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GRT DEVELOPMENT AND STANDARDIZATION OF ACHIEVEMENT TEST IN PHYSICS (ATP) FOR HIGHER SECONDARY STUDENTS



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Abstract: The word achievement means gained or level of success attained by an individual or group on the completion of a task whether it is academic, manual, personal or social. An achievement test is a test of developed skill or knowledge. The most common type of achievement test is a standardized test developed to measure skills and knowledge learned in a given grade level, usually through planned instruction, such as training or classroom instruction. In this research paper an attempt has been made to construct and standardize the achievement test in physics of Higher Secondary Students.

Key words: achievement , academic , socio-economic , Electrostatics.

INTRODUCTION :

Academic achievement is of paramount importance in the present socio-economic and cultural contexts. Obviously, at Higher Secondary stage, great emphasis is placed on achievement right from the beginning. This stage has its own systematic hierarchy which is largely based on achievement as this stage is a channel to enter professional course. The Schools perform the function of selection and differentiation among students on the basis of their scholastic and other attainments and open out avenues for advancement, again primarily in terms of achievement. Hence the investigator decided to construct and standardize an achievement test in physics of Higher Secondary Students. In order to construct the test, the investigator collected a variety of information regarding Electrostatics from the experts and other sources, Based on that as many as 75 multiple choice questions covering the following dimensions were coined:

1. Electric Charges
2. Electric Field
3. Electric Potential
4. Gauss's law
5. Electrostatic Induction.

METHODOLOGY

This test comprises of 75 items with five dimensions. There were 15 questions in each of the five dimensions. The maximum mark for a question is 1 and the minimum mark is 0. Therefore one can get a maximum score of 75 and a minimum score of 0 on this test. After having constructed the achievement test the investigator administered this test on a sample of 200 Higher Secondary Students for pilot study in order to carry out the item analysis.

ITEM ANALYSIS

Item analysis is an important step in the standardization of any test. The two criterion groups with 54 scripts each in the upper (top 27%) and the lower (top 27%) were formed. Then, the difficulty index and the discrimination level were computed.

By convention items with difficulty index higher than 10% or lower than 90% are retained. Similarly, items with index of discrimination above 0.30 are retained. In the present study, only items having index of difficulty in the range of 50% to 80% and index of discrimination ranging from 0.30 to 0.50 were selected. Accordingly 60 items were selected out of 75 items and this constituted the final form of the test. The details of item analysis are given in Table 1.

TABLE 1
ITEM ANALYSIS – INDICES OF ITEM
DIFFICULTY & DISCRIMINATION IN PILOT
STUDY

S. No	No. of Students (54) in the high group who responded correctly	No. of Students (54) in the low group who responded correctly	Index of item difficulty	Index of discrimination	Item selected
1	32	06	70	0.48	S
2	24	07	57	0.31	S
3	26	08	61	0.33	S
4	34	09	80	0.46	S
5	21	09	55	0.22	NS
6	29	05	63	0.44	S
7	28	05	61	0.43	S
8	35	08	80	0.50	S
9	31	05	66	0.48	S
10	22	11	64	0.20	NS

11	30	05	65	0.46	S
12	20	07	49	0.24	NS
13	33	09	78	0.44	S
14	29	06	64	0.43	S
15	29	07	67	0.41	S
16	26	05	57	0.39	S
17	23	06	54	0.31	S
18	34	19	98	0.28	NS
19	34	08	78	0.48	S
20	31	06	68	0.46	S
21	27	08	65	0.35	S
22	31	17	88	0.25	NS
23	23	05	52	0.33	S
24	30	12	78	0.33	S
25	26	06	59	0.37	S
26	28	07	65	0.39	S
27	32	08	74	0.44	S
28	30	08	71	0.41	S
29	31	08	72	0.43	S
30	20	11	57	0.16	NS
31	33	08	76	0.46	S
32	32	09	76	0.43	S
33	22	05	53	0.31	S
34	21	10	57	0.20	NS
35	29	10	73	0.35	S
36	30	15	83	0.28	NS
37	28	08	67	0.37	S
38	30	07	69	0.43	S
39	28	11	72	0.31	S
40	30	16	85	0.25	NS
41	24	06	55	0.33	S
42	30	10	75	0.37	S
43	31	09	74	0.41	S
44	26	07	61	0.35	S
45	25	07	59	0.33	S
46	29	09	71	0.37	S
47	25	06	57	0.35	S
48	30	13	80	0.31	S
49	27	09	67	0.33	S
50	33	06	72	0.50	S
51	29	08	69	0.39	S
52	18	09	49	0.16	NS
53	27	07	63	0.37	S
54	32	10	78	0.41	S
55	32	18	92	0.25	NS
56	32	06	70	0.48	S
57	24	07	57	0.31	S
58	26	08	61	0.33	S
59	34	09	80	0.46	S
60	21	09	55	0.22	NS
61	25	08	61	0.31	S
62	29	11	74	0.33	S
63	24	05	53	0.35	S
64	21	11	60	0.18	NS
65	34	07	76	0.50	S
66	33	07	74	0.48	S
67	27	06	61	0.39	S
68	25	05	55	0.37	S

69	33	10	80	0.43	S
70	21	08	53	0.24	NS
71	31	07	70	0.44	S
72	32	07	72	0.46	S
73	26	09	65	0.31	S
74	30	19	91	0.20	NS
75	28	09	69	0.35	S

(S – Selected; N.S – Not Selected)

SCORING PROCEDURE

The score of the test ranges from 0 to 60, as the final test consists of 60 questions. A higher score indicates the presence of high achievement in physics. Based on the normal probability theory the scoring procedure has been arrived at and is given in the following table-2.

TABLE 2
Scoring Procedure

Scores	Interpretation
50-60	High level
26-49	Average level
0-25	Low level

VALIDITY AND RELIABILITY

Validity reveals the merits of our measurement. This achievement test was given to the experts (20 members) in order to find out the content validity. The achievement test also has construct validity. Its intrinsic validity was found to be 0.89 which clearly states that the tool is valid. Reliability refers to the consistency with which a test measures, whatever it measures. The concept of reliability suggests both stability and consistency of measurement. The investigator calculated the reliability analysis and it was given in the following table-3.

TABLE 3
RELIABILITY METHOD AND CO-EFFICIENT VALUES

METHOD OF RELIABILITY ANALYSIS	RELIABILITY CO-EFFICIENTS
Correlation between forms	0.636
Equal-length Spearman-Brown	0.672
Guttman Split-half	0.625
Unequal-length Spearman-Brown	0.614

NORMS

The percentile norms, Z-score and T-score have been calculated and are given in the following tables. (Table-

4 & 5)

TABLE 4
PERCENTILE NORMS FOR THE ACHIEVEMENT TEST

Percentiles	EKT
10	14
20	21
30	25
40	30
50	38
60	43
70	48
80	51
90	56

TABLE 5
Z AND T SCORES OF THE SAMPLE ON THE ACHIEVEMENT TEST

S. No	Raw Scores X	$Z = \frac{X - M}{\sigma}$	T = 10 Z + 50
1	57	0.2165	52.165
2	56	0.1440	51.440
3	55	0.0716	50.716
4	54	-0.0007	49.993
5	53	-0.0731	49.269
6	52	-0.1455	48.545
7	51	-0.2179	47.821
8	50	-0.2903	47.097
9	49	-0.3627	46.373
10	48	-0.4351	45.649
11	47	-0.5076	44.924
12	46	-0.5800	44.200
13	45	-0.6524	43.476
14	44	-0.7248	42.752
15	43	-0.7972	42.028
16	42	-0.8696	41.304
17	41	-0.9420	40.580
18	40	-1.0144	39.856
19	39	-1.0890	39.110
20	38	-1.1593	38.407
21	37	-1.2317	37.683
22	36	-1.3041	36.959
23	35	-1.3765	36.235

24	34	-1.4489	35.511
25	33	-1.5213	34.787
26	32	-1.5937	34.063
27	31	-1.6661	33.339
28	30	-1.7385	32.615
29	29	-1.8110	31.890
30	28	-1.8834	31.166
31	27	-1.9221	30.570
32	25	-1.9664	29.113
33	23	-2.110	28.406
34	21	-2.365	27.828
35	19	-2.952	26.264
36	18	--3.112	26.842
37	15	-3.964	25.168
38	12	-4.282	25.924

CONCLUSION

The final version of the achievement test has been prepared with the 60 valid items. The maximum possible score will be 60 and the minimum will be zero. Higher the score in the test, greater is the achievement test of the candidate.

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