CHAPTER - V : THE INVENTORY AS IT EVOLVED

The preliminary runs of the test

As described in the foregoing chapter, the form with 164 items was got ready for the pilot testing. But before the pilot work was conducted, it was thought desirable that a preliminary try-out should be made on a small sample.

The objectives of the pre-tryout of the test were as follow :

(1) To standardise the instructions to be given for the inventory.

(2) To find out if any item needs any change in its wordings.

(3) To find out whether proper ~~directions~~ distractors are used in the multiple choice type.

(4) To find out the approximate time required to answer the inventory.

The pre-tryout of the inventory

All the 164 items were typed out and a number of copies were prepared. Separate paper sheets were used as answer sheets.

The inventory was answered by the teachers of three local schools in the month of February 1958. Table 4 gives the names of schools and the number of teachers who answered the inventory.

Table 4 - Sample selected for the pre-tryout of the inventory

	Name of the institution	Men teachers	Women teachers	Total
1	Saraswathi Mahila Samaj	-	6	6
2	Ladies' Association Middle and Primary Schools	-	14	14
3	Government Middle School for Boys	10	-	10
	Total	10	20	30

The inventory was administered to the teachers of the above schools after the school work. Thirty teachers answered the inventory. The first batch consisted of 20 teachers of the two girls' schools and the second batch consisted of 10 men teachers of a local boys' school. The teachers were given the following instructions :

"This is an attempt to construct an inventory to assess teacher-efficiency. This can be achieved only through your

help and cooperation. Your experience as a teacher will go a long way in improving the inventory. Hence, I request you to answer the inventory honestly and sincerely and suggest any changes anywhere in wording or the like. The following points should be borne in mind :

(1) Go through the instructions carefully and find out if there is any difficulty in following the instructions for answering the items.

(2) Mark all difficult words, and statements.

(3) There is no time-limit fixed for answering the inventory, but work as quickly as you can.

(4) All of you have to start answering simultaneously. Hence when I say 'begin', start answering.

(5) Do not discuss the statements among yourselves, since your individual opinions regarding them are required.

(6) Please respond to every item."

The time taken by each one of them to answer the inventory completely was noted down. This was done to get an approximate idea about the time taken to answer the inventory, though there was no such time limit set.

The pre-tryout of the inventory :

(1) gave the tester an experience of administering the inventory;

(2) enabled the tester to find out ambiguous words, statements whose meanings were not clear, and distractors which were not working at 11;

(3) enabled the tester to find out the approximate time required to answer the inventory;

(4) led her to standardise the instructions to be given while administering the inventory.

Corrections wherever necessary were made and 100 copies of the inventory in the form of booklets and 500 answer-sheets were got printed for the pilot test. The booklet and answer-sheet are appended (Appendix A & B).

The first pilot test

The following are the main objects of the pilot testing :

(1) To identify weak and defective items and to get an idea of needed improvement;

(2) To identify non-functioning or implaceable distractors in multiple choice items;

(3) To provide data for item analysis;

(4) To determine the difficulty level of each individual item to facilitate selection of item;

(5) To determine the discriminating power of individual item;

(6) To determine inter-correlations among items in order to avoid overlap in item selection;

(7) To provide data needed to determine the number of items to be included in the final inventory;

(8) To discover any weakness in the process of administering the inventory;

(9) To determine the needed improvements in the process of administering the inventory.

Selection of the sample

As the results of the pilot testing would determine the quality and nature of the items with respect to the population on which the norms were to be fixed later on, the sample used for pilot testing should resemble the sample of the ultimate population. It was aimed that the inventory would cater to the needs of Kannada speaking primary school teachers of the Mysore State, and as such they would form the best sample for the purpose. However, it would be a tremendous and very cumbersome task to include each and every-one. Hence, a representative sample of the population on which the norms would be fixed was needed.

The most trustworthy way of securing representativeness is to make sure that the sampling is random. The descriptive term 'random' means that we rely upon a certain method of selection to provide an unbiased cross-section of the larger group or population. The criteria for randomness in a sample are met when (1) every individual in the population has the same chance of being chosen for the sample; and (2) when the selection of one individual or thing in no way influences the choice of another. Selection can be said to be random when it is made in terms of some mechanical process and is not subject to the whims or biases of the experimenter.

In order to select a representative sample from the teacher population of the primary schools of the Mysore State, the following were borne in mind :

(1) It was seen that sample contained both men and women teachers of schools situated in urban and rural areas.

(2) Type of schools : There are different types of schools throughout Mysore State. The different types of schools that we have in our State are :

(1) Government Schools
(2) Aided Schools
(3) Boys' Schools
(4) Girls' Schools
(5) Mixed Schools
(6) Basic Schools
(7) N. T. M. Schools
(8) Single-teacher Schools
(9) Private Schools
(10) Municipal Schools.

Hence all such types of schools were included in the sample. While selecting men and women teachers from the different schools it was also remembered to include trained and untrained, graduates and non-graduates.

The details about the selection of teachers for the pilot test are furnished in Table 5.

Table 5 - Details of sample selection in the first preliminary run

Sl No.	Name of the Institution		Type of the institution	Grade of the institution	No. of teachers who answered the inventory		Date
					Men	Women	
1	2		3	4	5	6	7
1	Middle School, Yeshavantapur	Rural	Government	Senior Primary	4	-	28-2-58
2	Middle School for Boys Visweswarapuram	Urban	"	"	4	-	3-2-58
3	R.V.Middle School, Visweswarapuram	"	Aided	"	6	-	10-3-58
4	Girls' Middle School Visweswarapuram	"	Government	"	-	4	17-3-58
5	National High School, Primary Section, Basavanagudi	"	Aided	"	10	-	7-6-58
6	Middle School for Girls' Basavanagudi	"	Government	"	-	6	
7	Kasturba Gandhi Balamandir Basavanagudi	"	Aided	Junior Primary	-	5	
8	Maharastra Mahila Vidyalaya Basavanagudi	"	"	Senior Primary	-	2	
9	Middle School, Malleswaram (North)	"	Government	"	5	-	9-6-58
10	Middle School for Boys Malleswaram (Main)	"	"	"	3	-	14-7-58
11	M.L.A. Primary School Malleswaram	"	Aided	Junior Primary	-	10	6-3-58
12	M.L.A. Middle School Malleswaram	"	"	Senior Primary	-	5	2-3-58
13	Primary School for Girls Malleswaram	"	Government	Junior Primary	-	6	23-6-58
14	Dayananda Hindi Vidyalaya Malleswaram	"	Aided	Senior Primary	-	4	21-6-58
15	Girls' Middle School Malleswaram	"	Government	"	-	5	21-7-58
16	Girls' Middle School Baadhinagar	"	"	"	-	4	8-3-58
17	Girls' Middle School Seshadripuram	"	Aided	"	-	5	
18	Mahila Vidyalaya Seshadripuram	"	"	"	-	4	18-8-58
19	Saraswathi Mahila Samaj Malleswaram	"	"	"	-	5	27-2-58
20	Dayananda Vasathi Vidyalaya Kanakapura	Rural	"	"	3	-	17-3-58
21	Middle School for Boys Kanakapura	"	Government	"	9	-	17-3-58
22	Middle School for Girls Kanakapura	"	"	"	-	3	17-3-58
23	Middle school for Boys Harohalli	"	"	"	7	-	18-3-58
24	Middle School for Girls Harohalli	"	"	"	-	2	18-3-58
25	Middle School for Boys Channapatna	Urban	"	"	15	-	18-3-58

26	Girls' Middle School Channapatna	Urban	Government	Senior Primary	-	4	18-3-58
27	Boys' Middle School Magadi	Rural	"	"	10	-	23-5-58
28	Girls' Middle School Magadi	"	"	"	-	2	23-5-58
29	Primary School Bettahalasur	"	"	"	4	-	14-6-58
30	Basic Schools of :	"	"	Senior Basic	17	-	14-6-58
	(1) Tharabanahalli			"			
	(2) Mayanahalli			"			
	(3) Hunsamaranahalli			"			
	(4) Chikkajala			"			
	(5) Nosahalli			"			
	(6) Tharahunse			"			
	(7) Vidyanagara			"			
	(8) Kittagahanahalli			Senior & Junior			
31	Basic School Bandekodigenahalli	"	"	Senior Basic	6	-	5-4-58
32	Krishnarajendra Middle School for Boys Tumkur	Urban	"	Senior Primary	8	-	5-4-58
33	Krishnarajendra Middle School for Girls Tumkur	"	"	"	-	1	5-4-58
34	Girls' Middle School Nelamangala	Rural	"	"	-	1	
35	Extension Middle School Mandya	Urban	"	"	11	-	27-5-58
36	Town Middle School Mandya	"	"	"	3	-	27-5-58
37	Girls' Middle School Mandya	"	"	"	-	9	30-5-58
38	Sarvodaya Vidyalaya Subramanyapura	Rural	Aided	Junior Primary	2	-	
39	R.V.Teachers Training College, Bangalore	Urban	"	Training institution	41	18	14-3-58

Total Men : 168 ; Total Women : 105 ; Grand Total : 273

The Administration of the Inventory

The heads of institutions of the schools situated in and round-about places of Bangalore and Tumkur were contacted either personally or by post and their cooperation was sought for the administration the inventory in their schools. The tester thought of administering the inventory to the teachers in each of the above selected schools during the school-time. However, a few of the heads, when contacted and requested to allow the test to be conducted in their institutions did not take up the responsibility and wanted the teachers to answer the inventory at home. Most of the teachers were also of the same opinion. Hence the tester had to give the inventory to teachers to be answered at home. All those teachers who consented to answer the inventory were told that that project was undertaken to construct an inventory which would serve as a good tool of selection of teachers to the profession as well as training institutions. They were helping to construct such a tool on the basis of their wide experience in the teaching field. They were also told that the success of the construction of the tool deponded mostly on their cooperation.

350 teachers were given the inventory along with the answer-sheets. They were also requested to fill-up some particulars such as name, qualifications, years of service, trained or not, marital status, etc. in the form provided for the same.

All of them had filled up all the other particulars except their marital status. Most of the teachers did not like to answer whether they were married or not and if they were married the number of children they had. Out of 350 teachers only 273 of them answered and returned the answer-sheets. The rest of them did not return the sheets at all. Out of 273 answer-sheets about 175 of them were promptly returned on the dates fixed for them. The rest of the answer-sheets were collected after 3 or even four reminders. Sometimes, the tester had to visit nearly ten to twelve times certain schools to contact the teachers to requestthem to answer the inventory. There were also certain schools which the tester visited daily for nearly a fortnight to collect the answer-sheets from teachers. Some teachers returned the answer sheets only when they were assured that this testing had nothing to do with their official work and that the tester was not an official sent to test the capacities of teachers. It was found that 50 percent of the answer-sheets were returned in time and others after three or four reminders. Considering the research conditions in this country, this was thought to be quite satisfactory because this was the first type of such an inventory they had answered in this part of the country.

In a few schools where the teachers answered the inventory in a group after the school work, the following

procedure was followed uniformly in administering the same :

(1) The teachers were seated apart in an airy room and were given the booklets with the answer-sheets.

(2) They were asked to fill up the particulars asked about them in the form provided to them.

(3) Sufficient time was allowed to go through the instructions given for answering the inventory. Doubts with regard to the instructions were cleared.

(4) When all the teachers had finished going through the instructions, they were asked to start answering the inventory.

(5) They were requested not to discuss while answering the inventory.

Usually such groups consisted of 10 to 20 teachers and took about 80 to 120 minutes to answer the inventory.

Formation of the criterion groups for item selection in the first run

As has been said in the previous chapter, the two criterion groups of teachers had to be established for item selection. In order to do this the following procedure was adopted.

The heads of about 40 schools which were selected for the administration of the inventory were contacted either by post

or personally and were requested to fill-in the form given to them. The copy of the letter sent to the heads of institutions and the copy of the form are appended (Appendix C). The same form was also given to the first assistant in the same school. The headmaster and his first assistant were asked to write the names of all the teachers working in their schools. Then, they had to assess each of the teachers in the following areas and assign marks out of a maximum of 20 : (The headmaster and the assistants were specifically asked not to consult each other with regard to the assessment of other teachers).

(1) Knowledge of subject matter (5 marks)
(2) Professional interest (5 marks)
(3) Teaching ability of the teacher (5 marks)
(4) Teacher-pupil relationship (5 marks)

Thus, each teacher had two scores, one given by the headmaster and another by his first assistant. The average score obtained by each teacher who served as a testee on the inventory was calculated. It was thought that the assessment by the head of the institution and his colleague would lessen the subjective nature of assessment. The frequency distribution of the marks is given in Table 6.

Table 6 - Frequency distribution of the average scores alloted to 273 teachers by the respective heads of institutions

Score	Frequency
20	8
19	14
18	14
17	20
16	22
15	29
14	27
13	29
12	23
11	22
10	22
9	17
8	11
7	8
6	5
5	2

The above table shows that mean score was = 12.5; N = 273.

These 273 teachers were then divided into two criterion groups in the following manner : Those teachers who obtained

15 marks or above out of 20 were grouped as superior teachers. Those who obtained 11 marks and below were inferior teachers. The two criterion groups thus selected consisted of 107 teachers each. All the 273 teachers had answered the inventory, but for the purpose of determining the discrimination value of each statement, the answers of only 107 teachers in each criterion group were subjected to statistical analysis. Chi-square test was resorted to in order to find out : (1) whether the testees marked the statements randomly by chance or with understanding, and (2) to find out if each of the items discriminated the criterion groups. For the first purpose the simple chi-square test based on null hypothesis of equal-distribution of alternate responses on each item was applied, while for the second purpose the Chi-square test of independence of two criterion groups crouched in contingency table was used.

X^2 is employed to test the agreement between observed results and those expected on null hypothesis. Useful applications of X^2 can also be made when we wish to investigate the relationship between traits which can be classified into two or more categories or between groups which may be classified with respect to certain traits in the groups to be studied. The Chi-square formula for testing agreement between observed and expected results is :

$$\chi^2 = \sum \left[\frac{(f_o - f_e)^2}{f_e} \right] \quad \text{in which}$$

f_o = frequency of occurrence of observed or experimentally determined facts;

f_e = expected frequency of occurrence on some hypothesis.

The differences between observed and expected frequencies are squared and divided by the expected frequency in each case and the sum of these quotients is X^2. The more closely the observed results approximate to the expected, the smaller the X^2 and closer the agreement between observed data and the hypothesis being tested. Contrariwise, the larger the X^2, the greater the probability of a real divergence of experimentally observed from expected results. To evaluate Chi-square a table must be referred to with the computed value of Chi-square and the appropriate number of degrees of freedom.. The number of df = (r - 1) (c - 1) in which r is the number of rows and c is the number of columns of the table in which the data are tabulated. The reference table gives the probability P by which we can find out whether the obtained X^2 is significant or not.

In accordance with this, X^2 was computed first to find whether the distribution of responses on each item followed some trend or was by chance or in other words whether the

testees marked the statements randomly by chance or with understanding. It was found that all the items stood significant at 0.01 level. This shows that the statements were marked by teachers only after understanding them and they lacked the equal distribution by change. (~~The method suggested in Garrett in P. 2-8 was followed~~).

Next, Chi-square values were computed to determine the extent to which each item discriminated between the two criterion groups of superior and inferior teachers. In this case the X^2 test of independence was applied (~~p. 262 - Garrett~~). Table 7 shows that 45 items were significant at 0.1 level, 10 items at 0.05 level, 4 items at 0.02 level and 4 items at 0.01 level. Thus, it could be seen that these Chi-square values did not yield a sufficiently large number of discriminating items. The tester thought that as the tool was to be used for prediction purposes, it must have a high discriminating power. Hence, at least most of the items to be selected should discriminate the two groups at 0.01 level. In the light of these results it was thought that either the statements needed modification for discriminating purpose or the criterion groups were not adequately discriminated by the assessors.

The following observations were made after the first pilot survey :

Table 7 - X^2 values for the items when calculated for the criterion groups - superior and inferior groups (N in each group = 107)

Item No.	X^2	Level of significance
1	5.0	
2	4.0	
3	2.2	
4	6.2	
5	1.2	
6	8.2	.1
7	9.2	.1
8	4.0	
9	3.2	
10	5.2	
11	11.2	.05
12	18.4	.01
13	13.4	.01
14	13.4	.01
15	7.8	.1
16	9.2	.1
17	3.2	
18	2.4	
19.	2.2	
20	2.0	

Table 7 (contd.)

21	8.3	.1
22	10.0	.05
23	5.0	
24	6.2	
25	2.6	
26	9.1	.1
27	8.08	.1
28	12.2	.02
29	6.0	
30	1.0	
31	1.6	
32	1.6	
33	1.6	
34	8.0	.1
35	0.8	
36	2.4	
37	5.0	
38	5.2	
39	1.4	
40	8.6	.1
41	1.0	
42	4.2	
43	2.0	
44	1.6	

Table 7 (contd.)

45	8.6	.1
46	2.0	
47	2.2	
48	1.4	
49	8.0	.1
50	3.4	
51	5.4	
52	7.7	.1
53	11.2	.05
54	3.8	
55	0.8	
56	3.0	
57	2.0	
58	1.2	
59	1.7	
60	5.0	
61	8.8	.1
62	5.6	
63	6.8	
64	8.0	.1
65	5.2	
66	1.0	
67	6.4	
68	2.0	

Table 7 (contd.)

69	9.4	.05
70	8.2	.1
71	1.2	
72	8.0	.1
73	2.4	
74	11.8	.02
75	0.2	
76	2.0	
77	5.6	.1
78	3.8	
79	4.0	
80	0.2	
81	0.8	
82	2.0	
83	12.2	.02
84	5.2	
85	4.2	
86	8.4	.1
87	1.2	
88	2.4	
89	8.4	.1
90	11.0	.05
91	9.2	.1

Table 7 (contd)

92	8.4	.1
93	30.6	.01
94	2.4	
95	.8	
96	2.0	
97	8.2	.1
98	4.2	
99	1.2	
100	6.2	
101	10.6	.05
102	6.2	
103	8.4	.1
104	8.4	.1
105	8.6	.1
106	1.8	
107	8.2	.1
108	4.6	
109	6.4	
110	8.0	.1
111	3.6	
112	4.0	
113	7.8	.1
114	8.2	.1
115	10.6	.05

Table 7 (contd.)

116	4.2	
117	5.8	
118	1.4	
119	5.8	
120	7.2	
121	4.2	
122	3.2	
123	3.8	
124	9.8	.05
125	4.4	
126	4.4	
127	1.8	
128	8.2	.1
129	8.8	.1
130	11.2	.05
131	5.0	
132	5.2	
133	12.0	.02
134	9.8	.05
135	3.6	
136	2.6	
137	2.4	
138	4.6	
139	1.6	

Table 7 (contd.)

140	4.2	
141	4.2	
142	8.4	.1
143	8.8	.1
144	4.8	
145	3.2	
146	3.8	
147	8.8	.1
148	2.2	
149	4.4	
150	7.7	.1
151	8.3	.1
152	9.9	.1
153	11.0	.05
154	7.8	
155	8.0	.1
156	7.7	
157	7.6	
158	6.2	
159	7.0	
160	7.7	
161	8.3	.1
162	6.5	

Table 7 (contd.)

163	7.6	
164	8.5	.1

45 items are significant at 0.1 level

10 items are significant at 0.05 level

4 items are significant at 0.02 level

4 items are significant at 0.01 level

(1) Certain statements required further modifications.

(2) Certain words not in common usage had been used. It was also found that they were ambiguous in meaning. English equivalents for such words were more familiar to teachers. Hence English equivalents were to be given in brackets.

(3) The evaluation of the teachers by their respective heads of institutions and first assistants seemed to be unsatisfactory, because when the marks alloted by Headmasters and first assistants were studied it was found that the average mark was 12.5. Out of 273 teachers 230 teachers were given more than 50 per cent. Only 8 teachers out of 273 were given 30 per cent. Moreover many of the heads of institutions expressed their unwillingness to evaluate the teachers under them by giving marks or by grading them. When the investigator assured them that it would be kept completely confidential, some of them did not like to rate the teachers working in their institutions as below the average. Moreover, many of them did not like to give their honest opinion in black and white, in spite of sound assurances. This was a rather delicate situation.

In order to avoid this situation in the future, it was decided to take the headmasters' opinions about the teachers working in their schools by directly contacting them

and asking them to give names of outstanding and efficient teachers working in their institutions if any. On the second run of the inventory, the same following areas were to be suggested as bases for determining efficiency : (1) knowledge of subject matter, (2) professional interest, (3) teaching ability of the teacher and (4) teacher-pupil relationship. This, it was thought, would work well as the heads of institutions were not asked to give the evaluation in writing. Later, it was found that the two criterion groups formed on the basis of the opinions of the heads of institutions did work well. The X^2 test discriminated the two criterion groups, and most of the items which had earlier X^2 significant at .1 level or others showed significance at .05 level or even .01 level, and beyond.

Some of the items which did not discriminate the criterion groups and also such items which were ambiguous in meaning were either dropped or again modified. English equivalents to words like curriculum, time-table extra-curricular, etc. were given. Thus, the modified inventory contained 100 items of A type and 45 items of B type. Copies of the inventory in English and Kannada with the answer sheet are is appended (Appendix D, and E and F). Thus, the inventory was ready for the second try-out with 145 items.

The second try-out of the inventory

As before, care was taken to see that the sample included teachers working in different types of schools situated in rural and urban areas. The following categories of teachers were also included :

(1) Men and women

(2) Trained and untrained

(3) Graduates and undergraduates

The criterion groups were established on the basis of the opinions of headmasters. In each school the headmaster was contacted personally and the names of teachers whom he considered very efficient, were obtained. They were requested to judge the teachers on the basis of the four areas mentioned before. This was done to ensure that all the teachers were evaluated on a uniform basis. The tester went from school to school to collect this information.

In the second pilot testing 29 schools were chosen, for administering the inventory. Care was taken to see that all categories of teachers who were included in the first tryout were also included for the second tryout of the inventory, keeping in view the different types of schools that existed in the State. The details of selection of schools and teachers are furnished in Table 8.

Table 8 (contd.)

24	Vanita Sadana, Mysore	Urban	Aided	Sr.Primary	-	6	9-1-59
25	Training College for Men Mysore	"	Government	Training college	38	6	6-1-59
26	Maharani's N.T.M. Middle School, Mysore	"	"	Sr.Primary	-	10	7-1-59
27	Sri Chamarajendra Arasu Boarding School Mysore	"	"	"	4	-	8-1-59
28	Sadvidya Patasala Mysore	"	Aided	"	8	-	9-1-59
29	Maharani's Middle School Mysore	"	Government	"	-	5	9-1-59

Total : Men 220 ; Women 150 ; Grand Total = 370

370 men and women teachers of the 29 schools answered the inventory during the months of December and January 1958 and 1959. In almost all the schools the teachers answered the inventory in the school either after the school work or on a holiday. They were all seated in an airy room and the inventory was distributed. After all of them had gone through the instructions, they were asked to start answering the inventory. The teachers were requested not to discuss the items among themselves while they were answering the inventory. None of the teachers expressed any difficult with regard to the understanding of the instructions or the items. The average time taken to answer this inventory was about an hour and twenty minutes. A few were able to finish within one hour and some took two hours. As the tester herself was going from school to school, no booklets or answer forms were lost. Hence cent-per-cent return of the answer-sheets was secured.

It was also seen that all the 370 testees answered the questionnaire completely filling up all the information asked for. In the first try-out form, in order to find out the marital status of each of the teachers, they were asked to tell whether they were married or not and if married the number of children they had. Most of the teachers, somehow, did not like to answer those questions at all. Though they were told that they had not filled up all the columns, ~~they~~

they kept quiet and returned the forms without filling up. This meant loss of some valuable matter for further study which aimed to find differences, if any, between unmarried and married or teachers with children; but this was unavoidable. Hence in the second try-out these two columns were omitted and the rest of the information was honestly and gladly given by the teachers.

Formation of the criterion groups in the second run

150 Teachers who were termed as efficient by their respective headmasters were taken as the superior group and another 150 from the rest of the 220 teachers were chosen randomly and were taken as the inferior group. X^2 values were again computed for each of the items to find out whether they discriminated between the two groups. Table 9 gives the item numbers and their X^2 values.

Table 9 - X^2 values of the 145 items and their levels of significance

Item No.	X^2 values	Level of significance
1	2	3
1	-	-
2	-	-
3	13.4	0.01
4	2.0	
5		
6	11.4	0.05
7	11.6	0.02
8		
9	10.8	0.05
10	9.8	0.05
11	10.8	0.05
12	6.2	
13	6.2	
14	25.8	0.01
15	41.8	0.01
16	27.6	0.01
17	9.8	0.05
18	11.2	0.05
19		
20		

Table 9 (contd.)

1	2	3
21		
22	10.0	0.05
23	25.0	0.01
24	13.8	0.01
25	3.4	
26	6.2	
27		
28	16.4	0.01
29	14.0	0.01
30		
31	14.8	0.01
32	13.6	0.01
33		
34	14.2	0.01
35	10.2	0.01
36	10.4	0.05
37	6.2	
38	18.8	0.01
39	6.6	
40	30.4	0.01
41	10.02	0.05
42	9.6	0.05

Table 9 (contd.)

1	2	3
43	32.4	0.01
44	4.0	
45	22.6	0.01
46	49.4	0.01
47	14.2	0.01
48	12.6	0.02
49		
50	2.0	
51	51.8	0.01
52	10.8	0.01
53		
54		
55	6.0	
56	9.8	0.05
57	9.4	0.05
58	6.0	
59	23.6	0.01
60	9.9	0.05
61	7.6	0.05
62	19.6	0.01
63	15.4	0.01
64	12.6	0.02
65	14.2	0.01

Table 9 (contd.)

1	2	3
66	16.2	0.01
67	27.0	0.01
68	3.6	
69		
70	3.2	
71	32.0	0.01
72		
73	30.0	0.01
74	7.2	
75	14.3	0.01
76	10.0	0.05
77	6.8	
78	32.0	0.01
79	14.6	0.01
80	17.4	0.01
81	11.8	0.02
82	12.2	0.02
83	20.4	0.01
84		
85	16.2	0.01
86	10.4	0.05
87	4.0	
88	14.6	0.01

Table 9 (contd.)

1	2	3
89	12.0	0.02
90	15.4	0.01
91	12.6	0.02
92	17.6	0.01
93	3.0	
94	10.0	0.05
95	10.6	0.05
96	20.2	0.01
97	10.2	0.05
98	6.6	
99	4.4	
100	13.4	0.01
101	9.6	0.05
102	16.6	0.01
103	22.4	0.01
104	15.2	0.01
105	14.6	0.01
106	6.6	
107	11.6	0.02
108	13.6	0.01
109	19.6	0.01
110	9.3	0.05
111	12.2	0.02

Table 9 (contd.)

1	2	3
112	7.6	
113	9.9	0.05
114	9.8	0.05
115	16.8	0.01
116	7.1	
117	9.8	0.05
118		
119	9.3	0.05
120	3.8	
121	7.2	
122	7.0	
123	2.4	
124	10.6	0.05
125	14.4	0.01
126	10.7	0.05
127	14.4	0.01
128	10.0	0.05
129	9.8	0.05
130	10.0	0.05
131	6.4	
132	21.4	0.01
133	15.4	0.01
134	9.4	0.05

Table 9 (contd.)

1	2	3
135	6.0	
136	16.0	0.01
137	11.4	0.05
138	9.4	0.05
139	29.2	0.01
140	32.6	0.01
141	22.6	0.01
142	23.2	0.01
143	10.2	0.05
144	13.8	0.01
145	15.4	0.01

A N A L Y S I S

57 items are significant at 0.01 level

34 items are significant at 0.05 level or just about .05 level

9 items are significant at 0.02 level.

From the table it is seen that X^2 values of 57 items significant at 0.01 level, values of 9 items significant at 0.02 level, 34 at 0.05 level or just at about 0.05 level. The rest did not discriminate the two groups even at 0.1 level. All these items which discriminated the two criterion groups at 0.01, 0.02, 0.05 or just about 0.05 levels were selected for the final test. From the table it will be seen only 100 items were significant at different levels mentioned above and only those 100 items were selected for the final form.

However, it was decided to apply item analysis technique as a check on the selection of items for the final form.

In order to apply this technique, a scoring procedure had to be evolved. To do this, 55 experts were requested to record their own responses to each item of the inventory. These experts were selected on the basis of high qualification, long and rich experience and broadened outlook in educational matters.

Each of these 55 experts was given a copy of the inventory and an answer-sheet and were requested to record their own responses for each of the items in the inventory. This recording of the responses was done individually by all the 55 experts. The frequencies of answers for each of the cells SA, A, U, D and SD in first type and 1, 2, 3, 4 and 5 in

second type of questions were pooled for the 55 experts and tabulated. Table 10 gives a list of such pooled responses.

Table 10 - Pooled responses for the 55 experts for the 145 statements

"A" Type

Item	SA	A	U	D	SD
1	14	25	5	10	1
2	2	3	2	30	18
3	3	5	2	32	13
4	20	28	2	4	1
5	24	26	1	3	1
6	25	29	-	1	-
7	1	2	3	30	19
8	27	15	2	6	5
9	3	7	1	26	18
10	4	6	7	22	16
11	19	27	3	5	1
12	8	6	4	22	15
13	11	31	1	7	5
14	-	3	1	24	27
15	15	31	2	4	1
16	2	6	4	30	13
17	1	5	3	33	14
18	7	8	4	24	12

Table 10 (contd.)

19	5	10	3	25	12
20	1	9	6	29	10
21	5	5	5	26	14
22	12	31	4	7	1
23	10	30	7	8	-
24	13	30	4	8	-
25	25	18	6	4	2
26	2	12	4	13	24
27	22	20	5	6	2
28	-	5	1	30	19
29	11	6	3	21	14
30	2	8	4	28	13
31	1	3	6	25	20
32	-	7	3	30	15
33	5	8	7	23	12
34	1	5	-	37	12
35	-	14	3	24	14
36	14	25	5	10	1
37	12	16	10	10	7
38	3	2	7	25	18
39	7	8	2	21	17
40	3	10	6	25	11
41	2	6	7	30	10

Table 10 (contd.)

42	6	12	5	15	17
43	-	3	4	36	12
44	20	25	5	7	8
45	-	2	-	30	20
46	19	30	3	1	2
47	27	25	2	-	1
48	-	4	10	30	11
49	10	11	2	18	14
50	6	4	5	26	14
51	14	32	1	8	-
52	17	25	5	7	1
53	22	20	4	5	4
54	9	6	7	19	14
55	5	10	3	27	10
56	2	3	1	32	17
57	3	5	5	28	14
58	20	30	1	3	1
59	5	10	8	22	10
60	1	10	4	29	11
61	2	3	4	26	20
62	16	33	2	1	3
63	5	7	2	28	13
64	1	10	-	30	14
65	10	11	5	15	14

Table 10 (contd.)

66	2	5	4	34	10
67	3	9	1	29	13
68	6	9	2	25	13
69	5	5	6	23	16
70	3	7	10	27	8
71	14	28	1	12	-
72	6	4	10	19	16
73	1	4	2	38	10
74	7	5	8	20	15
75	10	32	2	6	5
76	2	8	4	28	13
77	19	17	6	8	5
78	10	28	9	8	-
79	17	28	6	4	-
80	1	4	5	39	6
81	1	5	3	37	9
82	2	4	7	29	13
83	-	4	6	32	13
84	7	8	10	20	10
85	2	9	3	30	11
86	7	5	2	27	14
87	4	5	1	25	20
88	-	4	3	41	7

Table 10 (contd.)

89	-	8	5	33	9
90	1	4	8	32	10
91	12	28	9	4	2
92	18	22	10	3	2
93	5	6	8	16	20
94	2	7	13	17	16
95	3	7	5	28	12
96	1	3	6	30	15
97	22	30	2	1	-
98	14	23	3	10	5
99	13	27	-	8	7
100	3	4	13	24	11

"B" Type

Item	1	2	3	4	5
101	-	3	6	2	44
102	7	3	17	27	1
103	17	5	1	12	20
104	1	3	20	5	26
105	1	25	18	4	7
106	5	14	26	8	2
107	37	3	8	2	5

Table 10 (contd.)

108	34	2	10	3	6
109	7	-	4	39	5
110	5	35	11	3	1
111	1	14	37	-	3
112	5	6	10	9	20
113	35	3	2	14	1
114	5	19	1	4	26
115	1	3	29	2	20
116	4	6	5	30	10
117	6	28	14	-	7
118	5	8	7	12	23
119	19	5	2	17	21
120	10	30	8	5	2
121	22	12	10	6	5
122	12	23	7	5	8
123	5	6	34	8	2
124	33	11	3	7	1
125	4	3	1	47	-
126	14	-	-	11	30
127	3	15	5	31	1
128	29	2	20	3	1
129	30	20	2	3	-
130	8	7	5	35	-
131	4	4	11	28	8

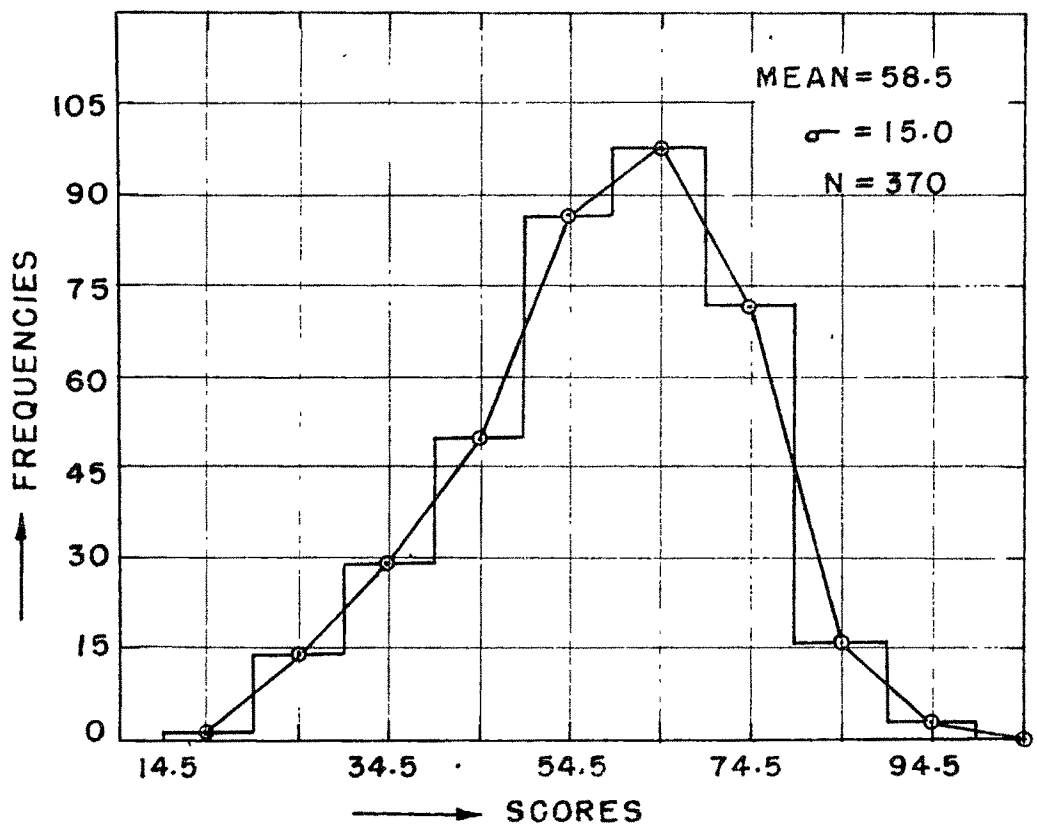
Table 10 (contd.)

132	21	-	13	4	17
133	3	4	41	1	6
134	4	34	11	6	-
135	37	8	2	3	5
136	21	4	1	23	6
137	2	10	4	34	5
138	12	23	-	6	14
139	-	26	9	20	-
140	30	12	1	7	5
141	4	2	38	1	10
142	-	-	1	44	10
143	8	32	6	2	7
144	8	20	4	6	17
145	14	1	25	13	2

Then for convenience of computation the response with highest frequency for each of the item was taken as the correct response to that item. The subjective nature of the key responses was minimised by taking into account the responses of all the 55 experts on the whole. This key was made use of in evaluating the answer-sheets of teacher testees of second run. A copy of such a key is herein appended (Appendix G).

Keys were prepared to help scoring easily and quickly. All the 370 answer-sheets were evaluated with the help of the key. Graph I and Table 11 gives the frequency distribution, the mean, median and S.D. of the scores of the 370 testees.

It may be argued that evaluation on the basis of such key may be a little arbitrary. However, there is not much strength in this argument when the key is prepared on responses of very reliable experts. Yet it may be said that a relative weightage of each alternative response of experts should have been computed instead of giving prominence only to a response with the highest frequency. However, with a limited group, it was tried and it was found that there was not significant difference between the total scores with key prepared on experts' opinion and weighted scores which involved much complex and time-consuming work. Hence, the simpler method of scoring on the basis of key taking into account only the



GRAPH I THE FREQUENCY POLYGON AND THE HISTOGRAM SHOWING THE DISTRIBUTION OF SCORES OF 370 EXAMINEES IN THE FINAL PILOT RUN OF THE INVENTORY.

highest frequency as correct response was adopted, and on this basis item analysis and selection were made finally to supplement the earlier technique.

Table 11 - Frequency distribution of the scores in the pilot test

(Calculation of Mean, Median and Standard Deviation)

Intervals	Mid-point	Frequency	X^1	$f(X^1)$	$f(x^1)^2$
90-99	94.5	3	4	12	48
80-89	84.5	16	3	48	144
70-79	74.5	72	2	144	288
60-69	64.5	98	1	98	98
50-59	54.5	87	-	-	-
40-49	44.5	50	-1	-50	50
30-39	34.5	29	-2	-58	116
20-29	24.5	14	-3	-42	126
10-19	14.5	1	-4	- 4	16
		370		+ 148	886

Mean :

Assumed mean = 54.5 $c = + \frac{148}{370} = 0.40$ $i = 10$

$ci = 4.0$

Mean = 54.5 + 4.0 = 58.5

Median :

$$N = 370 \qquad \frac{n}{2} = \frac{370}{2} = 185$$

$$Mdn = 59.5 + \frac{185 - 181}{98} \times 10$$

$$= 59.5 + .4 = 59.9$$

Standard deviation :

$$= \sqrt{\frac{886}{370} - .4^2} \times 10 \neq 10$$

$$= 15.0$$

Item analysis and item selection

Cyril Burt was the first psychologist who introduced the idea of item analysis in the process of test construction. He carried out the item analysis of the test items in the original Binet-Simon test in 1921. Since then, this technique has become one of the important procedures in the selection of test items.

Item analysis serves many important purposes in the technique of test construction :

(1) It supplies information concerning the item as a whole;

(2) It gives a measure of correlation between the test item and the criterion. Thus, it gives the discriminating index of each item;

(3) It supplies a measure of the difficulty of each item.

A good test should contain items which should discriminate between the testees. This inventory to be useful should consist of items which can demarcate sharply between teachers of high and low efficiency. A highly discriminating item is one which differentiates teachers differing by very narrow margins of efficiency. Each of the items marked by teacher testees of high and low efficiency can be analysed with respect to frequency, of those marking correctly. An item that is correctly answered by a good teacher more frequently than by an ordinary one is said to discriminate positvely. Items of poor discriminating power would be marked correctly as frequently by good teachers as by ordinary ones. Items of negative discriminating power would be marked correctly more frequently by poor teacher testees than by good ones. Thus, the technique of item analysis yields the discriminating value of items without which items do not carry any meaning.

A knowledge of the difficulty level of items besides their discriminating values is also obtained by this technique of item analysis. However, in this inventory, the items are not arranged according to their level of difficulty. While selecting the items, very difficult and very easy items have been omitted as far as possible. Yet, the difficulty

level in terms of commonness - uniqueness or the familiarity-unfamiliarity bend of each item can be gauged by the method of item analysis.

Long Sandiford[1] and others have published useful surveys on the technique of item analysis in mental testing. The various methods that the above investigators have adopted and recommend fall under two categories :

(a) Grouping type (b) Distribution type.

Under each of the two types there are different methods. In the present investigation, the biserial 'r' method described by Long, Sandiford and others for each item has been used. This 'r' was also compared with the biserial 'r' calculated from the tables prepared by Flanagan.

Now, the use of this technique of item analysis and selection involves first the establishment of two criterion groups of superior and poor or upper and lower groups on the strength of whose performance are computed the difficulty value and the discriminating index of each item. The following procedure was followed to establish the criterion groups.

As it will be clear from the following lines, it is

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1. John A. Long, Peter Sandiford : The Validation of Test items. Bulletin No. 3 Department of Educational Research, University of Toronto, Toronto, 1935, p 126.

statistically most convenient to have a sample of 370 testees for purposes of item analysis and that is why in this run, data on 370 teachers were obtained. The 370 answer-sheets after being scored with the key, were arranged in an ascending order with the answer-sheet having the least score at the bottom of the pile and the one with the highest at the top. The top 27 percent and bottom 27 per-cent i.e 100 answer-sheets from the top as well as from the bottom were set aside. Thus, two groups of 100 answer-sheets each were formed. The upper 27 percent constituted the group of good teachers and the lower 27 percent formed the group of ordinary teachers.

Next, the percentage of teachers in each group giving correct answer to each item was calculated. As each group contained 100 teachers, the number of teachers giving the correct answer to each item gave the percentage itself. From these values, the difficulty value and discriminating index needed for item selection were obtained as shown below.

Item selection

There are certain broad principles upon which the selection of items for the final form are to be based. Some of those principles according to Lindquist (p.312) are :

(1) Difficulty index should be computed for each item ;

(2) A discrimination index should be computed for each item preferably an index that reflects the underlying item-criterion relationship ;

(3) The entire group of items should be read over as a unit to detect unnoticed overlappings of choices and to prevent cross-keying of items.

Difficulty value

Different investigators have recommended different methods to compute the item difficulty indices. A very common method is to calculate the percentage of testees answering an item correctly. The level of difficulty can be judged from the percentage of students giving correct response to an item. Thus, the percentages obtained from the total group, irrespective of upper or lower sections, could serve as indicators of level of difficulty, i.e. the higher the percent value, the lesser the difficulty.

A second method which has become very popular with the test constructors is to use the extreme scores of the distribution. Generally the upper and the lower 27 percent of the distribution are used to compute item difficulty. In the present inventory, this method has been used to compute the difficulty value of the items. The formula used to find the difficulty value is

$$D = \frac{U + L}{2}$$

Where D = difficulty value ;

U = percentage of teachers scoring the items correctly in the upper group (27 %) ;

L = percentage of teachers scoring the item correctly in the lower group (27 %).

Thus, it can be seen that if the item is difficult enough to discriminate the upper from the lower (so that, suppose, it is answered correctly only by all upper group of 100 members) its difficulty value is 50; if the item is easy, thereby not discriminating the two (as it is answered by both groups) its difficulty value will be 100.

Some doubts are expressed about the reliability of the difficulty values computed by this method as it involves the elimination of the middle 46 % of answer-sheets. F. Davis has investigated the problem and has concluded that 'the loss of reliability incurred by estimating indices from only 54 % of the sample is not sufficient to be of practical consequence when the two criterion groups employed include at least 100 examiners'[1]. The same investigator further says : 'Experimental evidence has shown that the difficulty indices of this sort are extremely reliable when they are based on samples as large as 400'. The sample in the present work consists of 370 teachers. The reliability of difficulty indices calculated by this method can therefore be vouched for. These values are given in Table 12, col. 4.

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1. Davis, F.B. : Item Analysis Data, Harvard University, Cambridge 1949.

Table 12 - 'Difficulty Level' and 'Discrimination Indices' of the 140 items of the Inventory

Item No. 1	P4. Percentage of high group 2	P2. Percentage of low group 3	Difficulty Level 4	Discrimination index 5
1	64	72	-	-
2	42	22	39	15
3	53	20	42	20
4	32	20	35	10
5	72	73	-	-
6	57	28	45	20
7	76	39	55	25
8	73	75	-	-
9	51	19	42	20
10	39	9	35	25
11	57	17	42	30
12	33	9	31	20
13	35	25	39	10
14	37	6	31	30
15	48	24	42	15
16	50	17	42	25
17	54	9	40	35
18	25	11	31	15
19	18	10	25	10
20	10	6	18	10
21	50	13	39	30
22	55	18	42	25
23	56	23	45	20
24	50	24	42	15
25	30	55	-	-
26	24	21	35	5
27	31	56	-	-
28	59	15	42	30
29	20	4	25	20
30	49	10	39	30
31	45	15	40	20
32	56	17	42	25
33	40	9	25	30
34	54	15	42	30
35	37	11	35	20
36	45	25	42	15
37	4	2	-	-
38	48	19	42	20
39	42	15	39	20
40	57	16	42	30

Table 12 (contd.)

1	2	3	4	5
41	48	8	35	35
42	30	12	31	15
43	66	10	42	40
44	45	20	39	20
45	54	18	42	25
46	53	19	42	25
47	57	15	42	30
48	45	10	35	30
49	48	14	39	25
50	42	7	35	30
51	57	21	45	25
52	25	38	-	-
53	55	57	-	-
54	50	11	39	30
55	48	14	39	25
56	66	7	42	45
57	46	17	40	20
58	49	60	-	-
59	51	10	39	30
60	65	12	42	40
61	56	9	39	35
62	84	60	65	20
63	45	11	39	30
64	80	15	48	45
65	40	12	35	25
66	60	14	42	35
67	40	8	35	30
68	49	14	39	25
69	50	11	39	30
70	37	4	31	35
71	88	66	65	20
72	21	3	25	25
73	67	11	42	40
74	37	9	35	25
75	65	28	48	25
76	59	4	39	50
77	38	49	-	-
78	41	23	39	15
79	48	28	45	15
80	61	10	42	40
81	71	26	48	30
82	60	10	42	35

Table 12 (contd.)

1	2	3	4	5
83	55	15	42	30
84	38	10	35	25
85	55	11	39	35
86	61	13	42	35
87	43	7	35	30
88	72	16	45	40
89	62	10	42	40
90	61	14	42	35
91	56	19	42	25
92	55	18	42	25
93	4	3	18	5
94	33	7	31	25
95	57	11	42	35
96	69	13	45	40
97	69	18	45	35
98	47	17	39	20
99	55	34	48	15
100	49	8	35	35
		" B " Type		
101	85	55	61	20
102	28	13	31	15
103	77	56	55	15
104	47	14	39	25
105	72	37	52	25
106	89	52	61	30
107	81	27	52	35
108	67	48	52	15
109	72	20	48	35
110	78	40	55	25
111	56	26	45	20
112	85	37	38	35
113	47	28	42	15
114	43	20	39	15
115	67	24	48	30
116	66	56	55	5
117	35	17	35	15
118	87	54	61	25
119	37	14	35	20
120	9	6	18	5
121	91	54	65	35
122	76	61	61	10
123	88	60	65	25

Table 12 (contd.)

1	2	3	4	5
124	58	29	45	20
125	81	40	55	[illegible]
126	66	22	45	30
127	74	36	52	25
128	57	36	48	15
129	73	29	50	30
130	68	34	50	20
131	45	11	39	30
132	42	22	39	15
133	91	45	61	35
134	75	27	50	30
135	88	50	61	30
136	49	24	42	15
137	78	27	52	35
138	36	14	35	20
139	61	30	48	20
140	67	39	52	20
141	79	48	58	20
142	74	35	52	25
143	42	16	39	20
144	42	20	39	15
145	59	37	48	15

Item selection and difficulty level

Thus, it is a mathematical fact that items of 50 % difficulty level have the maximum discriminating power. If all the items that are selected have 50 % difficulty value, we would get discriminations at one point only. The real idea behind the selection of items should be that the selected item would discriminate between teachers who are capable of passing an item at different difficulty levels. Hence items of varying degrees of difficulty value have to be included in order to have discriminations not at one point but at different points on the difficulty scale.

Summer has suggested that items of different difficulty levels should be selected in the following proportions for inclusion in the test.

Difficulty range	Number of items
From 0 - 40	20 Percent
" 40 - 60	60 "
" 60 - 90	20 "

This proportion of items with different difficulty levels has to be made the basis for selecting items in the inventory. However, actually the number of items in this case were selected not only on the basis of different

difficulty levels but also on the basis of discriminating index of each item, as shown in the following lines.

Item selection and discriminating index

While selecting items, the discriminating value of each item has to be taken into consideration. The discriminating value of each item is calculated by calculating the item-total test correlation. An item yielding high biserial 'r' with the total test is more discriminating than the one that yields low biserial 'r'. The criterion selected in this method is total score on the test. This biserial 'r' has been calculated by using the following formula[1] :

$$r_{bis} = \frac{M_p - M_q}{\sigma} \sqrt{pq} \quad , \text{ in which}$$

M_p = mean of the 'right' responses ;

M_q = mean of the 'wrong' responses ;

p = proportion of correct responses ;

q = proportion of wrong responses ;

σ = standard deviation of the entire group.

As it was very difficult to calculate the biserial 'r' by the analysis of 370 answer sheets a representative sample of 100 answer-sheets was chosen. As has been already said the mean and SD of the whole distribution are 58.5 and 15.0 respectively. The mean and SD of the sample of 100 answer-sheets are 59.5 and 15.3 respectively. Hence

1. Garrett: H.E. Statistics in Psychology and Education, Longmans Green and Co., 3rd edn. 1946, p 353.

it can be concluded that the sample chosen is a representative sample of the whole group. The biserial 'r' values calculated for all items are given in Table 13, col. 4. These values are compared with the 'r' obtained from Flanagan Tables (col. 3).

A good test will contain items of high discriminating value. According to Thorndike a correlation coefficient of 0.25 represents an outstanding validity. Hence while selecting the items, though the selection of items was mainly based on X^2 values, items which satisfied the minimum discriminating value required have been considered fit for selection.

From the above considerations it was found that only 100 items out of 145 were suitable to be in the final form. Hence the final form contained only 100 items as shown in Table 13. Copy of the final form of the inventory in Kannada and English with an answer-sheet ~~are~~ is appended (Appendix H, I and J).

Table 13 - Showing the items selected for the final form of the inventory

Item Nos.	X^2 values	'r' values Flanagon table	Biserial 'r' values	Item selected for final form	Serial number in the final form
1	2	3	4	5	6
1	-	-	-0.026	*	-
2	-	-	0.38	*	-
3	13.4	0.31	0.28	**	2
4	2.0	0.15	0.31	*	-
5	-	-	-	*	-
6	11.4	0.31	0.19	**	3
7	11.6	0.38	0.23	**	4
8	-	-	-	*	-
9	10.8	0.31	0.36	**	5
10	9.8	0.38	0.22	**	6
11	10.8	0.45	0.37	**	7
12	6.2	0.31	0.32		-
13	6.2	0.15	0.22	*	-
14	25.8	0.45	0.32	**	8
15	41.8	0.25	0.27	**	9
16	27.6	0.38	0.21	**	10
17	9.8	0.51	0.40	**	11
18	11.2	0.25	0.18	**	12
19	-	0.15	0.14	*	-
20	-	0.15	0.15	*	-
21	-	0.45	0.39	*	-
22	10.0	0.45	0.33	**	1
23	25.0	0.31	0.15	**	14
24	13.8	0.25	0.29	**	15
25	3.4	-	-	*	-
26	6.2	0.10	0.19	*	-
27	-	-	-	*	-
28	16.4	0.45	0.26	**	16
29	14.0	0.31	0.20	**	17
30	-	0.45	0.25	*	-
31	14.8	0.31	0.28	**	18
32	13.6	0.38	0.34	**	19
33	-	0.51	0.29	*	-
34	14.2	0.45	0.27	**	20
35	10.2	0.31	0.34	**	21
36	10.4	0.25	0.32	**	22
37	6.2	0.15	0.14	*	-
38	18.8	0.31	0.20	**	23

Table 12 (contd.)

1	2	3	4	5	6
39	6.6	0.31	0.26	*	-
40	30.4	0.45	0.20	**	24
41	30.02	0.51	0.26	**	13
42	9.60	0.25	0.20	**	25
43	32.40	0.56	0.33	**	26
44	4.00	0.31	0.17	*	-
45	22.6	0.38	0.13	**	27
46	49.4	0.38	0.25	**	28
47	14.2	0.45	0.25	**	29
48	12.6	0.45	0.22	**	30
49	-	0.38	0.33	*	-
50	2.0	0.45	0.41	*	-
51	51.8	0.38	0.32	**	31
52	10.8	-	0.10	**	32
53	-	-	-	*	-
54	-	0.45	0.34	*	-
55	6.0	0.38	0.27	*	-
56	9.8	0.65	0.30	**	33
57	9.4	0.31	0.28	**	34
58	6.0	-	-	*	-
59	23.6	0.45	0.12	**	35
60	9.9	0.51	0.39	**	36
61	7.6	0.51	0.44	**	-
62	19.6	0.31	0.26	**	37
63	15.4	0.45	0.36	**	38
64	12.6	0.65	0.28	**	39
65	14.2	0.38	0.28	**	40
66	16.2	0.51	0.35	**	41
67	27.0	0.45	0.35	**	42
68	3.6	0.38	0.18	*	-
69	-	0.45	0.16	*	-
70	3.2	0.51	0.38	*	-
71	32.0	0.31	0.05	**	43
72	-	0.38	0.25	*	-
73	30.0	0.56	0.27	**	44
74	7.2	0.38	0.25	*	-
75	14.3	0.38	0.10	**	45
76	10.0	0.68	0.38	**	46
77	6.8	-	0.07	*	-
78	32.0	0.25	0.11	**	47
79	14.6	0.25	0.31	**	48
80	17.4	0.56	0.39	**	49

Table 13 (contd.)

1	2	3	4	5	6
81	11.8	0.51	0.36	**	50
82	12.2	0.51	0.29	**	51
83	20.4	0.45	0.45	**	62
84	-	0.38	0.41	*	-
85	16.2	0.51	0.45	**	53
86	10.4	0.51	0.29	**	54
87	4.0	0.45	0.13	*	-
88	14.6	0.56	0.45	**	55
89	12.0	0.56	0.40	**	56
90	15.4	0.51	0.31	**	57
91	12.6	0.38	0.28	*	58
92	17.6	0.38	0.40	**	59
93	3.0	0.15	0.04	*	-
94	10.0	0.38	0.36	**	60
95	10.6	0.51	0.47	*	61
96	20.2	0.56	0.23	**	62
97	18.2	0.51	0.33	**	63
98	6.6	0.31	0.22	*	-
99	4.4	0.25	0.16	*	-
100	13.4	0.51	0.15	**	64
101	9.6	0.31	0.14	**	66
102	16.6	0.25	0.27	**	67
103	22.4	0.25	0.26	**	68
104	15.2	0.38	0.25	**	69
105	14.6	0.38	0.13	**	70
106	6.6	0.45	0.35	*	-
107	11.6	0.51	0.33	**	71
108	13.6	0.25	0.13	**	72
109	19.6	0.51	0.26	**	73
110	9.3	0.38	0.28	**	74
111	12.2	0.31	0.17	**	75
112	7.6	0.51	0.30	*	-
113	9.9	0.25	0.21	**	76
114	9.8	0.25	0.23	**	77
115	16.8	0.45	0.44	**	78
116	7.2	0.10	-	*	-
117	9.8	0.25	0.22	**	79
118	-	0.38	0.20	*	-
119	9.3	0.56	0.16	**	80
120	3.8	0.10	0.20	*	-
121	7.2	0.45	0.23	*	-

Table 13 (contd.)

1		3	4	5	6
122	7.0	0.15	0.14	*	-
123	2.4	0.38	0.14	*	-
124	10.6	0.31	0.37	**	81
125	14.4	0.45	0.29	**	82
126	10.7	0.45	0.14	**	83
127	14.4	0.38	0.15	**	84
128	10.0	0.25	0.20	**	85
129	9.0	0.45	0.22	**	86
130	16.0	0.31	0.27	**	87
131	6.4	0.45	0.24	*	-
132	21.4	0.25	0.31	**	88
133	15.4	0.51	0.15	**	89
134	9.4	0.45	0.25	**	90
135	6.0	0.45	-1	*	-
136	16.0	0.25	0.29	**	91
137	11.4	0.51	0.22	**	92
138	9.4	0.31	0.19	**	93
139	29.2	0.31	0.18	**	94
140	32.6	0.31	0.33	**	95
141	22.6	0.31	0.41	**	96
142	23.2	0.38	0.24	**	97
143	10.2	0.31	0.25	**	98
144	13.8	0.25	0.37	**	99
145	15.4	0.25	0.24	**	100

* Not selected ; ** Selected.

Scoring system

The scoring of an inventory like this on a scientific basis is a very complicated affair. The opinions and reactions of the testees obtained on the five-point scale SA, A, U, D and SD in the first part and 1, 2, 3, 4 and 5 in its second part had to be scored on a proper basis so as to obtain scores which would distinguish between superior and inferior teachers. This was the problem.

Arbitrary scale system

Hence the arbitrary scale system of assigning 5, 4, 3, 2 and 1 in the case of ∉ favourable statements (or 1, 2, 3 4 and 5 in the case of unfavourable statements) to the opinions viz. SA, A, U, D and SD, irrespective of the frequency at each cell was considered. But this system does not take into consideration the cell frequencies of each response. Moreover, the total scores obtained thus were also too large for computational purposes and at the same time, such scoring did not seem to have any rational basis for adoption in the present case. Hence in order to have a common type of scoring, both for A and B types of items, other methods of assigning weightages to the various preferences were considered.

The scaling of answers by Likert's Method

Next, the system of scoring followed by Likert and

illustrated by Garrett[1] was tried. His internationalism scale furnishes an example of this scaling technique. In this method the scores have been converted into σ equivalents or Z scores. A real advantage of σ - scaling is that the units of the scale are equal and may be compared from item to item or from scale to scale. Moreover, σ - scaling gives a more accurate picture of the extent to which extreme or biased opinions on a given question are divergent from the typical opinion than does the arbitrary weighting method.

However, in this inventory, when the scores for each of the categories were thus calculated (as shown in table 14) it was found that this system was very elaborate. If a testee marks for each item, a response which carries the highest score then his total score would be 4400. Thus, the scores would be quite unwieldy for computational purposes. This difficulty could have been overcome by again reducing the total scores to a convenient maximum. Since during the process of calculation of the weights to the various preferences by this method, a number of approximations have already been made, to carry out any more approximations was not desirable. Even if this was done, the weightages obtained would be just as cumbersome as when the values 1, 2, 3, 4 and 5 were arbitrarily assigned as mentioned before.

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1. Garrett, H.E: Statistics in Psychology and Education. p 319-322. Longmans, Green & Co., New York 1951.

Table 14 - Scale prepared according to Likert's Method

Item No.	SA	A	U	D	SD
1	41	54	63	66	72
2	72	60	56	47	31
3	41	66	-	74	-
4	74	68	64	54	40
5	66	63	59	52	39
6	69	58	52	45	32
7	39	52	62	66	74
8	74	67	64	45	41
9	33	52	54	60	74
10	73	64	59	50	37
11	74	66	61	41	37
12	66	56	48	46	34
13	73	64	58	47	33
14	34	47	57	65	-
15	37	50	60	66	-
16	-	68	63	53	39
17	64	54	50	44	32
18	26	42	50	57	71
19	-	62	55	47	33
20	74	66	-	52	37
21	-	63	53	49	30
22	35	47	55	62	77
23	27	42	50	57	71
24	36	48	55	60	69
25	67	58	53	48	38
26	-	71	64	51	36
27	-	73	-	55	39
28	39	50	63	68	73
29	42	56	68	-	74
30	-	69	60	49	36
31	34	50	57	63	-
32	39	51	59	65	74
33	72	65	63	53	38
34	69	59	54	45	32
35	40	46	64	67	74
36	74	63	57	48	36
37	39	53	64	66	71
38	68	61	57	50	36
39	-	65	-	51	47
40	65	55	51	46	36

Table 14 (contd.)

1	2	3	4	5	6
41	72	64	60	50	35
42	71	60	55	48	35
43	37	50	57	64	-
44	74	67	63	51	34
45	32	46	55	60	69
46	72	63	58	50	37
47	35	48	57	65	-
48	32	45	53	61	-
49	74	66	62	49	31
50	74	67	62	49	31
51	73	53	55	45	31
52	-	68	61	51	37
53	73	62	57	49	36
54	67	57	53	46	32
55	-	62	63	50	34
56	-	65	58	48	34
57	74	66	61	50	36
58	31	45	54	61	72
59	31	43	51	59	71
60	71	59	51	44	33
61	69	59	54	46	33
62	74	61	54	44	28
63	40	55	72	-	-
64	71	61	54	44	29
65	37	50	58	62	72

Table 15 - Scale preparedgiving marks to the five responses according to the experts' cell frequencies

Item No.	SA	A	U	D	SD
			" A " TYPE		
1	4	5	1	3	2
2	2	3	1	5	4
3	4	5	1	3	2
4	1	2	3	5	4
5	2	3	1	5	4
6	1	2	3	5	4
7	4	5	2	3	1
8	1	3	2	4	5
9	4	5	2	3	1
10	1	2	3	5	4
11	1	3	2	5	4
12	2	3	1	5	4
13	1	2	3	5	4
14	4	5	2	3	1
15	4	5	2	3	1
16	1	3	2	5	4
17	3	2	1	5	4
18	1	2	3	5	4
19	2	3	1	5	4
20	2	3	1	5	4
21	1	2	3	5	4
22	4	5	1	3	2
23	2	1	3	5	4
24	1	3	2	5	4
25	2	3	1	4	5
26	1	2	3	5	4
27	1	3	2	5	4
28	4	5	3	1	2
29	5	4	3	1	2
30	1	2	3	5	4
31	4	5	1	3	2
32	4	5	2	3	1
33	2	3	1	5	4
34	1	3	2	5	4
35	4	5	1	3	2
36		3	2	5	4
37	4	5	2	1	3
38	2	3	1	5	4
39	2	3	1	5	4
40	2	3	1	5	4

Table 15 (contd.)

Item No.	SA	A	U	D	SD
41	1	3	2	5	4
42	2	3	1	5	4
43	4	5	2	3	1
44	1	3	2	5	4
45	4	5	1	3	2
46	1	3	2	5	4
47	4	5	2	3	1
48	4	5	3	2	1
49	1	2	3	5	4
50	1	3	2	5	4
51	1	2	3	5	4
52	1	2	3	5	4
53	1	3	2	5	4
54	2	3	1	5	4
55	1	3	2	5	4
56	1	3	2	5	4
57	1	2	3	5	4
58	4	5	3	2	1
59	4	5	3	2	1
60	1	2	3	5	4
61	1	3	2	5	4
62	1	2	3	5	4
63	4	5	3	2	1
64	1	2	4	5	4
65	4	5	2	3	1

" B " TYPE

1	2	3	4	5	6
66	1	3	4	2	5
67	3	2	4	5	1
68	4	2	1	3	5
69	1	2	4	3	5
70	1	5	4	2	3
71	5	2	4	1	3
72	5	1	3	2	4
73	4	1	2	5	3
74	3	5	4	2	1
75	2	4	5	1	3
76	5	3	2	4	1
77	3	4	1	2	5
78	1	3	5	2	4
79	2	5	4	1	3

Table 15 (contd.)

1	2	3	4	5	6
80	4	2	1	3	5
81	5	4	2	3	1
82	4	3	2	5	1
83	4	1	2	3	5
84	2	4	3	5	1
85	5	2	4	3	1
86	5	4	2	3	1
87	4	3	2	5	1
88	5	1	3	2	4
89	2	3	5	1	4
90	2	5	4	3	1
91	4	2	1	5	3
92	1	4	2	5	3
93	3	5	1	2	4
94	1	5	3	4	2
95	5	4	1	3	2
96	3	2	5	1	4
97	1	2	3	5	4
98	4	5	3	1	2
99	3	5	1	2	4
100	4	1	5	3	2

Evolving a scale based on experts' opinion

The scoring would be more accurate if weightages were given to all the 5 responses of all the 100 items on the basis of the pooled opinions of the 55 experts. The pooled responses of the 55 experts for 145 items has already been given in Table 10 on page 139 .

Instead of now arbitrarily giving 5 marks to SA, 4 marks to A, 3 to U, 2 to D and 1 to SD, for an item, the cell with the highest frequency was given 5, then the next highest was given 4 and so on in case of equal frequencies in some cells, arbitrary order was followed. All these values are shown in Table 15. It can be seen from the scale (Table 15) that in the case of favourable items 5 or 4 is secured by the cells SA or A and in the case of unfavourable items 5 or 4 is secured by D or SD, depending upon the cell frequencies.

Even here, though the order of the frequencies of responses of experts were taken into account, the weightages alloted did not take into account the actual cell frequencies. They were absolute values 5, 4, 3, 2, 1 with equal distance, irrespective of relative distance between actual cell frequencies. Hence, it was thought to give some weightage to each response taking into account the actual cell frequencies. The following method was considered for adoption in giving weightage to the five responses of each of the items. This

is illustrated with respect to item No. 1 and has been followed with others. E.g. in the case of item No. 1, the cell frequencies are 24, 26, 1, 2 and 2 for SA, A, U, D and SD respectively. The highest frequency is for A. Thus, A was given the value 5. Similarly SA was given the value 4, D and SD were given the values 2.5 each (or 3 and 2 making no difference in total) and U the value 1. This would be according to the method taking into account the order of cell frequencies. This is shown in Table 15. However, to be more accurate the modified method taking into account the actual number of cell frequencies would be as follows, so as to give the weighted score to each response, as based on cell frequency at each point of opinion.

Calculation of weighted score for each response

If all the 55 experts had recorded their responses as A, the highest frequency would be 55 at A carrying 5 marks for each expert; thus the total marks admissible would be 55 x 5 = 275. But all of them may not have marked A, necessarily. This could be seen from the cell frequencies. The actual total score for the 1st item would be 24 x 4 + 26 x 5 + 1 x 1 + 2 x 2.5 + 2 x 2.5 = 237. Hence the actual marks 5, 4, 3, 2 and 1 were reduced in the proportion of 237/275. Thus, the weighted score for SA would be 237/275 x 4 = 3.44. The weighted score for A would be 237/275 x 5 = 4.30. The weighted score for U would be 237/275 x 1 = 0.86. The weighted score

for D and SD would be 237/275 x 2.5 = 2.15. Thus, for the first item the weighted scores are 3.4, 4.6, .86, 2.6 and 2.6. The weighted scores for all the items were thus calculated. All these are shown in Table 16. It can be noticed that the proportion varies from item to item. After calculating the weighted scores for all the items a key was prepared.

Though the weighted scores can be used for scoring, one disadvantage is that the scores are in decimals and the totalling becomes too elaborate. Scoring must be made simple and easy.

Finding the weightages by drawing Ogives

Another graphical method of fixing the weightages to each of the items was tried by drawing Ogives. The Ogives were drawn by plotting the 5 points 5, 4, 3, 2 and 1 on the X-axis and the cumulative frequencies of the experts in percentage on Y-axis. By drawing the median for each of the Ogives, the weightage that was to be assigned to each item was found out. Table 17 gives the median value for each item and the weightages to each of the responses, calculated using the median value of each item. Even here the scores were in decimals and the weightages calculated did not vary very much from item to item. Hence, it was thought that this was not more discriminating than the previous method.

Thus, this method of scoring could also practically not be adopted. Scoring system should be simpler and convenient for use of all as far as possible.

Finally, on the basis of the frequencies of these experts' responses, three other possibilities of scoring were considered.

They were :

(1) Scoring only the most frequent response ;

(2) Scoring all the five responses, and

(3) Scoring the two responses with the highest frequencies in order of these frequences.

Selection of the most accurate system of scaling

All these methods were used to score 100 answer-sheets randomly chosen from the 370 answer-sheets. The correlation between these scores and the weighted scores were then calculated. These are given in Tables 18, 19 and 20. It is seen that correlation between the weighted scores and scoring only the most frequent response is 0.56; correlation between weighted scores and scores obtained by giving marks to all the five responses is 0.58; and correlation between weighted scores and scores obtained by scoring the two responses with the highest frequencies is 0.74.

The most accurate system is the scale of weighted scores,

but at the same time it is most complex. It is also seen from correlation tables that the system of scoring the two responses with the highest frequencies in each item is more approximate to the best, but complex one; and hence it can be considered as more reliable than the other two and is also convenient for use. In this method, the maximum score one could obtain was 200. If the testee rightly ticks all the 100 items then for each item he gets a score of 2 making the total 200. Hence this method was decided to be used for all practical purposes. This scoring key is appended as Table 21.

Table 16 - Weighted scores for the 100 items

Item No.	SA	A	U	D	SD
1	3.44	4.30	0.86	2.15	2.15
2	2.70	2.55	0.85	4.25	3.4
3	3.60	4.50	0.9	2.70	1.70
4	0.87	1.74	2.61	4.35	3.48
5	1.68	2.52	0.84	4.20	3.36
6	0.77	1.54	2.31	3.85	3.08
7	3.40	4.25	1.70	2.55	0.85
8	0.88	2.64	1.76	3.52	4.40
9	3.44	4.30	1.72	2.58	0.86
10	0.84	1.68	2.52	4.20	3.36
11	0.88	2.64	1.76	4.40	3.52
12	1.52	2.28	0.76	3.80	3.04
13	0.82	1.64	2.86	4.10	3.28
14	3.40	4.25	1.70	2.55	0.85
15	3.40	4.25	1.70	2.55	0.85
16	0.89	2.67	1.78	4.45	3.56
17	2.28	1.52	0.76	3.80	3.04
18	0.84	1.68	2.52	4.20	3.36
19	1.72	2.58	0.86	4.30	3.44
20	1.82	2.73	0.91	4.55	3.64
21	0.82	1.64	2.46	4.10	3.28
22	3.06	3.95	0.79	2.37	1.58
23	1.64	0.82	2.46	4.10	3.28
24	0.78	2.34	1.56	3.90	3.12
25	1.44	2.16	0.72	2.88	3.60
26	0.89	1.78	2.67	4.45	3.56
27	0.91	2.73	1.82	4.55	3.64
28	3.48	4.35	2.61	0.87	1.74
29	4.40	3.52	2.64	0.88	1.76
30	0.85	1.70	2.55	4.25	3.40
31	3.52	4.40	0.88	2.64	1.76
32	3.28	4.10	1.64	2.46	0.82
33	1.76	2.64	0.88	4.40	3.52
34	0.82	2.46	1.64	4.10	3.28
35	3.62	4.40	0.88	2.64	1.76
36	0.84	2.52	1.68	4.20	3.36
37	3.52	4.40	1.76	0.88	2.64
38	1.54	2.46	0.82	4.10	3.28

39	1.32	2.58	0.86	4.30	3.44
40	1.38	2.07	0.69	3.45	2.76
41	0.85	2.55	1.70	4.25	3.40
42	1.68	2.52	0.84	4.20	3.36
43	3.40	4.25	1.70	2.55	0.85
44	0.90	5.40	1.80	4.50	3.60
45	3.36	4.20	0.84	2.52	1.68
46	0.82	2.46	1.64	4.10	3.28
47	3.24	4.05	1.62	2.43	0.81
48	3.40	4.25	2.55	1.70	0.85
49	0.88	1.76	2.64	4.40	3.52
50	0.88	2.64	1.76	4.40	3.52
51	0.82	1.64	2.46	4.10	3.28
52	0.86	1.72	2.58	4.30	3.44
53	0.84	3.52	1.68	4.20	3.36
54	1.64	2.46	0.82	4.10	3.28
55	0.81	2.73	1.85	4.55	3.64
56	0.87	2.61	1.74	4.35	3.48
57	0.85	1.70	2.55	1.25	3.40
58	3.28	4.10	2.46	1.64	0.82
59	3.2	4.00	2.4	1.6	0.8
60	0.74	1.48	2.22	3.70	2.96
61	0.81	2.43	1.62	4.05	3.24
62	0.85	2.55	1.70	4.25	3.40
63	3.6	4.5	2.7	1.8	0.9
64	0.79	1.58	2.37	3.95	3.16
65	3.28	4.10	1.64	2.46	0.82

" B " TYPE

1	2	3	4	5	6
66	0.92	2.76	3.68	1.84	4.60
67	2.52	1.68	3.36	4.20	0.84
68	3.12	1.56	0.78	2.34	3.90
69	0.85	1.70	3.40	2.55	4.25
70	0.82	4.10	3.28	1.64	2.46
71	4.35	1.74	3.48	0.87	2.61
72	4.25	0.85	3.40	1.70	2.55
73	3.60	0.90	1.80	4.50	2.70
74	2.61	4.35	3.48	1.74	0.87
75	1.84	3.68	4.60	0.92	2.70
76	4.50	2.70	1.80	3.60	0.90
77	2.52	3.36	0.84	1.68	4.20
78	0.86	2.58	4.30	0.72	3.44
79	1.68	4.20	5.36	0.84	2.52
80	3.60	1.80	0.90	2.70	4.50

Table 16 (contd.)

1	2	3	4	5	6
81	4.30	3.44	1.72	2.58	0.86
82	3.80	2.85	1.90	4.75	0.95
83	3.44	0.86	1.72	2.58	4.30
84	1.72	3.44	2.58	4.30	0.86
85	4.30	1.72	3.44	2.58	0.86
86	4.40	3.62	1.76	2.64	0.88
87	3.44	2.58	1.72	4.30	0.86
88	4.00	0.80	2.40	1.60	3.20
89	1.82	3.64	4.55	0.91	2.73
90	1.72	4.30	3.44	2.58	0.86
91	3.28	1.64	0.88	4.10	2.48
92	0.85	3.40	1.70	4.25	2.55
93	2.40	4.00	0.80	1.60	3.20
94	0.86	4.30	2.58	3.44	1.72
95	4.20	3.36	0.84	2.52	1.68
96	2.73	1.82	4.55	0.91	3.64
97	0.95	1.90	2.85	4.75	3.80
98	3.28	4.10	2.46	0.82	1.64
99	2.28	3.80	0.76	1.52	3.04
100	2.46	0.82	4.10	3.28	1.64

Table 17 - Weightage given to the five responses from the median values obtained by drawing ogives

"A" Type

Item No.	Median value of each item	1	2	3	4	5
1	3.8	19.0	15.2	11.4	7.6	3.8
2	3.4	3.4	6.8	10.2	13.6	17.0
3	3.8	19.0	14.2	11.4	7.6	3.8
4	3.7	3.7	7.4	11.1	14.8	18.5
5	3.7	3.7	7.4	11.1	14.8	18.5
6	3.3	3.3	6.6	9.9	13.2	16.5
7	3.8	19.0	14.2	11.4	7.6	3.8
8	4.0	4.0	8.0	12.0	16.0	20.0
9	3.3	16.5	13.2	9.9	6.6	3.3
10	3.7	3.7	7.4	11.1	14.8	18.5
11	3.8	3.8	7.6	11.4	14.2	19.0
12	3.2	3.2	6.4	9.6	12.8	16.0
13	3.4	3.4	6.8	10.2	13.6	17.0
14	3.2	16.0	12.8	9.6	6.4	3.2
15	3.2	16.0	12.8	9.6	6.4	3.2
16	3.6	3.6	7.2	10.8	14.4	18.0
17	2.6	2.6	5.2	7.8	10.4	13.0
18	3.0	3.0	6.0	9.0	12.0	15.0
19	3.3	3.3	6.6	9.9	13.2	16.5
20	3.4	3.4	6.8	10.2	13.6	16.0
21	3.0	3.0	6.0	9.0	12.0	15.0
22	3.3	16.5	13.2	9.9	6.6	3.3
23	3.0	3.0	6.0	9.0	12.0	15.0
24	3.4	3.4	6.8	10.2	13.6	16.0
25	3.4	3.4	6.8	10.2	13.6	16.0
26	3.4	3.4	6.8	10.2	13.6	16.0
27	3.8	3.8	7.6	11.4	14.2	19.0
28	3.7	3.7	7.4	11.1	14.8	18.5
29	4.0	4.0	8.0	12.0	16.0	20.0
30	3.4	3.4	6.8	10.2	13.6	16.0
31	3.5	17.5	14.0	10.5	7.0	3.5
32	3.8	19.0	15.2	11.4	7.6	3.8
33	3.5	3.5	7.0	10.5	14.0	17.5
34	3.1	3.1	6.2	9.3	12.4	15.5
35	3.7	12.5	14.8	11.1	7.4	3.7
36	3.4	3.4	6.8	10.2	13.6	17.0
37	3.4	17.0	13.6	10.2	6.8	3.4
38	3.5	3.5	7.0	10.5	14.0	17.5
39	3.5	3.5	7.0	10.5	14.0	17.5
40	3.0	3.0	6.0	9.0	12.0	15.0

Table 17 (contd.)

41	3.5	3.5	7.0	10.5	14.0	17.5
42	3.2	3.2	6.4	9.6	12.8	16.0
43	3.5	17.5	14.0	10.5	7.0	3.5
44	3.1	3.1	6.2	9.3	12.6	15.5
45	3.4	17.0	13.6	10.2	6.8	3.4
46	3.6	3.6	7.2	10.8	14.4	18.0
47	3.5	17.5	14.0	10.5	7.0	3.5
48	3.2	16.0	12.8	9.6	6.4	3.2
49	3.4	3.4	6.8	10.2	13.6	17.0
50	3.6	3.6	7.2	10.8	14.4	18.0
51	3.2	3.2	6.4	9.6	12.8	16.0
52	3.6	3.6	7.2	10.8	14.4	18.0
53	3.4	3.4	6.8	10.2	13.6	17.0
54	3.2	3.2	6.4	9.6	12.8	16.0
55	3.0	3.0	6.0	9.0	12.0	15.0
56	3.6	3.6	7.2	10.8	14.4	18.0
57	3.6	3.6	7.2	10.8	14.4	18.0
58	3.1	15.5	12.4	9.3	6.2	3.1
59	2.5	12.5	10.0	7.5	5.0	2.5
60	2.0	2.0	4.0	6.0	8.0	10.0
61	2.8	2.8	5.6	8.4	11.2	14.0
62	2.6	2.6	5.2	7.8	10.4	13.0
63	3.8	19.0	15.2	11.4	7.6	3.8
64	3.2	3.2	6.4	9.6	12.8	16.0
65	3.2	16.0	12.8	9.6	6.4	3.2

Table 18 - Correlation between the weightd scores and the scores obtained by scoring only the most frequent responses

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Weighted Scores	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	Total
310-319						1						1
300-309					1	2	1	1		1		6
290-299					1	3	2	2	2	-	2	12
280-289				2	2	4	2	2	2	2	1	17
270-279		2	2	-	3	3	3	3	2	1	1	20
260-269		2	2	4	2	3	3	2	-	-	-	18
250-259	1	2	1	2	2	1	3	1	-	-	-	13
240-249	1	1	2	1	1	1	-	-	-	-	-	7
230-239	1	1	1	-	-	1	-	-	-	-	-	4
220-229	2	-	-	-	-	-	-	-	-	-	-	2
Total :	5	8	8	9	12	19	14	11	6	4	4	100

Product moment correlation = 0.56

Table 19 - Correlation between the weighted scores and scores obtained when all the five categories were given marks according to experts' opinion

Weighted Series	Scores obtained when all the five categories were given marks according to Experts' opinion										
	310-319	320-329	330-339	340-349	350-359	360-369	370-379	380-389	390-399	400-409	Total
310-319							1				1
300-309					1	2	-	2	-	1	6
290-299				1	2	4	3	-	2		12
280-289				4	3	4	2	2	2		17
270-279			2	3	7	2	3	1	2		20
260-269			4	3	4	4	2	1			18
250-259		2	-	4	3	3	1				13
240-249		2	2	1	2						7
230-239		1	1	1	1						4
220-229	1	1									2
Total	1	6	9	17	23	19	12	6	6	1	100

Product moment r = 0.58

Table 20 - Correlation between the weighted scores and scores obtained when the two categories with the highest frequencies according to experts' opinion were given marks

Weighted scores	60-69	70-79	80-89	90-99	100-109	110-119	120-129	130-139	140-149	Total
310-319							1			1
300-309						2	1	3		6
290-299					1	3	3	3	2	12
280-289				1	3	6	6		1	17
270-279			2	2	3	6	4	1	2	20
260-269		1	2	4	7	3	1			18
250-259	2	2	3	2	2	2				13
240-249	1	2	1	3						7
230-239	1	1	1		1					4
220-229	2									2
Total :	6	6	9	12	17	22	16	7	5	100

Product moment r = 0.74

Table 21 - The Key for the Final Form of the Inventory

" A " TYPE

	SA	A	U	D	SD
1	1	2			
2				2	1
3	1	2			
4				2	1
5				2	1
6					1
7	1	2			
8				1	2
9	1	2			
10				2	1
11				2	1
12				2	1
13				2	1
14	1	2			
15	1	2			
16				2	1
17				2	1
18				2	1
19				2	1
20				2	1
21				2	1
22	1	2			
23				2	1
24				2	1
25				1	2
26				2	1
27				2	1
28	1	2			
29	2	1			
30				2	1
31	1	2			
32	1	2			
33				2	1
34				2	1
35	1	2			
36				2	1
37	1	2			
38				2	1
39				2	1
40				2	1
41				2	1
42				2	1
43	1	2			
44				2	1
45	1	2			
46				2	1
47	1	2			
48	1	2			
49				2	1
50				2	1
51				2	1
52				2	1
53				2	1
54				2	1
55				2	1
56				2	1
57				2	1
58	1	2			
59	1	2			
60				2	1
61				2	1
62				2	1
63	1	2			
64				2	1
65	1	2			

" B " TYPE

	1	2	3	4	5
66			1		2
67			1	2	
68	1				2
69			1		2
70		2	1		
71	2		1		
72	2		1		
73	1			2	
74		2	1		
75		1	2		

Table 21 (contd.)

	1	2	3	4	5
76	2			1	
77		1			2
78			2		1
79		2	1		
80	1				2
81	2	1			
82	1			2	
83	1				2
84		1		2	
85	2		1		
86	2	1			
87	1			2	
88	2				1
89		1	2		1
90		2	1		
91	1			2	
92		1		2	
93		2			1
94		2		2	
95	2	1		1	
96			2		1
97				2	1
98	1	2			
99		2			1
100			2	1	

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