

## CONSTRUCTION AND STANDARDIZATION OF GENERAL SCHOLASTIC APTITUDE TEST (GSAT) FOR CLASS X STUDENTS OF MEGHALAYA

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### ABSTRACT

The present study highlights the construction and standardization of General Scholastic Aptitude Test (GSAT) for the Class X students of Meghalaya, in which the general scholastic aptitude of students is being assessed. The test included 190 items in preliminary try-out and was administered to a sample of 200 students. For the try-out, the test containing 150 items was administered to 555 students after which item analysis was done. The final form of the test consists of 100 items which was administered on a sample of 2000 students. The obtained split - half reliability coefficient was 0.95 and the K-R reliability co-efficient was 0.95. Concurrent validity was 0.96. Sigma scores, percentile norms, and stanine scores were derived for the total sample (N=2000) which comprises of male (N=853) and female (N=1147) students.

**Keywords :** General Scholastic Aptitude, General Scholastic Aptitude Test (GSAT)

### 1. INTRODUCTION

Research has established the fact that there is a positive correlation between intelligence and achievement. Based on this fact, it is generally believed that the academic performance of students depend upon their level of intelligence. It is therefore argued that the high achievers are those who have high intelligence and low achievers are those who have low intelligence. But then this is not always true. It is also a matter of observation that there is a group of children who are low achievers in spite of having high Intelligence level and conversely there is another group of children who are high achievers though they belong to low Intelligence level. Why is this so? There may be many factors which are responsible for this phenomenon but the scholastic/academic aptitude seems to be one of the instrumental factor. There is a need, therefore, to have some test which can measure the student's scholastic/academic aptitude besides their level of intelligence so that we can know the academic potential of the students and thus they will be guided accordingly in their academic performance.

The General Scholastic Aptitude Test (GSAT) is such a type of test which measures the general scholastic aptitude of students. Quite a number of tests have been constructed and standardised in the area of general scholastic aptitude with respect to different subject areas in India (Lele and Parikh,1965; Majumdar ,1966; Mukherjee ,1966; Shukla, 1970 and DE,U, 1979) and Abroad (Sedlacek,et.al,1992; Skuy,et.al,1996; Larose,et.al,1998; Barro,2001; and Gehring,2001.The review of related literature depicted that the scholastic aptitude test is definitely helping the educational practitioners and researchers to understand the academic aptitude of students. However no such test is available which measures the general scholastic aptitude of students in the Indian context with special reference to the 10<sup>th</sup>

standard students of Meghalaya. The present study makes an attempt to construct and standardise a special kind of general scholastic aptitude test for the 10<sup>th</sup> standard students of Meghalaya. It seeks to measure the student's Verbal Proficiency, Numerical Efficiency, Reasoning, Memory, Scientific Understanding, Problem Solving Ability and General Comprehension. It is a test that purportedly measures the aptitude of the high school students ready to enter into a college. GSAT does not test how much one knows, it tests how well one can apply one's own brain by thinking logically and analytically.

## 2. OBJECTIVES OF THE STUDY

The objectives of the study are stated as follows:

- (a) To construct a General Scholastic Aptitude Test (GSAT) for class X students of Khasi-Jaintia Hills, Meghalaya in English language.
- (b) To standardize the General Scholastic Aptitude Test (GSAT) by
  - (i) Establishing its reliability
  - (ii) Establishing its validity and
  - (iii) Establishing its Norms

## 3. DESIGN OF THE STUDY

Research Design typically includes the population, sample, method of study, collection procedure and tools employed.

### (a) Population of the study

The population of the study comprised of boys and girls of class X students of Khasi-Jaintia Hills, Meghalaya. At the time of data collection there were about 28,617 Class X students in the Khasi-Jaintia Hills of Meghalaya.

### (b) Sample of the study

There were three sets of sample for different stages of test construction and standardisation. They are as follows:

#### (i) Sample for Preliminary try-out

For the preliminary try-out a small sample of 200 Class X students comprising of 93 boys and 107 girls were randomly taken.

#### (ii) Sample for try-out

For try-out of the test a sample of 555 Class X students comprising of 290 boys and 265 girls were taken.

#### (iii) Sample for Final try-out:

For the final try-out, a representative sample of 2000 class X students were drawn randomly from the population which comprised of 853 boys and 1147 girls which were selected randomly from the schools of the four districts in Meghalaya.

### (c) Method of the study

The Investigator decided to make use of the descriptive method of research as the objective of the present study was to construct and standardize the general scholastic aptitude test.

### (d) Data collection

The data has been collected from the following sources:

- (i) By administering the General Scholastic Aptitude Test (GSAT) that was constructed by the investigator.
- (ii) By administering the G.C. Ahuja Group Test of Intelligence (GGTI)

### (e) Tools used

For the present study the following tools were used.

- (i) General Scholastic Aptitude Test (GSAT) constructed and standardised by the

Investigator.

- (ii) G.C. Ahuja Group Test of Intelligence (GGTI, 2005)
- (iii) Rating scale constructed by the researcher for estimating the content validity of the test under construction.

#### 4. CONSTRUCTION OF GSAT

To construct the test, the following steps were taken:

##### (a) Item Preparation

The investigator first of all prepared 190 items for its various sub-test viz: Verbal Proficiency, Numerical Efficiency, Reasoning, Memory, Scientific Understanding, Problem Solving Ability and General Comprehension along with their scoring key. These items were reviewed and edited after taking the opinion of the experts.

##### (b) Preliminary try-out

The GSAT under construction included 190 items for the preliminary try-out on a sample of 200 students of 5 schools in Shillong city. Students were randomly selected from Class X, comprising of 93 males and 107 female students.

##### (c) Try-out

The GSAT under construction, at this stage, contained 150 items spreading over seven sub-tests. The Test was administered to 555 students drawn from 10 Secondary Schools of Shillong.

##### (d) Item analysis

Item analysis, being a set of procedures was applied to the data drawn at the Try-out stage in order to know the indices of the truthfulness of items. At this stage, the difficulty value and discriminative value of an item was then calculated by using the following formulas as suggested by Davis were used:

$$\text{Difficulty Value (DV)} = \frac{P_u + P_1}{2}$$

$$\text{Discriminative Power (DP)} = P_u - P_1$$

Guildford's formula of correction formulae  $P_c = \frac{R-W/(K-1)}{N-HR}$  was used to get the corrected value for chance success.

##### (e) Item selection

For selecting the appropriate items the Kelley's Item Analysis method of 27 % top and 27% bottom dichotomy was applied. After item analysis, some items were rejected on the basis of difficulty value (0.20 - 0.80) and discriminative power (Above .40). After the completion of item analysis the total numbers of items were reduced from 150 to 104. However, 4 items were discarded randomly for the sake of convenience. Therefore, 100 items were finally retained for final administration of the test as given below:

**Table 1: Number of Items retained for the GSAT and Time taken in all Sub- tests**

Sl. No.	Sub-test	No. of Items retained	Time taken (in minutes)
1	Verbal Proficiency	16	10
2	Numerical Efficiency	14	12
3	Memory	8	5
4	Reasoning	18	7
5	Scientific Understanding	16	8
6	Problem Solving Ability	12	8
7	General Comprehension	16	10
Total		100	60

## 5. STANDARDIZATION OF GSAT

The test so constructed was then standardized by establishing its reliability and validity as shown in the following steps:

### (a) Establishing its reliability

For establishing the reliability of the test the split half reliability was calculated using Spearman Brown Prophecy formula. The table below shows the split half reliability co-efficient for GSAT, which is significant at .01 level.

**Table 2**  
**Split-half reliability co-efficient for GSAT**

N	r <sub>11</sub>	P
2000	0.95	0.01

The obtained split-half reliability co-efficient is significant at .01 level. This indicates a very high degree of positive correlation between the two set of half scores of GSAT.

The following table shows the Kuder-Richardson Reliability Co-efficient of the General Scholastic Aptitude Test (GSAT) which is also significant at .01 level.

**Table 3**  
**Kuder- Richardson Co-efficient for GSAT**

N	r <sub>11</sub>	P
2000	0.95	0.01

### (b) Establishing its validity

For estimating the validity of the GSAT, the Investigator used the following methods:

#### (i) Content Validity

The Investigator constructed a rating scale to estimate the content validity of the General Scholastic Aptitude Test (GSAT) under construction. It contained six items. The scale was then given to the experts for their opinion. According to their opinion the items were by and large a representative of the general scholastic aptitude of the Class X students and that the tests were highly suitable for the age group of 14 to 17+ years in terms of content, difficulty and language.

#### (ii) The concurrent Validity

The concurrent validity of the present test was computed by calculating the correlation between the scores of GSAT (The present test) and external criterion test of Ahuja's Group Test of Intelligence (GGTI). The same is given below which is significant at .01 level.

**Table 4**  
**Coefficient of Correlation of the GSAT with respect GGTI**

N	r	p
2000	0.96	.01

### (C) Establishing its Norms

The raw scores of a test obtained by the individual does not have much significance unless tables of norms have been provided to make interpretation much easier. For the present study, the Sigma Scores (Z) Norms, Percentile Norms and Stanine Norms were worked out for the different age groups (sex wise).The derived scores of the total sample (N=2000), total males (N=853) and total females (N= 1147) are shown in Tables 5, 6 and 7.

Table 5: Derived scores of Total Sample (N=2000)

X	Z	PR	ST	X	Z	PR	ST
1	-3.88	0.01	1	51	-1.11	13.35	3
2	-3.83	0.01	1	52	-1.06	14.46	3
3	-3.77	0.02	1	53	-1.00	15.87	3
4	-3.72	0.02	1	54	-0.94	17.36	3
5	-3.66	0.02	1	55	-0.89	18.67	3
6	-3.61	0.02	1	56	-0.83	20.33	3
7	-3.55	0.03	1	57	-0.78	21.77	3
8	-3.49	0.04	1	58	-0.72	23.58	4
9	-3.44	0.04	1	59	-0.67	25.14	4
10	-3.38	0.05	1	60	-0.61	27.09	4
11	-3.33	0.05	1	61	-0.56	28.77	4
12	-3.27	0.07	1	62	-0.50	30.85	4
13	-3.22	0.07	1	63	-0.45	32.64	4
14	-3.16	0.08	1	64	-0.39	34.83	4
15	-3.11	0.10	1	65	-0.33	37.07	4
16	-3.05	0.12	1	66	-0.28	38.97	4
17	-3.00	0.14	1	67	-0.22	41.29	5
18	-2.94	0.16	1	68	-0.17	43.25	5
19	-2.88	0.20	1	69	-0.11	45.62	5
20	-2.83	0.23	1	70	-0.06	47.61	5
21	-2.77	0.28	1	71	0.00	50.00	5
22	-2.72	0.33	1	72	0.05	51.99	5
23	-2.66	0.39	1	73	0.11	54.38	5
24	-2.61	0.45	1	74	0.16	56.36	5
25	-2.55	0.54	1	75	0.22	58.71	5
26	-2.50	0.62	1	76	0.27	60.64	6
27	-2.44	0.73	1	77	0.33	62.93	6
28	-2.39	0.84	1	78	0.39	65.17	6
29	-2.33	0.99	1	79	0.44	67.00	6
30	-2.27	1.16	1	80	0.50	69.15	6
31	-2.22	1.32	1	81	0.55	70.88	6
32	-2.16	1.54	1	82	0.61	72.91	6
33	-2.11	1.64	1	83	0.66	74.54	6
34	-2.05	1.54	1	84	0.72	76.42	6
35	-2.00	2.28	1	85	0.77	77.94	7
36	-1.94	2.62	1	86	0.83	79.67	7
37	-1.89	2.94	1	87	0.88	81.06	7
38	-1.83	3.36	1	88	0.94	82.64	7
39	-1.78	3.75	1	89	1.00	84.13	7
40	-1.72	4.27	2	90	1.05	85.31	7
41	-1.67	4.75	2	91	1.11	86.65	7
42	-1.61	5.37	2	92	1.16	87.70	7
43	-1.55	6.06	2	93	1.22	88.88	7
44	-1.50	6.68	2	94	1.27	89.80	8
45	-1.44	7.49	2	95	1.33	90.82	8
46	-1.39	8.23	2	96	1.38	91.62	8
47	-1.33	9.18	2	97	1.44	92.51	8
48	-1.28	10.03	2	98	1.49	93.19	8
49	-1.22	11.12	3	99	1.55	93.94	8
50	-1.17	12.10	3	100	1.61	94.63	8

(X – Raw Score; Z – Sigma Score; PR – Percentile Rank; ST – Stanine Score)

(9th Stanine = Outstanding ; 8th Stanine = Excellent;7th Stanine =Very Good;6th Stanine = Good;5th Stanine = Above Average;4th Stanine = Average; 3rd Stanine = Below Average; 2nd Stanine = Poor; 1st Stanine =VeryPoor)

**Table 6: Derived scores of Total Males (N=853)**

X	Z	PR	ST	X	Z	PR	ST
1	-4.62	0.01	1	51	-1.44	7.48	2
2	-4.56	0.01	1	52	-1.38	8.38	2
3	-4.49	0.01	1	53	-1.31	9.51	2
4	-4.43	0.01	1	54	-1.25	10.56	2
5	-4.37	0.01	1	55	-1.18	11.90	3
6	-4.30	0.01	1	56	-1.12	13.14	3
7	-4.24	0.01	1	57	-1.06	14.46	3
8	-4.17	0.01	1	58	-0.99	16.11	3
9	-4.11	0.01	1	59	-0.93	17.62	3
10	-4.05	0.01	1	60	-0.87	19.22	3
11	-3.98	0.01	1	61	-0.80	21.19	3
12	-3.92	0.01	1	62	-0.74	22.96	4
13	-3.86	0.01	1	63	-0.68	24.83	4
14	-3.79	0.02	1	64	-0.61	27.09	4
15	-3.73	0.02	1	65	-0.55	29.12	4
16	-3.67	0.02	1	66	-0.48	31.56	4
17	-3.60	0.02	1	67	-0.42	33.72	4
18	-3.54	0.03	1	68	-0.36	35.94	4
19	-3.47	0.04	1	69	-0.29	38.59	4
20	-3.41	0.04	1	70	-0.23	40.90	5
21	-3.35	0.05	1	71	-0.17	43.25	5
22	-3.28	0.07	1	72	-0.10	46.07	5
23	-3.22	0.07	1	73	-0.04	48.01	5
24	-3.16	0.08	1	74	0.02	58.71	5
25	-3.09	0.10	1	75	0.09	53.51	5
26	-3.03	0.13	1	76	0.15	55.96	5
27	-2.97	0.15	1	77	0.22	58.71	5
28	-2.90	0.19	1	78	0.28	64.80	6
29	-2.84	0.23	1	79	0.34	67.00	6
30	-2.77	0.28	1	80	0.41	65.60	6
31	-2.71	0.34	1	81	0.47	68.08	6
32	-2.65	0.40	1	82	0.53	70.19	6
33	-2.58	0.49	1	83	0.60	72.57	6
34	-2.52	0.59	1	84	0.66	77.64	6
35	-2.46	0.69	1	85	0.72	76.42	6
36	-2.39	0.84	1	86	0.79	78.52	7
37	-2.33	0.99	1	87	0.85	80.23	7
38	-2.27	1.16	1	88	0.91	81.86	7
39	-2.20	1.39	1	89	0.98	83.65	7
40	-2.14	1.62	1	90	1.04	85.08	7
41	-2.08	1.88	1	91	1.11	86.65	7
42	-2.01	2.22	1	92	1.17	87.90	7
43	-1.95	2.56	1	93	1.23	89.07	7
44	-1.88	3.01	1	94	1.30	90.32	8
45	-1.82	3.44	1	95	1.36	91.31	8
46	-1.76	3.92	1	96	1.42	92.22	8
47	-1.69	4.55	2	97	1.49	93.19	8
48	-1.63	5.16	2	98	1.55	93.94	8
49	-1.57	5.82	2	99	1.61	94.63	8
50	-1.50	6.68	2	100	1.68	95.35	8

(X - Raw Score; Z - Sigma Score; PR - Percentile Rank; ST - Stanine Score)

(9<sup>th</sup> Stanine = Outstanding ; 8<sup>th</sup> Stanine = Excellent; 7<sup>th</sup> Stanine = Very Good; 6<sup>th</sup> Stanine = Good; 5<sup>th</sup> Stanine = Above Average;  
4<sup>th</sup> Stanine = Average; 3<sup>rd</sup> Stanine = Below Average; 2<sup>nd</sup> Stanine = Poor; 1<sup>st</sup> Stanine = Very Poor)

**Table 7: Derived scores of Total Females (N=1147)**

X	Z	PR	ST	X	Z	PR	ST
1	-3.51	0.03	1	51	-0.93	17.62	3
2	-3.46	0.04	1	52	-0.88	18.94	3
3	-3.41	0.04	1	53	-0.83	20.33	3
4	-3.36	0.05	1	54	-0.78	21.77	3
5	-3.31	0.05	1	55	-0.73	23.27	4
6	-3.26	0.07	1	56	-0.68	24.83	4
7	-3.21	0.07	1	57	-0.63	26.43	4
8	-3.15	0.09	1	58	-0.57	28.43	4
9	-3.10	0.10	1	59	-0.52	30.15	4
10	-3.05	0.12	1	60	-0.47	31.92	4
11	-3.00	0.14	1	61	-0.42	33.72	4
12	-2.95	0.16	1	62	-0.37	35.57	4
13	-2.90	0.19	1	63	-0.32	37.45	4
14	-2.84	0.23	1	64	-0.26	39.74	4
15	-2.79	0.26	1	65	-0.21	41.68	5
16	-2.74	0.31	1	66	-0.16	43.64	5
17	-2.69	0.36	1	67	-0.11	45.62	5
18	-2.64	0.41	1	68	-0.06	47.61	5
19	-2.59	0.48	1	69	-0.01	49.60	5
20	-2.53	0.47	1	70	0.05	50.99	5
21	-2.48	0.66	1	71	0.10	53.98	5
22	-2.43	0.75	1	72	0.15	55.96	5
23	-2.38	0.87	1	73	0.20	57.93	5
24	-2.33	0.99	1	74	0.25	59.87	5
25	-2.28	1.13	1	75	0.30	61.79	6
26	-2.22	1.32	1	76	0.36	64.06	6
27	-2.17	1.50	1	77	0.41	65.91	6
28	-2.12	1.70	1	78	0.46	67.72	6
29	-2.07	1.92	1	79	0.51	69.50	6
30	-2.02	2.17	1	80	0.56	71.23	6
31	-1.97	2.44	1	81	0.61	72.91	6
32	-1.92	2.74	1	82	0.66	74.54	6
33	-1.86	3.14	1	83	0.72	76.42	6
34	-1.81	3.51	1	84	0.77	77.94	7
35	-1.76	3.92	1	85	0.82	79.39	7
36	-1.71	4.36	2	86	0.87	80.78	7
37	-1.66	4.85	2	87	0.92	82.12	7
38	-1.61	5.37	2	88	0.97	83.40	7
39	-1.55	6.06	2	89	1.03	84.85	7
40	-1.50	6.68	2	90	1.08	85.99	7
41	-1.45	7.35	2	91	1.13	87.08	7
42	-1.40	8.08	2	92	1.18	88.10	7
43	-1.35	8.85	2	93	1.23	89.07	7
44	-1.30	9.68	2	94	1.28	89.97	8
45	-1.24	10.75	3	95	1.34	90.99	8
46	-1.19	11.70	3	96	1.39	91.77	8
47	-1.14	12.71	3	97	1.44	92.51	8
48	-1.09	13.79	3	98	1.49	93.19	8
49	-1.04	14.92	3	99	1.54	93.83	8
50	-0.99	16.11	3	100	1.59	94.41	8

(X – Raw Score; Z – Sigma Score; PR – Percentile Rank; ST – Stanine Score)

(9<sup>th</sup> Stanine = Outstanding; 8<sup>th</sup> Stanine = Excellent; 7<sup>th</sup> Stanine = Very Good; 6<sup>th</sup> Stanine = Good; 5<sup>th</sup> Stanine = Above Average; 4<sup>th</sup> Stanine = Average; 3<sup>rd</sup> Stanine = Below Average; 2<sup>nd</sup> Stanine = Poor; 1<sup>st</sup> Stanine = Very Poor)

## 6. FINDINGS

The study reveals that the General Scholastic Aptitude Test constructed by the Investigator for the students of class X is the first of its kind in Meghalaya. Following are the major findings:

- (a) General Scholastic Aptitude Test (GSAT) constructed by the investigator measures the general scholastic aptitude of Class X students through the 100 items which covers student's Verbal Proficiency, Numerical Efficiency, Reasoning, Memory, Scientific Understanding, Problem Solving Ability and General Comprehension.
- (b) The obtained split-half reliability co-efficient is 0.95 and is significant at .01 level. This indicates a very high degree of positive correlation between the two set of half scores of GSAT.
- (c) The obtained K-R reliability co-efficient is 0.95 and is significant at .01 level. This indicates a very high degree of positive correlation.
- (d) General Scholastic Aptitude Test (GSAT) has a high degree of validity as the co-efficient of correlation of GSAT with the external criterion test viz. G.C. Ahuja Group Test of Intelligence (GGTI) was found to be 0.96 and is significant at .01 level.

## 7. IMPLICATION

The modern day students are exposed to a very competitive world. At this stage, the class X students are to make very important decisions about their future academic career. It is a very difficult decision as it is the first step where they will have to decide their future course of study. Therefore, it is the responsibility of the educators to assist them in this regard. The GSAT will prove to be quite useful in giving proper guidance to the students with regards to choosing their line of study based on his/her interests and aptitude. Hence, it is important for schools to administer such tests to measure the students' general performance.

## REFERENCES

- Anastasi, A. (2003), Psychological Testing (6<sup>th</sup>ed) New Delhi: Prentice Hall of India, Pvt, Ltd
- Garrett, H.E (1981), Statistics in Psychology and Education. Bombay: Vakils Feffer and Simons Ltd, p.364
- Mehrens, W.A and Lehmann, I.J. (1973). Measurement and Evaluation in Education and Psychology. New York: Halt, Rinehart and Winston Inc,
- Sharma, R.A. (2004). Essentials of Measurement in Education and Psychology. Surya Publication. Meerut.
- Thorndike, L.R. & Hagen, E. (1970) Measurement and Evaluation in Psychology and Education. New York: John Wiley and Sons, Inc, p.4

