CHAPTER – 4

PLANNING AND

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STUDY
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4.1 INTRODUCTION

Design is an essential step in the process of research. It is often at this stage of planning that the decisions taken will differentiate a sound study from a faulty study. Research design is a strategy on paper like an architect's plan. The purpose of a research design is to impose controlled restrictions 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. As Burroughs (1975) puts it: "The hypotheses 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."

Thus, a reliable research cannot just happen. It is not the fruit of a few hours or days. It encompasses number of operations, carried out with patience, accuracy and industriousness for months and years. For such a long process, planning demands utmost care and insight. The product of research depends upon the quality of its design. A good research work cannot be done if the design has faults. Therefore, proper design is needed for valid analysis. Certain fundamental steps of research design must be given due importance when it proposed to be used. The operation of the design, that is planning must be carried out with patience and accuracy.

4.2 RESEARCH METHOD

Research methods may be understood as all those methods that are used for conduction of research. Research methods, thus refers to the methods researchers use in performing research operations. In other words, all those methods which are used by the researcher during the course of studying his research problem are termed as research methods. Since the object of research is to arrive 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 this in 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 already 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 results obtained.

Miller (1991) has defined "designed research" as the "the planned sequence of the entire process involved in conducting a research study." According to Selltiz and others (1976), "Research design is a catalogue of the various phases and facts relating to the formulation of a research effort. It is an arrangement of the essential conditions for collection and analysis of data in a form that aims to combine relevance to research purpose with economy in the procedure." Research design is the plan, structure and strategy of investigation conceived to obtain answers to research questions and control variance.

4.3 RESEARCH DESIGN

The formidable problem that follows the task of defining the research problem is the preparation of the design of the research, popularly known as the 'research design'. Decisions regarding what, where, when, how much, by what means concerning a research study constitute a research design. According to Claire Selltiz and others (1962, p.50) research designs means "A research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure."

Different research designs can be conveniently described by categorizing them as (1) research design in case of exploratory research studies (2) research design in case of descriptive and diagnostic research studies and (3) research design in case of hypothesis-testing research studies. In the present study, the investigator has used Experimental Method.

According to Festinger, L. (1952)"The essence of an experiment may be described as observing the effect on a dependent variable of the manipulation of an independent variable."

In the words of Greenwood, E. (1945) "An experiment is the proof of a hypothesis which seeks to look up to factors in a causal relationship through the study of contracting situations which have been controlled on all factors except the one of the interest the later being either the hypothetical case or the hypothetical effect."
According to Bedkar, V.H. (1982) "Experimental method implies a controlled observation of a succession of events. The aim is to search for causal connection."

The experimental design refers to the layout or set up, procedure and conditions under which the experiment itself is carried out or conducted in research one or more than one factor or variables are effective. So this variable should be collectively examined.

In the present study investigator has selected One-Group Pretest-Posttest Design. Design procedure given by Stephen Isaac (1995) is given below.

1. Investigator administers pre-test (O1), to measure mean metacognitive thinking score of a single group before exposure to the metacognitive thinking programme.
2. Investigator exposes subjects to the metacognitive thinking programme (X), for a given period of time.
3. Investigator administers post-test (O2), to measure mean metacognitive thinking score after exposure to metacognitive thinking programme.
4. Compare O1 and O2 to determine what difference, if any, the exposure to X has made.
5. Apply an appropriate statistical test to determine whether the difference is significant.

The pretest provides a comparison between performances by the same group of subjects before and after exposure to X (the experimental treatment). According to Kothari, C.R. (1985) "In such a design a single test group or area is selected and the dependent variable is measured before the introduction of the treatment. The treatment is then introduced and the dependent variable is measured again after the treatment has been introduced." The effect of treatment would be equal to the mean score of the metacognitive thinking inventory after the treatment minus the mean score of the metacognitive thinking inventory before the treatment. In short, research design for the present study can be described in brief as given below:
Table 4.1
Research Design

<table>
<thead>
<tr>
<th>Pre-test</th>
<th>Treatment (Independent Variable)</th>
<th>Post-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>O₁</td>
<td>X</td>
<td>O₂</td>
</tr>
<tr>
<td>Metacognitive Inventory</td>
<td>Metacognitive Thinking Programme</td>
<td>Metacognitive Inventory</td>
</tr>
<tr>
<td>Mean Score ‘P’</td>
<td></td>
<td>Mean Score ‘Q’</td>
</tr>
</tbody>
</table>

Treatment Effect = Q – P

4.4 POPULATION OF THE STUDY

For any good research, it is mandatory on the part of investigator to study the population and sample in depth. To define population and sample is necessary for good research work. According to Sindhu, K.S. (1999),

"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."

Sometimes it is not possible to examine every item in population. Sometimes it is possible to obtain sufficiently accurate results by studying only part of the total population. However, in certain cases, a few items are selected from the population in such a way that they are representative of the universe. Such a section of the population is called sample and the process of selection is called sampling. A sample is the reflection of the universe and bears all characteristics of the universe.

According to Elhance, D.N. (1923),

"The main aim of sampling studies is to obtain maximum information about the phenomenon under study with the least sacrifice of money, time and energy."

The investigator had decided to develop metacognitive thinking Programme and perform the experiment with students of class IX. The population consisted of students of class IX of Gujarati medium schools of Anand district of Gujarat state.

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4.5 SAMPLING TECHNIQUES

John W. Best (1983) pointed out that “A population is any group of individuals that have one or more characteristics in common that are of interest to the investigator. The population may be all the individual of a particular type or a more restricted part of the group. A sample is a small proportion of a population selected for observation and analysis. By observing the characteristics of the sample, one can make certain inferences about the characteristics of the population from which it is drawn. Contrary to some popular opinion, samples are not selected haphazardly. They are chosen randomly in a systematic way, so that chance or the operation of probability can be utilized.”

The process of sampling makes it possible to draw valid inferences or generalizations on the basis of careful observation of variables within a relatively small proportion of the population.

Sampling is simply the process of learning about population on the basis of a sample drawn from it. Under this method a small group of the universe is taken as the representative of the whole mass and the results are drawn. It is a method to make social investigation practicable and easy.

According to Young, P. (1980),

“A statistical sample is a miniature picture or cross-section of the entire group or aggregate from which the sample is taken.”

A sample is the reflection of the universe and bears all the characteristics of the universe.

4.5.1. Types of Sampling Techniques:

The primary objective of the sample survey is to obtain accurate and reliable information about the universe with minimum of cost, time and energy and to set out the limits of accuracy of such estimates.

According to Garrett, H. E. (1981),

“Various techniques have been devised for obtaining a sample which will be representative of its population.”

Different types of sampling techniques are used for drawing a sample, such as,

- Random Sampling
- Stratified Random Sampling
- Double Sampling
4.5.2 Selection of the Sample for the Present Study

The main purpose of the present study was to develop metacognitive thinking programme and study its effectiveness for the students of class IX. Present study was carried out in two important phases.

- **Phase: 1 Development of metacognitive thinking Programme**
- **Phase: 2 Implementation of metacognitive thinking Programme**

For the present study, the investigator has deliberately selected certain units for study from the universe, which is known as purposive sampling. Purposive sampling is also called “deliberate sampling” or “judgment sampling”. When the investigator deliberately selects certain units on the judgment of the investigator and nothing is left to the chance.

According to Jensen, A.R. (1968), “Purposive selection denotes the method of selecting a number or groups of units in such a way that the selected groups together yield as nearly as possible the same averages or proportion as the totality with respect to these characteristics which are already a matter of statistical knowledge.”

The investigator has selected this method due to following reasons:

1. Under proper controls and safeguards this method can prove very useful. It is more economical and less time-consuming.

2. This method ensures proper representation of a cross-section of various strata of the universe if the investigator has full knowledge of the composition of the universe.
3. This method is very useful specially when some of the units are very important and their inclusion in the study is necessary. 
A detail of Sampling for both phases is given below:

4.5.2.1 Phase: 1 Implementation of Metacognitive Thinking Programme

Purpose of the present study was to study effectiveness of Metacognitive thinking programme developed by the investigator. Students of class 9th A of Anand High School, Anand were selected as a sample for the implementation of Metacognitive thinking programme. A detail of the sample is given in Table 4.2

| Table: 4.2 |
| Sample for the Implementation of Metacognitive Thinking Programme |
| Boys | Girls | Total |
| 28   | 24    | 52    |

4.6 TOOLS FOR DATA COLLECTION

The tools used in the present study for data collection were:

1. Metacognitive Inventory

   Metacognitive thinking inventory Constructed and standardized by the Dr. R. S. Patel. Reliability of the test was 0.75 by test retest method and 0.90 by split of method. Criterion and construct validity were 0.73 and 0.78 respectively.

2. Metacognitive Thinking Programme

   Cognitive activities based Metacognitive thinking programme was developed by the investigator. Following components were selected for Metacognitive thinking programme:

   1. Metacognitive knowledge

   Metacognition includes at least three different types of metacognitive knowledge:
   - Declarative Knowledge
   - Procedural Knowledge
   - Conditional knowledge
2. Metacognitive regulation

Metacognition includes at least three different types of metacognitive regulation:
- Planning
- Monitoring
- Evaluating

3. Socio-Economic Status Scale

Socio-Economic Status Scale constructed and standardized by Prof. Pallavi P. Patel was used to measure Socio-Economic status of the students. Reliability of SES scale was 0.85 by test retest method and 0.82 by split half method. Concurrent validity of the scale was 0.88. Scale showed positive relationship between factors for factor validity.

4. Intelligence Test

Verbal Non-verbal Intelligence Test for students of standard 8 to 12 constructed and standardized by Dr. R.S Patel was used to measure intelligence of the students. Reliability of the test was 0.79 by test retest method and 0.87 by split half method. Criterion and construct validity were 0.83 and 0.87 respectively.

4.7 IMPLEMENTATION OF METACOGNITIVE THINKING PROGRAMME

The main purpose of the present study was to study the effectiveness of metacognitive thinking programme. The detailed description of the development of metacognitive thinking programme is given in chapter 5.

The investigator has decided to carry out an experiment on students of Gujarati medium school. Experiment was carried out in Anand High School, Anand. One-Group Pretest-Posttest design was followed in the present study.

The detailed plan and implementation for the metacognitive thinking programme is given below.
1. Time-span: 15 days of a month excluding public holidays.
2. Three periods of 40 minutes were taken per day.
3. Investigator administered the pre-test (Metacognitive thinking inventory) before the treatment.
4. Metacognitive thinking programme was given to class 9th A students of Anand High School, Anand.

5. Metacognitive thinking programme was prepared having 10 detailed Task for the components of Metacognitive thinking.

6. All the cognitive activities were taught by using various tasks, worksheets and practice sheets.

7. Then after give metacognitive thinking task with designed questioning to promote metacognitive thinking.

8. After completing the metacognitive thinking programme, a post-test (Metacognitive thinking inventory) was administered to find out the effectiveness of the treatments.

9. After administering the tests, required computations were carried out to find the effectiveness of the metacognitive thinking programme.

4.8 METHOD OF DATA COLLECTION

Data collection in this study was carried out for the one phase as given below:

Phase – 1 Implementation of Metacognitive thinking programme

Metacognitive thinking programme was implemented to find its effectiveness. For that metacognitive thinking test were administered for data collection as pre-test and post-test. Effectiveness of the metacognitive thinking programme was also found for variables like SES and intelligence. SES scale constructed and standardized by Prof. Pallavi P. Patel and Verbal-nonverbal intelligence test constructed and standardized by Dr. R.S. Patel was used to collect data.

4.9 ANALYSIS OF DATA

Present study statistics used for analysis of data is given below:

Phase – 1 Implementation of Metacognitive thinking programme

Descriptive statistics were computed for the data collected from metacognitive thinking inventory used as a pre-test and post-test. t-test was computed to test the hypotheses. Chi-square was found to study significance of student’s feedback towards metacognitive thinking programme.

Next chapter comprises of phase – 1 of the study i.e. construction and Development of Cognitive Activities based Metacognitive thinking programme.