METHODS OF INVESTIGATION

The present study attempts to find out the role of playschools with regard to the behavioural profile, creativity, problem solving ability and social cognition of preschoolers.

In the view of Walker (1985), methodology should specify methods, but only in order to justify their use for defined purpose in specified situations and circumstances. According to Kothari (1996) research methodology not only talks of research methods, but also considers the logic behind the methods being used in the context of the research study and explain the reason for using a particular method or technique and for not using others so that research results are capable of being evaluated either by the researcher himself or others.

3.1 Nature of study

The present study is basically a comparative and correlational study. Bajpai (1985) states comparative method as a scientific method in which comparative data are collected with specific purpose; analysed and specific conclusions are derived from the results.

In this study comparison of

a. preschoolers b. preschool boys c. preschool girls

who had attended and those who had not attended playschool is done with regard to the study variables - behavioural profile, creativity, problem solving ability and social cognition.
Comparison of
(i) study variables based on gender and
(ii) SES of the sample is also found out.

For the present study interrelationship among study variables is also analysed. Correlation brings out the relationship between two or more paired variables or two or more sets of the data. The degree of relationship is measured and represented by the coefficient of correlation, as per Best and Khan (1994).

Matrix of correlation and multiple regression analysis were employed to study the relationship connecting various aspects in each study variable.

3.2 Design of study

The methods used to test the hypotheses in connection with the present study are discussed under six sections namely (1) the sample (2) the tools (3) description of the tools (4) pilot study (5) data collection/main study procedure and (6) statistical technique.

3.2.1 The sample

The sample chosen for the present investigation consists of preschoolers of age group four years and who were in lower kindergarten. Preschoolers who had attended and those who had not attended playschool were selected. As the present investigation aimed at finding the role of playschools with regard to certain specific areas of development, it was decided to focus attention on children who were in
lower kindergarten, as the influence of playschool will be more pronounced on them.

The validity of any field of study will be based on the sampling technique used for the purpose. The nursery schools were selected using the technique of purposive sampling. As Wilkinson and Bhandarker (1994) remark, the basic assumption behind purposive sampling is that with the exercise of good judgement and appropriate strategy one can handpick the cases to be included in the sample and thus develop samples that are uniform and satisfactory in relation to one's research needs.

For the present investigation, the investigator needed free access to the nursery schools in order to administer the individual tests for measuring creativity, problem solving ability and social cognition of preschoolers and these tests were time-consuming. So only those nursery schools, which gave permission to conduct these tests, were considered for sample selection.

Sample for investigation was selected from these nursery schools using the technique of random sampling. In this method every member of the population has equal chance of being selected and the selection of any individual does not influence the selection of any other as viewed by Potti (1991) and that random sampling can be done by two methods (a) lottery method (b) from the table of random numbers. For the present investigation the lottery method was used.

All children from the lower kindergarten of the selected nursery schools were given a general questionnaire, which was to be filled by their parents. This questionnaire was used to get some relevant
information regarding the children, as whether they had attended playschool and also to get some background information regarding the children. After analysing the filled in questionnaire, children were grouped into two: those who had attended playschool and those who had not attended playschool. The number of boys and girls coming under each category was noted. Their names were written on a slip of paper of identical size and shape and random sampling was done by blindfold selection from each category so that an equal number of boys and girls were selected from each category from the different nursery schools coming under Kochi Corporation.

**Table: 3.1 Distribution of the sample**

<table>
<thead>
<tr>
<th>Name of schools</th>
<th>Number of children</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Attended playschool</td>
<td>Not attended</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Boys</td>
<td>Girls</td>
<td>Total</td>
<td>Boys</td>
</tr>
<tr>
<td>---------------------------------------------------------</td>
<td>------</td>
<td>-------</td>
<td>-------</td>
<td>------</td>
</tr>
<tr>
<td>A.C.S. English Medium School, Kaloor</td>
<td>15</td>
<td>15</td>
<td>30</td>
<td>15</td>
</tr>
<tr>
<td>St. Antony's Convent Nursery, Kacheripady</td>
<td>20</td>
<td>20</td>
<td>40</td>
<td>20</td>
</tr>
<tr>
<td>St. Martin's Nursery School, Palarivattom</td>
<td>15</td>
<td>15</td>
<td>30</td>
<td>15</td>
</tr>
<tr>
<td>St. Teresa's Home Science Nursery School, Ernakulam</td>
<td>10</td>
<td>10</td>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td>St. Teresa's Nursery School, Ernakulam</td>
<td>15</td>
<td>15</td>
<td>30</td>
<td>15</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>75</td>
<td>75</td>
<td>150</td>
<td>75</td>
</tr>
</tbody>
</table>

The total sample size comprised 300 preschoolers of whom 150 who had attended playschool and the remaining 150 who had not attended playschool. An equal number of boys and girls - 75 each were
selected from the two different groups, namely, those who had attended and those who had not attended playschool. The table (3.1) shows clearly the sample distribution. From all five schools an equal number of boys and girls were selected from each category.

Age and general curriculum were the factors that the investigator wanted to keep constant and hence children from lower kindergarten, who had completed four years of age, were selected and the general curriculum was kept constant by selecting nursery schools, which were attached to schools that followed the Kerala State Education Board.

The parents of the selected sample were also included for the present study. They were to fill in the general questionnaire and the parent questionnaire to assess their children’s behavioural profile.

### 3.2.2 The tools

Selection of an appropriate tool is the most important part of conducting a research. The various tools used for the present study are as follows:

The present investigation encompasses the following variables (1) behavioural profile (2) creativity (3) problem solving ability and (4) social cognition and the tools used were:

3.2.2.1 Personality inventory ‘Parent Questionnaire’ of Thomas and Chess (1977) to assess behavioural profile.

3.2.2.2 Verbal and non-verbal tests to measure creativity constructed by the investigator.
3.2.2.3 Tests to measure problem solving ability developed by the investigator.

3.2.2.4 Tests to assess social cognition constructed by the investigator.

3.2.2.5 A general questionnaire to elicit information regarding the socio-economic status, home environment and family background of preschoolers formulated by the investigator.

3.2.2.6 Observation schedule to collect information regarding the playschools developed by the investigator.

3.2.3 Description of tools

'Parent Questionnaire' had been constructed by Thomas and Chess (1977) and had been standardised in Indian condition by Sarah (1991).

From the tools developed by the investigator the tests to assess creativity, problem solving ability and social cognition were standardised details of which are given under pilot study (Section No. 3.2.4).

3.2.3.1 To assess behavioural profile

Thomas and Chess's (1977) personality inventory Parent Questionnaire is used. It is a 72-item scale designed for use with 3-7 year old children. It is a seven-point scale with each item depicting the behavioural pattern of a child in day-to-day situations. It is the upward extension of the original NYLS or New York longitudinal study. It is a temperament scale.
Thomas and Chess (1977) have described nine dimensions of temperamental differences. The nine dimensions of temperamental differences are:

1. *Activity level* - it is the amount of typical movement by the child and the amount of active time spent by the child each day.

2. *Rhythmicity* - denotes predictability or unpredictability of the child’s daily patterns.

3. *Approach withdrawal* - indicates the child’s initial response to a new situation.

4. *Adaptability* - points out how easily the child’s initial response to a new stimulus can be changed.

5. *Threshold of responsiveness* - indicates the intensity level of some stimulus necessary to trigger a response.

6. *Vigour of reaction* - denotes the level of energy of the child’s responses regardless of whether it is positive or negative.

7. *Quality of mood* - is the amount of a pleasant, joyful and friendly behaviour in contrast with unpleasant, unfriendly behaviour.

8. *Distractibility* - denotes the degree to which the child’s behaviour can be interfered with or altered by an outside event.

9. *Persistence and attention span* - indicates how the child pursues any one activity even in the face of obstacles.
Table: 3.2 Categorisation of the nine dimensions of behavioural profile done by Indulekha (1977)

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Dimensions</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Rhythmicity</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Adaptability</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Approach withdrawal</td>
<td>Reaction pattern</td>
</tr>
<tr>
<td>4.</td>
<td>Quality of mood</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Attention span and persistence</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Distractibility</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Activity level</td>
<td>Intensity of reaction</td>
</tr>
<tr>
<td>8.</td>
<td>Threshold of responsiveness</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Vigour of reaction</td>
<td></td>
</tr>
</tbody>
</table>

The nine dimensions of behavioural profile were grouped into two categories by Indulekha as seen in table (3.2) and the same pattern is followed in the present study.

The question numbers and the number of questions from the Parent Questionnaire coming under each category are given in detail in vide appendix (I).

3.2.3.1.a Scoring pattern

The parent questionnaire consists of 72 questions. Each question is scored on a 7-point rating scale - the alternatives being - hardly ever, infrequently, once in a while, sometimes, often, very often or almost always. The maximum score a child can get is 504 and the minimum score is 72. Parents had to encircle the alternative that is best suited for their child. Accordingly scores were awarded to the children.
The positive and negative behaviour pattern is to be considered while scoring. For a positive behaviour almost always gets 7 and hardly ever 1 and the vice-versa is true for the negative behaviour.

For reaction pattern

- Maximum score - 322
- Minimum score - 46

Higher value for more positive behaviour.

For intensity of reaction

- Maximum score - 182
- Minimum score - 26

The higher the value, the more intense the reaction.

3.2.3.2 To assess creativity

3.2.3.2.i Test development

Guilford (1967) has noted that an essential operation for creativity is divergent thinking - the fluent generation of a wide variety of alternatives as reflected in the question. Divergent thinking is more in preschool children compared with the other age group (Guilford 1967); keeping this in mind for the present study, the investigator developed both verbal and non-verbal tests of creative thinking, which were basically aimed at getting divergent responses.

The verbal and non-verbal tests of creativity and the scoring pattern for the present investigation were based on the guidelines given by Tripathi (1969) on how to test creativity. The investigator also had discussion with the experts in this field. The investigator scanned
standard tests of creativity-Guilford (1967) and Torrance (1962) before the construction of the tool which was then subjected to pilot study as discussed in section (3.2.4). The final tool to measure creativity with its major sections and subsections are as follows:

Tests to assess creativity

- **Verbal tests**
  - Uses of balls
  - Things that make noise
  - Things that move on wheels

- **Non-verbal tests**
  - Closed figures
  - Open figures

### 3.2.3.2.a Verbal tests of creativity

Verbal tests are so designed as to get as many responses as possible from children. The responses are to be obtained for the following test items.

1. the uses of balls
2. the things that make noise
3. the things that move on wheels.

**Method of administration**

Children are individually to be called and questions are to be asked one at a time. The subject is free to suggest as many responses as possible while answering the questions. Children are to be given 5 minutes for responding to each question. The total time required to
administer the verbal test of creativity is 15 minutes. The responses given by children are to be noted down by the investigator for scoring.

Scoring pattern

Scores are determined on the basis of the responses given by each subject for fluency, flexibility and originality- the three elements of creativity.

Fluency is assessed on the basis of the number of responses children give. The total score a child gets for fluency depends on the total number of responses offered by the child.

Flexibility score is determined by the number of different categories of ideas relevant to the task given by the child. For example- in the case of uses of balls if the responses given by the child fall in one category; example all related to play (to play football, catch and throw game, hockey, cricket) then the child gets only one score; whereas if responses are like (catch and throw game, to study shape, size, colour, close a round hole, cricket, etc.) then the child gets a score of 5; as responses fall under 5 categories. Thus the total score for flexibility depends on the number of category of responses a child has made; for each category the child gets one score.

Originality is determined by unusual responses. A score of one is awarded for each novel/unique response. If the responses given by the child fall under a common category of responses then the score is zero for originality.
The responses given by less than 5% of the sample is to be considered as original response by Mehdi (1985). The same method was used by the investigator to identify the original response for the present study.

There is no maximum score for fluency, flexibility and originality of responses.

3.2.3.2.b Non-verbal tests of creativity

The non-verbal test of creativity comprises both open and closed figures (vide appendix II.a and II.b). On the whole there are 6 test items - three each for open and closed figure tests. The open figures comprise a few lines and curves, details of which are shown in (vide appendix II.a). The closed figures consist of a circle, triangle and a rectangle (vide appendix II.b). All the 6 figures are drawn on separate pieces of white paper of size 25 x 30 centimetre.

Method of administration

Children are to be called individually and one test is to be administered at a time. Crayons are to be provided. The time fixed was 4 minutes minimum and 10 minutes maximum for each test. The subjects are to be given the instructions in a uniform manner to complete the test and to make as many drawings as possible. Children are to be given as many figures as they demand for completion.

Scoring pattern

Scores are to be awarded for fluency, flexibility and originality on the basis of their performance in non-verbal tests of creativity.
Fluency is to be scored depending upon the number of drawings made by children. For each drawing a child gets a score of one.

Flexibility score is determined by the number of categories of ideas expressed by the children through their drawings. The drawings made by children are classified, based upon the ideas expressed by children. Each category will fetch the child one score each.

For originality scoring is done based on the uniqueness and novelty of the drawing/ performance. For each original response one score is awarded.

The responses given by less than 5% of the sample are considered original Mehdi (1985). This criterion was used in the present investigation to find out novel/original responses/drawings. As there were only few responses which came in this category one point was awarded to each response and no graded scoring was done.

There is no maximum score for fluency, flexibility and originality.

3.2.3.3  Test to assess problem solving ability

3.2.3.3.i  Test development

The areas that were to be included and the scoring pattern for the test of problem solving ability were decided after relevant literature survey and discussion with psychologists. The investigator had also kept in mind the suggestions given by Helms and Turner (1981), Fisher (1990) while constructing the tests to assess problem solving ability. The tool
was constructed and subjected to pilot study, but no changes were made (Section 3.2.4).

The tests to measure problem solving ability includes memory tests, test to measure the physical concept of the human body, test to measure concept of shape using shape sorter and puzzles.

3.2.3.3.a Memory test

Tool

Memory test consists of a set of five items, which are familiar to the child, namely - rubber, pen, pencil, chocolate and scale (vide appendix III.a).

Method of administration

The items for memory test are to be displayed on a white cardboard. The children are to be called individually. They are to be asked to observe these items for 4 minutes and to say what they are. After 3 minutes he/she is asked to recall these items. The investigator has to note down children's response.

Scoring pattern

For each correct recall one score is to be awarded to the child. Thus a child can get a maximum score of 5, if he/she could recall all the five items shown to him/her correctly. The minimum score for the test is zero.
3.2.3.3.b Test to measure the physical concept of the human body

**Tool**

The test item chosen is a cut-out of the human body made of wood. The head, hands and legs are detachable, children have to assemble these detachable body parts in their correct position (vide appendix III.b).

**Method of administration**

The test item (detached parts of the human body) is kept on a table and individually children are to be called. Then they are to be told to assemble the parts of the human body in their correct positions. Each child is to be given 5-8 minutes. Based on the child’s ability to assemble the body parts, scores are to be given.

**Scoring pattern**

Children secure one point for each correct assembling. Thus a child can get a maximum score of 5 and the minimum score is zero.

3.2.3.3.c Test to measure the concept of shape - Using shape sorter

**Tool**

Shape sorter is a wooden cubic box. The bottom part is sealed (vide appendix III.c) The top part has an opening; through which one can take all the blocks that fall inside. One side is closed and on its remaining three sides are inscribed nine different shapes. Wooden blocks of these specific shapes are provided which the children have to fix correctly. The shape sorter operates on lock and key principle. The shape inscribed on the shape sorter varies from simple to complex ones.
Method of administration

Children are to be called individually, then they are to be asked to insert the blocks in the correct position. Children are to be given the task in increasing order of complexity. Each child is to be given 10 minutes to complete the task.

Scoring pattern

Each correct insertion fetches the child a score of one. A child can get a maximum score of 9 and the minimum score is zero.

3.2.3.3.d. Test using puzzle

Tool

To test the concept of shape, coloured square blocks, are to be used. Three different patterns of increasing complexities are to be made using the blocks provided to them (vide appendix III.d).

Method of administration

Children are to be called individually and are to be shown one pattern at a time; which they have to make with the coloured blocks provided to them. Children are given a total of 24 minutes (8 minutes per test) for completion. The first pattern was to be made by the two blocks provided to them, the second pattern by the four blocks provided to them and the third pattern by the 9 blocks provided to them.
Scoring pattern

The score a child gets depends upon his/her performance on the test. A child gets one score each, for making correctly each side of the puzzle including the pattern and colour as shown in the puzzle provided to them. Thus for completing the pattern $\triangle$, the child gets a score of 3, for the pattern $\diamondsuit$, the child gets a score of 4 and for completing the pattern $\Box$ he/she gets a score of 4. The maximum score that can be obtained is 11 and the minimum is zero.

3.2.3.4. Test development for social cognition

As there was no standardised test available, the investigator developed a test for social cognition based on the views of Selman (1980), Feldman (1989) and Craig (1996).

3.2.3.4.a. Preliminary processing

Pooling of items

It consists of two processes (a) a series of informal talks with preschool children (b) drawing information from available literature.

Twenty preschoolers from lower kindergarten, 10 boys and 10 girls, were chosen for discussion in order to know the areas which had to be included for the test. The information available through the literature survey and the suggestions given by experts were also considered in order to decide the areas that were to be included in the test for social cognition. Children were asked to describe their father, mother, teacher, themselves, their best friend and their siblings.
3.2.3.4.b. Scoring pattern

Each response fetches the child a score of one. No score was given when the child failed to respond.

3.2.3.4.c. Secondary processing

During preliminary processing, the areas that had to be included in order to test social cognition were decided. As children could not describe their best friend and also their siblings, these two areas were excluded. Then these 20 preschoolers were asked to describe their father, mother, teacher and also themselves. The attributes/description, which they gave through their response were noted down. Then the test for social cognition was administered for pilot study (section 3.2.4) and a general response pattern (vide appendix IV) for each question was formulated.

3.2.3.4.d Reshaped test for social cognition

After secondary processing the areas to be included to test social cognition and scoring pattern were decided. The areas are to test children’s concept of their father, mother, teacher and of themselves.

Method of administration

Children are to be called individually and after developing good rapport with them, they are to be asked one question at a time. First they are to be asked to describe their mother, then their father, their teacher and lastly themselves. Their responses are to be noted down. For the children who are hesitant to respond to the same type of prompting (do you know your mother’s name?) is to be given. Each test takes 10 minutes.
Scoring pattern

For each description/response the child makes, he/she will get a score of one. The maximum score a child could secure for describing his father and teacher is 10. For describing their mother and themselves the maximum score is 11 (if the children could give more information then their score would increase). The minimum score for the test is zero.

3.2.3.5 General questionnaire

The questionnaire consists of items to elicit personal information of the respondents as name, age, sex, school and home address, type of family, birth order, whether mother is employed or whether the child was sent to playschool, description of playschool, type of their residence. It also reveals information regarding the socio-economic variables like father’s and mother’s education, father’s and mother’s occupation and their average income from all sources (vide appendix V.a).

Scoring

In this investigation, the measure for the socio-economic status variable of children is obtained by adding the scores awarded to father’s and mother’s education, father’s and mother’s occupation and the average monthly income from all sources. The socio-economic variables like father’s and mother’s education and occupation are scored based on the guidelines given by Srivastava (1978). There are eight categories of items which relate to parental education. The item of occupation relates to the primary occupation of the parent and there are seven categories of items within the variable. The scores are allotted to each category of items of parental
education and occupation. The scoring of the variables is detailed in (vide appendix V.b) and the average monthly income is scored on the basis of the classification of income groups by National Council of Applied Economic Research (1994).

3.2.3.6 Observation schedule for collecting information regarding playschools

An observation schedule was constructed by the investigator (vide appendix VI). It consists of questions related to the following aspects:

- Physical facilities
- Outdoor space
- Indoor space
- Bathroom facilities
- Storage space
- Equipment and materials
- Daily programme

3.2.4 Pilot study

A pilot study was undertaken immediately after formulating the tools for the present investigation. The pilot study was conducted on 50 preschoolers of whom 25 who had attended playschools and the remaining 25 who had not attended playschools, in order to find out the applicability of the formulated tools. For non-verbal creativity test one modification had to be made. As children could not elaborate their drawings, the dimension elaboration was not measured. So also
preschoolers could not give the title for the drawings they made and so titles were excluded from the analysis.

General questionnaire was also subjected to pilot study to find out whether parents could answer it properly but no test-retest reliability was found out.

Observation schedule and parent questionnaire to elicit behavioural profile were not tested during pilot study.

Test-retest method was used for finding out the reliability of all the tools (test to measure creativity, problem solving ability and social cognition) except the parent questionnaire to assess the behavioural profile as it had already been standardized. Test-retest was conducted after a time span of three months.

The reliability coefficients for the tests constructed are presented in the following table.

**Table: 3.3 Reliability coefficients**

<table>
<thead>
<tr>
<th>Tests</th>
<th>Method</th>
<th>Coefficients obtained</th>
<th>Level of significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verbal creativity tests</td>
<td>Test - retest</td>
<td>0.828622</td>
<td>0.01</td>
</tr>
<tr>
<td>Non-verbal creativity tests</td>
<td>Test - retest</td>
<td>0.788313</td>
<td>0.01</td>
</tr>
<tr>
<td>Problem solving ability test</td>
<td>Test - retest</td>
<td>0.967535</td>
<td>0.01</td>
</tr>
<tr>
<td>Test for social cognition 1) Father</td>
<td>Test - retest</td>
<td>0.743480</td>
<td>0.01</td>
</tr>
<tr>
<td>2) Mother</td>
<td>Test - retest</td>
<td>0.846820</td>
<td>0.01</td>
</tr>
<tr>
<td>3) Teacher</td>
<td>Test - retest</td>
<td>0.7016711</td>
<td>0.01</td>
</tr>
<tr>
<td>4) Themselves</td>
<td>Test - retest</td>
<td>0.8629321</td>
<td>0.01</td>
</tr>
</tbody>
</table>
The reliability of the parent questionnaire - the temperamental scale to measure children’s personality in Indian settings (Kochi) was analysed and was already established. The split half reliability of the questionnaire was done and Spearman Brown prophecy formula was calculated. The correlation obtained was very high ($r=0.91$) (Sarah 1991).

A study of table (3.3) indicates that reliability coefficients for all the tests constructed are significant of 0.01 level. From this it is clear that all the tests used are highly reliable.

Validity

Face validity was taken into account in the present investigation.

3.2.5 Data collection procedure

Main study

After establishing the reliability and validity for the tools the main study was conducted. Since the results of pilot study confirm test reliability and meet the criteria of face validity the same tests were replicated for the main study.

The preliminary step included getting permission of the nursery school authorities for carrying out the investigation. The authorities of the schools were contacted, permission obtained and the time was fixed to conduct the investigation in each nursery school. A general questionnaire to elicit background information of the children was distributed to all children from lower kindergarten of the selected nursery schools and the names of children who had attended and those
who had not attended playschool was noted down from the filled-in questionnaire. Each nursery school had different sections, children were selected from all these different sections in a proportionate manner, by the technique of random sampling and good rapport was established with the selected children. After sample selection ‘parent questionnaire’ of Thomas and Chess (1977) was put in an envelope and distributed through the children to their parents. Either father or mother was asked to fill in the questionnaire, but mostly mothers filled it in. The filled-in questionnaires were collected back after 4-5 days.

The nursery schools were visited for the second time in order to administer the various tests. As all the tests were individual tests it was decided to conduct them in a separate room outside their class. For this purpose all necessary arrangements were done and children were called individually and the tests were administered in the following order.

1. Memory test.
2. Test to measure the physical concept of the human body.
3. Test to measure concept of shape using shape sorter.
4. Verbal test of creativity.
5. Non-verbal test of creativity.
6. Test for social cognition.

After completion of administration of one category of tests to the entire sample (the number of days required to complete the test varied depending on the number of children selected from each school) the next category of test was administered.
Memory test was administered first as it was a comparatively easier test and all the test items were familiar to the children. The test items were displayed on a white cardboard and the children were allowed to see and handle these things for four minutes. After three minutes they were asked to recall the things they had seen. The investigator had to note down all that the children recalled and scores were awarded appropriately.

Test to measure the physical concept of the human body was administered after conducting the memory test. Human body parts made of wood were given for assembling correctly. A time span of 5-8 minutes was given to complete the test, scores were awarded based on children’s ability to assemble parts of the body correctly.

The test to measure the concept of shape using shape sorter and puzzle were given next. Children had to insert the shape correctly for the test using shape sorter. Ten minutes were given to complete the task and each successful insertion fetched the child one score. For the next test the pattern that was shown in the puzzle had to be made by the children. 24 minutes were given to complete the task. Each correct completion would fetch the child one score.

The verbal test of creativity was administered following the test using puzzle. The three questions that came under the verbal tests were administered one at a time. Based upon the response given by children, scoring was done for fluency, flexibility and originality. Fifteen minutes were given for test completion.
The non-verbal tests of creativity were administered next. Children were first given the closed figures and were asked to develop them into the figures of their imagination. The open figures were then given and the same instructions were given. 10 minutes (maximum) were given for each figure completion. Scores were awarded for the children’s fluency, flexibility and originality of their performance.

Lastly the test for social cognition was administered. The children were asked to describe/talk about their mother, father, teacher and finally about themselves and 10 minutes were given per test. Their responses were noted down and scoring was done based upon the responses given by children. The playschools children had attended was evaluated using the observation schedule developed by the investigator.

The investigator had to visit the nursery schools a number of times to collect the data to administer the tests. Thus the main study was undertaken and it was completed before the end of that academic year.

3.2.6 Statistical technique

The data collected were compiled and analysed statistically. The important statistical techniques used in the present investigation to facilitate the analysis and interpretation of data are

1. ‘t’ test
2. ANOVA
3. Correlation
4. Multiple regression
‘t’ test was used for comparing the scores obtained for preschoolers who had attended and those who had not attended playschool for the four study variables - behavioural profile (the nine dimensions and two categories), creativity, problem solving ability and social cognition. The formula used for calculation of ‘t’ is

\[ t = \frac{|\bar{x}_1 - \bar{x}_2|}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} \]

having degrees of freedom \( n_1 + n_2 - 2 \) and they are presented in tables (4.1-4.18)

Multiple regression and matrix of correlation analysis were employed to study the relationship connecting various aspects in each study variable. The significance of the fitted regression was tested using ANOVA technique and they are presented in tables (4.19-4.48). Results obtained for correlation are presented in tables (4.49-4.55). The formula employed for calculation of Pearson’s coefficient of correlation was

\[ r = \frac{\Sigma (x-\bar{x})(y-\bar{y})}{n \sigma_x \sigma_y} \]

The form of the multiple regression fitted to the data was

\[ Y = b_0 + b_1 x_1 + b_2 x_2 + \ldots + b_k x_k \]

Where \( Y \) is the total score (constant) and \( x_1, x_2, \ldots \) and \( x_k \) are the aspects for the children (predictor variable) who had attended and those who had not attended playschool.

The results are presented in the following chapter.