

- ✓ Difficulty level of item
- ✓ Discriminatory power of item
- ✓ Effectiveness of distractors

Difficulty level of item provides information whether test was too easy or too difficult. It provides the proportion of persons who correctly answer an item. Too difficult or too easy items were rejected, i.e. items with indices of difficulty lower than 30 and higher from 80 were too difficult and too easy. An average index ofdificulty from 30-79 were taken. It is calculated by using formula

$$D_L = (R_U + R_L / 2E) \times 100$$

Where,

D_L = difficulty level

R_U= no. of students who answer correctly from the upper group

R_L= no. of students who answer correctly from the lower group

E= no. of students in each group

Discriminatory power of item provides us information to what extent the test was able to discriminate between high and low achievers. A good item should discriminate between those who score high (top 27% cases) on the test and who score low on the test (bottom 27% cases). The item were selected having more than 0.30 discriminatory index. For the calculations of the discriminatory index following formula was used.

$$D_P = R_U - R_L / E$$

Where D_P = discriminatory power

R_U = no. of current answer from upper group

R_L = no. of currect answer from lower group

E = no. of students in each group

Distractor analysis helps us to know the effectiveness of different alternatives or distractors. After calculating the difficulty value, discriminatory index and distractor analysis, total of 100 items were selected for final test.

Preparing Final Form of Test and Final Tryout of the Test:

Depending on the item analysis, a final form of test was prepared. Out of 200 items, 100 questions were considered as the best questions for the test. The final tryout test was administered to randomly selected 900 students (580 boys and 320girls), of 8th class from the government and grant in aid schools among which 5 schools from Urban area,13 schools From Taluka area and 18 school from Rural area of Surendranagar

district. Same process of first tryout was followed for asses the answer sheets with the help of scoring key.

Standardization of an Achievement Test

It includes reliability and validity measure of test. Reliability refers to degree of consistency of test scores. There is various method such as test-testes, spilt half, alternate forms, reliability. In order to estimate reliability of presents achievement test, investigator used test-retest method and split half method of reliability. For obtaining test-retest reliability, the final version of the test was administered over a sample of 100 students and second administration of the test was carried out after a gap of four weeks. Scores obtained in both the measures were co-related by using product moment method of correlation and the value of co-efficient of correlation was found to be 0.85. The value indicates that the test was highly correlated.

Validity refers to the attainment of purpose for which the test is prepared. An ideal test should not be treated as a valid unless it's validity is established. To estimate validity of presents achievement test, the scores on the test were compared with marks In science obtained at final examination on the sample of about 110 (boys and girls). The correlation between them was found to be 0.79. In this way validity of the achievement test was established.

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