CHAPTER IV

CONSTRUCTION AND STANDARDIZATION OF THE TOOL

A healthy system would tend to invent new procedures, move toward new goals, produce new kinds of products, diversify itself and become more rather than less differentiated over time. Such a system could be said to grow, develop and change, rather than remaining routinized and standard.

- MATHEW B. MILES.

Planned Change and Organizational Health. In Fred D. Carver and Thomas T. Sergiovanni (Eds.), Organizations and Human Behaviours, Focus on Schools, McGraw-Hill Book Company, New York, 1969, p. 381.

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CHAPTER IV

CONSTRUCTION AND STANDARDIZATION OF THE TOOL

4.1 INTRODUCTION

The principal objective of the present study is to construct and standardize the tool to measure innovative proneness of the teacher-educators of the Secondary Teachers' Training Colleges of Gujarat. This chapter embodies the complete account of the procedure of construction and standardization of the present tool.

The present tool will be first of its sort in Gujarat. India in general and Gujarat in particular, needs many such questionnaire and this is just an humble attempt in that direction. Here is an attempt to provide a tool to measure innovative proneness of the teacher-educators of Gujarat.

Construction and administration of a questionnaire require a good deal of pre-planning and pre-thinking. Lindquist (1955) says, "Planning is an essential activity in all stages of a test construction". Questionnaire is constructed for administering it to a population or a section, and hence planning plays a dominant role. He further tells:

3

> Scale planning encompasses all the many operations of an outline or a table specifying the contents or operations to be covered by the test, but it must also involve careful attention to item difficulty, to types of items, to directions to the examiners, to arrange for tryout, to problems of test reproduction, to provision for expert review, to the provision of adequate equipment and facilities.

4.2 THE PRESENT PLAN OF WORK

In the light of the foregoing discussion, the following steps were planned in the construction and standardization of the present study.

The steps in the present work are:

1. Scale Construction and Development of Innovative Proneness Scales.

2. Selection of the components of the Scales of Innovative Proneness.

3. A large number of items belonging to the area of innovative proneness of teacher-educators were constructed.

4. These items before assembling in a scale were edited; the items having ambiguous meaning were eliminated.

5. This scale was administered to a sample of population for which the scale was to be

4 standardized.

6. Scoring of each item was calculated.

7. This scale was again administered to a second group.

8. The validity, the reliability and norms were found out.

9. The final form of a scale was administered to the entire sample of the population.

4.3 SCALE CONSTRUCTION AND DEVELOPMENT OF INNOVATIVE PRONENESS SCALES

The instrumentation developed by the investigator seek to identify and quantify four aspects of teachers' innovativeness:

(i) Teachers' expressed attitudes towards specific innovations and combinations of innovations, having regard to the potential cumulative effect of attitudes arising from past experiences with innovations.

(ii) Teachers' general attitudes to change or their change related values.

(iii) Teachers' preferred behaviours in relation to their perception of attributes of innovations.

5 (iv) Teachers' preferred behaviours in relation to their perception of the setting and circumstances in which innovations are introduced.

The distinction between attitude towards innovation defined as a relatively enduring organization of an individual's belief about an object or idea which predisposes him to action and his actual behaviour requires exploration. There is little evidence that expressed attitude and overt behaviour are necessarily consistent. Festinger (1964) found that a change in attitude towards an innovation did not always lead to be discrepancy behaviour change. In the school context attitude behaviour could carry important implications. The overt behaviour of individuals in a formal organizational setting may be highly divergent from their attitudes and centrally held values. Attitude behaviour discrepancy may result in a form of cognitive dissonance which has been termed as 'innovation dissonance'. Viewed in terms of dissonance theory (Festinger, 1957) or balance theory (Heider, 1958), it may be hypothesised that the resultant strains and tensions induced in the individual will be resolved by various dissonance-reducing mechanisms, depending upon the individual's latitude of tension tolerance. The consequence of undue stress and dysfunctional adoptation require further exploration. Various modes of accommodation are suggested in Kelman's (1960) compliance

6 theory. In order to predict behavioural outcomes attitudes towards both the innovation and the situation need to be considered (Rokeach, 1967 and 1968).

To explore the dimensionality of general change related and innovation - specific attitudes and behaviours the investigator constructed the four instruments. They are given below:

1. Section I - The Inventory of Attitudes to Innovation (I.A.I.).

2. Section IIA - The Situational Characteristics Scales (S.C.S.).

3. Section IIB - The Innovation Characteristics Scales (I.C.S.).

4. Section III - The Change-Related Values Questionnaire (C.V.Q.)

5. Section IV - Biographical Data.

(a) Description of Each Section Scales

Section I - The Inventory of Attitudes to Innovation (I.A.I.)

Rationale and Construction: The I.A.I. is a closed form - Likert type summated rating scale designed to measure teachers' pre-disposition to adopt educational innovations.

7 Section II - Teachers' Perceptions of Situational and Innovation Characteristics

Rationale and Construction: Research on the determinants and correlates of teacher 'innovativeness' suggests that 'antecedent conditions', to use Rogers' term (1962), for the successful adoption of innovations include three major sets of variables:

(i) Situational Variables
(ii) Characteristics of the Innovation
(iii) Personal Variables.

To explore the hypotheses that teacher 'innovativeness' would be significantly influenced by these variables the investigator constructed two scales: (i) The Situational Characteristics Scale (S.C.S.) and (ii) The Innovation Characteristics Scale (I.C.S.). (iii) The Personal Variables: Biographical data and attitude scores for all respondents was collected by means of separate questionnaires described in Section IV below.

Section III - The Change-Related Values Questionnaire

Rationale and Construction: The relationship between teacher innovativeness and their general change-related attitudes and values has been the subject of several studies.

8

Section IV - Biographical Data

On a separate questionnaire respondents were requested to provide information on the variables like - Age, Sex, Teaching experience, Academic qualification, Foreign visit, Professional qualification, Mobility, Inservice education, Reading habits and Professional satisfaction.

(b) Selection of the Components of the Three Scales of Innovative Proneness of Teacher-Educators

A questionnaire in its preliminary stage requires a large number of statements regarding the object. After studying the various definitions of innovative proneness as given by the experts, and the heads and teacher-educators were interviewed, asking them their views and opinions regarding innovative proneness and frequency was prepared. With the help of the respected guide, the investigator arrived at seven main components of Section I - The Inventory of Attitude to Innovation, eight main components of Section II - The Situational and Innovation Characteristics Scales and six main components of Section III - The Change-Related Values Questionnaire. This twentyone main components of the above three scales are described here as under:

9 Section I - The I. A. I.

Types of innovation hypothesised:

1. Innovations in 'Individualization'.
2. Innovations in 'Curriculum Organization'.
3. Innovations in 'Teaching-Learning Process'.
4. Innovations in the use of 'Teaching Resources'.
5. Innovations in 'Internal School Organization'.
6. Innovations oriented towards 'Staff Development'
7. Innovations in 'School Community Relationship'.

Section IIA - The S. C. Scales

8. Teachers' perceptions of the degree and kind of administrative support provided for innovation in the school (Administrative support).
9. Teachers' perceptions of the change-related norms and values of their colleagues (Staff Norms).
10. Teachers' perceptions of the change-related norms and values of the educational system (System Norms).

Section IIB - The I. C. Scale

11. Complexity - Teachers' perception of the complexity of the innovation.

10

12. Compatibility - Teachers' perception of the compatibility of the innovations.

13. Risk Taking - Teachers' perception of degree of risk involved in adoption (Riskness).

14. Localite - Perceived 'local' orientation of the innovation (Localiteness).

15. Cosmopolite - Perceived 'Cosmopoliteness' of the innovation.

Section III - The C. V. Q.

16. Traditionalism.
17. Progressivism.
18. Dogmatism.
19. Venturesomeness.
20. Conservatism.
21. Change Proneness.

(c) Description of the Components

The description of above mentioned twentyone components of "Innovative Proneness Scale" is already given in Chapter III - Plan and Procedure. To avoid repetition, it is not necessary to give that description again here in this section.

11 4.4 COLLECTION OF THE ITEMS

There are two ways of collecting items for a questionnaire:

1. To translate the questionnaire available and standardized in foreign countries.

2. To construct a questionnaire independently for the specific area.

Translated items imply the following drawbacks:

1. The environment of foreign countries and Indian are different basically.

2. The customs, social taboos and the like make the material of one country unsuitable for the other.

3. Idioms and proverbs of one country be actually translated. Translation would at times mean such a drastic change that the norms of the original tests would not be applicable.

In view of the non-availability of a suitable tool for the Indian conditions, and because of the drawbacks prevailing in the foreign country's tool as enumerated above, the investigator decided to prepare a separate and independent tool on innovative proneness of teacher-educators, based on the Indian conditions.

12 The construction of the items is based on three sources, viz., (a) the existing inventories, (b) the descriptions of these areas in the sociological and the psychological literature, and (c) the discussions with persons who had studied these areas for same purposes.

There can be no set rules for writing items. Thorndike (1955) puts it beautifully:

> Writing a good test is an art. It is little like writing a good sonnet or little like baking a good cake. The operation is not quite free and fanciful as writing a sonnet, it is not quite standardized as baking the cake.
>
> It lies somewhere in between, so discussions of item writing is somewhere in between exhortation to the past to go out and express himself and the precise recepies of a good cook-book.

Lindquist (1955) says,

> Item writing is essentially creative. Each item as it is being written presents new problems and new opportunities. Just as there can be no set formula for producing a good story or a good painting, so there can be no set of rules that will guarantee the production of good test items.

The items should serve the purpose of testing. This should not be boring to teacher-educators. McCall (1949) suggests, "Tests should be enjoyable to both pupils and teachers".

13 (a) General Principles of Wording Items

The investigator observed the following general principles towards the framing of the better questionnaire:

1. Statements that refer to the past rather than to the present should be avoided.

2. Statements that are factual or capable of being interpreted factual should be avoided.

3. Statements that may be interpreted in more than one way should be avoided.

4. Statements that are irrelevant to the psychological objects under consideration should be avoided.

5. Statements that are likely to be endorsed by almost everyone or by almost no one should be avoided.

6. Statements that are believed to cover the entire range of the attitude scale of interest should be selected.

7. The language of the statements should be simple, clear, direct and easy to grasp.

8. Statements should be short, rarely exceeding twenty words.

14

9. Each statement should contain only one complete thought.

10. Statements containing universals such as all always none and never often introduce ambiguity and hence they should be avoided.

11. Words such as only, just, merely and others of a similar nature should be used with proper care and moderation in writing statements.

12. Wherever possible, statements should be in the form of simple sentences rather than in the form of compound or complex sentences.

13. The use of words that may not be understood by those who are to be given the completed scale should be avoided.

14. The use of double negative should be avoided.

Keeping in view all these twentyone main components of the above three scales, the investigator prepared a list of items under each scale for the purpose of this study. These items varied in their degree of agreement - Strongly agree, Agree, Tend to agree, Tend to disagree, Disagree, Strongly disagree. The weightage was given to each item 5, 4, 3, 2, 1 and 0 respectively. Inversely keyed items were scored 0, 1, 2, 3, 4 and 5.

15 Item scores for each of the seven components of the I.A.C., The S.C. Scales, The I.C. Scale and The C.V.Q. were summed to yield a subscale total score. For the components of Section I 50 items, for Section II 100 items and for Section III 100 items were prepared showing various degree of agreement to disagreement. Bearing in mind the above general principles for writing the items, investigator prepared a list of 250 items for preparing the scale of innovative proneness of teacher-educators.

All the items were carefully worded into simple language. They were edited and scrutinized again and again with the help of the respected guide. Items were revised in the light of the comments.

Lindquist (1955) expresses his views regarding the number of items for tryout. He says, "The number of items should be considerably larger than the number needed for the finished one".

(b) Check-up of the Language of the Items

Thorndike (1954) states, "It is anxiousness of writing that the author of statement is not best qualified to judge the clarity of the statement - he cannot appreciate the difficulties that others will have with his ideas".

After constructing the items for the questionnaire the investigator sought cooperation of language experts and

16 experienced persons in the field of education. All the items were checked separately by the experts and some of their suggestions were carried out so that teachers may not find difficulty in understanding the language of the question ~~it~~ items. Thus, the items were made more practical.

(c) Compilation of the Items

Lindquist (1955) says,

> Once the individual items have been constructed, the problem remains of selecting from among those that survived the review process and tryout those which are to constitute the test, and of arranging the selected items into an appropriate order and avoiding undesirable overlapping among the items.

From these items some were rejected on the basis of ambiguity and similarity. The items, which were slightly different in construction but giving the same meaning were rejected. While preparing the above list, the investigator has rewritten some of the items in proper language. Thus, a list of 225 items was compiled. The Table 4.1 sets out the number of items included against each components of the three sections of the scales.

17

TABLE 4.1

The Number of Original Items in Each Component of the Three Sections of the Scales

Number of components	Number of original items in each components of		
	Section I	Section II	Section III
1	7	16	15
2	5	12	15
3	7	9	15
4	6	10	15
5	7	10	15
6	7	10	15
7	6	12	-
8	-	11	-
Total No.of items	45 +	90 +	90 = 225

Thus, 225 items prepared under twentyone components and it is now ready for giving it to judges for review of the items.

(d) <u>The Language of the Scale</u>

The scale is prepared in Gujarati for application in Secondary Teachers' Training Colleges of Gujarat.

(e) <u>Form and Contents of the Scale</u>

Some have argued that use of several different kinds of items, lend interest to a test through its variety.

18 Lindquist (1955) states:

> However, the interest value of a test depends primarily upon the quality of the items, rather than upon their external form, and if the items are competently constructed even though all of one form, there will usually be no problem of maintaining interest.

The form of the item chosen was in the statement form and the items consisted of positive as well as negative statements.

4.5 REVIEW OF THE ITEMS

Lindquist (1955) says:

> Test items should be reviewed, before tryout on any sizable number of subjects, from three points of view: (1) the accuracy and appropriateness of their subject-matter contents, (2) their technical merits apart from content, and (3) their editorial quality.

Following the above views the investigator decided to give a list of 225 items to a group of experts for editing.

(a) Selecting the Judges

The collection of items were given to large group of judges.Fifteen judges were selected for this purpose.

The judges were instructed as follows:

> This questionnaire contains 225 items regarding innovative proneness of teacher-educators. You are requested to go through

19 each item carefully and classify them into the various categories relating to innovative proneness, ranging from very high to very low.

Out of fifteen judges, ten judges responded. The following table gives the composition of ten judges who responded.

TABLE 4.2

The Composition of Judges

Profession	Number of judges
Professors	2
Readers	3
Lecturers	3
Educationists	2
Total	10

(b) Analysis of the Judges' Ratings

After collection of the questionnaire from judges, the investigator found out the number of times a item was given each scale position. This gave the investigator a simple frequency distribution and then a cumulative frequency distribution was prepared. From this frequency distribution the median values were determined. Also Q_1 and Q_3 positions, i.e., 25th and 75th percentile points were obtained. These percentiles are useful in determining the ambiguity or otherwise of the items. This is found by following formula:

20

$$Q = \frac{Q_3 - Q_1}{2}$$

Thurstone and Chane (1929) regarded:

> Median value of the distribution for each statement was taken as scale value. The interquartile range Q was calculated, in order to have an idea of the spread of the distribution about the scale value. This Q value is regarded as a measure of ambiguity of a statement, and thus it gave an objective criteria for eliminating unscalable statement. These serve as the criteria for the scale.

(c) Selecting the Items for Pre-Tryout

After a careful scrutiny, 25 items were rejected. These items having high Q values indicated that the items do not carry uniform meaning to all the judges. Such items were eliminated as they indicated relative disagreement among the judges. The selected 200 items had a small Q value.

TABLE 4.3

The Number of Items in Each Component of the Three Sections of the Scales in the First Tryout with Number of Items Retained

No. of section	No. of components	No.of original items in each component	No.of deleted items in each component	Retained items for next tryout
I	1	7	1	6
	2	5	1	4
	3	7	1	6
	4	6	0	6

21 TABLE 4.3 Contd.

No. of Section	No. of Components	No. of original items in each components	No.of deleted items in each components	Retained items for next try-out
	5	7	0	7
	6	7	0	7
	7	6	2	4
Total	7	45	5	40
II	1	16	2	14
	2	12	2	10
	3	9	1	8
	4	10	1	9
	5	10	1	9
	6	10	1	9
	7	12	1	11
	8	11	1	10
Total	8	90	10	80
III	1	15	2	13
	2	15	1	14
	3	15	2	13
	4	15	1	14
	5	15	2	13
	6	15	2	13
Total	6	90	10	80
Grand Total	21	225	25	200

22 In this manner, the first form of the inventory was made ready for pre-tryout.

4.6 PRE-TRYOUT OF THE QUESTIONNAIRE

After items have been written, criticized by experts and revised on the basis of their criticisms, it must ordinarily be tried out experimentally on a sample of teacher-educators. Purpose of the pre-tryout was that once items were constructed and reviewed, the questionnaire constructor was anxious to know how the items would work. The questionnaire was, therefore, pre-tried. Lindquist (1955) defines the pre-pilot test as, "The preliminary administration of the tentative tryout units to a small sample for purpose of discovering gross deficiencies, but with no intention of analysing pre-tryout data for individual items."

In pre-pilot stage omissions, ambiguities or inadequacies in the items may be discovered.

(a) Objectives of the Pre-Tryout

The main objectives of the pre-tryout questionnaire, were as follows:

1. To find out gross deficiencies in the items such as to correct answers, ambiguous words, etc.

23

2. To find out the difficulties of the teacher-educators in items.

3. To determine the time limit for the questionnaire.

4. To study the items for analysis.

5. To provide data needed to determine how many items should constitute the finished scale.

6. To determine the intercorrelations among the items, in order to avoid overlap in item selection and to know how best to organize the item into subcomponents.

(b) Procedure for the Pre-Tryout

The questionnaire of 200 items was duplicated for 50 teacher-educators. No time limit was imposed. There are inherent difficulties in the task of measuring innovative proneness by way of lack of clarity in the area to be measured. Clear definition of this is a first requisite, before any attempt is made to measure.

(c) Administering the Questionnaire

The questionnaire of 200 items was given to the 50 teacher-educators of five Secondary Teachers' Training Colleges of Education of Gujarat for pre-tryout. Teacher-

24 educators were asked to return the questionnaire to the investigator on completion of their work. The following Table shows the details of the sample for administering the questionnaire.

TABLE 4.4

The Sample for Administering the Questionnaire for Pre-Tryout

Sr. No.	Name of the College	No.of teacher-educators
1	Faculty of Education and Psychology, Baroda.	10
2	M.B.Patel College of Education, Vallabh Vidyanagar.	10
3	Shri Rang Shikshan Mahavidyalaya, Billimora.	10
4	College of Education, Patan.	10
5	Secondary Teachers' Training College (Vasana), Ahmedabad.	10
5		50

(d) Item Analysis

After administering the questionnaire, there is some need for determining the value of each item for making the questionnaire accurate. If the questionnaire constructor know the relative value of each item, he could select only the best for inclusion in the final form of the questionnaire. One of the main objectives of this tryout

25 was to study the item for analysis. Item analysis serves many useful purposes in the technique of tool construction. The information obtained from the procedure of item analysis may be tested on the following:

1. It supplies information concerning the item as a whole.

2. It gives a measure of the correlation between the item and the criterion.

3. It supplies measure of the internal consistency of the questionnaire.

Kelley has shown that the most accurate determination of item validation or internal consistency can be obtained by comparing approximately the upper and lower 27 per cent of the total group. Micheels (1950) has expressed the same opinion.

Each item is now subjected to some form of item analysis. The investigator selected the top and bottom 27 per cent of the subjects in terms of total scores on the items. The top group is called a "high" group and the bottom group is called a "low" group, in terms of total scores. For each item a frequency distribution is obtained for the high and low groups. Then the response categories for all the items are dichotomized. The entire procedure is summarized in Table 4.5.

26

TABLE 4.5

Schematic Representation for Dichotomizing Response Categories

Response categories	High Group	Low Group	Total
27% High Group (Top)	a	b	(a + b)
27% Low Group (Bottom)	c	d	(c + d)
Total	a + c	b + d	

(e) Finding the Discriminating Power of the Statements

Many ingenious statistical procedure have been devised to provide discrimination indices. Among statistics proposed for expressing item discriminating power in the form of relationship, the biserial 'r', the tetrachoric 'r' and phi-coefficient have been suggested. The method used in the present work phi-coefficient for item discriminating. It is used because of its simplicity. Calculation of the phi-coefficient rØ can be expressed in terms of the rotation of the table above.

$$\text{Thus,} \quad r\emptyset = \frac{AD - BC}{\sqrt{(A+B)\ (C+D)\ (B+D)\ (A+C)}}$$

Phi is most useful in item analysis to know the item-item correlation. The phi values of 200 items of 27 per cent lower and upper group were .16 to .82. The

27 investigator selected those items with highest phi values from .48 to .82.

After the item analysis of 200 items, 50 items were to be rejected on the basis of low phi-coefficient values. The following Table shows the number of items in each component in the pre-tryout with number of items retained.

TABLE 4.6

The Number of Items in Each Component for Pre-Tryout with Number of Items Retained

No. of section	No. of components	No.of original items in each components	No.of deleted items in each components	Retained items for next tryout
I	1	6	1	5
	2	4	1	3
	3	6	1	5
	4	6	2	4
	5	7	2	5
	6	7	2	5
	7	4	1	3
Total	7	40	10	30
II	1	14	2	12
	2	10	2	8
	3	8	2	6
	4	9	3	6

28

No. of section	No. of components	No.of original items in each components	No.of deleted items in each components	Retained items for next try-out
	5	9	3	6
	6	9	3	6
	7	11	3	8
	8	10	2	8
Total	8	80	20	60
III	1	13	3	10
	2	14	4	10
	3	13	3	10
	4	14	4	10
	5	13	3	10
	6	13	3	10
Total	6	80	20	60
Grand Total	21	200	50	150

Out of 200 items only 150 items were found valid, showing high phi values from .48 to .82 and, therefore, they were retained for final run of the questionnaire. The number of items that should be included in the final form of the questionnaire is, an idealistic standpoint, determined by the statistical characteristics of the item, and amount of time likely to be available or convenient for

29 the administration of the questionnaire (see Appendix

4.7 TRYOUT OF THE QUESTIONNAIRE

Lindquist (1955) says,

> Once the gross deficiencies in the tryout forms have been eliminated, perhaps on the basis of a pre-tryout, it becomes necessary to obtain accurate information concerning the performance of each item in a sample of teachers similar to those with whom the final form of the test is to be used.

Constructing questionnaire items on the basis of pre-tryout work is not a sufficient and efficient procedure for a good questionnaire. It needs to be standardized if it is to be a really good, useful, valid and reliable questionnaire to be widely used. This standardization procedure takes into account a number of further steps besides the pre-tryout. These steps as given by all authors of questionnaire construction include selecting adequate sample for pilot study, administering the pre-tryout form of the questionnaire,item analysis and item selection for the final form of the questionnaire on the basis of difficulty value and discrimination power and finally testing the validity and reliability of the questionnaire.

The main purpose for the final administration of the questionnaire was to provide data necessary for standardization of the tool, i.e., for determining the

30 validity and the reliability of the tool. As mentioned above, the pre-tryout was carried out to study how the questionnaire worked. To make the questionnaire more efficient and valid, it was thought proper to administer the second tryout of the questionnaire.

Lindquist (1955) supports more tryouts,

> More than two tryouts may sometimes be deemed advisable, particularly if the questionnaires are to be used to make important decisions about the examinees and if the time and resources, that the final form of the test will be highly efficient as well as valid.

(a) <u>The Objectives of the Tryout</u>

1. To identify weak and defective items.

2. To find out the validity and reliability of the questionnaire.

3. To establish the norms.

(b) <u>Administering the Questionnaire</u>

As the result of the second tryout would determine the quality and the nature of the items with respect to the population,the sample used for tryout testing was selected so as to resemble the sample of the population. To facilitate the calculation in the tryout, the questionnaire was administered to a sample of 50 teacher-educators. For the

31 present sample, 50 teacher-educators were picked up from five Secondary Teachers' Training Colleges of Education of Gujarat.

Table given below shows the names of training colleges and the number of teacher-educators where the questionnaire was administered for second tryout.

TABLE 4.7

The Sample for Administering the Questionnaire for Tryout

Sr. No.	Name of the College	No.of teacher-educators
1	Shikshan Mahavidyalaya, Gujarat Vidyapeeth, Ahmedabad.	10
2	V.T.Chokshi Sarvajanik College of Education, Surat.	10
3	Secondary Teachers' Training College, Visnagar.	10
4	Secondary Teachers' Training College, Kheda.	10
5	A. G. Teachers' College, Ahmedabad.	10
Total	5	50

From the scores of this tryout the investigator tried to work on the validity and reliability of the questionnaire.

4.8 VALIDITY, RELIABILITY AND ESTABLISHING NORMS

32

(a) Validity of the Present Questionnaire

The validity of the present questionnaire has been studied in a number of ways:

1. Content validity.
2. Rating of the teacher-educators with the ratings of the principals or Heads or Deans.
3. Item analysis by phi-coefficient formula.

(1) Content Validity

All questionnaire items have relied principally on the definitions of 'innovative proneness' given by experts. Again, the principals and teacher-educators were interviewed and finally arrived at 21 components.

Anastasi (1958) said,

> This type of validation is based upon the original selection of items to be included in the test. The preparation of test items is preceded by a thorough and systematic examination of relevant course syllabi and textbooks, as well as by consultation with subject-matter experts. On the basis of the information, thus gathered, scale items are drawn up.

2. Ratings of the teacher-educators with the Ratings of the Principals or Heads or Deans

The validity of the questionnaire was further teste

33 by correlating scoring of teacher with principal estimates of their innovative proneness into five points scale, viz.,

1. VH = Very High
2. H = High
3. A = Average
4. L = Low
5. VL = Very Low

For testing the validity of the questionnaire the investigator selected six colleges from Gujarat. The investigator discussed with the principals of the selected colleges and requested to spare 6 teacher-educators, two each with high innovative proneness, average innovative proneness and low innovative proneness. The questionnaire containing 150 items was distributed to these teacher-educators for giving their responses. The investigator collected responses from 36 teacher-educators from 6 selected colleges and requested the principals to give their opinion for each teacher relating his innovative proneness with respect to the components.

Studying the responses of the selected teachers the positive statements were assigned values as 5, 4, 3, 2, 1 and the negative statements the values assigned were 1, 2, 3, 4, 5. Thus, the total value scores of each teacher-educators were further subdivided componentwise. Correlation was determined between the principal's score

34 and the teachers' score.

It was seen that the product moment coefficient correlation between the two sets of scores were .77, meaning a fairly good coefficient of correlation showing that questionnaire agreed with principal's estimates.

(3) Item Analysis

Item validation was also done through phi-coefficient formula as discussed above. It showed the relation of items with each other. So there was no need for cross validation. These proved that the questionnaire was valid.

(b) The Reliability of the Present Questionnaire

It was decided to check the reliability of the present questionnaire by the following methods:

(1) The Test-Retest Method
(2) The Split-Half Method

(1) Reliability by Test-Retest Method

The investigator employed the Test-Retest Method for determining the reliability of the present scale. In the present work 50 teacher-educators of Secondary Teachers' Training Colleges of Gujarat were administered the questionnaire on 15th November 1976 and the same group of teachers were again administered on 12th December 1976,

35 i.e., after 27 days of interval. The scores of the subjects at both the administrations were correlated. The correlation between the first and the second sets of scores give an estimate of the reliability coefficient. The mean score of the first administration was found to be high as compared to the mean score on the second administration. The correlation between the first and the second sets of scores was found by the product-moment method.

$$r = \frac{XY}{N\ X\ Y}$$

The Test-Retest correlations for total scores and for factor scores are listed in Table 4.8.

TABLE 4.8

Test-Retest Correlation for TwentyOne Components of Innovative Proneness of Teacher-Educators

No. of section	No. of items	Factor No.	Name of the Factor	Correlation
I	5	1	Individualization	0.84
	3	2	Curriculum Organization	0.79
	5	3	Teaching-Learning Process	0.89
	4	4	Teaching Resources	0.85
	5	5	Internal School Organization	0.79
	5	6	Staff Development	0.82
	3	7	School Community Relationships	0.87
Total Scale	30	7	The Inventory of attitudes to Innovation	0.89

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TABLE 4.8 Contd.

No. of section	No. of items	Factor No.	Name of the Factor	Correlation
IIA	12	1	Administrative Support	0.80
	8	2	Staff Norms	0.87
	6	3	System Norms	0.79
Sub-Total	26	3	The Situational Characteristics Scale	0.94
IIB	6	4	Complexity	0.75
	6	5	Compatibility	0.76
	6	6	Riskness	0.81
	8	7	Localiteness	0.81
	8	8	Cosmopoliteness	0.80
Sub-Total	34	5	The Innovation Characteristics Scale	0.92
Total Scale	60	8	The Situational and Innovation Characteristics Scale	0.93
III	10	1	Traditionalism	0.89
	10	2	Progressivism	0.80
	10	3	Dogmatism	0.81
	10	4	Venturesomeness	0.82
	10	5	Conservatism	0.82
	10	6	Change Proneness	0.83
Total Scale	60	6	The Change-Related Values Questionnaire	0.90
Grand Total	150	21		

37 In Table 4.8, Test-Retest correlations for both factor and total score is shown. It shows that the factor correlations are predominantly above .70 level and for the total scores are above 0.80.

With the above high coefficient of reliability the investigator could say that the present scale is satisfactory.

Kelly suggests,

> A test with a reliability as low as 0.5 is useful for determining the status of a group in some subjects whereas reliability of more than 0.9 is useful for differentiating the status of an individual in a group.

The reliability of the present questionnaire is no where less than .89, therefore, it is concluded that the scale is sufficiently reliable.

(2) Reliability by the Split-Half Method

According to Garrett (1958), "The Split-Half Method is generally regarded as the best of the methods for determining test reliability".

A sample of fifty teacher-educators of Secondary Teachers' Training Colleges were administered for determining the reliability values for the scale. Scores on the odd items of the scale were correlated with the even items of the same. In this method, the investigator divided the

38 items into two equivalent parts and the correlation between the two parts showed the index of reliability. So from the split-half test reliability, the self correlation of the whole test was found out by the Spearman Brown formula:

$$r_{11} = \frac{2r_{\frac{1}{2}1/11}}{1 + r_{\frac{1}{2}1/11}}$$

where, r_{11} = reliability coefficient of the whole test

$r_{\frac{1}{2}1/11}$ = reliability coefficient of the half test.

The Table given below shows the reliability coefficient of the Section I, Section II and Section III of the whole test by Spearman Brown formula

TABLE 4.9

Reliability Coefficient of Each Section by Split-Half Method

No. of section	Number of items	No. of components	Reliability coefficient
I	30	7	.90
II	60	8	.95
III	60	6	.92
Total	150	21	

The reliability was found out by Split-Half Method and it was highly correlated .90, .95 and .92 respectively.

39 This proved that the questionnaire is reliable and it is ready for administration. The investigator has given the name of the questionnaire for measuring innovative proneness of teacher-educators of Secondary Teachers' Training Colleges, 'Innovative Proneness Scale' (I.P.S.) for teacher-educators (see Appendix

(C) Norms

For standardization of the inventory for Innovative Proneness Scale for teacher-educators, reliability and validity were already worked out and have been reported earlier. Norms in terms of percentiles have also been worked out with respect to each component of the three sections of the scale. The result in the form of percentile scores have been given in the following Tables 4.10 to 4.12.

TABLE 4.10

Percentile Points of the Components of Section I - The Inventory of Attitudes to Innovation

Percentile Points	Individualization	Curriculum Organization	Teaching-Learning Process	Teaching Resources	Internal School Organization	Staff Development	School Community Relationships	The Inventory of Attitudes to Innovation
90	25.0	15.0	25.0	20.0	25.0	25.0	15.0	150.0
80	25.0	15.0	24.0	19.0	25.0	24.0	14.0	140.0
70	24.0	15.0	23.0	18.0	23.0	23.0	14.0	135.0
60	23.0	14.0	23.0	18.0	22.0	22.0	13.0	132.0
50	23.0	14.0	22.0	17.0	21.0	22.0	12.0	130.0
40	22.0	14.0	21.0	16.0	20.0	21.0	12.0	126.0
30	21.0	13.0	20.0	16.0	19.0	20.0	11.0	122.0
20	20.0	12.0	19.0	14.0	18.0	19.0	10.0	114.0
10	18.0	11.0	17.0	13.0	17.0	17.0	9.0	106.0

TABLE 4.11

Percentile Points of the Components of Section II - The Situational and Innovation Characteristics Scale

Percentile Points	Administrative Support	Staff Norms	System Norms	Section IIA - The Situational Characteristics Scale	Complexity	Compatibility	Riskness	Localiteness	Cosmopoliteness	Section IIB - The Innovation Characteristics Scale	Section II - The Situational and Innovation Characteristics Scale
90	40.0	58.0	30.0	126.0	30.0	30.0	40.0	40.0	30.0	167.0	289.0
80	32.0	44.0	23.0	96.0	28.0	27.0	40.0	40.0	24.0	152.0	243.0
70	30.0	38.0	21.0	89.0	27.0	26.0	39.0	39.0	22.0	146.0	233.0
60	28.0	36.0	20.0	82.0	27.0	25.0	38.0	38.0	20.0	143.0	225.0
50	25.0	33.0	18.0	75.0	25.0	25.0	36.0	36.0	18.0	139.0	213.0
40	23.0	31.0	16.0	68.0	24.0	24.0	36.0	35.0	16.0	135.0	199.0
30	21.0	26.0	14.0	65.0	23.0	23.0	34.0	33.0	14.0	131.0	189.0
20	18.0	19.0	12.0	53.0	21.0	22.0	32.0	32.0	12.0	125.0	177.0
10	15.0	13.0	8.0	40.0	19.0	20.0	29.0	29.0	9.0	113.0	165.0

TABLE 4.12

Percentile Points of the Components of Section III - The Change-Related Values Questionnaires

Percentile Points	Traditionalism	Progressivism	Dogmatism	Venture-someness	Conservatism	Change Proneness	Section III - The Change-Related Values Questionnaires
90	50.0	50.0	43.0	44.0	47.0	50.0	269.0
80	42.0	48.0	36.0	35.0	33.0	49.0	229.0
70	40.0	46.0	33.0	33.0	30.0	48.0	220.0
60	38.0	44.0	30.0	31.0	27.0	46.0	213.0
50	37.0	42.0	28.0	30.0	25.0	45.0	206.0
40	36.0	41.0	26.0	29.0	23.0	44.0	200.0
30	34.0	40.0	23.0	28.0	21.0	42.0	191.0
20	31.0	38.0	21.0	26.0	19.0	40.0	186.0
10	29.0	33.0	17.0	24.0	15.0	37.0	173.0

43 To conclude, the present chapter gives a complete account of the procedure followed for construction and standardization of the scale. On the basis of the data obtained in the tryout, the items were selected and assembled into the finished questionnaire. The finished scale was then ready for a trial administration. Lindquist (1955) says,

> The trial administration, as it is defined serves to indicate exactly, how the test will be finished in actual use. This means that nominal changes can be made after the trial administration and that the sample employed must be essentially like the group with whom the test is to be used. The trial administration is a final check on time limit and on the procedure of administration.

The next chapter deals with the Factor Analysis of the Questionnaire prepared by the investigator, as one of the objective of the present study.

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