CHAPTER III
Chapter III

3.0 METHODOLOGY

The present chapter deals with research methodology and the tools and techniques. It also presents the details of the sample used for the investigation.

3.1 SAMPLE

The total no. of subjects in the sample was 180. It consisted of both males and females in the age group 6 to 12 years from the schools in Guwahati city. In the first round 300 male and female children between the age of 6 to 12 years were selected from different types of schools like public schools, govt schools and municipal schools. The children were chosen from three Socio-economic status groups by administering socio-economic scale by Kuppuswamy. Next, 60 subjects were chosen from each SES group so that in each group there were equal no. of male and female children. Hence, the sample had 60 subjects from low SES, 60 from middle SES and 60 from higher SES. Out of 180 subjects, 90 were male and 90 were females.

Since the age group taken for this study was from 6 to 12 years, there may be differences in the cognitive development of the children between 6 or 7 years and 11 or 12 years. Hence, the sample was divided in three age groups as follows:

...
1. **Age group 6 to 8 years.**

2. **Age group 8 to 10 years.**

3. **Age group 10 to 12 years**

Diagrammatically, the sample can be shown as follows:

**Age group 6 to 8 years.**

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\          \          \          
L(SES)20   M(SES)20   H(SES)20
\----------\----------\----------
MALES  FEMALES  MALES  FEMALES  MALES  FEMALES
  10      10      10      10      10      10
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**Age group 8 to 10 years.**

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\-----------\-----------\-----------
\          \          \          
L(SES)20   M(SES)20   H(SES)20
\----------\----------\----------
MALES  FEMALES  MALES  FEMALES  MALES  FEMALES
  10      10      10      10      10      10
```

**Age group 10 to 12 years.**

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\-----------\-----------\-----------
\          \          \          
L(SES)20   M(SES)20   H(SES)20
\----------\----------\----------
MALES  FEMALES  MALES  FEMALES  MALES  FEMALES
  10      10      10      10      10      10
```
3.2 SELECTION OF TOOLS:

In order to study the cognitive development a choice has to be made from the vast amount of cognitive tasks available. These tasks are based on various researches done in the field of cognitive development. In this present investigation only one of the stages suggested by Piaget is taken for the study, that is, the stage of concrete operations. The investigator has selected only those tasks which were based on Piagetian model for this stage (concrete operational stage).

3.2.1 Selection Of Piagetian Tasks:

It was rather difficult in the first place to choose some appropriate task from the vast range of the Piagetian experimentation. The tasks chosen for this study are taken from the following publications:

2. The Growth of Logical Thinking from Childhood To Adolescence (Inhelder and Piaget 1958).
In the above publications, Piaget and Inhelder have studied the thought of young children extensively. In Piaget's view, there are certain general features that characterise early ways of thinking. A child's immediate perceptual experience is more convincing to him than his awareness that the objects appearance would differ after some hypothetical transformations. The aspect of conservation of the young child shows clearly in his lack of the notion of conservation of quantity. The child's confusion over apparent volume shows clearly in an experiment where the same quantity of water is poured into different shaped glasses. The child thought that the quantity of water is changed with the change in the shape of the glass. Similarly, Piaget studied the conservation of numbers. Other general concepts of the physical world that Piaget and others have studied in children are weight, volume, area and their relationships, time, movement and speed and their inter relatedness, spatial properties of two or three dimensional objects. The general picture emerging from these studies is that a young child's concepts differ from those of the adults in many ways. Piaget believes that adult concepts are the final product of an orderly progression through several versions and re-versions of earlier forms of concepts.

Flavell (1963) makes some comments regarding the book "The Growth of Logical Thinking From Childhood to Adolescence". He says that this book contains a thorough theoretical analysis
of concrete operations and formal operations and their relationship. Further, while discussing studies on logical thinking. Flavell comments that these studies were designed specifically to uncover the origins of classification and seriation from early to middle childhood. This book utilises the logical models to describe the mental strategies of the children between 7 to 11 years. It examines the evolution of seriation and classification in children. The book suggests that the origin of classification and seriation are to be found in sensory motor schemata and their origins can be traced before the evolution of language and symbolic representation. Perhaps the most interesting researches are reported in the first four chapters of this book. The first experiment is of free classification where the child is given some assorted objects (geometric forms, cut-outs of people and animals, plants and the like) and told to put those objects together which are similar or go together. The second experiment deals with the child's understanding of relation between class and sub-class.

A further aspect of classification is that of multiple classification. They appear more complex than the previous additive classification but are mastered at the same time. The author of the above mentioned book finally investigates the operations of seriation and multiple seriation.
The experiments chosen from this book for the present study are of classification, multiple classification, discrimination, seriation and multiple seriation. These tasks are given to all three age groups to keep the uniformity. However, the time limit given for completion of the task is different for different age groups.

Tasks For Classification And Multiple Classification:

Another reasoning skill present in only rudimentary form in the young pre-operational child is the ability to classify to put objects, events or whatever into groups and to use these groups consistently, but all theorists and researchers agree that there is a major change in a child's thinking and the way of learning somewhere between age 5 and 7. This time, according to Piaget, the child reaches the stage of concrete operations. This stage is characterised by mental actions of complex sorts like addition, subtraction, classification, putting things in serial order, relating one thing to another and so forth. All these operations are reversible, that is the child cannot only add, he or she can also subtract and understands that subtraction is the reverse of addition. The task chosen for classification, multiple classification and their scoring are as follows:
Scoring

Since all tasks are given to all the three groups, the level of difficulty is maintained through a time limit. The smaller children were given more time to complete the particular task as compared to older children who were given less time. Four levels of difficulty were constructed for each task and the level at which the child could perform that task was his level. In order to subject the data to statistical analysis the numerical value of 1 was associated with level 1, 2 with level 2, 3 with level 3 and 4 with level 4.

Procedure: The children were given these tasks individually. The investigator contacted the teacher and fixed up the timing so that the child could be spared for one hour. The investigator could administer the tasks to two children in a single working day. If the tasks could not be completed in one hour, the same child was taken again the next day. Following cognitive tasks were given to the children.

Task N0.1 (Classification of Beads)

The child was presented with 2 sets of wooden beads, most of which were brown but a few of them were white and red. One set was bigger than the other. The child was asked to classify the beads on the basis of colour and then on the basis
The child was asked the following two questions:

1. Are there more big beads than wooden beads?
2. Are there more brown beads than wooden beads?

The responses of the child were noted in the following way:

LEVEL 1:

The child is unable to classify the beads on any one dimension.

LEVEL 2:

The child could classify them on both the dimensions, that is, on the basis of colour and size.

LEVEL 3:

The child could not say that all beads are wooden only and the question whether there are more wooden beads than brown beads does not arise.

LEVEL 4:

The child could complete the task and could also reply to questions satisfactorily.

Task NO. II

The child is given twenty objects of which 8 represent fruits and vegetables (4 each) made of clay and 12 represent artificial flowers. Eight of these are roses, four being red and
the rest of four other colours. The child is asked to classify according to the objects that go well together. The time limit varied between 5 to 10 minutes. The child was asked the following questions:

1. If I ask you to make a bouquet with red roses only, will you use this rose (pointing towards the yellow rose)?

2. Does this red rose belong to all these roses (pointing towards different coloured roses)?

3. Does this white rose belong to these (pointing towards red roses)?

4. Do these fruits and vegetables belong to the same category as these flowers? Explain.

Scoring:

LEVEL I: The child is able to classify different objects into three categories i.e. fruits, vegetables and flowers.

LEVEL II: The child successfully answers questions about class inclusion, that is, able to differentiate between red roses and roses of other colours.

LEVEL III: The child is able to answer that fruits and vegetables cannot be put in the same category as flowers but is not able to give explanations for it.
LEVEL IV: The child is able to answer all the questions correctly and is also able to give explanations for everything. The age group A was given 10 minutes, age group B 8 minutes and age group C 5 minutes.

TASK NO. III (MULTIPLE CLASSIFICATION):

The child was presented with 32 cardboard pieces which included four different figures (circles, triangles, squares and half circles) in two different sizes big and small. He was asked to classify them as he thinks is correct. The older children were given 10 minutes and the younger children were given 05 to 15 minutes.

SCORING:

The classification was judged at the following levels. Age group A was given 15 minutes, age group B was given 10 minutes and age group C was given 5 minutes.

LEVEL I: The child groupings which were not based on similarity at all (fig.1.0).
LEVEL II : The child can group the objects based on similarity on one dimension (size, fig.1.1).

LEVEL III : The child can group the objects completely based on the complete similarity on one dimension, e.g. shape (fig.1.2).

LEVEL IV : The child can group the objects based on complete similarity on the dimensions, say shape and size (fig.1.3).

Task NO. IV : Discrimination:

For this task the child was presented with two dimensional blocks. The blocks were placed in disarray upon the table in front of the subjects and then the child was asked to find the smallest block and the largest block. The child was blindfolded and the smallest element was hidden in such a way that it appeared bigger. The child's blindfold was then removed and he was asked to find the smallest object. When the child
responded, he/she was blindfolded again. This time the largest element was hidden in such a way that it appeared smaller. The blindfold was then removed and the child was asked to find the largest block. The responses were noted at four levels. The time limit varied from 5 minutes to 10 minutes.

**SCORING:**

**LEVEL I:** The child could find the smallest elements only when they were not camouflaged.

**LEVEL II:** The child could find both the smallest and the largest element only when they were not camouflaged.

**LEVEL III:** The child could give correct response for the above two and also found the smallest block when it was hidden in such a way that it appeared bigger.

**LEVEL IV:** The child could give correct responses to the above three levels and found the largest elements when it was hidden in such a way that it appeared smaller.

The age group A was given 10 minutes, age group B was given 8 minutes and the age group C was given 5 minutes.
TASKS FOR SERIATION AND MULTIPLE SERIATION:

Another problem which a concrete operational child can perform is the problem of arranging objects in a serial order. Since numbers represent a serial order, it is clear that until a child understands about serial systems, he won't be able to understand or use numbers either.

A related concept, which a child usually grasps during this same period, is the concept of transitivity. Transitivity describes one of the relationships that exists within a serial order. The following tasks for seriation and multiple seriation were given, and the child's responses were noted on a 4-level scale. In order to subject the data to statistical analysis, numerical value of 1 was associated with level 1, 2 with level 2, 3 with level 3, and 4 with level 4. The time limit ranged from 5 to 10 minutes. Younger children got more time than older children.

TASK NO. V:

The child was presented with a set of eight two-dimensional sticks varying in thickness and length. The child was asked to place them as he wished. The smaller sticks were less thick than the longer sticks. The child's response was judged in the following manner. The time limit for group A was 15 minutes, for group B 10 minutes and for group C 8 minutes.
LEVEL I: The child could only place the sticks in a haphazard manner (fig. 2.0).

LEVEL II: The child could only segregate the smaller sticks or where the difference in length and width was quite apparent (fig. 2.1).

LEVEL III: The child could place the smallest stick at one end and the largest stick at the other end but the sticks which were placed in the middle were not in a serial order (fig. 2.2).

LEVEL IV: The child could complete the experiment in the required time, i.e. he could seriate the sticks according to their length as well as their width (fig. 2.3).
TASK NO. VI: Multiple Seriation:

The child is presented with 49 drawings of ducks cut out of cardboard. These ducks were different in size and colour intensity. The drawings were ordered in seven sizes and seven colours ranging from light turquoise to dark turquoise. The size increased as the colour intensity increased. The child was asked to seriate them as he wished. The response of the child were noted down in the following manner. The time limit for age group A was 10 minutes, for age group B 8 minutes and for age group C 5 minutes.

LEVEL I: The child could make a row of drawings which were either small or large in size or he/she could only differentiate between the lightest and the darkest colour.

LEVEL II: The child could seriate according to one criteria only (either size or colour) and neglected the other. If he is told about one criterion, he forgets about the other criteria.

LEVEL III: The child could seriate the pieces according to both the criteria (size and colour) only after he was prompted in between by the experimenter.

LEVEL IV: The child could seriate the pieces according to the criteria and was able to give adequate explanation for doing so.
3.2.2 SELECTION OF TOOLS TO STUDY THE FAMILY ATMOSPHERE AND CHILD REARING PATTERNS:

To study the child’s family atmosphere and the child rearing patterns used by his parents, the investigator used the following tools, viz. -


The above mentioned tools were chosen for the following reasons:

a) They are standardised tools and are suited to Indian conditions.

b) They have been constructed recently, in 1989 and 1990.

c) F.C.S. covers 10 very important dimensions of parental influence and family climate in general as perceived by the child.

d) There are 90 statements in F.C.S. and therefore, each dimension is fully represented.

e) M.H.E.I. covers the physical environment of the
child which is a very important aspect of the child's family environment.

f) M.H.E.I. covers areas of child rearing patterns employed by the parents besides giving information about a child's home environment.

3. Questionnaire to study child rearing patterns developed by the investigator to study those dimensions of child rearing patterns which are not covered by the above mentioned tools.

Details And The Procedure Of The Tools Used:

Family Climate Scale By Dr. Beena Shah:

In this scale family climate means an interpersonal relationship between the parents and the child. It includes parent's attitudes towards the child as perceived by him in the 10 dimensions. The 10 dimensions are as follows:

1. Restrictiveness vs freedom.
2. Indulgence vs Avoidance.
3. Partiality vs Fairness.
4. Attention vs Negligence.
5. Acceptance vs Rejection.
6. Warmth vs Coldness.
7. Trust vs Distrust.
8. Dominance vs Submissiveness.
9. Expectation vs Hopelessness.
10. Open communication vs Controlled communication.

Procedure:

The statements in the scale are in Hindi so the investigator translated them into English and Assamese. The scale was administered in a group to the children between ages 8 to 10 years. For age group 6 to 8 years the scale was administered individually. The investigator took help of the teacher in explaining each item to the small children. The children's response were then ticked by the investigator. There is no time limit for this test.

The investigator translated the items into English and Assamese as the sample consisted of children from English as well as Assamese medium schools.

Scoring:

There is a three point scale working for negative statements, 0, 1, 2 for always, sometimes and never respectively whereas for positive statements it was 2, 1, 0. Total score speaks of the "favourable family climate" whereas "negative total score" indicates "unfavourable family climate" of the child.
Mohite Home Environment Inventory:

The assessment of a child's home environment is very important. The home environment which includes physical environment also gives information about a child's family atmosphere and also about the child training methods used by the family members in bringing up a child.

At present, many instruments for measuring environmental process exist in the west; the most widely used is probably Caldwell's Home Observation for measurement of the environment (Home for infants and pre-schools). No such tests are available in India and therefore this inventory was developed by Prema Mohite. This tool can be used in homes with low levels of stimulation and thereby also identify children who are likely to develop learning difficulties. For the purpose of assessing the home environment, observations as a method has many advantages. One of the main advantages is that it gives a true picture of everyday activities at home. The present inventory was chosen mainly for its informative value regarding child rearing practices adopted by the parents.

Description Of The Items:

These are 24 items which try to observe the levels of stimulation which a child is receiving in the following areas:
1. Language stimulation.
2. Physical environment.
3. Encouragement of social security.
4. Variety of stimulation.
5. Maternal attitude and disciplining.

As may be evident, all the above five areas are indicative of child rearing practices besides giving an assessment of the home environment also.

PROCEDURE:

This inventory can be given to children from grades 1 to 4 belonging to any socio-economic level. The procedure involves observations made at the home of the subjects; hence the investigator visited the homes of all the subjects twice within a span of six months. The two visits to the homes were necessary as for observation technique establishment of a good rapport is essential. The investigator also sent a word through the teacher to the child's home so that parents co-operate easily. During the two visits the child was observed for one hour along with the mother or with the main care-taker of the child.

SCORING:

Each item is marked present or absent and gets a score of 1 or 0 respectively. The total score is obtained by simple summation. The total score indicates the following levels of stimulation:
0-10, poor.lacking.
11-19, moderate.
20-24, high.

QUESTIONNAIRE FOR MEASURING CHILD REARING PATTERNS:

The above scales used for measuring family atmosphere (family climate scale, Mohite home environment inventory) also give us some information about the child rearing patterns followed by the subjects' parents. However, these tools do not cover all areas of child rearing. The areas of feeding and general care have been found to be quite important in child development. In order to cover these dimensions and also to study other related dimensions, a need for a different scale for measuring child rearing patterns was felt. Hence the investigator developed a questionnaire for measuring child rearing patterns. The items in the questionnaire were constructed in such a way that they gave an idea of child training on the basis of three methods: that is, authoritarian, permissive, and democratic. The steps followed in the construction of the questionnaire are as follows:

1. Step I - The investigator first prepared a questionnaire of 60 items covering the following dimensions:

   a. Weaning / Feeding.
   b. Father’s participation.
   c. General care.
d. Moral and religious training.

2. Step II - The items were shown to five judges in the field of education and psychology. Their suggestions were noted down. Most of the judges suggested deletion of some items which they thought were either repetitious or were irrelevant. Two judges suggested adding one more dimension viz. discipline.

Step III - The suggestions given by the judges were followed and a fresh questionnaire containing 30 items was prepared. The questionnaire was shown to the judges again and they all agreed unanimously that all the items in the questionnaire were relevant.

Procedure:

The questionnaire was given to the mother or the person in charge of the child's upbringing. They were asked to fill up the questionnaire. The investigator gave the assurance to the person filling up the questionnaire that their identity will not be disclosed to any body. The investigator also requested them to answer all the questions truthfully. The questionnaire was administered at the time of the investigator's home visits of the subjects.
STEP IV:

SCORING:

For scoring purposes the investigator constructed a 3 point scale for three responses: Always, Sometimes, and Never. After consulting the judges, for positive statements: Always is given a score of 3, Sometimes 2, and Never 1. For negative statements: Always is 1, Sometimes 2, and Never 3.
3.3 DESIGN OF THE STUDY:

As shown earlier in this chapter the sample was divided into three age groups. The statistical analysis was done separately for all the age groups.

A factorial design (3×2×2) for the study was employed with three levels of socio-economic status (low, medium, high), two levels of sex (male and female) and two levels of family climate (positive and negative). The dependent variable was cognitive development. The factors were as follows:

1. Socio-economic status, low/medium/high
2. Sex, male/female
3. Family climate, positive/negative

Scores obtained were interpreted by applying the technique of two way analysis of variance. The main effects and interactional effects are as follows:

<table>
<thead>
<tr>
<th>Main effects</th>
<th>df</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sources</td>
<td></td>
</tr>
<tr>
<td>Socio-economic(3)</td>
<td>(3-1)=2.</td>
</tr>
<tr>
<td>Sex(2)</td>
<td>(2-1)=1.</td>
</tr>
<tr>
<td>Family climate(2)</td>
<td>(2-1)=1.</td>
</tr>
<tr>
<td>Inter-action effects</td>
<td></td>
</tr>
<tr>
<td>SES x sex</td>
<td>(3-1)(2-1)=2.</td>
</tr>
</tbody>
</table>
One way analysis of variance was employed to study the home environment and the training methods employed by the parents. The factorial design involved three levels of home environment (high, moderate, poor). The dependent variable was cognitive development.

The data was further treated for regression to see the impact of home environment (child rearing pattern) on cognitive tasks and also the combined impact of home environment and family climate on cognitive scores of the subjects. The variables are as follows:

Variable I  Cognitive scores (dependent variable).
Variable II  Family climate (independent variable).
Variable III  Home environment (independent variable).

The interpretation of the results of the questionnaire prepared by the investigator was done more on qualitative basis as this questionnaire is an addition to the standardised scale and inventory used earlier.

First the subjects in each age group were divided into
two further groups. Group one consisted of subjects having high cognitive scores and group two consisted of subjects having low cognitive scores. Those subjects who had cognitive task score of 60% or above of the total score (obtained earlier by administration of cognitive tasks) were put in group one (having high cognitive scores) and the rest were put in group two (having low cognitive scores). The questionnaire had statements covering five dimensions of child-rearing practices. The means for each dimension for the subjects in group one (both male and female) and group two was calculated and tabulated. The higher means on different dimensions indicated a more democratic way of child-rearing employed by parents while lower means on different dimensions indicated authoritarian way of bringing up.