CHAPTER III

METHODOLOGY
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3.0 Introduction

This chapter describes the methodology adopted for the study. It consists of the following:
1. Design of the study
2. Sample identification & selection
3. Description of tools for sample selection & treatment
4. Data collection procedures
5. Statistical treatment of data

3.1 Design

The study was conducted in 2 phases. Both phases employed the Pretest - Posttest - Control Group design.

This design involves at least two groups, both of which are formed by random assignment. Both groups are administered a pretest of the dependent variable. The experimental group receives treatment, and subsequently both groups are post tested.

\[ R \ O_1 \ X \ O_2 \ X = \text{Treatment} \]
\[ R \ O_3 \ C \ O_4 \ C = \text{Control} \]

\[ O_1 \ O_2 = \text{Pretest} \quad O_3 \ O_4 = \text{Posttest} \]
\[ O_2 - O_1 = \text{X gain} \quad O_4 - O_3 = \text{gain} \]
The Pretest - Posttest Control Group design is a true experimental design. However, to strengthen the design, following threats to the validity of the experiment were controlled.

**Maturation**

The effect on posttest due to maturation was ruled out due to the factors mentioned below.

a) The sample of student teachers selected for study did not have previous experience of classroom teaching and were enrolled in full time B.Ed course.

b) The sample of mentally handicapped learners was drawn from school that did not practice an AAC method in language training of such students.

c) The gap period between pre and posttest in both phase 1 and 2 was not more than 5-6 weeks.

**Instrumentation**

Since the tools used for posttest were same as those for pretest, the threat to validity from inconsistent instruments was reduced. Moreover, internal consistency of tools was pre-established.

**Statistical Regression**

The sample of student teachers and learners were randomly selected and assigned to the experimental and control groups before the administration of pretest.

**Mortality**

As the duration of the study was within one academic year, experimental mortality was not experienced.
*Experimental Setting*

The study was conducted during the usual school timings (within natural school situation) and practice teaching sessions in order to reduce the reactive effect from experimental setting.

*Testing*

In an experimental design that uses a pretest, the effect of testing on score of posttest poses the strongest threat to the internal validity of the experiment. Similarly, the pretest - treatment interaction can jeopardise the generalisability of the findings. In the present study the following measures reduced the impact of testing.

a) In phase 1 the pre and posttests were done through a 3-point observational schedule of language teaching behaviour. Since the subjects were unaware of the specific items on which the rating was being done the element of pretest sensitisation was excluded.

b) The lack of knowledge about the specific variables under test also prevented the subjects from being alerted to the nature of the treatment.

c) In phase 2 in which the pretest was directly administered, the subjects were learners (between 6 & 12 yrs) with severe to moderate grade of mental retardation. It is known that mentally retarded individuals often perform poorly on non-serial short term memory tasks (Luftig 1987) given a list of words or pictures to recall mentally retarded individuals do not appear to cluster items according to recognisable categories (Jensen & Frederickson 1973). This characteristic of mental retardation reduced the tangible effect of testing on children included in the study.

d) The items included in the pretest (phase 2) did not sensitise or alert the subjects to the nature of treatment (use of AAC system), thus controlling the effect of pre-test treatment interaction.
Extraneous Variables

Even when the subjects of a study are unlikely to know or care that they are participants in an experiment, it may be necessary to utilize a control group (Best 1983). Research with retarded children may result in increased time spent with the experimental group children over the control group children unless a placebo is introduced (Kahn 1978).

The Phase 2 of the study required that experimental group children be given individual instructions by experimental group teachers. In order to assure that group differences were a result of training procedures rather than individual attention, it was seen that control group teachers gave instructions to control group children either in one to one settings or in very small groups.

3.2 Sample Identification & Selection

A sample is a small proportion of a population selected for observation and analysis. By observing the characteristics of the sample, one can make certain inferences about the nature of the population from which it is drawn (Best, 1983).

Given below is an account of sample identification and selection process adopted in the two phases of the study.

3.2.1 Phase 1

Phase 1 involved the student teachers. The sample for the study was drawn from the B.Ed (special education) courses, in Mumbai, that train teachers to work with intellectually handicapped children. This was done in order to equate the subjects on following characteristics.

a) Qualification - all subjects were graduate degree holders.

b) Orientation to disabilities - all subjects were being trained to work with children with intellectual deficits.

c) Socio - geographical milieue - selected subjects belonged to middle class families living in Mumbai.
d) Training - All subjects were receiving pre-service training. Additionally all subjects were females within the age group of 21 - 27 yrs.

The selection process followed the course given below and represented in Table 3.1.

**Stage I:**

The student teachers (N=58) enrolled in the two existing B.Ed (special education) courses in Mumbai were identified.

**Stage II:**

The teachers who were on in-service training or had previous experience of working in a special school were subsequently not considered for study. This process yielded a sample of student teachers (N=48) who had the required common characteristics.

**Stage III:**

The number (N=30) of subjects were randomly drawn from the available sample. These subjects were finally assigned to experimental group (N=15) and control group (N=15) for the purpose of the study.

Table 3.1
Sample Identification and Selection at Phase 1

<table>
<thead>
<tr>
<th>Stage I</th>
<th>Stage II</th>
<th>Stage III</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identification of sample</td>
<td>Sample at pre-service level</td>
<td>Random Selection</td>
</tr>
<tr>
<td>N=58</td>
<td>N=48</td>
<td>N=30</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Assignment of final sample</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Experimental group</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N=15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Control group</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N=15</td>
</tr>
</tbody>
</table>
3.2.2. Phase 2

This phase involved the children with mental handicaps. The sample for the study was drawn from three special schools in Mumbai. The identification process ensured that the children shared following characteristics.

a) Age - the children belonged to the age group of 6-12 yrs.

b) Intelligence - the children had an IQ range of 30 - 49 and were categorised as having severe to moderate grade of mental retardation.

c) Socio - economic status - All children came from low middle class background.

d) Geo - cultural background - The children belonged to Maharashtra and lived in Mumbai.

e) Disability - all children had identified speech and language delay.

A stagewise representation of sample identification and selection is given in Table 3.2 and discussed below.

Stage I

Children within the age group of 6 to 12 yrs, classified as having severe to moderate grade of mental retardation with an IQ between 30 and 49 (as assessed on Kamat Binet Test of Intelligence and Sequin Form Board) were initially identified in the special schools. This identification from the school records provided the initial sample (N=42) of children.

Stage II

From the given sample, children (N=34) with identified speech and language delay (as assessed on Language Assessment Tool) were selected as possible subjects.

Stage III

The required number (N=30) of children were randomly drawn from the obtained sample. Subsequently these were assigned to experimental group (N=15) and control group (N=15).
Table 3.2
Sample Identification and Selection at Phase 2

<table>
<thead>
<tr>
<th>Stage I</th>
<th>Stage II</th>
<th>Stage III</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identification of sample</td>
<td>Sample with language delay</td>
<td>Random Selection</td>
</tr>
<tr>
<td>N=42</td>
<td>N=34</td>
<td>N=30</td>
</tr>
<tr>
<td>Assignment of final sample</td>
<td>Experimental group</td>
<td>Control group</td>
</tr>
<tr>
<td>N=15</td>
<td>N=15</td>
<td></td>
</tr>
</tbody>
</table>

3.3 Tools
The following tools were used for the study

**Tools for Identification & Selection of Sample**
1. Kamat Binet Test of Intelligence
2. Sequin Form Board
3. Language Assessment Tool

**Tools for Treatment**
1. The Makaton Vocabulary (Indian Version)
2. The Makaton Training Module

**Tools for Measurement**
1. Teacher’s Behaviour Scale for Language Teaching (TEBSLAT)
2. Children’s Language Acquisition Test (CLAT)
3. Reaction Scale (RS)

3.3.1 Tools for identification & Selection
1. Kamat Binet Test of Intelligence

Designed in 1936 by V.V. Kamat, this verbal test is the adaptation of the Stanford Binet Test of Intelligence. The test is applicable to subjects between the ages of 3 and 22 years. Hence, it is found suitable for
assessing students with mental handicaps. The validity coefficient is 0.5. The reliability coefficient has not been given by the author.

2. Sequin Form Board

The Sequin Form Board is a performance test which can be administered with ease. It serves as a quick measure of general intelligence. The test is commonly used for measuring psychomotor and visual - perceptual abilities for children and adults between 3 and 20 yrs. The Indian norms for the test are available. The norms provide the guidelines for converting the trial timing (in seconds) to mental age. Subsequently, the IQ is computed using the standard formula \( \frac{MA}{CA} \times 100 = IQ \).

3. Language Assessment Tool

Language Assessment Tool (LAT) was developed by National Institute for the Mentally Handicapped Secunderabad. The tool includes 2 subscales: (1) receptive and (2) expressive. The items are divided into different age ranges: 1 month interval up to the age of 12 months; 2 months interval up to the age of 26 months; 3 months interval up to the age of 36 months, and 3 yrs and above. There are a total of 48 items on the receptive scale and 47 items on expressive scale. LAT aims to give information regarding the approximate level at which a child is functioning in receptive and expressive aspects of language development.

3.3.2. Tools for Treatment

1. Makaton Vocabulary (Indian Version)

The Indian version of the Makaton Vocabulary is an open ended lexicon of some 450 words. The Vocabulary is to be used in the Makaton Language Programme. Presented in 8 stages (excluding a stage for additional vocabulary) it follows the basic structure of the original Makaton Vocabulary widely used in the UK.

The Indian version includes a large number of words familiar and relevant to the Indian population. The adaptation of the original Makaton
Vocabulary was done in 1992 in India by a committee of professionals of which the investigator was a member.

The initial stages of the Vocabulary contain words that are used for expressing immediate needs, establishing interaction, naming familiar people, items and places. The stages advance to include complex words that denote community, events attributes, leisure interests, feelings and relationships etc. (Refer appendix II).

The Indian adaptation was done with permission from the Makaton Vocabulary Development Project (UK). Since its introduction seven years ago in India, the Makaton Vocabulary has been effectively tried and tested by professionals working in special education centres in different parts of the country.

2. The Makaton Training Module

The principles that govern the design of the Makaton Vocabulary Language Programme are derived from the belief that effective use of any mode of communication depends on its consistent use in significant environments. The Programme seeks to accommodate not only the needs of a student with communication problems but also the needs of those who relate to him / her and the situational factors affecting their interactions.

The investigator was sensitive to this fact while developing the Makaton Training Module. The module design contained theory and practical inputs about Makaton Language Programme. It was divided into two parts.

Part 1 consisted of a 2-day training workshop that included lectures and demonstration by the tutor, and practice sessions for the student teachers. The lectures aimed at providing theoretical background of AAC systems and Makaton, research studies supporting the use of alternative modes (signs and symbols) of communication, teaching principles of the Makaton Programme, and development of literacy skills through Makaton symbols.

The use of signs and symbols in daily communication was demonstrated and sessions provided for practical exercise. The training module
included Peer Practice Feedback (PPF) which entailed simulated teaching sessions on Makaton in groups with feedback from observers who belonged to the group.

The total training time for Part 1 was 12 hours spread over both days. For details of module outline refer to appendix III.

Part 2 required student teachers to give two language lessons using Makaton Programme to children with mental handicaps and language delays.

The first lesson would introduce the signs/symbols for words that one commonly used in the child’s immediate environments.

The second lesson was meant to teach the child to use the signs together to communicate in structured setting.

Both lessons would be supervised by the investigator and feedback exchanged with student teachers.

_Pilot Testing of Makaton Training Module_

The module was tried on a group of 28 students from B.Ed. (Special-Mental Retardation) course run in Mumbai. None of the participants had received a training on Makaton or any other AAC system previously.

The total absence of any information on AAC in the B.Ed. Syllabus was underscored by the participants ignorance about this topic. The lectures in the module were planned so as to refer to AAC systems in general while discussing Makaton and its concept as a multi model approach to language intervention.

Of the 12 hours, nearly 7 hours of the module were devoted to sign & symbol practice. This was found appropriate and adequate, as the participants were using the augmentative methods for the first time, and needed practice for acquiring the level of competence essential for teaching children. During the practice sessions the participants were encouraged to monitor and check each other’s performance.
Simulated lessons given during PPF were found useful by the participants, and investigator for ensuring the acquisition of competence. The exercise provided the opportunity for self improvement.

The video film on use of Makaton in Indian school setting was helpful to the participants in conceptualizing the information given during theory & practical sessions.

The PPF and the video film prepared the participants for the ‘hands on’ experience of Part 2. The lectures and discussions were appropriate for the interest level of the participants.

While the pilot testing found Part 1 of the module suitable, it brought out the need for some change in Part 2.

The module design included 2 lessons each to be given by participants to children with language delays and mental handicaps. During the trial it was found that the predecided number of lessons were inadequate for children. The children (severe to moderately retarded between 6-12 yrs) chosen during trial were similar to those who would be in the sample. Such children needed more than 2 lessons to learn something new. They also needed repetition in order to retain what had been taught. This was especially so when lessons were not given on consecutive days.

Since the experimental group teachers were required to use Makaton to teach children during their regular practice, and in actual practice it is often not possible to have same children on consecutive days (due to children’s involvement in other school activities), it was decided to include 10 lessons in Part 2 of the training module.

### 3.3.3. Tools for Measurement

1. Teacher’s Behaviour Scale for Language Teaching (TEBSLAT).

Developed by the investigator the TEBSLAT aimed to assess the teacher’s

- General communication skills during teaching
• Ability to develop language through its components of
  a) semantics  b) syntax &  c) pragmatics.

TEBSLAT was used as the pre & posttest in the study.

The scale was divided into two parts. Each part consisted of a list of
behaviours crucial for the skill under assessment. The measure of presence or
absence of a skill could be indicated on a 3 point scale.

Part 1 enlisted 6 behaviours of general communication and included
items on set induction, clarity and organisation of topic being taught, use of
non verbal communication (e.g. gestures, facial expression), illustration
through examples and recapitulation of content.

Part 2 enlisting 12 behaviours on language development was
divided into 3 segments (each containing 4 items) namely, semantics, syntax
and pragmatics.

The items described teacher’s behaviour during concept teaching,
use of age-appropriate vocabulary, using new vocabulary into a variety of
familiar sentences, use of simulation / activities to elicit contextual responses
from children. For details of items refer appendix IV.

Content validity of TEBSLAT was ensured after obtaining expert
opinions about the items within the tool. Content validity refers to the degree
to which the tool actually measures, or is specifically related to, the traits for
which it was designed. It shows how adequately the tool samples the universe
of knowledge and skills that a person is expected to master (Best & Kahn
1995) Items on TEBSLAT were selected after careful examination of studies
and documents on language development process and teaching of languages &
communication. Additionally, the suggestions by the experts were included.

Pilot Testing of TEBSLAT

Four teachers of special education classroom were observed during
language teaching sessions for the purpose of testing the efficacy of
TEBSLAT.
Care was taken to ensure that observations were made of such language sessions which involved interaction and communication between teacher and children and among children. Hence, sessions on picture talk, picture reading, story telling, event description etc rather than book reading, writing and spelling, were observed.

This was done because TEBSLAT as a tool would be used during the experiment on student teachers teaching very young handicapped children who needed to develop receptive and expressive language. The items in the scale were selected keeping this factor into focus.

The trial showed the suitability of the items included. While all teachers scored well on part 1 of the scale, it was found that each individual teaching session concentrated on one or the other of the language components contained in part 2. The reason for this could be that the teachers under observation preferred using the traditional method of language teaching which often overlooks the advantage of an integrated development of semantics, syntax and pragmatics.

This aspect notwithstanding, the pilot testing brought out the appropriateness of listed teacher behaviours for language teaching. The behaviours for each language component were found to be adequate during different teaching sessions.

(2) Children’s Language Acquisition Test (CLAT)

Developed by the investigator, CLAT aimed to assess the level of language comprehension and expression of children. CLAT was a tool for pre and posttest in the study.

The test comprised of two parts. Part 1 focussing on Semantics required the child to identify a given object / picture when presented with distractors. It tested expressive language when the child was required to sign / name a given picture or an object. The words (30) in this section were selected from the initial stages of the Makaton Vocabulary and described those objects that are commonly used / seen in daily life.
Part 2 tested the syntactic and pragmatic abilities of the child at comprehension and expression levels. This section contained the following topics:

a) Response to verbal instruction
b) Grammatical comprehension of sentence (with help of pictures)
c) Sentence imitation
d) Grammatical completion of sentence (with help of pictures)
e) Functional response to given objects
f) Functional response to given pictures.

Each topic consisted of 4 items ranging from simple to complex (refer appendix V).

The test was shown to a panel of experts in order to ensure the validity of content.

Pilot testing of CLAT

CLAT was piloted on 5 children who were similar in age and characteristics to those finally selected as sample.

The items in part 1 were found to be suitable, but the trial showed a need to bring in some changes in the part 2.

Certain words and sentences in the second section were found to be unfamiliar or high in complexity for the children. These were changed to words that were commonly used in their environment (e.g. comb substituted for hairbrush)

The pictures, flashcards and objects used while testing were generally identifiable by the children.

3. Reaction Scale

Developed for this research by the investigator the Reaction Scale aimed to measure the attitude of experimental group teachers towards Makaton as an appropriate method to develop language and communication skills in children with mental retardation.
The tool was designed as an opinionnaire. An information form that attempts to measure the attitude or belief of an individual is known as an opinionnaire. Through the use of questions, or by getting people's expressed reaction to statements, a sample of their opinion is obtained. From this statement of opinion one may infer or estimate their attitude (Best & Kahn 1995).

The format of the Reaction Scale was based on Likert Method of Summated Ratings. It contained 24 statements. The respondents were required to indicate their position regarding each statement on a 5 point scale. (Refer to appendix VI).

The statements were collected from the large number of professionals who have used Makaton with handicapped children and those who have only heard about the system. This ensured that the tool had a mixture of statements comparing Makaton favourably and unfavourably with traditional approach to language intervention.

After the statements were gathered, the same were shown to experts knowledgeable on Makaton. The tool was then tried on a number of participants of Makaton Training Workshop.

Item total correlation and reliability coefficients of the tool were derived on the basis of this try out.

The tool was split into 2 parts (12 items each) for this purpose. The reliability coefficients were 0.7695 (Equal length spearman - Brown) and 0.7695 (Buttman Split-Half)

Correlation index between forms was 0.6253 with alpha for part 1 = 0.8196 and for part 2 = 0.7693.

Each item, except no. 16, was found to have a positive correlation with the total items. Item no. 16 which correlated negatively was modified subsequently.
| ITEMS | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   | 13   | 14   | 15   | 16   | 17   | 18   | 19   | 20   | 21   | 22   | 23   | 24   |
|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1     | 1.00 | .77  | .33  | .39  | -.05 | .22  | -.00 | .26  | .18  | .00  | .64  | .73  | .03  | .22  | .14  | .07  | .39  | .64  | .12  | .85  | .49  | .13  | .49  | .85  |
| 2     | 1.00 | .54  | .53  | .12  | .50  | .10  | .46  | .33  | .23  | .44  | .58  | .00  | .36  | .03  | .11  | .64  | .68  | .06  | .58  | .80  | .08  | .49  | .90  |
| 3     | 1.00 | .62  | .05  | .20  | .56  | .82  | .00  | .00  | .52  | .45  | .03  | .41  | .03  | .27  | .36  | .37  | .29  | .39  | .68  | .06  | .22  | .39  |
| 4     | 1.00 | .11  | .33  | .16  | .70  | .31  | .00  | .68  | .39  | .23  | .59  | .21  | .27  | .47  | .54  | .07  | .24  | .29  | .14  | .17  | .54  |
| 5     | 1.00 | .57  | .16  | .09  | .48  | .77  | .10  | .12  | .34  | .57  | .58  | .29  | .70  | .22  | .04  | .06  | .48  | .13  | .08  | .06  |
| 6     | 1.00 | .20  | .14  | .20  | .77  | .34  | .30  | .24  | .54  | .30  | .18  | .76  | .51  | .28  | .00  | .70  | .07  | .45  | .26  |
| 7     | 1.00 | .36  | .43  | .19  | .39  | .05  | .20  | .20  | .38  | .18  | .06  | .11  | .35  | .22  | .20  | .04  | .17  | .04  |
| 8     | 1.00 | .32  | .00  | .33  | .49  | .17  | .39  | .10  | .53  | .26  | .48  | .48  | .37  | .60  | .01  | .21  | .37  |
| 9     | 1.00 | .21  | .05  | .38  | .07  | .45  | .04  | .61  | .35  | .30  | .10  | .00  | .44  | .17  | .16  | .28  |
| 10    | 1.00 | .00  | .00  | .56  | .38  | .75  | .00  | .69  | .26  | .00  | .00  | .43  | .17  | .43  | .00  |
| 11    | 1.00 | .60  | .29  | .59  | .22  | .20  | .39  | .50  | .03  | .47  | .49  | .23  | .21  | .47  |
| 12    | 1.00 | .04  | .55  | .19  | .06  | .31  | .70  | .10  | .57  | .66  | .26  | .11  | .57  |
| 13    | 1.00 | -.19 | .88  | .02  | .23  | .28  | .66  | .33  | .04  | .98  | .04  |
| 14    | 1.00 | -.02 | .12  | .56  | .51  | .16  | .00  | .70  | .47  | .20  | .26  |
| 15    | 1.00 | -.11 | .34  | .10  | .57  | .20  | .07  | .43  | .07  | .16  |
| 16    | 1.00 | -.21 | .12  | .26  | .00  | .27  | .10  | .40  | .00  |
| 17    | 1.00 | .51  | .08  | .23  | .80  | .03  | .35  | .46  |
| 18    | 1.00 | .23  | .58  | .64  | .03  | .47  | .76  |
| 19    | 1.00 | .59  | .10  | .42  | .23  | .04  |
| 20    | 1.00 | .28  | .38  | .28  | .70  |
| 21    | 1.00 | .17  | .16  | .57  |
| 22    | 1.00 | .26  | .15  |
| 23    | 1.00 | .57  |
| 24    | 1.00 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
3.4 Procedure for Collection of Data

The data collection in both phases was done according to the steps given below

1. Identification of sample
2. Administration of the pre-test
3. Treatment
4. Administration of posttest.

A phasewise report on data collection process is as follows.

3.4.1 Phase 1

1. Identification of Sample:

Having identified the two B.Ed (Special Education) courses in Mumbai that prepare teachers for children with mental retardation, the investigator approached the Heads of the courses to explain the aim and scope of the study. Together the courses had a total of 58 students on their rolls. After receiving permission from the Heads, the investigator obtained a brief background of each student teacher. This enabled the inclusion of only those students for whom the course was a pre-service training and who had no previous experience of working with children with mental retardation.

The process provided a sample of probable subjects (N=48) for the study. The subjects (N=30) were randomly selected from both courses and assigned to experimental (N=15) and control (N=15) groups. This was done keeping in mind the nature of the treatment to be given in the study.

In effect the experimental and control group subjects belonged to intact groups but this arrangement reduced the threat of contamination and maturation which would have been active had the experimental and control groups emerged from a large mixed group.

2. Administration of Pretest:

Student teachers of both groups were observed on TEBSLAT while teaching language and communication skills to children with mental
retardation. These teaching sessions were part of the regular practical work included in the B.Ed curriculum.

Since supervised practice teaching is a regular event in teacher education courses, the subjects under observation did not have the experience of being in a contrived experimental setting. Also, the subjects were unaware that they were participants in an experiment.

In order to maintain objectively and avoid personal feelings and bias, the subjects were observed simultaneously by two observers. The second observer was trained in advance on techniques of systematic observation.

Coefficient of correlation between the scores of both observers was 0.7026 (P < .004).

Though the subjects in both groups shared common characteristics as mentioned earlier in this chapter, the obtained pretest scores of the two groups were compared statistically in order to ensure that there was no true difference between the mean scores of the groups.

T-test, which is a parametric test was used for testing the significance of difference between the obtained means. Table 3.4 shows that subjects included in the sample were comparable. The t-critical value (1.27) at df = 28 does not reach any level of significance.

Table 3.4
Mean, SD and t-value obtained
By Experimental and Control Groups at Pre-test
(Phase 1)

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Standard error</th>
<th>Degree of freedom</th>
<th>t-critical value</th>
<th>level of significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exp. Group</td>
<td>15</td>
<td>11.067</td>
<td>5.035</td>
<td>1.300</td>
<td>28</td>
<td>1.27</td>
<td>N.S*</td>
</tr>
<tr>
<td>Control group</td>
<td>15</td>
<td>9.200</td>
<td>2.678</td>
<td>0.691</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Not significant.
3. Treatment:

The experimental group teachers were given a 2-day training on Makaton Language System. As mentioned earlier, the 12 hours training completed the Part 1 of the Makaton Training Module. Subsequently each subject was assigned to work with a mentally handicapped child who was included in the sample required for Phase 2 of the study.

The student teachers were asked to teach language and communication skills using the Makaton Language System and the Makaton Vocabulary. These teaching sessions were held under the guidance of the investigator. A total of 10 sessions were taken by each subject of the experimental group.

The control group continued with its regular curricular activities.

4. Administration of Posttest:

a) After a period of 5-6 weeks the student teachers of both experimental and control groups were asked to give language lessons to a group of children. The teacher’s behaviour during the teaching session was observed on TEBSLAT. As in pretest, the observed lessons were interactive in nature.

b) After completion of Phase 2 the experimental group teachers were administered the Reaction Scale in order to measure their opinion / attitude towards Makaton as a suitable method for language intervention and development in children with mental retardation.
3.4.2. Phase 2

1. Identification of sample.

Three special schools for children with mental retardation were identified for sample selection. Two of these were situated in the suburbs of Mumbai and one in the city. The schools were similar to each other in that they primarily catered to children from middle to low middle class background.

The researcher approached the Principals of these schools and explained the nature and purpose of the study. The school records revealed that there were severe to moderately handicapped children (N=42) within the required age group of 6-12 yrs. From the records it was found that in this group there were children (N=34) with identified deficits / delays in language comprehension and expression.

From this yield of 34 children the investigator randomly selected children (N=30) as subjects for the study.

The selected sample was further subjected to the assignment into experimental group (N=15) and control group (N=25).

2. Administration of Pretest.

Children of both experimental and control groups were administered CLAT. The test was administered individually to each child after establishing rapport with him/her. This ensured that children performed without anxiety during the testing.

Though the subjects shared common characteristics discussed earlier they belonged to different school settings. The pretest scores were compared statistically to rule out significant difference between the means of the two groups. T-test was used for testing the significance of difference between the obtained means. Table 3.5 shows that the subjects included in the sample were comparable. The obtained t-critical value (1.08) at df=28 does not reach any level of significance.
Table 3.5
Mean, SD and t-value obtained
By Experimental & Control Groups at Pre-test
(Phase 2)

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Standard error</th>
<th>Degree of freedom</th>
<th>t-critical value</th>
<th>level of significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental group</td>
<td>15</td>
<td>11.067</td>
<td>5.035</td>
<td>1.300</td>
<td>28</td>
<td>1.27</td>
<td>N.S*</td>
</tr>
<tr>
<td>Control group</td>
<td>15</td>
<td>9.200</td>
<td>2.678</td>
<td>0.691</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Not significant.

3. Treatment:

The children in the experimental group were assigned to the student teachers of the experimental group (Phase-1) so that each teacher had a child.

The teachers were explained the areas of language deficits/delays in their respective children (as shown through the CLAT) and asked to plan intervention programme to remediate/reduce the same.

The teachers were required to use the Makaton Language System as the method of intervention. Using the Makaton Vocabulary each teacher planned intervention programme of 10 lessons. The language concepts chosen for teaching belonged to the earlier stage of the Makaton Vocabulary.

The teaching steps planned for the lessons were as given below.

- Priorities the vocabulary to be taught
- Select 2-3 words per session
- Label each selected concept by using signs/symbols with speech
- Check comprehension by asking child to identify the given concept.
- Ask child to label the concept (either with speech & sign/symbols or sign/symbol alone)
- Link vocabulary into simple phrases expressed through combined use of speech & signs/symbols.
- Provide opportunities for generalisation and spontaneous use of the learned concepts.
The sessions were conducted under supervision of the investigator. This assumed appropriate use of the AAC system by the teachers. The 10 sessions were spread over 4-5 weeks. The control group children were given the traditional language intervention programme during this period by the control group teachers.

4. Administration of Posttest:

CLAT was administered after a period of 5 weeks to children of both experimental and control groups. Conditions during posttesting were kept similar to ones at pretest.

### 3.5 Statistical Treatment of Data

Parametric tests are considered to be the most powerful and reliable for testing data statistically.

1. The t-test, a parametric test, was used in the study as the samples selected in both phases were small (N=15 for each experimental & control group) in size. Developed by Gosset (1915) for small samples, the t-test is a test of significance of difference between two independent or correlated means. It involves the computation of ratio (t-critical value) between the experimental variance (observed difference between the two sample means) and error variance (the sampling error factor).

Gosset's t-critical values necessary for rejection of a null hypothesis are higher for smaller samples at a given level of significance. Each t-critical value for rejection is based upon the appropriate number of degrees of freedom.

2. MANOVA or repeated measures ANOVA was also used in the study to analyse the data. MANOVA is an appropriate statistical test to use when analysing data from experiments in which there is one independent variable.

MANOVA partitions the total variability in the study into three components. One component SS, (between groups) results from the
manipulation of the independent variable. This component contains both systematic variability and error variability. Another component SS_{subj} is based on variability among the participants. The third component of variability SS_{resid} is the remaining variability and contains error variability and is used in determining the error term for the F-ratio; MS_{resid}. The F-ratio is derived by dividing MS_{x} by MS_{resid}.

Additionally, Pearson’s Product Moment method was applied to correlate the marks allotted on TEBSLAT by the investigator and another observer. This test was also used for establishing the correlation between the Posttest scores and Reaction Scale Scores obtained by student teachers of the experimental group.

Spearman - Brown and Buttman Split - Half tests were applied to establish reliability coefficient of the Reaction Scale.