CHAPTER III

PLAN AND PROCEDURE

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PLAN AND PROCEDURE

3.1 Introduction

A research design is the logical and systematic planning and directing of a piece of research. Young (1968) stated, 'The most meaningful and revealing studies are those that are conceived from a definite point of view and for the success of any investigation, careful planning is essential.'

This chapter contains an outline of the different aspects of methods and procedures followed in conducting the study. In what it follows are, description and construction of tools, selection of schools, sample,
administration of tools and plan of analysis of data, considering different criterion variables of study.

3.2.0 Procedure of the Study

For data collection, following steps were followed by the investigators.

3.2.1 Selection of the Schools:

Since this study was aimed at finding the classificatory ability of six to ten years old rural children of Rajasthan state, it was imperative that schools selected should be representative of the rural as well as of Rajasthan state. To meet this requirement, following districts and schools were selected. Since Rajasthan is divided in 26 districts out of which some are backward, and others are industrial, advanced, desert and average districts. The selected districts were from all the categories and basis of selection was the same as designated by Rajasthan Government.

Selection of the schools were made from each district and from rural area, where village panchayat exists and not municipal council. The level of village was third, where a secondary school along with primary school and a girls
RAJASTHAN

DISTRICTS

DISTRICTS COVERED IN DATA COLLECTION

INDEX

DESERT
AVERAGE
INDUSTRIAL
BACKWARD
ADVANCED
school runs. The table below gives the more detail picture of the schools.

Table 3.1: Details of the Schools Selected for Data Collection

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>District</th>
<th>Category</th>
<th>Names of the Schools</th>
<th>Sex</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Ajmer</td>
<td>Advanced</td>
<td>Primary School, Saraghana M Girls Middle School, Saradhana</td>
<td>M &amp; F</td>
<td>III</td>
</tr>
<tr>
<td>2.</td>
<td>Banswara</td>
<td>Backward</td>
<td>Primary School, Ghantol M &amp; F Girls Middle School, Ghantol</td>
<td>M &amp; F</td>
<td>III</td>
</tr>
<tr>
<td>3.</td>
<td>Bhilwara</td>
<td>Average</td>
<td>Primary School, Aguncha M Girls Middle School, Aguchha</td>
<td>M &amp; F</td>
<td>III</td>
</tr>
<tr>
<td>4.</td>
<td>Chittore</td>
<td>Average</td>
<td>Girls Primary School, Begun Middle School, Udasar M &amp; F</td>
<td>M &amp; F</td>
<td>III</td>
</tr>
<tr>
<td>5.</td>
<td>Bikaner</td>
<td>Desert</td>
<td>Primary School, Udasar M &amp; F Girls Middle School, Udasar</td>
<td>M &amp; F</td>
<td>III</td>
</tr>
<tr>
<td>6.</td>
<td>Kota</td>
<td>Industrial</td>
<td>Primary School, Kaithoon II Girls Primary School, Khera Rasulpur</td>
<td>M &amp; F</td>
<td>III</td>
</tr>
</tbody>
</table>

* All the schools were government schools
3.2.2 Sample

Admission and class registers were consulted for the dates of birth of the children for the requisite sample. Only subjects whose dates of birth fell within plus-minus one month to six, seven, eight, nine, and ten years were selected for the purpose of the study. A total number of 400 children, 200 boys and 200 girls, each 40 at each age level attending primary classes participated in the study. But in final analysis of data, however, responses of only 311 children were taken into account for the reasons given in the next section (rapport).

3.3.0 Tools Used

Following tests and tools were used for data collection.

3.3.1 Intelligence Test

'Draw-A-Man Test for Indian Children' by Dr. (Mrs.) Pramila Phatak (1966) was administered to the children to determine their intellectual levels. It is a non-verbal test and can be given to five, six... and ten years old Indian children. The sample drawn for standardization of this test was from five levels. City with university education (level I), town with a college (level II), town with a secondary school (level III), village with a full primary school level IV, and village with 4 primary classes
( level V ), were used in working out norms. Separate norms for boys and girls are given. The validity coefficients against Kamat's Test for measuring intelligence of 6 to 8 years Indian children are .51, .51, and .53 respectively. The reliability coefficient of this test with test-retest and inter-scorer agreement methods ranged from .60 to .94. Thus, this test is valid and reliable to an acceptable level for further work, leading to practical use. The scoring of the picture is also demonstrated by illustrating many drawings of children covering 21 points.

Irrespective of merits mentioned above, one important reason for selecting this test was that there were very few group intelligence tests available for this age group. There were some, which required written expression. The children coming for the first time in school were unable to perform those tests. Thus, after trying many tests for a long period, it was selected.

The selected children were seated in a separate room and given with an answer-sheet and a pencil. They were instructed to draw a picture of man (father, brother, uncle) with the pencil on given answer sheets. There was
no time limit, but it lasted 20 - 25 minutes. The pictures drawn by the children were scored on 21 scoring points as explained in manual. Scores obtained by children were utilized in assessing the intellectual level. The mean, and SD, were calculated for each age group and their levels were decided, $(-1 \sigma \text{ Low Intelligence, } +1 \sigma \text{ High Intelligence }$ $\pm 1 \sigma \text{ Average Intelligence})$. The scoring done by the investigator was randomly checked by his supervisor. (Proforma for answersheet and scoring sheet is given in Appendix I, and II).

3.3.2 Socio-Economic Status Scale

Socio-economic status scale by Udai Pareek and G. Trivedi was used to assess the socio-economic status of children. This scale was selected due to reason as it is prepared for rural people. The reliability of the scale by test-retest method is .87 whereas the inter-judge reliability of the scale is very high (.93). Content, concurrent and construct validity is also well determined by authors. Items in scale are related with nine variables that is caste, occupation, education, social participation, land, house, farm power, material possession, and family. Income variable is excluded in scale on which generally people's responses are not true due to many reasons. Every variable is further divided
in categories which carries different weightage. Caste categories are also given in manual. Looking to the high reliability and validity of the scale it was preferred.

Information for socio-economic status was collected by contacting the parents, class teachers, heads of the family and students. To collect the information on all the nine variables of the study, queries were made in Hindi, or regional language. The scoring was done as given in the manual. For determining children's SES levels (High, Average, and Low), the Mean and SD of scores on scale of all 311 cases were calculated. The children getting scores within $\pm 1 \sigma$ were considered of Average SES, while children getting scores above $+1 \sigma$ were designated of High SES and the children secured below $-1 \sigma$ were included in Low SES. The details of the variables and weightage to each are given in Appendix III.

3.3.3 Classificatory Ability Test

Classificatory Ability Test was developed by the investigator during his M.Ed. For the construction of the test, many books and experts were consulted. Inhelder and Piaget (1964) have given a large number of experiments for
each classificatory ability. The material used by them was flowers, pictures, solid and liquid objects, animals, seeds, toys and other things. The same material was not used in the construction of the test to avoid cultural influences. It was thought that Indian children might not be familiar with material used by Piaget. To make the test culture free, tasks involving geometrical blocks were developed but it was kept in mind that the logical content of the classes remained same. As the test was mainly constructed for primary school children, the use of wooden geometrical blocks was felt appropriate because figures like square, circle and triangle are included in their syllabus too. The colours of the blocks were usually red, blue, green and yellow and blocks were usually triangle, square and circle. The construction of each of the eleven classification tasks was decided according to Kofsky (1966). Constructed tasks were tried out on 100 children of Ajmer and Jaipur city of Rajasthan State by the investigator and it was found suitable. Names of the tasks, materials, content and questions were same as taken by Kofsky except Resemblance Sorting Task which was replaced by Piaget (1964) task as Kofsky task did not work for children.
The reliability of the test was determined by test re-test method. The reliability coefficient calculated was .73. The content validity was established with the help of three experts in the field. This test was worked out on 100 Rajasthani children and gave good results. The details of the administration procedure, task construction and questions for each task are given below.

Steps followed by the investigator to find out the classificatory ability of the subjects were as follows.

3.3.4 Rapport

Headmasters and headmistresses were requested to provide a quiet place where children could be interviewed individually. The interview was conducted in a separate room.

Subject was sitted at a table directly opposite to the experimentef and was told that he was going to play a game with him / her. The subject was allowed to handle the wooden blocks, play with them and asked questions if he/she wanted before the actual experiment started. Some subjects who had no knowledge of different geometrical figures which formed the testing material of this study, were drilled for geometrical figures and colour identification. For example, 'This is a triangle', 'This is a square' etc. Shy subjects and who did not answer three consecutive questions were dropped from the study. Selected children were asked to show their choice from red, blue, green and yellow colours.
3.3.5 Clinical Method

Clinical method was adopted because this method is flexible and provides a general framework for questioning the child rather than a set of standardized forms. The basic aims of the method was to follow the child's thought without deforming it by suggestions, or by imposing the investigators views on the child. One important feature was that the experimenter tried to adopt the language of the child and kept the level of questions accessible to the child. Terms beyond his / her reach were avoided and replaced as much as possible by those which the child had spontaneously emitted. The examiner usually began by asking non-directive questions.

3.3.6 Task Description and Administration

Tasks were developed that required students to demonstrate their understanding of each of the eleven classificatory operations by correctly manipulating a set of geometrical blocks. The blocks were one inch thick and had a plane surface of approximately four square inches in area. The plane surface were either square, circular or triangular, and the colours of the blocks were usually blue, red, green and yellow. The labels employed
by students in describing the colours and shapes during the initial screening device were subsequently used by the experimenter to describe the blocks throughout the regular testing session. During the testing procedure each of the 11 tasks was administered in a random order to individual students to control the effect of learning.

Each subject was seen individually and questioned on each of the classificatory ability. The testing sessions lasted approximately one half to three-fourths of an hour. In order to avoid fatigue the youngest children were seen individually for two 20 minute sessions. The rest of the subjects were questioned individually in one session. Taskwise responses were noted down by the investigator and later scored by him. Most of the children were convergent with Hindi hence they were questioned in Hindi language. Children not convergent with Hindi were questioned in regional language. The details of record sheets used for writing the answers of each child for each task is given in Appendix IV. Scoring criteria and weightage to each response is mentioned in Appendix V. Hindi version of questions and task is given in Appendix VI. A detailed description of the tasks is given below and arrangement of blocks for each task is illustrated in figure one to eleven. The academic achievement scores were collected from examination registers of schools which included the marks of monthly, half yearly and yearly examinations.
(1) Resemblance Sorting (RS):

All the blocks of different shape, size and colour were spread on the table before the subject. Three different sets of blocks were constructed by the E. There were; one blue square and one red triangle, in first set. A red square and a red triangle in second, and two red triangles, one small and another large in size in third set. E asked the subject to construct same set by choosing the blocks from table and asked the reasons for selecting those.

A successful sorter constructed any two sets completely and stated reasons.

(2) Consisting Sorting (CS):

A mixed array of blocks consisting of two red, one green, one blue, and one brown triangle; a red, a yellow, a blue, and a green square; and a red a yellow, and a blue circle was presented to subject, who was to place together some things that were alike and to explain the reason for his grouping. Subject who grouped just two objects were encouraged to find more things that were alike.

Consistent classifiers selected three or more objects which were alike in some perceptual feature.
ARRANGEMENT OF BLOCKS IN RESEMBLANCE SORTING
CLASSIFICATION TASK

SET I

SET II

SET III

Figure - 1
BLOCKS USED IN CONSISTENT SORTING TASK

Figure 2
3. **Exhaustive Sorting (ES):**

A collection of blocks, including a red and a blue circle, one green and two blue squares, two red and two green triangles, were shown to student. He was to choose a block and put it in a box along with all the others that were 'like it'. After the first box was filled the procedure was repeated with the remaining blocks until all the blocks had been chosen.

In an exhaustive sort, Ss consistently used an attribute to select the contents of each box and filled the box with all the blocks that processed the criterial attribute.

4. **Conservation (CON):**

A group of nine triangles, each of a different colour, was placed on a paper plate and labeled with a nonsense syllable name, MEF, selected from the Glaze list (Hilgard, 1951, p. 544) of three letter combinations eliciting minimal associations. The subject was asked if all the blocks were still called MEF's under three conditions: (a) after the blocks were removed from the plate and scattered on the table; (b) after subject constructed a pattern with the triangles and one block was removed.
BLOCKS USED IN EXHAUSTIVE SORTING TASK

Figure 3
BLOCKS USED IN CONSERVATION TASK

"MEF"

"WUB"

Figure - 4.
from the pattern; (c) if investigator should take a block home. The last two questions were also asked about the specific block that was removed. The procedure was then repeated with a group of nonsense shapes called WUB's.

A successful subject asserted consistently that MEF's and WUB's retained their identity despite all the changes because each block possessed some attribute that made it a WUB or MEF. For example, 'It's still a MEF because it's a triangle too.' An acceptable alternative explanation mentioned a condition under which, class membership is invariant such as 'A MEF is a MEF wherever it is.'

5. Multiple Class Membership (MM):

A set of triangles varying in size (large as well as small) and colour red or green was placed in front of subject. The plane surface of the small triangles measured 4 square inches in area and the large ones were approximately 9 square inches in area. The large triangles were either red or green, but all the small ones were red. The object of the task was to determine whether any of the blocks
BLOCKS USED IN MULTIPLE CLASS MEMBERSHIP TASK

Figure - 5
could be placed in more than one category. The experimenter asked:

(a) This is a bag full of red things. Do all of the small things belong in the bag with the reds? Why?
   (Yes, all the small blocks are red).
(b) This is a bag for triangles. Do the greens belong in the bag? Why?
   (Yes, the green are triangles).
(c) Do the reds go in the bag for triangles? Why?
   (Yes, all the reds are triangles).
(d) This is a bag for small blocks. Do the greens belong in it? Why?
   (No, the greens are all large).

The order of questions was varied for each subject. Successful performance entailed three correct responses. Acceptable answers for this and other tasks each appears in parentheses.

6. Horizontal Reclassification (HR):

The eight wooden blocks to be sorted included pairs of reds. Yellows, greens and blues. One of each colour
BLOCKS USED IN HORIZONTAL RECLASSIFICATION TASK

Figure - 6
was triangle and the other a square. Each subject was (a) to sort all the objects that were alike into classes, (b) to sort a different way, and (c) to explain each complete grouping.

To pass the test, subject was required to sort the blocks into groups in which (a) all the blocks were alike in some respect, and (b) all the objects possessing the criterial attribute were included in the group. Subsequently subject change his criteria for sorting to produce a new arrangement which conformed to the above requirements. In other words, one time he sorted completely by colour and another time by shape.

7. Hierarchical Classification (VC):

In this task there were seven triangles, four of which were red and the rest blue, which were arranged in two parallel rows. Each row contained both reds and blues. The investigator said 'All of these are called MEF's (Points to each) but only some are TOV's. What are MEF's? Which are the TOV's?' The child points to the MEFs and TOVs and explains his action to TOV, like MEF, was selected from the Glaze list of nonsense syllable eliciting few associations.
ARRANGEMENT OF BLOCKS IN HIERARCHICAL CLASSIFICATION TASK

Figure - 7
To classify correctly, subject had to define MEF's interns of some attribute shared by all the members of the group (such as 'triangle'). TOV's were defined by an attribute shared by one part of the group but not the entire group (such as 'Blue').

8. 'Some' and 'All' (S.A.):

There were nine blocks differing in colour and shape. Among the six blue figures were two triangles and four squares. The three red figures were all triangles. In Inhelder and Piaget's (1959) notation, a superordinate class is called B, its subclasses A and A', with A the larger of the two sub classes. The class of blue figures (B) contained four squares (A) and two triangles (A'). The class of triangles (B) contained three reds (A) and two blues (A'). Each S had to determine whether the members of the superordinate class (B) were all members of one subordinate class (A), and the converse, if all the A's belong to B. The order of question varied randomly among the Ss. As in order tasks, the categories of blocks were mixed so that the subdivisions were not readily apparent to subjects. First subject were asked to find the reds, blues, triangles and squares. Then investigator asked:
ARRANGEMENT OF BLOCKS IN 'SOME' AND 'ALL'

TASK

Figure - 8
(a) Are all of the reds (A) triangles (B)?
    Why? (Yes, every red is a triangle).

(b) Are all the triangles (B) red (A)? Why?
    (No, some triangles are blue).

(c) Are all the squares (A) blue (B)? Why?
    (Yes, every square is blue).

(d) Are all of the blues (B) squares (A)? Why?
    (No, there are some blue triangles.)

Three correct responses were necessary for passing.

9. Whole is the Sum of Its Parts (A + A'):

Two blue wooden squares were mixed in among a half-dozen red ones. The experimenter asked.

Are all of these squares? Are the red ones square?
Are the blue square?

I am going to tell you a story. Seeta and Ram wanted to build a very high tower using all these (investigator demonstrated). Seeta said they could make the highest tower if they took all the red; and all the blue blocks and put them together. Ram said they could make the tallest house if they put all the squares together. Who was right? Seeta? Ram? Both? (Both, since the reds and blues are all squares.)

If you put the reds and blues together would there be more of them, or more squares, or as many reds and
BLOCKS USED IN WHOLE IS THE SUM OF ITS PARTS

TASK

Figure 9
BLOCKS USED IN CONSERVATION OF HIERARCHY TASK

Figure 10
blues as squares? (There are as many reds and blues as square since the red and blue are squares). Two correct answers were required for passing.

10. Conservation of Hierarchy (B - A):

The same arrangement of blocks as in the preceding task was used. The opening question was also the same. Then investigator asked,

'If I took away all the reds, are there just blues left, just squares left, or both blues and squares? Why? (Both blues and squares since the remaining blocks are all blue and square). If I took away all the reds, would there be more blues or more squares left or as many blues as squares? (Since all the remaining blocks are blue and square, there are as many blues as squares left.)

Again, two correct answers were needed for success.

11. Inclusion (B A):

The arrangement and kind of blocks were the same as in the some and all task. However, in this task the children had to compare the number of objects in different classes by answering the following questions:
ARRANGEMENT OF BLOCKS IN INCLUSION TASK

Figure - 11
(a) Are there more blues (B) or Squares (A)?
Count them (More blues, since there are six blues and four squares).

(b) Are there more reds (A) or triangles (B)?
Count them (More triangles, since there are five triangles and three reds).

(c) Are there more triangles or blues? Count them.
(More blues, since there are five triangles and six blues).

The order of the question varied, and sometimes the subclass name was stated first. Sometimes, the superordinate.
Two correct responses were required for passing.

3.4.0 Variables

A total of 37 variables were considered in the present study. Out of 37 variables, following 5 were independent and following 32 were dependent variables.

(A) Independent Variables: (5)

(1) Sex (2) Socio-Economic Status Category (High, Average and Low), (3) Intellectual levels (High, Average and Low), (4) Age (Six, Seven, Eight, Nine and Ten years), (5) Standard (I, II, III, IV and V).

(B) Dependent Variables: (32)

Scores on: (1) Resemblance sorting (2) Consistency Sorting, (3) Exhaustive Sorting, (4) Conservation,

3.5.0 Statistical Analysis

The data collected were systematically tabulated and following statistical analysis was carried out with the help of computer centre, Physical Research Laboratory, Ahmedabad. The analysis done was as follows:

Univariate
(1) Variate Frequency Distribution of all the 37 variables.

(2) Intercorrelation Matrix, Mean, SDs of all the 32 dependent variables.
(3) 't' test (Significance of difference between the means of all the 32 dependent variables.

(4) Factor analysis of all the eleven classificatory abilities by principal component method:

(A) Inter-correlation Matrix

(B) Rotated factors

(C) Varimax Factors.