CHAPTER 4
TEST DESIGN AND PROCEDURE

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CHAPTER IV
TEST DESIGN AND PROCEDURE

4.1 INTRODUCTION

Design is an essential step of research. This stage of planning will differentiate a sound study from faulty study. Research design is a strategy in paper like an architect's blue-print. The purpose of research design is to impose controlled restriction on observations of natural phenomena. It suggests the investigator what to do and what not to do. The factor that most often differentiates between good and poor research is not the funds available, the size of sample or sophistication of the statistics but it is the care and thought that goes into the research plan. “The hypothesis formulated act as a guide to what one is proposing to test. The purpose of the design is to show how to do it. We need to collect data in such a way that we may validly draw conclusions from them. There are many elements to be taken into consideration at this stage not all of which are compatible.” (Burroughs, 1975)

Thus, a reliable research can not just happen. It is not the fruit of a few hours or days. It includes number of operations, carried out with patience, accuracy and seriousness for months and years. For such a long process, planning demands extreme care and insight for research. The product of research depends upon the quality of its design. A good research work can not be done if the design has faults. Therefore, proper design is needed for suitable analysis. Certain fundamental steps of research design must be given due importance when it proposed to be used. The operation of design, that is planning must be carried out with patient and accuracy. Thus design is a very important step in research. “The activities relating to design in research are comparable to those of the architect in designing an intricate structure. As the architect does his designing before construction activities get underway. So should the researcher do his designing, before he gets the project underway.” (Grath, 1970)
4.2 RESEARCH METHOD

All those methods which are used by the researcher during the course of studying his research problem are termed as research method. Thus research method may be understood as all those methods that are use for conduction of research. Research methods, thus refers to the methods that the researchers used in performing research operations. Research method is the particular strategy researchers use to collect the evidence necessary for building and testing theories. Since the object of research is arrived at a solution for a given problem, the available data and the unknown aspects of the problem have to be related to each other to make solution possible. Keeping in this view, research methods can be put into the following three groups:

1. In the first group we include those methods which are concerned with the collection of data. These methods will be used where the data are not sufficient to arrive at the required solution.

2. The second group consists of those statistical techniques which are used for establishing relationships between the data and the unknowns.

3. The third group consists of those methods which are used to evaluate the accuracy of the result obtained.

There are many types of research methods and there are also a number of ways in which they may be classified. Research methods may be classified as follows:

1. Historical research method

2. Survey method

3. Experimental research method

4. Causal comparative research method

5. Case study.
The survey method is one of the most important method among the research methods.

The survey method is gathered data from relatively large number of cases of particular time. It is not concerned with characteristics but it is concerned with generalized statistics that result when data are abstracted from a number of individual cases it is essentially cross sectional. The survey is non experimental descriptive research method. Survey can be useful when a researcher wants to collect data on phenomena that can not be directly observed.

The present study is about construction and standardization of critical thinking test so in context of the aims of the study investigator has selected survey method from above stated research methods.

4.3 POPULATION OF THE STUDY

In any educational research study it is important to have a precise description of the population of elements (persons, organizations, objects, etc.) that is to form the focus of the study. In most studies this population will be a finite one that consists of elements which conform to some designated set of specifications. These specifications provide clear guidance as to which elements are to be included in the population and which are to be excluded.

In order to prepare a suitable description of a population it is essential to distinguish between the population for which the results are ideally required, the desired target population and the population which is actually studied, the defined target population.

A population can be defined as including all people or items with the characteristic one wishes to understand.

"By population we mean the aggregate on totality of objects or individuals regarding which inference are to be made in a sampling study. A
population is any group of individual that have one or more characteristics in common that are of the research.” (Sindhu K.S., 1999)

In the present study, the population consisted of students of Grade VIII to X of Gujarat, who were studying in secondary schools during academic year 2009-10.

4.4 SAMPLING TECHNIQUE:

Sample is defined as a small part of a large bulk to represent the whole. A subset of cases from the population chosen to represent it. By using the characteristics of the subset, we can infer the characteristics of the population.

The main purpose of any sampling process is to secure a sample which, subject to limitation of size, will reproduce the characteristics of the population as closely as possible. Sampling procedure can be compared to a mirror which gives a reflection true to original.

Some population is so large, therefore their characteristics could not be measured and if anybody tries to measure the characteristics of population, the population would have changed before the measurement. The sampling process makes it possible to draw valid generalization on the basis of careful observation of variables within a relatively small proportion of the population.

There are four types of sampling techniques: (1) Random sampling (2) Stratified sampling (3) Purposive sampling and (4) Incidental sampling.

The population studied in the investigation may not always be homogeneous, so to avoid this error investigator selected the representative sample by stratified random sampling method for this study.

4.5 TOOLS FOR DATA COLLECTION:

Tools used in the present study for data collection were:
(I) Critical Thinking Test:

Critical thinking test was constructed and standardized by the investigator. Following components were selected for critical thinking test:

1. Perception
2. Assumption
3. Fallacy
4. Argument
5. Logic
6. Problem Solving

Construction and standardization of critical thinking test was followed by establishing reliability, validity and norms. The detailed explanation is given in next chapter i.e. chapter no. V.

(II) Anxiety Scale:

Anxiety scale constructed by Prof. Pallaviben P. Patel and Dr. Hiteshbhai P. Patel was used to measure anxiety level of the students. This scale measure the anxiety of secondary school students of Gujarat State belonging to grade VIII, IX and X. The reliability of this scale was 0.77 by test-retest method validity was 0.81.

4.6 DATA COLLECTION:

Data collection in this study was carried out for the construction and standardization of critical thinking test. Data were collected for pre-pilot, pilot, final run out and establishment of norms, reliability and validity of the test.

4.7 ANALYSIS OF DATA:

Data were collected for manuscript, pre-pilot, pilot and final run during construction and standardization of critical thinking test. The following techniques of analysis of data and statistical calculation were used:
1. Mean (x) and standard deviation (S.D.) were calculated in order to determine the average scores of students belonging to different groups of gender, grade, age, and area.

2. The chi-square ($\chi^2$) technique, difficulty value and discriminative index were done for item analysis.

3. The t-test was used to test significant of difference between mean score of critical thinking test of students belonging to different group of gender and area of the schools.

4. ANOVA was used to test significant of difference between mean scores of critical thinking test of students belonging to different age, grade and anxiety level.

5. The correlation coefficient (r) was used to test reliability of critical thinking Test.

6. Percentile Rank (PR) was used to indicate the percentages of students in the norms group.

Next chapter comprises of development of the critical thinking test.