CHAPTER-3

METHODOLOGY
Methodology

3.1: Design of the Study:

The research work was conducted following quasi-experimental design with pre test - post test equivalent group and survey.

3.2. Population:

The population of the study covers the public schools (Government schools or Government Aided Schools) of Kolkata and North 24 Parganas where inclusion of children with various disabilities was undertaken.

3.3 Sample:

Sampling Frame

A list of all primary schools of Kolkata and North 24 Parganas published by District Project Office served as the sampling frame.

Sample and Sampling Procedure

Multistage sampling technique was followed to identify the sample. From the sampling frame schools that have children with mental retardation were identified with the help of the office of District Project Office, Sarva Shikshya Abhiyan.

1.70 children with mild mental retardation were selected from 41 schools (Appendix-3.1) of Kolkata and North 24 Parganas. The age range of the selected children is 7 to 14 years (Table-4.1) and 38 boys and 32 girls (Table-4.2) were in the sample. The children were studying in the grades from 1 to 5 (Table-4.3). The students were divided into two matched group on the basis of their performance on Intelligent Quotient and Social Quotient (Table-4.7).
After assessing intelligence of the students with the help of Binet-Kamat Test of Intelligence and social maturity with the help of Vineland Social Maturity Scale; they were listed in order of merit. The students were then grouped into two by taking all the odd numbers of the list to the experimental group and the even numbers to the control group.

For conformity of matching of groups a suitable statistical test was administered. Before the decision of the test for matching of the groups, the distribution was subjected to normality test. The normality of distribution was decided from Shapiro-Wilk Test due to low sample size. The result indicated that sample was not normally distributed (Table 4.6).

The mean rank and sum rank of two groups were subjected to Mann-Whitney U Test. The result of Mann-Whitney U Test established equivalence of the group (Table-4.8).

2. Teachers who were associated with children in experimental group were selected for responding to the interview questions and to the rating scale to understand their change of perception about children with mild mental retardation after intervention.

3. The special educators of all disciplines who were appointed by SarvaSikshyaAbhiyan in geographic region of research and who also were associated with the sampled subjects were selected for responding to the interview questions to find out their perception about intervention though CAI.
4. The parents of children under experimental group were selected for responding to the interview questions to find out their perception on CAI and its role in inclusive education.

3.4. Tools:

The tools used for the study are listed below:

A. Standardized Tests:

- Binet-Kamat Test of Intelligence. (Indian Adaptation by V.V. Kamat in 1964 and 1967 of Stanford Binet Test of Intelligence 1934)
- Vineland Social Maturity Scale (VSMS) (Edger. A. DOLL 1953, Indian Adaptation by Father A. J. Malini, 1976)
- Grade Level Assessment Device (GLAD) for Children with Learning Difficulties in Schools (Developed and standardized by Narayan, J., National Institute for the Mentally Handicapped, Secunderabad, 1997)

B. Software Programme, Rating Scale and Interview Schedules Developed by the Researcher:

- A software programme for teaching mathematic.
- A parallel test to the grade level assessment device.
- Rating scale and interview schedule for regular teacher teaching the participants.
- Interview schedule for the parents of children with mild mental retardation.
- Interview Schedule for the Special Educators.
3.4.1. Description of the Standardised Tests:

Out of some available tests for assessing intelligence and social maturity of children with mental retardation, Binet-Kamat Test of Intelligence and Vineland Social Maturity Scales are commonly used by many institutions and individual practitioners. The researcher decided to measure intelligence and social maturity with the help of these two tests.

**Binet-Kamat Test of Intelligence:**

**Description:** It is primarily a verbal test of intelligence having a few non-verbal items & prescribes different domain of intelligence such as 1. Language, 2. memory, 3. conceptual thinking, 4. reasoning, 5. numerical reasoning, 6. visuo-motor coordination, and 7. social intelligence. It is being used from 3 years of age till 21 years age of individuals. This test can be conducted in individual sessions for 1 & ½ hours.

**Reliability:** The test-retest reliability is found to be .86 (Kamat, 1967).

**Validity:** The content validity is found to be 0.5 (Kamat, 1967)

**Vineland Social Maturity Scale:**

**Description:**

This measures differential social capacities of an individual from birth to 15 years. This scale has 89 test items which are sequentially arranged to assess the individual’s social maturity.

Reliability: It shows high correlation with Binet- Kamat Test of Intelligence (.76, Bharatraj 1986)

Grade Level Assessment Device for Children with Learning Problem in Schools:

Grade Level Assessment Device was used for conducting pre-test and post-test assessment for recording the students’ performance in mathematics. It covers basic areas of mathematics such as number work, addition, subtraction, multiplication, division, time, money and measurement.

Test-retest reliability –

<table>
<thead>
<tr>
<th>Class</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class I</td>
<td>0.98</td>
</tr>
<tr>
<td>Class II</td>
<td>0.98</td>
</tr>
<tr>
<td>Class III</td>
<td>0.99</td>
</tr>
<tr>
<td>Class IV</td>
<td>0.68</td>
</tr>
</tbody>
</table>
Criterion Validity:

Criterion Group Validity was established for this test and the correlation of the scores obtained for class I is .76, for Class II is 0.86, for Class II is 0.76, and for Class IV is 0.74 showing that the test is valid for respective classes.

Content Validity:

This is established by comparing the respective contents of class I, II, III and IV with the MLL (Minimum Level of Learning) of 1992 and drawn out the percentage content – wise which showed that the contents of GLAD are valid (Narayan, J., 1997)

3.4.2. Development of Tools:

1. Computer Assisted Instruction (CAI)

A software programme was developed by the researcher under the supervision of revered guide to teach mathematics to the children with mild mental retardation.

Description of the Software: This is indigenous software devised on the basis of simple to complex tasks on counting, addition, subtraction, multiplication, division, simple reasoning time and money concepts. The above mentioned areas have been identified from standard one to standard three level text books of school curriculum of West Bengal. This programme has two components in all areas. The first part of this is to help development of the concept and the second part of this is to practice the exercises based on these concept and also development of related concept.
Validity:

Content Validity: Items for content for software package for computer assisted instruction were selected under the guidance of supervisor and recommendation of teachers and special educators. Opinion was sought from four primary teachers teaching Mathematics and three experts from the Department of Education of University of Calcutta. The content validity was determined after inter ratter consistency of the experts (Appendix-3.2).

Reliability: This programme was administered to 30 children with mental retardation in a special school at Bonhooghly, Kolkata and was repeated after a gap of one month. The test-retest reliability was found to be .972 indicating a reliable Computer Assisted Instruction Software Programme.

2. A parallel test to the grade level assessment device:

A parallel test to the Grade Level Assessment Device was developed for the grades one through four. The items were selected from the contents from the text books of West Bengal School Board for the grades one through four. It was finalized after getting expert opinion from faculty from National Institute for the Mentally Handicapped Regional Centre (NIMH-RC), Kolkata and from Department of Education, University of Calcutta

3. Rating Scale for the School Teachers: A five point rating scale was developed to assess perception of the teachers, teaching in schools where the children with mild mental retardation undergone CAI. This scale was administered before and after intervention to find out change of the teachers’
perception towards the children with mental retardation. The rating of the scale is described below:

   a) Almost always: When the teacher observes a behaviour listed in the rating scale more than 75% of time in a day.

   b) Moderately: When a teacher observes a behaviour listed in the rating scale approximately more than 50% but less than 75% of time in a day.

   c) Sometimes: When a teacher observes a behaviour listed in the rating scale approximately more than 25% but less than 50% time in a day.

   d) Rarely: When a teacher observes a behaviour listed in the rating scale approximately less than 25% of time in a day.

   e) Never: When behaviour listed in the rating scale does not occur by the children

They were to respond about the children with mild mental retardation with regards to their general behaviour in classroom, in school, and extent of interaction during classroom instruction. Initially twenty three items were listed but finally ten items were selected.

Validity: The rating scale was validated with the help of experts’ opinion. After listing the items, opinion was sought from five experts (three from the faulty of Dept. of Education and two senior teachers who have been working with children with mental retardation). The content validity was determined on the basis of inter ratter consistency as shown in the Appendix-3.3.
4. **Interview Schedules:**

Separate Interview Schedules with open ended questions for the teachers, special educators, and the parents were used to find the usefulness of the CAI. An interview schedule for the teachers were used to assess their view regarding the usefulness of teaching mathematics through CAI and its usefulness for enhancing inclusion in the regular school. Another Interview schedule was also used to assess the view of the special educators regarding use of CAI in teaching mathematics as well its impact on promotion of inclusive education. A separate Interview Schedule was also used to assess the parents’ observation on their children’s involvement in learning mathematics and its help to their children in being included in the school.

**Validity:** The interview schedules for the teachers, special educators and the parents were validated with the help of experts’ opinion. The content validity was determined on the basis of inter ratter consistency (Appendix-3.4 to Appendix-3.6).

a) An interview schedule was developed to find out the teachers’ perception about the children with mental retardation after teaching mathematics through Computer Assisted Instruction. Fourteen items were identified and experts’ opinions were sought for their opinion. Finally eight items were selected after getting opinion of the experts (Appendix- 3.4).

b) To find out the perception of the special educator on CAI and its impact on inclusive education; an Interview Schedule was developed. Initially,
fifteen nos. of items were listed and experts’ opinions were sought for finalization of the items in the schedule. Finally, eight items were selected after recommendation of the experts. The schedule is described in the Appendix- 3.5

c) Interview Schedule for the Parents initially contained fourteen items and experts’ opinion was sought. Finally, eleven items were selected after recommendation of the experts (Appendix-3.6)

3.5. Procedure:

The tools generated two kinds of data a) quantitative data and b) qualitative data. The effectiveness of computer assisted instruction for teaching mathematics has been analyzed quantitatively. The perception of the teachers, special education teachers, and the parents about its effect of CAI on promotion of inclusive education for the children with mild mental retardation has been analyzed qualitatively. The flow chart bellow will give a glance of process followed for carrying out the study.
Development of a software programme in Bengali and Hindi for teaching mathematics to the children with mild mental retardation

Identification of the children with mild mental retardation through the sampling procedure; forming two equivalent groups

Teaching Mathematics to the Control Group traditionally

Teaching Mathematics to the Experimental Group with CAI

Collection of Data

Analysis of data

Interpretation and conclusion
ii) **Schematic Representation of the Work: Qualitative Part:**

![Diagram]

- **Development of rating scale and interview schedules**
- **Recording the response on rating scale of the regular teachers and on interview schedule of the regular teachers, the parents and the special education teachers who were associated with the children who received the treatment.**
- **Encoding the responses on rating scale and interview schedule of the respondents**
- **Description of their responses**

**a) Preparation for the study:**

After planning and preparation taken for the work, the State Project Director, Paschim Banga Sarva Shiksha Mission (PBSSM) was requested for permission and necessary support for the study in schools located in the geographical area of Kolkata and North 24 Parganas of West Bengal. The State Project Director, PBSSM permitted for the study vide his Memo No. 207/RS-1 (A) /PBSSM/11-12, dated 22-09-2011 with instruction to the district authorities for necessary assistance to the researcher (Appendix-3.7).

Following the permission from the State Project Director, PBSSM; the researcher contacted the District Project Officers of North 24 Paraganas and Kolkata. They were requested for details of the schools that have enrolled children with disabilities and specially children with mental retardation. The
District Project Officer, North Parganas informed The Circle Project Coordinator at Baranagar, Kamarhati, and Kamarhati New Circles vide Letter No. S.18011/1/2011-SSM/5675, dated 10-01-2012 to provide necessary assistance to the researcher (Appendix-3.8). The District Project Officer, Kolkata verbally instructed to the District Coordinator, SarvaShiksha Mission to provide necessary assistance to the researcher. The researcher met the special educators working with the children with various disabilities in North part of Kolkata and South Part of North 24 Parganas to plan the course of study.

The details of the children with disabilities attending to the regular Government Schools obtained from the special educators. The schools that have enrolled children with mental retardation were identified and visited along with the special educators. The headmasters and headmistresses were communicated about the research and their cooperation was sought. The school administrator agreed.

b) Planning for the Study:

❖ Carrying out the Assessment:

After identification of the children with mental retardation with the help of the special educators, the parents were contacted. Informed consent was obtained from all the parents of the children with mental retardation attending to the regular schools. Intelligence and social maturity of all children were found out with the help of Binet-Kamat Test of Intelligence and Vineland Social Maturity Scale.
Distributing the Children into Experimental and Control Group

Children having IQ and SQ indicating Mild Mental Retardation were listed separately from all the children who were assessed. Children with mild mental retardation were enlisted with descending order of IQ an SQ. Among this list experimental group and control group were determined as explained in the sampling procedure at page no. 94-95.

Scheduling Teaching by Computer Assisted Instruction and Traditional Methods

The children in Experimental Group were taught by the researcher with the help of computer though Software Programme developed by the researcher. The children in the control group were taught through traditional methods. All the participants were taught thrice in a week along with their regular peers from January to December 2012 i.e. for the school year 2012.

c) Carrying out the Study and Collection of Data:

The baseline of the participants’ performance on mathematic was assessed with the help of Bengali version of Grade Level Assessment Device for Children with Learning Difficulties, NIMH.

The children in the treatment group were taught seven areas (counting, addition, subtraction, multiplication, division, money and time) of mathematics with the help of Computer Assisted Instruction; whereas the children of the control group were taught in the same areas through traditional methods. The teaching continued for a period of one school year as per schedule. The children in the treatment group were taught the lesson though CAI at the beginning and
followed by working out exercises through the CAI. The participants were taught along with their peers. Sometimes, the school teachers and the headmaster/headmistress were also present as an observer.

After completion of teaching for a period of one school year, the performance of the participants was assessed with the help of a parallel test developed by the researcher. After a gap of one month, the participants’ performance was assessed again by parallel test. General behaviour and interaction of the participants with other children were observed throughout the study.

It is worth to mention that during and after the intervention is over, some headmasters/headmistresses, teachers, and students of sampled schools requested the researcher to continue teaching with the CAI programmes. In many schools, the researcher had to take classes with the programme at the request of the headmasters/headmistresses and the students, after intervention period was over; indicating the worth of the programme. These data, however, not included in the analysis.