The purpose of this chapter is to discuss the methodology used for data collection. Thus, this part of research discusses study design details, the method and the techniques used and data analysis techniques. The present study was conducted on preschool teachers and children. This section consists of following:

3.1 Hypothesis
3.2 Operational definition
3.3 The Sample
3.4 Tools for Data Collection
3.5 Procedure for Data Collection
3.6 Data Analysis

3.1 Hypothesis

A hypothesis is the obligatory starting point of all experimental reasoning. Without it, no investigation would be possible, and one would learn nothing: one would only pile up barren observations. To experiment without a preconceived idea is to wander aimlessly (Claude Bernard, 1965). Based on the objectives of the study, the following hypotheses were framed to execute the study:

3.1.1 There is no significant difference in the level of knowledge of MIT from pre test to post test between preschool teachers of experimental and control group
3.1.2 There is no significant difference between pretest and posttest level of knowledge of MIT in experimental group of teachers
3.1.3 There is no significant difference between pretest and posttest MI preferences in experimental group of teachers
3.1.4 There is no significant difference between the age and the level of knowledge and preferences of MI of preschool teachers
3.1.5 There is no significant difference between the educational qualification and the level of knowledge and preferences of MI of preschool teachers
3.1.6 There is no significant difference between work experience and the level of knowledge and preferences of MI of preschool teachers
3.1.7 There is no significant difference between the marital status and the level of knowledge and preferences of MI of preschool teachers
3.1.8 There is no significant difference between the religion and the level of knowledge and preferences of MI of preschool teachers
3.1.9 There is no significant gender difference of MI in preschool children

3.2 Operational Definition

**MI preferences**: Multiple intelligences preferences are patterns of intelligences teachers use most in the classroom to carry out the activities or tasks.

**MI activity**: At least three intelligences mainly involved to accomplish classroom activities by children are described as MI activity.

**Preschool teachers**: Refers to the teachers that are involved in preschool setting.

**Preschool children**: Children in the age group of 3 to 4 years are considered as preschool children.

**Additional qualification**: Additional qualification is the qualification related to early childhood education.

**Intervention programme**: It refers to the three workshops designed for the preschool teachers to impart knowledge, practices and assessment techniques based on multiple intelligences theory.

3.2 The Sample

3.2.1 Sampling Method

A pre-post intervention trial along with a control group has been undertaken. The sampling technique used was “Purposive Sampling”. The ICSE schools, which were willing to be part of this program and provided the required sample size, were selected.

3.2.2 Sampling Size

The participants of the study were preschool teachers and 3 to 4 year old preschool children. The total sample size (Refer Figure 3.1) for the study was 100 preschool teachers. Teachers observed 364 children on a rating scale and the researcher observed 460 children as per time sampling method.
3.3 Tools for Data Collection

3.3.1 The Tools

The tools used for data collection were a questionnaire, rating scales and an observation schedule.

Questionnaire for teachers on MI awareness

The questionnaire was designed to acquire information about the teachers’ awareness on the concept of multiple intelligences. The questionnaire was divided into four parts:

1. Personal profile of teachers (Refer Appendix A, section I), which included Name, Age, Educational Qualification, Marital Status, Religion, Number of years of work experience. (6 items)

2. General awareness (Refer Appendix A, section II) on Multiple Intelligences (6 items) which were multiple choice with one correct answer, which was scored as follows:
   - Correct answer: 1
   - Incorrect answer: 0

3. Awareness of all eight intelligences (10 items). Subjects were also asked to answer ten ‘yes’ or ‘no’ type questions in item number one (Refer Appendix A, section III).
   - Yes: 1
   - No: 0

   Multiple-choice questions from item number two to item number nine had three correct answers. Each item was scored as follows:
   - All three correct: 3
   - Two correct: 2
   - One correct: 1
   - None correct: 0

   Item ten had only one correct answer, which was scored as follows:
   - Correct answer: 1
   - Incorrect answer: 0
*Equal number of male and female children were selected in the age group of 3-4 yrs
4. Multiple Intelligences Activity Grid (10 items). Subjects were asked to tick mark at least three main intelligences involved in each activity (Refer Appendix A, section IV). Each item was scored as follows:

- Three intelligences: 3
- Two intelligences: 2
- One intelligences: 1
- None correct: 0

**Rating Scales**

**Rating Scale for Multiple Intelligences Preferences of teachers:**

This scale was designed to find out intelligences preferred by the teachers for the execution of activities or tasks. A 5-point rating scale (Refer Appendix A, section V) was used which consisted of 32 items, which was further divided into following subsections:

- Interpersonal (4 items)
- Intrapersonal (4 items)
- Verbal/Linguistic (4 items)
- Visual/Spatial (4 items)
- Naturalistic (4 items)
- Musical/Rhythmic (4 items)
- Logical/Mathematical (4 items)
- Bodily/Kinesthetic (4 items)

The options on the rating scale ranged from Always to Never. Negative statements were not included in the scale. The rating scale was scored as follows:

- Always: 5
- Very Often: 4
- Sometimes: 3
- Rarely: 2
- Never: 1
Observation rating scale for preschool children on multiple intelligences:
Teachers recorded the multiple intelligences of preschool children on this scale. A 5-point rating scale (Refer Appendix B) was used, which consisted of 49 items, which was further divided into following subsections:

- Musical/Rhythmic (6 items)
- Bodily/Kinesthetic (6 items)
- Verbal/Linguistic (6 items)
- Logical/Mathematical (6 items)
- Visual/Spatial (7 items)
- Interpersonal (6 items)
- Intrapersonal (6 items)
- Naturalistic (6 items)

The options on the rating scale ranged from Always to Never. Negative statements were not included in the scale. The rating scale was scored as follows:

- Always: 5
- Very Often: 4
- Sometimes: 3
- Rarely: 2
- Never: 1

Time sampling observation Schedule for preschool children on multiple intelligences
Time sampling method was used to observe preschool children (Refer Appendix C). Children were observed for seven and a half minutes for an interval of 30 seconds. This checklist consisted of 63 items, which studied the type of intelligences children use in the classroom while performing a task. It was further divided into following subsections:

- Musical/Rhythmic (8 items)
- Bodily/Kinesthetic (8 items)
- Verbal/Linguistic (8 items)
- Logical/Mathematical (8 items)
- Visual/Spatial (7 items)
- Interpersonal (8 items)
Methodology

- Intrapersonal (8 items)
- Naturalistic (8 items)

### 3.3.2 Validation of the Tool

The tools were carefully designed to measure required information. Three experts in the field of Human Development and Early Childhood Education validated the tools. Their suggestions were incorporated and required changes were made in the tool.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name</th>
<th>Designation and Contact details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Ms. Sudha Chhikara</td>
<td><strong>Professor, KVK Mandkola,</strong> Faridabad-121103, Haryana. Tel: 9910169453</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Educator, VIBGYOR High</strong> Motilal Nagar-1, Shrirang Sabade Marg, Off Link road, Goregaon (W), Mumbai-400104 Tel: 9930415169</td>
</tr>
<tr>
<td>3.</td>
<td>Ms. Gurpreet Kaur</td>
<td><strong>Educator, UNDP</strong> Raipur, Chattisgarh. <a href="mailto:gurpreetsareen@gmail.com">gurpreetsareen@gmail.com</a></td>
</tr>
</tbody>
</table>

The changes suggested were in scale-2 (MI preferences of teachers), item 3, the statement “I am always involved in the school activities” instead of “I take initiative in school activities.” Item 25- the statement “I believe in recycling things and my work place is preferred place for that” instead of “I try to recycle things around me.”

**Pilot study**

After completion of the suggested changes, the tools were pilot tested on 10 preschool teachers and 10 preschool children (5 male and 5 female) who were randomly selected from an English medium school from a western suburb in Mumbai on 31st July’ 09, Thursday.
3.3.3 Factor analysis of tools
Construct validity of tools was established through factor analysis. Factor analysis uncovered the underlying constructs that explained the relationship between the observed variables. Scale-2 and Scale-3 (MI preferences of teachers and MI assessment of preschool children) were assigned for the factor analysis.

Table 3.1 Factor analysis of MI preferences for teachers

<table>
<thead>
<tr>
<th>Factors</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eigenvalues</td>
<td>3.23</td>
<td>2.55</td>
<td>2.34</td>
<td>2.10</td>
<td>1.91</td>
<td>1.81</td>
<td>1.68</td>
<td>1.57</td>
</tr>
<tr>
<td>% of Variance</td>
<td>10.09</td>
<td>7.97</td>
<td>7.31</td>
<td>6.57</td>
<td>5.98</td>
<td>5.67</td>
<td>5.25</td>
<td>4.91</td>
</tr>
<tr>
<td>Cumulative %</td>
<td>10.09</td>
<td>18.06</td>
<td>25.37</td>
<td>31.95</td>
<td>37.93</td>
<td>43.61</td>
<td>48.87</td>
<td>53.78</td>
</tr>
</tbody>
</table>


Table 3.1 explained the extraction of eight factors, which had Eigenvalues more than 1.0. These first eight factors accounted for 53.78% (Refer Appendix D, section I) of variance in the 32 MI preferences items.

Table 3.2 Factor Analysis of rating scale for preschool children on MI

<table>
<thead>
<tr>
<th>Factors</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eigenvalues</td>
<td>8.95</td>
<td>4.09</td>
<td>3.94</td>
<td>3.17</td>
<td>2.70</td>
<td>2.66</td>
<td>1.97</td>
<td>1.95</td>
</tr>
<tr>
<td>% of Variance</td>
<td>18.27</td>
<td>8.36</td>
<td>8.04</td>
<td>6.47</td>
<td>5.52</td>
<td>5.43</td>
<td>4.02</td>
<td>3.98</td>
</tr>
<tr>
<td>Cumulative %</td>
<td>18.27</td>
<td>26.64</td>
<td>34.68</td>
<td>41.15</td>
<td>46.68</td>
<td>52.11</td>
<td>56.13</td>
<td>60.11</td>
</tr>
</tbody>
</table>


Table 3.2 demonstrated that the first eight factors extracted, had Eigenvalues more than 1.0. These first eight factors accounted for 60.11% (Refer Appendix D, section II) of variance in the 49 items of MI assessment in children.
3.3.4 Reliability of tool

Table 3.3 Reliability coefficients of the scales

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Scale</th>
<th>Cronbach's Alpha</th>
<th>Split-half Spearman-Brown formula</th>
<th>Split-half Guttman's formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Questionnaire for teachers on MI awareness</td>
<td>.92</td>
<td>.96</td>
<td>.93</td>
</tr>
<tr>
<td>2</td>
<td>Rating Scale for MI Preferences of teachers</td>
<td>.77</td>
<td>.70</td>
<td>.70</td>
</tr>
<tr>
<td>3</td>
<td>Rating Scale for MI assessment of preschool children</td>
<td>.95</td>
<td>.91</td>
<td>.90</td>
</tr>
</tbody>
</table>

Table 3.3 illustrated the reliability of the tools. It was obtained by the internal consistency, which indicated intercorrelation among the scale items. Cronbach's Alpha, Split-half technique for reliability like Spearman-Brown and Guttman formulae were used to calculate reliability. All formulae showed similar pattern with Cronbach's alpha i.e. all three formulae revealed high reliability. Nunnally (1978) has suggested that the score reliability of .70 or better is acceptable when used in basic research. Scale-1 and scale-3 (Questionnaire for teachers on MI awareness and Rating Scale for MI assessment of preschool children) indicated high reliability, that is .92 and .95 respectively, while scale-2 (Rating Scale for MI Preferences of teachers) demonstrated moderate reliability of .770 (Cronbach's Alpha).

3.3.5 The Training Module

The training module was developed in order to upgrade understanding about knowledge, practices, and assessment of preschool children with regard to MIT. In order to prepare the training module, the researcher reviewed the previous literature on MIT and the resources used in training. In addition, studies related to the MIT and the preparations of
training programs were reviewed. The training module (Appendix E) consisted of three domains: (1) Theoretical background of MIT, which further included detailed information about all intelligences and common characteristics among preschool children based on MI; (2) Classroom practices, which illustrated how to design lesson plans based on MIT and enriching existing classroom practices to include children with distinct profiles; (3) Assessment strategies, that included portfolio, and performance based assessment with traditional method of assessment. The module was also presented to educators who specialized in related the fields for validation.

3.4 Procedure for Data Collection
This work was undertaken with real-world constraints, especially institutional settings that were not always supportive. Despite such constraints, the study considered here helped increase the under-served researchers' access to more challenging work. The procedure for data collection commenced with the identification of schools where the researcher wished to carry out the study (Refer Figure 3.2). The study was executed in the schools with a similar locality to have a homogenous group with respect to school infrastructure, ICSE school board, and exposure to information and knowledge; factors that can have confounding effect on the results. Eight schools were approached for the permission to conduct the study, out of which four schools granted approval. All the information related to the study were explained to concerned authority i.e. the topic, the objectives, the sample size needed for the study and the dates for the workshop and classroom observation and the duration. They were also assured of data confidentiality. Baseline data of 103 preschool teachers was obtained, out of which three preschool teachers could not complete the posttest data, and so were eliminated from the study. A total 100 teachers were part of this research. Four hundred and sixty children of 3-4 years of age were selected from the classrooms of the sample teachers and were observed through the time sampling method. Sample teachers assessed 364 children on a multiple intelligences rating scale.
Figure 3.2 TECHNICAL PLAN OF WORK

Selection of schools

Experimental Group

Observation 1
(To observe the MI usage in the classroom by children)

Pre Test
(To cognize the knowledge of teacher on MI)

Intervention
(Workshop on Knowledge on MI for teachers)

Observation 2
(To see the use of MI by children)

Intervention
(Workshop on Practices based on MI for teachers)

Observation 3
(To see the use of MI by children)

Intervention
(Workshop on assessment techniques based on MI for teachers)

Observation 4
(To see the use of MI by children)

Post test
(To see the knowledge of MI in teachers)

Control Group*

Observation 1
(To observe the MI usage in the classroom by children)

Administration of questionnaire
& rating scale
(To cognize the knowledge of teacher on MI)

Observation 2
(To see the use of MI by children)

Administration of questionnaire
& rating scale
(To see the knowledge of MI in teachers)

* Observations and administration of tools in congruence with the experimental group
Actual data collection began with the classroom observation in all four schools. It was followed by administration of pretest among teachers. The treatment group of teachers were exposed to three workshops (Appendix F) alternated with the observation sessions in between. The control group did not receive any intervention. There were four observations for treatment group of children and two observations for the control group. This was followed by the posttest for teachers in both the groups. Teachers also assessed the children on MI assessment scale prepared by the investigator. The investigator recorded multiple intelligences of children with a self-structured observation schedule.

3.5 Data Analysis

The data obtained was tabulated and coded for further analysis. Reliability of tool was determined through Cronbach’s Alpha, Split-half Spearman-Brown formula and Split-half Guttman’s formula. Factor analysis was used to generate factors from the observed variables with the method of Principal Component Analysis. Further, Rotation Method of Varimax with Kaiser Normalization was used to analyze variance contributed by factors. Percentage was calculated to show the distribution of variables. Arithmetic mean was used as a measure of central tendency. Standard deviation (SD) was used to measure dispersion in variables. Student’s $t$ test was used to test the significant difference between the means of two groups. The paired $t$ test was used to analyze the significant differences between paired observations of a group. The difference was considered significant at $p<0.05$ and $p<0.01$. A one-way analysis of variance (ANOVA) was used to compare means of several populations. Bonferroni’s test was used to determine which mean levels are different when significant difference existed. Observations recorded were also represented in the form of graphs and analyzed qualitatively.