

AAC IN INDIA:

THE CURRENT STATUS OF ART

C. Balaraju

Reg. No. M9105

A Master's dissertation submitted as part fulfillment
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In Precious Memory of
MY EVER LOVING FATHER,

"Day by day I remember you
in silent grief,

But you are with ALMIGHTY,

Is my sustaining BELIEF.

Let perceptual light, on thee
ever shine,

May your soul rest in place Divine".

CERTIFICATE:

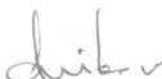


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MYSORE
MAY, 1993.


Dr. (Miss) S. Nikam
Director
All India Institute
of Speech and Hearing,
MYSORE.

CERTIFICATE:



This is to certify that this Dissertation entitled :

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THE CURRENT STATUS OF ART",**

*has been prepared under my
supervision and guidance.*

MYSORE
MAY, 1993.

Shyamala cheyappa
Dr. (Mrs.) Shyamala, K. C.,
Guide.

DECLARATION



/ hereby declare that this Dissertation entitled

**"AAC IN INDIA :
THE CURRENT STATUS OF ART",**

*is the result of my own study under the guidance
of Dr. (Mrs.) Shyamala, K. C., Lecturer , Dept.
of Speech Pathology, All India Institute of Speech
and Hearing, Mysore, has not been submitted earlier
at any University for any other Diploma or Degree.*

MYSORE
MAY, 1993.

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1. INTRODUCTION

The layman's view of communication is likely to be relatively simple: everyone communicates or tries to; some understand; some do not. Lay men may also assume that people communicate because they have something to convey to others: information, feelings, demands, or arguments. We communicate in many ways, but basically in two ways. The more obvious method is through our use of words, that is verbal. However, we also communicate without words, through many nonverbal modes. Additionally, we use many signs, signals, symbols and codes to communicate with others (Van Hattum, 1980).

The importance of communication is infinite, and difficult to grasp. Communication is more than "talking to one another" or "reading and writing". Approximately 35% of our communication is verbal and 65% nonverbal (facial expressions, body language and orientation, gesture, signs, and tones).

The speech constitutes the primary mode of communication between human beings. Those who are unable to speak or cannot make themselves understood adequately are also handicapped in their ability to communicate personal attitudes and traits and establish satisfactory social relations. There are a number of children and adults, who

are "locked in" in the sense that their speech is unlikely ever to be adequate for their communicative purposes. In many cases speech therapy offers a solution to the problems of such individuals while in some cases technical aids or nonverbal communication systems, hereafter referred to as Augmentative and Alternative Communication (AAC) systems provide prerequisites for a workable system of communication.

There is a diverse group of people for whom an AAC systems will facilitate their communication. It includes individuals whose communication deficits are congenitally or adventitiously derived as the result of neuromotor deficits, cognitive and/or linguistic impairment, and emotional difficulties, as well as structural alteration or anomaly. This poor prognosis for verbal communication could result from any of several conditions including severe mental retardation, childhood autism, childhood aphasia, cerebral palsy, hard of hearing, severe dysarthria (either congenital or acquired), apraxia of speech (developmental or acquired), laryngectomy, aphasia and glossectomy. During the past few years there has been considerable work on developing AAC systems for such persons. Members of several professions has been involved. Table-1 lists the members of an ideal team(Cohen and Shane,1982).

-
1. Advocate
 2. Follow-through coordinator
 3. Fabrication specialist
 4. Fitting specialist (interface and electronic aid aspect)
 5. Audiology
 6. Biomedical engineering
 7. Electrical engineering
 8. Computer consultant
 9. Competent manual signer
 10. Special Education
 11. Medicine
 12. Occupational therapy
 13. Parents/caregivers
 14. Physical therapy
 15. psychology
 16. Social service
 17. Speech-Language Pathology.

TABLE - 1: Components of ideal AAC systems evaluation and service delivery team for potential user of aided and/or unaided communication technique.

As reflected in Table - 1, a wide spectrum of professionals are needed to deliver a comprehensive service to persons who are nonspeaking. Most of the disciplines listed have a recognized function and have established

reputations which have evolved from work in other areas of disability. Based on reports in literature it would be difficult to conceive of a child or adult who is so severely impaired that there would be no AAC system that he or she could use.

For the last two decades researchers have documented the usefulness of AAC systems (Porter, Brink and Hagen, 1973; Mc Donald, and Schultz, 1973; Carrier, 1974; Archer, 1977; Goodman,et.al, 1978; Coleman,et,al, 1980; Poulton and Algozzine, 1980; Clark, 1981; Schuler and Baldwin, 1981; Bonvillian and Orlansky, 1984; Calculator and Delaney, 1986; Fahey,et.al, 1984; Kiernan and Barbara, 1984; Luftig and Bersani, 1985; Glennen and Calculator, 1985 Reichle and Yoder, 1985; Ecklund and Reichle, 1987; Bryen,et.al, 1988; Downing and Siegel, 1988; Sevcik, Ronski and Wilkinson, 1991; Clark, 1992; Shailashree, 1992) with various clinical groups.

The emergence of AAC systems as a unique discipline is a recent phenomenon. Although, estimates concerning the birth of this discipline vary, it is safe to say that most of the influential developments have occurred in the last two decades. It is a well known fact aware that we are at the beginning stages of this journey which will challenge the limits of our knowledge, our professional identities and some therapeutic principles but at least we all now realize

that this journey has to be made. It will take us through familiar and unfamiliar territories, leading us to an ill-defined future where we will have new skills and tools to help the most communicatively impaired. When our journey began it was a headlong rush, mostly into the unknown, speech language pathologists becoming increasingly aware of what technology was available at that time and what is available at present and what may be available in the future (Enderby, 1987).

In India however the overall picture of AAC systems remains the same. The only clinical area in which AAC systems are used is the area of education and habilitation of the cerebral palsied. Karanth (1991) reported that the most commonly quoted reasons for the lack of advancement, use and implementation of the AAC systems in India are that:

1. they are expensive and
2. they involve technology/technological sophistication that is not within easy reach of many.

It is true that the AAC systems that are currently in use and available in the western market are too expensive by our standards. It is also true that the technologically based AAC systems are neither easily available in the Indian market nor is the expertise to fabricate them, easily or inexpensively, available. It is not that, we do not

have any low cost AAC systems in our country. However, no worthwhile research has been attempted to study the use and implementation of AAC systems in India, even if any one is using them. The reason could be that the development of speech-language pathology field took place in India when the oralists held the upper hand in the oral-manual controversy in the habilitation and education of the hearing impaired. This despite the fact that our failures in the oral only approach are no less than those reported elsewhere.

In reality the limitations of our success in the oral only approach are even greater than in the west for our basic infrastructure, support systems and technological advances are not comparable, as of now, to those existing in the west. Yet we have clung tenaciously and blindly to the oral only approach and by and large, neglected the AAC systems. It is a reflection of these attitudes that our training courses and clinical programmes have so little to offer in terms of AAC systems (Karanth, 1991).

1.1. WHAT IS AAC?

AAC systems are communication systems used in addition to or instead of speech. AAC refers to any technique used to enhance or augment communication.

Nonspeech communication modes can be defined operationally (Bridgman, 1927)," as procedures for encoding

and transmitting messages without their being directly encoded into phonemes by the vocal tract. Thus, any approach to encoding and transmitting messages that does not require a person to directly produce speech sounds would be classifiable by this definition as a nonspeech communication mode".

Thus, AAC refers to any "communication approach designed to support, enhance, or augment the communication of individuals identified as nonspeaking" (Whitney, 1972).

1.2. TERMINOLOGY:

Coming to terminology used in AAC; it is much more confusing because of the transdisciplinary nature of AAC. We are also experiencing problems of various disciplines using other jargon to describe essentially the same phenomenon, act, characteristics etc... Terms like "nonspeech communication", "Nonverbal communication", "Augmentative communication", "Alternative communication", "Augmentative and Alternative Communication", "Graphical users interface", "Assistive communication devices/ aids", "Manual communication", "Digital to analog (D to A) conversion", "Voice recognition computer technologies", "Sign languages", are becoming more and more common in our research activities, professional journals, and to a lesser extent our clinical interventions.

The importance of terminology, relative to our communication with other professionals and the general public as well as the very special needs of international and transdisciplinary communication and development, has become increasingly apparent. In addition to improved consistency in our use of terms, we need to carefully examine what meanings the jargon we develop may have to other individuals who rely primarily on a dictionary and their own common sense. Although many people in the field may know what is meant by a given term, the same meaning may not be shared by others. Some terms used by many people in one country (e.g. augmentative) are not easily translated into other languages. There also is a need to develop a glossary to assist in comparing the different terms used by various authors and/or disciplines. Keeping this in mind, the editorial board of Augmentative and Alternative Communication (AAC) journal published a series of articles on "AAC Terminology Policy and Issues Update" (Lloyd and Kangas, 1988; Lloyd and Kangas, 1990; Lloyd and Blischak, 1992).

The thirteen terms in the original policy statement (Lloyd and Kangas, 1988), the sixteen terms in the first update (Lloyd and Kangas, 1990) and the twenty two terms in the second update (Lloyd and Blischak, 1992) have stood the test of time in the policy. These twenty two terms are

listed in Appendix - I. Lloyd and Blischak (1992) hope/that this terminology will assist the development of our field in several ways: 1) by providing guidance to authors in preparing manuscripts for publication; 2) by providing the readership with a reference; 3) by facilitating the work of the International Society for the Augmentative and Alternative Communication (ISAAC) Terminology Committee; and 4) by stimulating the transdisciplinary and international communication, which has been one of the most important strengths of ISAAC and of AAC.

1.3. 'PURPOSE OF THE STUDY:

In India the manual systems like gestures and sign languages have been mainly used as AAC systems for the hard of hearing, in limited schools/institutes since many years. However, the growth and development of AAC systems in India is restricted to this particular clinical population. Since the past few years this has included the cerebral palsied and mentally retarded as well. But there is no empirical study done on the use and implementation of AAC systems in these schools/institutes throughout the country. This is the first survey attempted to gather information about the current status of AAC in India.

The purpose of this survey was to provide information about the following: in the Indian context:

- 1.Which schools/institutions are using AAC systems?
- 2.What AAC systems they are using?
- 3.Why they were using them?
- 4.With what categories of children (type and severity)?
- 5.What is the age range of the children?
- 6.What AAC system is mostly used/accepted and
- 7.With what success?

2.REVIEW OF LITERATURE

Communication serves as the basis for social relationships of all kinds. A social system may be considered as a set of positions interconnected with communication channels. Communication requires interaction between at least two individuals. In the traditional model the terms "sender" and "receiver" are commonly used. Both sender and receiver are required to handle ideas and concepts in symbol form. These language symbols expressed by speech, writing or special signals are to be combined into message according to some system, (for example, a code which is known to both the sender and the receiver. A suitable transmission medium is needed for an effective presentation of the message units. In general, speech communication is not only a matter of oral presentation. We rely on an acoustic as well as a visual medium. A part of the visual communication conveyed by bodily expressions adds to the extra-linguistic aspects of the spoken message. A reduced or distorted bodily mode of expression may be the sole communication medium available to some handicapped people.

The Decision Making Process (DMP) in Augmentative and Alternative Communication (AAC) intervention has been the focus of a new body of literature in the field of speech and language pathology (Blau, 1983). The large number of

articles and workshops dealing with AAC in the past 20 years and the founding of a journal, indicate growing interest in AAC systems and increase in demand of training models for speech and language clinicians. Guidelines are currently available for the evaluation, candidacy selection, technique and symbol set selection procedures for optimally developing an AAC system for a non speaking individuals unique functional needs.

2.1. MODEL OF COMMUNICATION:

Shane (1980) presented an expanded model of communication which relates to nonspeaking individuals having congenital or adventitious, neurologically based communication disorders. Figure-1 represents the communication model. All potential forms of expressive communicative behavior are contained within this schema. This schematic figure should serve as a guide to the clinician enabling the evaluator to systematize, subjective impressions and data, obtained from objective examination. Such information include the results of thorough assessment of integration (forms of expression) and the integrity of transmission (mode of expression) structures.

Schiefelbusch and Hollis (1980) present another communication model which is based on a functional analysis of communication channels and linguistic processes. These

authors combined two separate models (communication channels and psycholinguistic analysis) and created a general system of language.

INTEGRATION (FORMS OF EXPRESSION)		TRANSMISSION (MODE OF EXPRESSION)	
vocal, nonlinguistics crying, grunting, laughing, pleasure sounds.	vocal, linguistic speaking, listening,	Respiratory Phonatory Resonatory Articulatory	vocal structures
nonvocal, nonlinguistics, affect, orthography,	Representational, line drawings, photographs, models, nonvocal, linguistic Face	Head Body Upper- extremities traditional-gestures,	nonvocal structures
physiological- reactions.	ITA, blissymbols, sign language, Non-SLIP, morse code	Eyes	

FIGURE-1: Expanded model of communication. The communicative information components is expressed either the vocal or nonvocal structures (from Cohen and Shane, 1982).

The channel component involves sensory input, integrative and mediation functions, and response output. Sensory input includes visual, auditory, tactile and olfactory modes. The integrative and mediation processes

are imitation, symbolization, construction and transformation. Gross motor actions, signing, writing, and speech compose the output options. The psycholinguistic analysis model depicts receptive language, inclusive of linguistic and nonlinguistic concepts, linguistic rules and expressive language. The issue of alternative modes, i.e. input sensory and output expressive, is emphasized in this model.

Lloyd, et.al. (1990) proposed a specific model for AAC. The model explores in terms of features common to communication models and AAC features, such as alteration of feedback, interfacing with the environment, means of representation, selection and transmission of a message and increased potential for message distortion. The major parameters of this AAC model are: Sender, message, transmitters, AAC transmission processes, AAC interface, internal feedback, transmission environment, communication environment, receiver and external feedback.

2.2. AAC SYSTEMS:

AAC refers to any communication approach designed to support, enhance, or augment the communication of individuals identified as nonspeaking.

2.2.1. CLASSIFICATION OF AAC SYSTEMS:

There is no particular classification system which explains all AAC systems. However, various authors try to

classify AAC system on the basis of function of the system or mode of the system.

Silverman (1980) assigns all AAC systems, that have been developed to one of three categories: gestural, gestural-assisted or neuro-assisted. The defining characteristics of these categories are summarized in Table-2.

	Type of mode		
	Gestural	Gestural-assisted	Neuro-assisted
Instrumentation Necessary	No	Yes	Yes
Muscle Gesture control of instrumentation	No	Yes	No
Neuro-activity control of instrumentation	No	No	Yes

Table-2: Defining characteristics of gestural, gestural-assisted, and neuro-assisted communication systems.

I.GESTURAL MODES:

The defining characteristic of a gestural mode is that it requires no instrumentation, only patterned muscle gestures, or movements. Messages are encoded into muscle gestures and transmitted visually. They include following systems:

A. American sign language (Ameslan)

- B. American Indian sign Language (Amerind)
- C. Pantomime (mime)
- D. Left-Hand Manual Alphabet.
- E. Limited Manual Sign systems for Hospitals and Nursing Homes:
 - a. Manual Shorthand,
 - b. Manual self-care signals,
 - c. Hand Talking Chart.
- F. Gestures for "yes" and "no".
- G. Eye Blink Encoding.
- H. Gestural Morse Code.
- I. Pointing.

II. GESTURAL-ASSISTED MODES:

The defining characteristic of a gestural-assisted communication scheme is that it contains a read out device (or display) that is activated directly or indirectly by muscle gestures or movements. Users either point to or cause to be reproduced on the display the components of the message they wish to transmit. They include following systems:

- A. Symbol Systems:
 - a. Photographs and Drawings,
 - b. Blissymbolics,
 - c. Rebuses,
 - d. Yerkish Language (LANA Lexigrams),
 - e. Premack-type Plastic Word Symbols,

- f. Braille,
 - g. Machine-Generated Speech (synthesized speech),
 - h. Morse Code.
- B. Non electronic Gestural-Assisted Communication systems:
- a. Communication (conversation) boards,
 - b. Manipulatable symbols,
 - c. Drawn or Written symbols,
- C. Electronic Gestural-Assisted Communication Systems:
- a. Switching mechanisms,
 - i) Push switches
 - ii) Position switches,
 - iii) Proximity switches,
 - iv) Pneumatic switches,
 - v) Sound controlled switches,
 - vi) Light controlled switches.
 - b. Displays
 - i) Noise light or vibration generators,
 - ii) Rectangular Matrix Displays,
 - iii) CRT (Cathode Ray Tube) displays,
 - iv) LED (Light Emitting Diode) displays,
 - v) Strip (line) printer displays,
 - vi) Electric Typewriters,
 - vii) Speech generators (synthesizers).

III. NEURO-ASSISTED MODES:

The defining characteristic of a neuro-assisted communication system is that it contains a read-out device

or displays that is activated by bioelectrical signals electrical signals originating from within the body such as muscle action potentials (electrical signals transmitted by lower motor neurons to muscle fibers, which causes them to contract). The only way in which neuro-assisted communication systems differ from electronic gestural-assisted ones is that they are activated by an electrical signal rather than gestural manipulation of a switching mechanism. The components of neuro-assisted communication systems can be diagrammed as in figure-2.

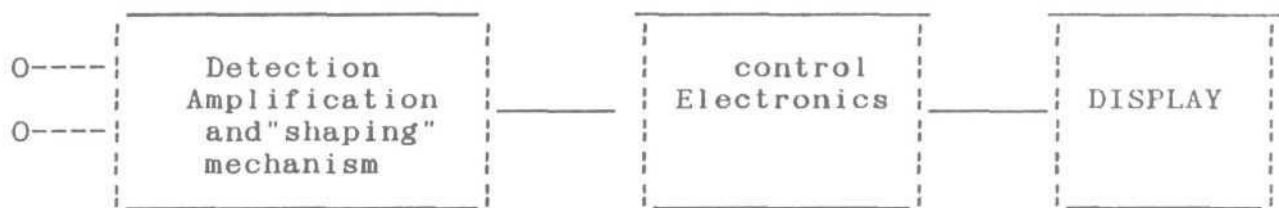


FIGURE-2: Components of neuro-assisted communication systems (from Silverman, 1980).

These include following systems:-

- A. Muscle Action Potentials/brain wave patterns
- B. Biofeedback
 - a. electro myography (EMG)
 - b. EEG morse code

Silverman's (1980) classification appears to be a broad classification. He classified these systems based mainly on 1)whether any instrumentation was needed to encode or transmit messages and 2) if instrument was needed, whether it is manipulated by muscle gestures (i.e. patterned

movements of muscle groups) or bioelectrical signals (i.e. electrical signals generated by the nervous system such as muscle action potentials).

Blau (1983) classifies AAC systems particularly symbol systems as follows in Table-3.

DYNAMIC SYSTEMS	GRAPHIC SYSTEMS	FUNDAMENTAL SYSTEMS
1. Idio syncratic-signal	1. Alphabet	1. Objects
2. Pantomime	A. Orthography	2. Miniature objects
3. Gesture	i) Letters	
4. Amer-Ind	ii) Phrases	
5. American Sign Language	iii) Combinations	
6. Manual/Pedagogical systems	B. Phonemic	
a. Paget Gorman-sign system	i) I.T.A.	
b. Seeing essential English	ii) Synthesized speech	
c. Signing Exact English	iii) SPEEC (Sequences of Phonemes for Efficient English)	
d. Signed English	2. Logographic	
e. Linguistics of visual English	a. Photographs	
f. Manual English	b. Pictures	
7. Manual English/Siglish	c. Picsyms	

- b. Pantomime and natural signs
5. Symbol systems
- a. Visually associated symbol systems
 - i) Blissymbolics
 - ii) Rebuses
 - iii) Pictogram Ideogram Communication(PICS)
 - iv) Picture/Photographs and line drawings
 - b. Coded Symbolic Languages
 - i) Traditional orthography
 - ii) Braille
 - iii) Morse code

These are the few classification AAC systems but none of them could encompass all the available systems. This probably indicated the magnitude of such an attempt. In the following section some of the AAC systems will be described in detail, specifically those systems used widely. These however, are not mutually exclusive as is evident in the review.

2.2.1.1. GESTURAL AND SIGNING SYSTEMS

a. AMERICAN SIGN LANGUAGE (AMESLAN):

Ameslan is the manual gestural communication system used by the deaf in the United States. Each gestural sign in this system performs one of the linguistic functions like a letter of the alphabet (figure-3, see appendix-II); a word or phrase, morphological or syntactic information (figure-4, see appendix-II) and a phoneme. Ameslan is a very flexible

sign system. It can be used to communicate any message concerning present, past or future that could be communicated in English.

b. AMERICAN INDIAN SIGN LANGUAGE (AMERIND):

Amerind is a manual gestural communication system that was used by North American Indians for inter-tribal communication - for communication between tribes whose members did not speak a common language (Tomkins, 1969). The gestural signs in Amerind are (kinetic) pictographic and ideographic rather than phonetic. The amerind signs for some words or concepts of an ordered series of gestural rather than a single gesture. The syntactic structure of Amerind is less complex than that of English and other spoken languages. Amerind can be used to convey messages about the "here and now" as well as the past and future. The time and energy investments required to learn to use Amerind do not seem to be excessive (figure-5, see appendix-II).

c. BRITISH SIGN LANGUAGE:

British sign language is an original language of the deaf people in Britain. It has evolved historically signs being added as they are needed. British sign language has a grammar of its own. Some signs have a high level of transparency, that is they may be readily guessed, others are abstract in their form.

d. PANTOMIME AND NATURAL SIGNS:

If physically able, all persons use pantomime. It can be

described as an art form or can be used naturally, synchronised with speech to convey extra meaning. It is very different from manual sign systems in several ways. Silverman (1980) notes that it uses the whole of the body, not only the upper body. Also its gestures are dynamic and not static. The movements are an 'acting out' of the message. It is known to facilitate speech (Balik, et.al., 1976).

e. EYE BLINK ENCODING:

For those who are grossly physically handicapped, a system of eye blinking may be introduced. A few basic needs can be expressed by having a specific number of blinks indicating a particular need. The needs may be printed on a board beside the individual for encoding purposes, with the number of corresponding blinks stated.

f. GESTURAL MORSE CODE:

As is known, Morse code encodes letters of the alphabet into a series of dots and dashes. It is suggested by Silverman (1980) that a gestural use of Morse code may be used for those who are cognitively intact but grossly physically handicapped. All that is required, is a single gesture or movement which can be produced at two durations, e.g. a short eye blink for a dot and long blink for a dash. Obviously those who have had a prior knowledge of Morse code may be particularly suitable users.

g. FINGER SPELLING:

It was reported by Moores (1980) that finger spelling has

been used as a tool for the deaf in their education since 1920. Finger spelling is a code in which 26 different finger positions denote the letters of the English alphabet. Such positions of the fingers are then used to form words or meaningful units.

h.CUED SPEECH:

The cued speech system was devised in 1966 by Dr. Orin Cornett, Gallaudet college, Washington D.C, after discovering the generally poor academic standing and retarded language development of most deaf pupils. It is a supportive tools for oral language development. It is a simple system of hand cues placed around the mouth to supplement lip-reading making oral language visually clear to the deaf child. It consists of 8 hand shapes placed in 4 positions around the face. The syllable that look alike on the lips are differentiated with different hand cues, while any one hand cue represents a number of sounds that can be identified only through observation of lips (figure-6, see appendix-II). The cues are now available in Marathi, Hindi, Malayalam and Telugu (Sara Parekh, 1985).

i.TEE MAKATON VOCABULARY:

The Makaton vocabulary was formed originally by Margaret Walker in the 1970s as a specialized signing system for the needs of the deaf retarded population. The Makaton vocabulary is not a devised signing system but rather a vocabulary of words/signs taken from the British sign

language. It used approximately 350 signs from the British sign language. In 1976 revisions were made in the system which are highly visually representative of their meaning and contain enough vocabulary for basic communication. It may be used in conjunction with other systems. It has been used with a large variety of handicaps i.e. mental handicap, multiple handicap, autism and stroke patient.

j. PAGET GORMAN SIGNED SPEECH (PGSS):

It was devised by Sir Ricahrd Paget from 1933-1955 in order to help deaf people in the development of language. PGSS is the earliest of the contrived signing systems. It aims to provide an accurate representation of the English language and does not claim to be a language in its own right. The late Lady Paget and Dr. Pierre Gorman further developed the PGSS. It can now offer word-for-ford translations from speech or writing with a vocabulary of over 4000 words. All of the grammatical features of English are included in PGSS and signs are always accompanied by speech. It has been used with hearing impaired, autistic children, mentally retarded and educationally subnormal children and adults.

2.2.1.2. SYMBOL SYSTEMS:

A symbol system is a set of sensory, visual, auditory or tactile images signs that suggest or stand for, something else by reason of relationship (association) or convention. The symbol system to be described fall into two categories:

A. visually associated symbols:

These represent in some way the idea they are transmitting. Into this category fall the following systems:

a. BLISSYMBOLICS:

When visiting Shanghai, Charles Bliss was influenced by ideographic Chinese symbols which made it possible for people speaking different languages to have a common written language, this being made up of symbols they could all understand. Bliss (1965) went on to produce his semantography (from the Greek--'a meaningful writing') containing his symbol system. In 1971 Shirley McNaughton from the Ontario Cripple Children's Centre made the discovery of Blissymbols which was to greatly help the severely speech handicapped. The symbols required adaptation but became, as McNaughton and Kates (1980) describe, '.... a graphic nonalphabet communication system'. Blissymbolics are categorized into four types:

i. Pictographic symbols: These are symbols visually similar to that which they represent and their meaning could be easily guessed. These are 'transparent' symbols (see figure-7).



FIGURE-7: Pictographic symbols, flower, house, chair, man, woman (from Enderby, 1987).

ii. Ideographic symbols: These symbols are representational

of ideas of things and can be remembered once initially explained and are said to be 'translucent' symbols (see figure-8).



FIGURE-8: Ideographic symbols, animal, insect, mind, protection (roof) (from Enderby, 1987).

iii. Arbitrary symbols: These may be already known international symbols of symbols laid down by Bliss. They need to be learned (see figure-9).



FIGURE-9: Arbitrary symbols, addition, multiplication, question, forward, musical note (from Enderby, 1987).

iv. Combined symbols: These are groups of symbols combined form one meaning (see figure-10).

(For some more symbols see figure-11, in appendix-II).



FIGURE-10: Combined symbols, toilet (chair & water), ambulance(car & medical), child, music (ear & Musical note) (from Enderby, 1987).

b. REBUSES:

Rebuses developed by Clark, Davies and Woodcock, 1974 are line drawings which visually represent objects, actions and attributes. They may be readily recognized through some are chosen arbitrarily and require explanation, others require initial explanation but can be early recalled (see figure-12, in appendix-II). Rebuses can be used in several ways with other AAC systems. Rebuses can be used to encode messages concerning the "here and now" as well as the past and future. Also, they can be used to encode both abstract and concrete concepts.

c. PICTOGRAM IDEOGRAM COMMUNICATION (PICS):

PICS has been designed specifically as a communication system for the speech impaired. PICS is a graphic symbol system based on the language development of children. The symbols are semantically based and follow logical principles. New symbols can be created making the system open to the changing needs of a child or adult. There are 400 symbols in the PIC system (phase-1) They are divided into pictograms and ideograms. Pictograms are pictures or representations of an item or object and ideograms are symbols for concepts or actions, that is, ideas represented as symbols. It is not the popular symbol set.

d. PICTURE/PHOTOGRAPHS AND LINE DRAWINGS:

A wide variety of materials may be used in this category. Pictures may be clipped from magazines, news papers or

books. When making a choice of pictures, consideration needs to be given as to the individual's abilities. A good photographic system is the 'photographic communication chart.'. There are many commercially prepared sets of these systems. They may be easily adapted to suit the person. Those with low cognitive skills may find a picture system beneficial.

e. YERKISH LANGUAGE (LANA Lexigrams):

The Yerkish lexigram language was developed by Ernst Von Glaserfeld (1977) for the LANA project (LANA is an acronym for Language Analogue Project as well as being the name of a young chimpanzee) of the Yerkes Regional Research centre. The Yerkish language consists of nine design elements (see figure-13, appendix-II) that when used singly and in combinations of two, three and four yield 255 different lexigrams. Each Yerkish lexigram has only one meaning and this meaning almost always corresponds to that of an English word. Since Yerkish lexigrams are conventional symbols (i.e. have assigned meanings) they are not intelligible to untrained observers.

f. PREMACK - TYPE WORD SYMBOLS:

David Premack (1970) to investigate the ability of the chimpanzee to learn several aspects of human language ("reading and writing") designed a symbol system consisting of pieces of plastic, each representing a specific word. Premack's symbols are ideographic, but not pictographic (see

figure-14, appendix-II). Premack - type plastic symbols can be fabricated quite easily from 1/8" sheet plexiglass. The plastic symbols vary in color, shape and size. There is a program commercially available that utilizes Premack - type symbols - the Non-SLIP or Non-Speech Language Initiation Program (Carrier and Peak, 1975).

B. Coded symbolic languages:

These represent a spoken or written language. Into this category fall the following systems:

a. TRADITIONAL ORTHOGRAPHY:

This refers to the written alphabet representing English. The 26 letter written alphabet can be arranged and used in various ways on communication boards. Single letters, single syllables, whole words or phrases may be produced on communication boards as desired by the individual. It is ofcourse necessary to have good visual discrimination skills since small differences between letters need to be noted, also a high level of cognitive development for encoding of words, a knowledge of language structure and spelling skills are necessary for formulating words and thus sentences.

b. BRAILLE:

The Braille symbol system which was invented by Louis Braille in 1824. As is well known this coded symbolic language is most used by the blind. It is thus a tactile symbolic system which is based upon traditional orthography. Its 63 characters are formed by raised dot patterns based on

a six-cell matrix (see figure-15, appendix-II).

c. MORSE CODE:

This system encodes letters and digits through a series of dots and dashes (see figure-16, appendix-II). They are methods which may be kept in mind for multiply handicapped individuals. Morse code requires good finger control since it would require the individual to be able to tap out his method by some means and be able to interpret a reply.

2.2.1.3. COMMUNICATION BOARDS:

Communication or conversation or language boards consists of one or more sheets of some type of material on which the elements of a symbol system are reproduced. Materials from which they can be made include paper, card board, cloth, plastic, masonite, and plywood. The symbol elements may be reproduced on a single sheet of material or on several sheets (e.g. in booklet form). Each sheet may contain a single symbol element or a number of symbol elements. On the contrary, communication boards provide the child with a means of two way communication and facilitate language development. There might be several different boards for different situations. One board may have vocabulary used more in the home, one may be for the classroom and one may be for a dormitory of a residential school. Types of communication boards are picture communication boards (figure-17, appendix-II); word and phrase boards; boards for sentence construction (figure-18, appendix-II); and alphabet

communication boards. Several variations of communication board arrangements have proved useful for individual children.

2.2.1.4. ELECTRONIC COMMUNICATION SYSTEMS

Electronic communication systems or aids are available in a variety of forms, providing a range of different modes of communication enhancement or replacement. The output can be very simple, such as an audible buzzer or light to assist the user in attracting the attention of others, or to convey basic needs. More elaborate communication is provided by other media such as text, symbol or pictorial displays and in some of the more recently developed devices output can be in the form of synthesized speech. The range of electronic communication aids and other electronic assistive equipment now available is very wide, in terms of both capability and price. These systems may include portable typewriters, synthesized speech, computers, electronic communication boards, etc., (see appendix-IIA for figures).

2.2.2. NEED FOR THE AAC SYSTEMS:

Children and adults having speech that is inadequate for their communicative purposes for a variety of reasons have benefited from AAC systems. The primary reason for providing a system is to enable the child to become an active communicator rather than a passive receiver. The AAC user needs to be provided with (Yoder, 1980):

- * a reason to communicate,
- * social situations in which to communicate,
- * the means to communicate.

This has implications for the listener. The responsibility of the listener involves:

- * a commitment to the use of (and understanding of) the systems.
- * providing the child with opportunities to initiate conversations, time to clarify or repair messages, and encouragement to provide new information,
- * reinforcing all the child's communicative attempts by responding appropriately to all messages expressed.

Studies demonstrate that children provided with an AAC systems achieve more success educationally, socially and cognitively than those deprived of an effective means of communication. It has also been shown that non-speaking children using AAC systems vocalize and verbalize as they communicate. They exhibit less frustration and anger than those who have no supplementary means of communication or expression.

The goals of AAC systems have been listed by Llyle L. Lloyd (1984) as:

1. Provision of a temporary means of communication until spoken communication is re-established to the point that it is (or becomes) adequate.
2. Provision of a lifelong means of communication where spoken communication does not become functional.
3. Provision of a means for facilitating development (or re-establishment) of spoken communication.
4. Temporary or permanent support which render otherwise inadequate speech effective.
5. Provision of a means for enhancing language development (development and acquired impairments).

2.2.3. CLINICAL POPULATION USING AAC SYSTEMS:

There are several conditions that typically lead to the implementation of an AAC system. Adults and children for whom speech is often neither the most functional nor the primary mode of expressive communication result from one or more of the following categories:

1. Dysarthria (either congenital or acquired),
2. Apraxia of speech (developmental or acquired),
3. Aphasia (developmental or acquired),
4. Glossectomy,
5. Dysphonia or Aphonia due to laryngectomy,
6. Mental retardation,
7. Childhood autism,

8. Cerebral palsy,
9. Deafness or hearing impairment,
10. Neuromuscular weakness,
11. Multiple sclerosis,
12. Amyotrophic lateral sclerosis (ALS),
13. Parkinson's disease,
14. Sickle cell anemia,
15. Deaf-Blind,
16. Degenerative diseases,
17. Trauma,
18. Multiple handicap,
19. Emotional disorder and
20. Other acquired or congenital structural anomalies.

Despite diversity of etiology and symptomatology across speechless conditions, clinical experience and experimental reports have suggested communicative progress using AAC systems. Representative reports describing the use of AAC systems with persons having each of these conditions also are indicated. Some of them are discussed in detail as follows: (for more details see Silverman, 1980).

A. DYSARTHRIA:

The term dysarthria is a "collective name for group of related speech disorders that are due to disturbances in muscular control of the speech mechanism resulting from impairment of any of the basic motor process involved in the execution of speech" (Darley et.al., 1965,1975). Dysarthria,

according to these authors of neurologic origin (except apraxia of speech) that is damage to the central or peripheral nervous systems and is characterized by some degree of weakness, slowness, incoordination or altered muscle tone. The term encompasses coexisting motor disorders of respiration, phonation, articulation, resonance and prosody. The degree of impairment ranges from minimal to profound. Certain neurological conditions such as cerebral palsy, amyotrophic lateral sclerosis, bulbar palsy, pseudobulbar palsy, cerebellar ataxia, parkinson's disease, dystonia, chorea, stroke (CVA), brain tumors and trauma frequently result in dysarthria severe enough to warrant the introduction of AAC system. Several types of AAC systems have been used with children and adults who are dysarthric. These include manual sign languages (Chen, 1971; Fenn and Rowe, 1975; Peters, 1973), gestural morse code (Adams, 1966), nonelectronic communication boards (Cohen, 1976; Kladde, 1974; McDonald and Schultz, 1973; Mc Naughton, 1976b; Vanderheiden, 1976), electronic communication systems (Bullock et. al., 1975; Burnside, 1974; Carlson, 1976; Combs, 1969; Vasa and Lywood, 1976; White, 1974) and Blissymbolics (Hartley, 1974; Mc Naughton, 1976a, 1976b; Reinen and Scheibel, 1975), (cited from Silverman, 1980).

B. VERBAL APRAXIA:

Verbal apraxia is a condition which prevents a person from normally producing the muscle gestures required for speech

on a voluntary level. A person who has this condition is able to produce them normally, however, on a vegetative or involuntary level. AAC systems have been used for two purposes with verbal apraxics: 1) Facilitating communication and 2) Facilitating speech. There is some evidence (Skelly.et.al., 1974) that teaching verbal apraxics an AAC system is likely to result in an increase in their attempts at speech. Thus teaching verbal apraxics an AAC systems may improve both their ability to speak and their ability to communicate. Several AAC systems have been used with verbal apraxics. These include pantomime (Schlanger, 1976) manual sign languages (Chen,1968,1971; Eagleson,1970; Goldojarb,1976; Goldstein & Cameron,1952; Hanson,1976; Helfrich,1976; Skelly.et.al.,1974), nonelectronic communication boards (Cohen, 1976; Nuffer, Sklar & Bennett, 1956) and electronic communication systems (Copeland, 1974; Perron, 1965) (cited from Silverman, 1980). Manual sign language appears to have been used more often with these patients than other AAC systems. The relatively frequent use of this system may be at least partially due to the fact that many verbal apraxics are only hemiplegic. Since hemiplegics have one upper extremity that is normal motorically, it would be relatively simple for them to learn a one-hand manual sign language.

C. APHASIA:

When there is impairment in the cerebral hemisphere that has

as its primary functions the processing of the language of the code, the resulting language disorder is aphasia. Aphasia is the multimodal reduction in the capacity to decode and encode meaningful linguistic elements (Barley,et.al., 1975). It is manifested in difficulties in listening , reading, speaking, and writing. Gestural competency for communication intentions may also be deficient (Duffy,et.al., 1975). AAC systems can be used with aphasics on a temporary or permanent basis to facilitate communication. Those with moderate to severe deficits in speech comprehension, speaking, reading and writing may be able to communicate basic needs to persons taking care of them by pointing to pictures on a communication boards, by pantomiming or by using manual sign language. The need for such communication modes may only be temporary-perhaps during the first few moths post-trauma because speech comprehension, speaking, reading and writing may improve sufficiently through spontaneous recovery and speech therapy to again be adequate for the person's communicative purposes. Several AAC systems have been used with aphasics. These include pantomime (Schlanger, 1976) manual sign languages (Chen, 1968, 1971; Eagleson,et.al., 1970; Baker, 1976; Goldojarb, 1976; Hanson, 1976; Skelly,et.al., 1975) manipulatable symbols (Glass,et.al., 1973) nonelectronic communications boards (Cohen, 1976; Bklar & Bennett, 1956) and electronic communication systems (Copeland, 1974; Fitch

& Gross, 1983; Kraat, 1990; Perron, 1965) (cited from Silverman, 1980).

D. GLOSSECTOMY:

The term glossectomy refers to surgical excision or removal of all or part of the tongue, usually because of cancer. Using an AAC system would obviously facilitate communication in such instances. Any AAC system can be used by glossectomy patients. The only one, however, that appears to have been used extensively with this population is American Indian sign language or Amerind (Skelly, et.al., 1975).

E. DYSPEONIA AND LARYNGECTOMY:

Dysphonias are voice disorders. They often result from anatomical or physiological anomalies of the larynx that make normal phonation impossible. Such anomalies include 1) absence of the vocal folds following laryngectomy 2) bilateral flaccid paralysis of the adductors of the vocal folds and 3) lesions on the vocal folds such as vocal nodules. AAC systems have been used for several purposes with children and adults who have voice problems. They have been used for example, as a temporary communication mode for patients who are on vocal rest because of a lesion (or lesions) on their vocal folds (eg., vocal nodules) resulting from vocal abuse. They also have been used as permanent communication mode for patients who have permanently lost the ability to phonate such as laryngectomies who are poor

candidates for an electro larynx or esophageal speech (included in this group would be persons who have had both laryngectomies and glossectomies. In addition, they have been used as a temporary communication mode for persons who have had laryngectomies, until they acquire adequate esophageal speech for their communication. Any AAC system can be used with these patients. However any one type has been used with this population is manual sign language (Skelly et.al., 1975).

F. MENTAL RETARDATION

Some children and adults who are diagnosed mentally retarded (particularly those who are diagnosed severely mentally retarded) do not appear to be able to acquire enough speech for their communicative purposes. They usually attempt to communicate primarily by crying (or screaming or producing other noises) pointing and or using very concrete gesture. These behaviors often are not perceived as messages or if they are perceived as such not appropriately interpreted. There is considerable clinical evidence that AAC systems can not only improve the abilities of such persons to communicate, but can facilitate their acquisition of speech. Several types of AAC systems have been used mime (Balick, Spiegel & Greene, 1972; Levett, 1969, 1971) manual sign languages (Bicker, 1972; Brookner & Murphy, 1975; Bryen, et.al., 1988; Green, 1975; Lake, 1976; Gates & Edwards, 1989; Hoffmeister & Farmer, 1972; Fahey, et.al., 1984; Kent.

1974; Kopchik and Lloyd, 1976; Peters, 1973; Topper, 1975; Wilson, 1974a, 1974b; Wilson, Goodman & Wood, 1975), manipulatable symbols (Carrier, 1974a, 1974b, 1976; Carrier & Peak, 1975; Premack * Premack, 1974) and Blissymbols (McNaughton, 1976a, 1976b; Vanderheiden.et.al., 1975) nonelectronic communication boards (Cohen, 1976; Mc Donald & Schultz, 1973; Vicker, 1974) and electronic communication systems (Bullock,et.al., 1975; Combs, 1969; Clappe,et.al.,1973; Harmon, 1974; Shane & Melrose, 1975; White, 1974) (cited from Silverman, 1980).

G. CHILDHOOD AUTISM:

Autism children typically make little, if any attempt to use speech for communicating with persons in their environments. Such children in fact are reported to make little, if any use of vocalization or gesture for this purpose. There is some evidence that the interpersonal communication of autistic children can be facilitated in two ways by teaching them an AAC system. First, at least some such children will attempt to communicate with persons in their environment more while using the mode than they did previously. And second, at least a few will begin to use speech for interpersonal communication. Several types of AAC systems have been used with autistic children including manual sign languages (Bonvillian & Nelson, 1976; Menyuk, 1974; Schaeffer,et.al., 1975; Smith, 1975; Webster,et.al., 1973) nonelectronic communication boards (Ratusnik & Ratusnik,

1974, 1976) and computers (Heelbring, 1985) (cited from Silverman, 1980).

H. DEAFNESS OR HARD OF HEARING:

The term deafness is used to designate a profound hearing loss persons with this condition receive little or no information necessary to understand speech through the auditory channel. They may, however receive such information through the visual channel by speechreading. The deaf usually do not learn to talk without special training. Even with such training, their speech may not become sufficiently intelligible for at least some communicative purposes. Many deaf persons, therefore, rely on AAC systems as either a supplement to or substitute for speech. The AAC system that used most often by the deaf is a manual gestural system known as American sign language or Ameslan (Moores, 1974). Ameslan is used by the deaf in two ways. The first is as a supplement to speech, messages are encoded and transmitted simultaneously in manual sign and speech (Total communication). The second is as a substitute for speech, messages are encoded and transmitted manual sign.

2.2.4. SELECTION OF AAC SYSTEMS:

Many of the AAC systems are described in earlier section. The optimal communication mode (or combination of modes) for a person is the one (or ones) from among those he

could use that would come closest to meeting his communication need at a relatively low cost. Cost refers here not only to the expense of purchasing and maintaining components (switching mechanisms; displays etc.,) but also to the time investments required of both client and clinician.

There are certain questions arise before we select any system. They are:

1. What is the cause of the persons communicative disorder?
2. How does the person communicate at present?
3. What are his communication needs?
4. What is his inner receptive and expressive language status?
5. Of the existing AAC systems which would it be possible for him to use?
6. Of the systems he could use, which system (or combination of systems) would be optimal for meeting his communication needs?

We have to obtain types of information to answer these questions. Those mentioned, of course, are not the only ones that ever would be needed for this purpose. They are, however, ones that would be needed to answer these questions for almost all speechless children and adults (Silverman, 1980).

2.2.4.1. CRITERIA FOR SELECTION OF CANDIDACY:

There is no particular criteria for determining candidacy

for an AAC system followed universally. However, Shane and Bashir (1980) reviewed criteria for the selection of a candidate for an AAC system. These included consideration of cognitive, oral, reflex, language, motor, intelligibility, emotional, chronological age, previous therapy, imitative and environmental factors. Shane and Bashir (1980) proposed a preliminary decision-making process for determining an individual's candidacy for an AAC system. This does not address which system or teaching method would best serve the individual for whom an AAC system is deemed appropriate. Although AAC systems are used with persons having adventitious communication disorders, the described decision process is intended for disorders having a congenital origin. Decision making results from an evaluation of data derived from 10 areas of clinical concern arranged in levels of a branching type decision matrix described in the figure-30.

LEVEL-I: COGNITIVE FACTORS:

At least stage V sensorimotor intelligence?

At least 18 months mental age or abilities to recognize at least at photograph level?

YES_____> Go to II
 No --_____> Delay

LEVEL-II: ORAL REFLEX FACTORS:

Persistent 1) Rooting 2) Gag 3) Bite 4) Suck/Swallow or
 5) Jaw extension reflex?

YES_____> Elect_____> Go to X
 NO_____> Continue to III

LEVEL-III: LANGUAGE AND MOTOR SPEECH PRODUCTION FACTORS:

A. Is there a discrepancy between receptive and expressive skills?

YES_____> Go to IIIB

NO_____> Go to V

B. Is the discrepancy explained predominantly on the basis of motor speech disorder?

YES_____> Go to V

NO_____> Go to IIIC

Uncertain_____> Go to IV

C. Is the discrepancy explained predominantly on the basis of an expressive language disorder?

YES_____> Go to VII

NO_____> Go to VI

Uncertain_____> Go to V

LEVEL-IV: MOTOR SPEECH - SOME CONTRIBUTING FACTORS:

* Presence of neuromuscular involvement affecting postural tone and/ or postural stability?

* Presence of praxic disturbance?

* Vocal production consists primarily of vowel production?

* Vocal production consists primarily of undifferentiated sounds?

* History of eating problems?

* Expressive drooling?

YES_____> Evidence to support motor speech involvement.
(Go to V)

NO_____> Evidence against motor speech involvement.
(Go to V)

LEVEL-V: PRODUCTION - SOME CONTRIBUTING FACTORS:

* Speech intelligible except to family and immediate friends?

* Predominant mode of communication is through pointing, gesture, facial-body effect?

* Predominance of single word utterances?

* Frustration associated with inability to speak?

YES_____> Evidence to Elect (Go to VII)

NO_____> Evidence to Delay or Reject (Go to VII)

LEVEL-VI: EMOTIONAL FACTORS:

A. History of precipitous loss of expressive speech?

YES_____> Go to VIII

NO_____> Go to VIB

B. Speaks to selected persons or refuses to speak?

YES_____> Go to VIII

NO_____> Go to V

LEVEL-VII: CHRONOLOGICAL AGE FACTORS:

A. Chronological age less than 3 years?

YES_____> Go to VIIIA

B. Chronological age between 3 and 5 years?

YES_____> Go to VIIIA

C. Chronological age greater than 5 years?

YES_____> Go to VIIIA

LEVEL-VIII: PREVIOUS THERAPY FACTORS:

A. Has had previous therapy?

YES_____> Go to VIIIB

NO_____> Go to IX weigh evidence (Delay with trial therapy or Elect) Go to X

B. Previous therapy appropriate?

YES_____> Go to VIIIC

NO_____> Delay with trial therapy.

C. Therapy progress too slow to enable effective communication?

YES_____> Elect_____> Go to X

NO_____> Delay_____> Continue therapy

D. Therapy appropriately with held?

YES_____> Elect_____> Go to X
NO_____> Delay with trial therapy

LEVEL-IX: PREVIOUS THERAPY - SOME CONTRIBUTING FACTORS:

* Able to imitate (with accuracy) speech sounds or words?

* Gross motor or oral motor movements?

YES_____> Evidence to Delay. Go to VIII
NO_____> Evidence to Elect. Go to VIII

LEVEL-X: IMPLEMENTATION FACTORS - ENVIRONMENT:

* Family willing to implement (use, allow to be introduced)

* AAC system recommendation?

YES_____> IMPLEMENT
NO_____> COUNSEL.

FIGURE-30: Election Decision Matrix (from Shane and Bashir,1980).

The decisions generated from the matrix are specified as to whether the final decision is to elect, delay or reject an AAC system. A decision to delay indicates that an AAC system is inappropriate at the time, possibly because of lack of cognitive readiness or the need to study the effects of a different form of therapy. A decision to reject indicates that expression through speech rather than through an AAC system is considered more appropriate.

In recent years, number of general considerations for the selection of a symbol systems have been presented (Lloyd and Karlan, 1983).

2.2.4.2. ASSESSMENT:

Two general strategies are used in selecting an AAC system for the non-oral individual.

- 1) To present the client with an array of AAC systems determine which the client can use best and then recommend that system/device.
- 2) To focus on the needs and abilities of the client through a set of assessment procedures. This assessment generates a list of functions and specifications that should be combined in a device. Devices can then be compared to this list to determine the extent to which a client-device match can be made.

A. SYSTEM CHARACTERIZATION:

The characterization method consists of three phases; technical evaluation; human factors evaluation and clinical trials (Coleman et al., 1980).

- 1) Technical evaluation helps determine the operational principles of the device. The information sought includes the method of accessing vocabulary, power source, the method of materials of construction, quality of fabrication and design, maintainability, reliability, physical structure and any other aspects of device operation that may be measured or determined in a bench test.
- 2) The goals of human factors evaluation are:

- a) to determine the user skills and abilities required to operate the device.
 - b) to ascertain what the device can do when, and
 - c) to note features that may either increase or decrease performance efficiency.
- 3) Clinical trials are conducted with individuals selected on the basis of type of disability, physical and linguistic capability and situational requirements. A cross section of clients is used and each device is evaluated with at least five clients.

A. ASSESSMENT OF NON-ORAL INDIVIDUALS:

The major goal in the assessment of a client for an AAC system is to obtain a clear picture of his or her current functional levels as they relate to the use of an AAC system. When a client is referred for an AAC system, the staff gathers information from other professionals concerning the client's past medical history, assessment and therapy. Interviews are conducted with the client and the client's family or primary car-taker. During these interviews, questions from three forms are used to obtain additional information on the client's background abilities, functional skills, communication skills and device utilization. The functional skills form organizes the client's medical history and his/her sensory and motor abilities. The communication skills form provides information regarding receptive and expressive language

skills. The device utilization form allows the interviewer to gather information regarding for e.g. where, how and how many hours per day the system/device will be used, how it should be packed and arranged, whether it should be portable, and whether it should have hard (printed) copy or soft (transient) copy (Coleman, et.al., 1980).

a. PHYSICAL ASSESSMENT:- The first procedure is to determine a behavior that the client can voluntarily and reliably control. Measurements of force, resolution and range capabilities of various anatomic sites allow selection of an interface. Language skills can then be evaluated using the interface. Additional interfaces are also tried and measurements are made to determine speed and accuracy with various interface and output combinations. The client is encouraged to express opinions regarding the desirability of various interfaces and out-puts.

1. ACTION FORCE: Activation force is the minimal and maximal amount of force which client can exert using a given anatomic site. Measurements are made with a strain-gauge bridge calibrated in grams of force. The client is instructed to exert a comfortable pressure and the force is measured across five trials. The client is then asked to press as hard as possible. Again, five trials are given. These data are then matched to the force required for specific interface.

2. RANGE OF MOTION: This term refers to the maximal distance

across which a client can move a body part. In most cases a client is asked to point in space or sweep a space with the arm, elbow, head or other possible site (for eg. up-down; left-right). Data are usually taken in the form of number of degrees per direction per zero reference point for each anatomical site. Zero reference points are usually rest positions, such as head straight, arm at rest beside the body, or arm moving from the midline of the body. A permanent record can be obtained with a marking pen attached to the body and a large piece of paper.

3. RESOLUTION OF MOTION: Resolution of motion is the minimal movement a client can reliably and accurately execute. Methods of measurement depend somewhat on a client's physical abilities. One way of measurement is that, two marks are made a given distance apart and the client is requested to make or point to an area between the two marked locations. The distance between the locations is varied until an accurate response can no longer be generated. The client is required to produce 8 out of 10 correct responses at the minimum separation and the test is repeated after a rest period to insure reliability.

4. REACTION TIME: This term refers to the time from the onset of a stimulus to the making of a response under instructions emphasizing rapid responding. This time is measured using both visual (light) and auditory (buzzer) stimuli. A client's reaction time is compared to the time

requirements of a specific AAC system.

5. REPETITION OF RESPONSE: Repetition of response is the average number of responses capable of being made in a specified period. Five trials are used with each potential interface.

b. LANGUAGE EVALUATION: The following tasks test the prelanguage and language skills (Clark, 1974; Coleman, et.al., 1980; Schlesinger, 1974) needed for an AAC system. The purpose of these tasks is to screen the client so as to determine if an AAC system is feasible and what language features it should have.

1. ATTENTION: To determine the presence of visual attention a blinking light is presented space at 45 degree angles in five positions beginning at the midline and going to each side. The tester should observe the client for a shift of gaze toward the light. For auditory attention, a tone of approximately 3000Hz at 70dB is presented through speakers placed at angles in the same manner as the light. Again the client is observed for evidence of localization such as head or eye movements in the direction of the tone. For tactile attention, simple rhythmic patterns are presented on areas of the body believed to have sensation and shifts of gaze is observed.

2. MATCHING: The client is presented an array of two items and shown an item that matches one of the two. The client is asked to match one item from an array of 2-5 items,

starting with the smallest array. Five trails are conducted with each size array and a new array is presented for each trail.

3. MEMORY: The client is presented with 3 - 6 stimuli in a specific order such as a square, a circle and triangle. The client is requested to recall the items in order. Then words, digits are presented in a similar manner.

4. SEQUENCING: The sequencing task requires a client to arrange 3-6 stimuli in logical order based on size, causality, succession of event or any similar series appropriate to the client's functional ability. A point is subtracted for each item out of sequence.

5. CATEGORIZATION: The client is requested to group 8-10 items in two or three categories (for e.g. animals; furniture; transportation). Five arrays are presented and one point is subtracted for each item placed in an appropriate category.

6. VOCABULARY: Vocabulary refers to the type of elements a client can use to communicate. A client is instructed to select from arrays that may consist of real articles or miniature of real articles, pictures, Blissymbolics, Rebus symbols or words or letter of the alphabet, depending on the estimated ability of the client. Tasks are increased in complexity if the client responds correctly to 2/3 trials in a task.

7. GRAMMAR: The term grammar refers to a client's ability

to arrange items, pictures, symbols, words or letters into larger communication units. The results from the vocabulary evaluation indicate which items can be used in the arrangement of larger meaningful units. The client is presented with four items and asked to select two of them name by the evaluator to produce a meaningful sentence or idea. For e.g. the client may be shown Blissymbols for big, read, cat and truck and asked to select big cat. The task consists of three trials with new items for each trial. The client is only given more complex tasks if he or she responds correctly on two out of the three trials in the preceding tasks.

8. SEMANTIC AND PRAGMATICS: The terms semantics and pragmatics refer to the selection of meaningful; usable items for the client's communication system. In cases where the alphabet is used, this step is unnecessary, in other cases (particularly those in which the number of items the array can accommodate are limited); care must be taken to provide those items most useful to the client, the client's caretakers and friends.

2.2.4.3. SYSTEM PRESCRIPTION:

Following a client's evaluation the data are related to characteristics of an AAC system. Based on knowledge of the client's capabilities an appropriate AAC system can be selected. The characteristics desired in a system are then matched to a commercially available system/device. If a

suitable system can not be found, a custom designed AAC system may be indicated. If the client decided to procure a system/device, follow-up evaluations and training in its use for both client and those who interact with the client are highly desirable.

Follow-up consists of making sure the system is functioning properly and that it is used in the manner intended. Task analysis are also done after one week and one, three, six and twelve months following device delivery. During these test, speed and accuracy scores are obtained with and without the aid of the device. By comparing these results to the original baseline data and by comparing performance with and without the device, the efficiency of the AAC system can be evaluated.

2.2.4.4. MOVING FROM ASSESSMENT TO TRAINING:

The transition from assessment to training is often exciting time one that is filled with great anticipation for the client, but often a time of anxiousness for others. It is critical during this period that the client clearly understands that an AAC system will not eliminate his or her disability, but with proper training and use, can serve to equalize or minimize the effects of that disability. The Speech-Language-Pathologist plays an important role at this point in the client's training. During this phase, the Speech-Language -Pathologist can not only detail what system components are required for the individual to be

successful, but also can map out communication approaches for using the AAC system successfully. By following these procedures once the AAC system is obtained, the client already knows how it works, when and where it will be used, what things it will communicate. Thus the task of customizing the device to meet the clients individual needs has begun (Clark, 1992).

Vanderheiden and Lloyd (1983) offer seven suggestions for evaluating an AAC system. In order for the system to be functional must:

1. Meet the full range of communicative functions and tasks.
2. Allow interactions with all communication partners in the environment.
3. Permit efficient and effective communication while minimizing conversational control.
4. Permit expression of increasingly complex ideas and messages as the user develops.
5. Be integrated and accepted into the user's social and physical environments.
6. Interface with existing seating systems, environmental controls and teaching aids.
7. Be purchased and maintained without financial hardship.

2.2.5. SOME AVAILABLE RESOURCES:

A. ORGANIZATIONS:

a. The International Society for Augmentative and Alternative Communication (ISAAC) is an organization dedicated to promoting the field of AAC. It was founded by representatives of seven countries in May 1983, at East Lansing Michigan. The purpose of ISAAC are threefold:

- * To advance the transdisciplinary field of AAC throughout the world,
- * To facilitate information exchange,
- * To focus attention on work in the field through conferences and scientific meetings, publications, advocacy, scholarships and publication awards.

ISAAC now has over 2,400 members in more than 45 countries. ISAAC currently has ten national/regional chapters: Canada, Denmark, Finland, Germany, Israel, Sweden, The Netherlands, Norway, United Kingdom and USA. ISAAC also has official journal and affiliate publications. The journal is AAC and publications are COMMUNICATION OUTLOOK and COMMUNICATING TOGETHER. For addresses see appendix-III.

b. The rehabilitation Engineering Society of North America (RESNA) is an organization dedicated not just for rehabilitation engineering but more generally to the concept of the interdisciplinary advancement of rehabilitation through technology. The organization puts out a quarterly

newsletter entitled REHABILITATION TECHNOLOGY REVIEW. For address see appendix-III.

c. The International Project on Communication Aids for the Speech Impaired (IPCAS) is a coalition of four member countries to promote government support of the needs of the speech impaired. Countries which are currently comprise IPCAS membership are Canada, the United States, Sweden and The U.K. Major activities include information sharing, publications, an annual fellowship for study in the field and cooperative ventures in areas such as standardization of assessment protocols. Publications are JOHNATHAN; CONVERSATION; and FELLOWSHIP REPORTS. For address see appendix-III.

There are other organizations which are dedicated to the work in the field of AAC. For these addresses see appendix-III.

ORGANIZATIONS IN INDIA:

The Spastic Society of Eastern India (SSEI) has taken initiative work in the field of AAC. This organization also offers a short term course in AAC for the professionals. The short term course focuses on philosophy of AAC, assessment, goal planning and intervention for the client and facilitator, overview and available systems and strategies for enhancing communication. The teacher training diploma program also focuses the above areas in AAC

and Blissymbolics in great detail. AAC is a new field and there is a need to create awareness. Keeping this in perspective, the SSEI has developed two short film presentations titled (i) SOUND OF SILENCE and (ii) BLISS.

"Kya Baat Hai" is a series of seven short 15 minute films produced for the telefilms projects depicting the development of communication in a physically and mentally handicapped child. SSEI publishes a journal "DEEPSHIKA" which is a forum for exchanging information, ideas, teaching strategies, views and new thoughts on the disabled population. SSEI ran a trainer's workshop in AAC for speech therapists and senior special educators in 1991. For more information contact SSEI (for address see appendix-III).

The Spastic Society of Tamilnadu (SPASTN) also offers AAC services. The AAC services are offered at two levels:

LEVEL-I: Assessment, intervention and training in AAC offered to children with cerebral palsy and their families.

LEVEL-II: a) Inservice offered to the staff of SPASTN,
b) AAC is offered as a part of the training courses for Resource Teachers and Resource Teacher Assistants for children with cerebral palsy.

Resource teacher assistants are trained in implementing intervention programs in therapy and education and construction of individualized communication aids

appropriate for Indian setting and to assist rehabilitation professionals. For address see appendix-III.

C. JOURNALS AND NEWS LETTERS:

There are number of journals and newsletters existing in the field of AAC and dedicated to bring out the information regarding the recent technology and research work in the world. For addresses see appendix-III.

2.2.6. SURVEY OF AAC SYSTEMS:

Many research problems require the systematic collection of data from populations or samples of population through the use of personal interviews or other data-gathering devices. Surveys are now commonplace in our lives. Surveys employ verbal statements or questions to which a person is asked to respond. Surveys can be used simply to estimate population characteristics (e.g., the percentage of the population using an AAC system) or to study relations between variables.

Such survey reports exist in the field of AAC systems, but are quite limited. They are Orthographic Systems Used in Education of the Deaf (Avery, 1967); Survey of the use of signing and symbol systems (Kiernan, Reid & Jones, 1979a); Sign and Symbols - A Review of literature and survey of use of non-vocal communication systems (Kiernan, Reid & Jones, 1982); The use of non-vocal communication techniques with autistic individuals (Kiernan, 1983); The use of

augmentative communication systems in schools and units for autistic and aphasic children in the United Kingdom (Kiernan and Reid, 1984); A survey of special educators awareness of experiences with and attitudes toward nonverbal communication aids in the schools (Shrewsbury, Lass & Joseph, 1985) and Roles and Responsibilities of Special Education Teachers Serving on Teams Delivering AAC Services (Locke and Mirenda, 1992). However, there is no survey attempt to study the implementation of AAC systems in India.

Avery (1967) found that the Northampton Charts had the widest use in schools for the deaf and teacher training centers. i/t/a (Initial Teaching Alphabet) has emerged as a system which is receiving much attention in teacher training centers.

Kiernan and Reid (1984) surveyed the use of augmentative communication systems in schools and units for autistic and aphasic children in the United Kingdom. Up to 40 schools and units were surveyed in the four surveys between 1978 and 1982. These surveys focused only the use of sign languages and symbol systems by schools catering for autistic and aphasic children. Thirty one schools and units describing themselves as for autistic or for speech or language disordered children were surveyed in 1978. The figures for 1979, 1980 and 1982 were respectively 32, 39 and 42. No attempt was made to survey language units attached

to schools for normal children. The return rates overall special schools for the four surveys were as follows: 1978- 77.8%; 1979- 52.3%; 1980- 84.7%; 1982- 91.9%. The results of postal surveys showed that the majority of schools and units were using some form of augmentative system. The use of sign language predominated in all types of schools. Of the 42 schools responding to the surveys, 35 used sign and nine some type of symbol system at some stage in the period between 1978 and 1982. In general, schools or units describing themselves as catering for autistic pupils used British Sign Language (BSL); usually British Sign Language in context of the Makaton Vocabulary [BSL(M)]. Of the 30 schools and units which said that they catered either exclusively or in part for autistic children, 16 said that they used BSL(M) and a further two units had used latest survey reply. Four schools and units teaching autistic pupils reported successful use of Paget Gorman Sign Systems (PGSS). Eight schools and units did not use sign although, as noted, three had used BSL or BSL(M).

Data on symbol systems showed minimal use with autistic pupils. Two schools or units were using Rebus, one Makaton symbols. One school had experimented with Blissymbols and abandoned them in favor of Rebus. Two other settings were considering symbols.

Data from schools educating children with speech or language disorders show a predominant use of PGSS. Of the 13

relevant schools and units their most recent information indicated that ten employed PGSS, two BSL(M) and one unit did not employ any of the system. The two BSL(M) programmes used the vocabulary as a word bank, i.e., they ignored the stages. Several schools employed Blissymbols or word cards. It is likely that other schools in fact employed words or word cards since they emphasized the integration of their language programmes in terms of reading and writing as well as immediate communication skills. Kiernan and Reid (1984) paper has isolated a number of issues and problems in use.

Shrewsbury, Lass and Joseph (1985) did a survey to determine the awareness of experiences with and attitudes toward nonverbal communication aids by special educators in county school systems throughout West Virginia. A 14-item questionnaire was constructed and distributed to special educators in 14 counties throughout the state. Of 796 questionnaires distributed to the 14 counties, a total 420 special educators (53%) from 12 counties returned completed questionnaires and 237 of these questionnaires from 11 counties qualified for inclusion in the survey. Results indicate respondents limited awareness, understanding and experiences with nonverbal communication aids. The following are the major findings of the survey:

1. The overwhelming majority of respondents (88.4%) currently teach the learning disabled (38.8%); educable mentally retarded (24.0%); trainable mentally retarded

(13.9%) or a combination of two of these three groups (11.7%) and the overwhelming majority (90.4%) hold state certification in special education (43.0%); learning disabilities (15.6%); learning disabilities and special education (16.9%) or a combination of at least these areas with other areas (14.9%).

2. More than half of all respondents (60.3%) had never worked with a student using an AAC system during their careers.
3. When asked what they felt was the most appropriate means of communication for non-verbal individuals, half of all respondents (50.6%) indicated a combination of two or more of the techniques of sign language, Blissymbolics and picture boards while 18.6% indicated sign language alone. However, 22.4% of the respondents had no option.
4. More than half of all respondents (52.7%) felt that the appropriate time to introduce an AAC system is immediately (as soon as resources are available); while 19.4% felt that the aid should be introduced after traditional speech therapy had failed. However, one-fifth of all respondents (19.8%) did not know.
5. When asked about other concerns that they as teachers have regarding AAC system in the classroom, the respondents most frequent answers included additional training required by teachers (36.3%), acceptance of AAC system by fellow (verbal) students (15.6%) or both (21.5%).

Several suggestions were made for preservice and continuing education programs for special educators by those authors.

Locke and Mirenda (1992) did a survey to gather information about the background, roles and responsibilities of special education teachers who serve on teams that deliver AAC services across the United States. The surveys were mailed to a total of 304 special education teachers from the continental United States. A total of 286 surveys were completed and returned, for an overall return rate of 94%. However, only 210 out of 304 (69%) of these surveys were eligible for the study, since 76 were completed by a speech-language-pathologist or someone other than special education teacher. The results indicated that typical respondents served on teams that delivered AAC for 2 to 3 years, had Master's degrees and had some education in the AAC area. The majority of such teams served students diagnosed with a variety of handicapping conditions. The primary AAC roles and responsibilities identified by 80% or more of the educators involved a variety of areas, including adapting the curriculum, identifying needed vocabulary, preparing and maintaining documentation of student progress, writing goals and objectives for AAC users and assessing cognitive abilities. Survey results suggested that there are a number of nontraditional roles assumed by special education teachers that may require particular training attention:

- a) identifying appropriate vocabulary for an AAC user;
- b) determining a students motivation and attitude towards AAC technique;
- c) determining the communication needs of students;
- d) implementing a symbol assessment; and
- e) training significant others about AAC systems.

It appears that the mere AAC knowledge and experience teachers have with students with severe communication disorders, the more AAC roles and responsibilities they feel qualified to assume as members of the teams. Therefore, in addition in planning college courses, workshops and inservices, post secondary educators must begin to develop practicum experiences for adult learner with students who have sever communication disorders.

3. METHODOLOGY

The aim of the study was to gather information on the status of AAC systems in India. Specific information about which schools were using AAC systems, why they were using them, with which type of children and with what success in India, was sought.

3.1. DESIGN OF THE STUDY:

The data was obtained through a questionnaire (see appendix-IV). It included a covering letter requesting the respondent to go through the contents and fill the questionnaire. Confidentiality of the information was assured to the subject. The questionnaire was designed in such a way to elicit maximum information about the use, implementation and efficacy of AAC systems in India.

3.2. PREPARATION OF QUESTIONNAIRE:

The questionnaire was designed to obtain information on AAC systems from schools/institutions for the mental handicap, cerebral palsy and autism. It included 28 questions including the aspects of demographic information, medium of instructions, AAC systems, number of students, type of handicap, severity of the handicap, age, criteria for AAC system selection, tests used, personnel involved, hours of training, reaction of family members, mode of communication at different places, frequency of using AAC system, school/institute/organisation providing any system freely,

teaching programmes, reassessment, training the listeners, type of AAC with respect to indigenous or non-indigenous one, listeners understanding, programmes for public awareness, participation of family members, parent training programmes, most useful AAC system, personal experience, case reports and addresses of the schools which are using AAC systems.

3.3. COVERING LETTER:

The purpose of the study, the person conducting it, the last date to mail it back and instructions to the respondents were printed on the first page of the questionnaire.

3.4. SELECTION OF SUBJECTS:

About one hundred and eighty four schools/institutions (eighteen states) in India were selected from the directory of institutions for the mentally handicapped persons in India (1988) published by National Institute for the Mentally Handicapped (NIMH). The criteria for selection of schools/institutes were as follows:

- a) Those schools having trained professional including Psychologist, Speech-Language-Pathologist, Special educators, occupational therapist, Physiotherapist and/or others.
- b) Most of the schools were selected from urban areas as it was felt that only in such set ups would a AAC system be considered.

c) Only schools/institutions for the mentally handicapped, cerebral palsied and autism were selected.

3.5. CONFIDENTIALITY:

Much emphasis was placed on personal anonymity and confidentiality of the information sought through the questionnaire. This was also conveyed to the respondents.

3.6. MAILING PROCEDURE:

A total of one hundred and eighty four questionnaires were mailed to the respective schools/institutions for the mental handicap, cerebral palsy and autism in seventeen states throughout India. A self-addressed stamped return envelop with the questionnaire was mailed to each respondent to ensure early reply.

3.7. FOLLOW UPS:

Three weeks after the questionnaires were dispatched a reminder was sent to those people who did not return them. In case there was no response for eight weeks a second and last follow-up was sent, requesting them to return the filled questionnaire immediately.

3.8. DATA PROCESSING:

Questionnaires on receipt were reviewed and categorized according to the state-wise information. Then the data was separately tabulated for each school/institution and analysed. The data was analysed regarding the AAC systems,

type of handicap, severity of handicap, personnel involved, age of the children etc,. The questionnaires which were returned due to incorrect addresses were not included for the analysis of the data.

RESULTS AND DISCUSSION

As the questionnaires and the responses were received, they were tabulated and analyzed for information on different AAC systems used by different schools/institutions for mental handicap/ cerebral palsy/autism in different states of India. Findings of the survey were described and represented in the tabular and graphical forms.

4.1. DISTRIBUTION OF QUESTIONNAIRES:

There were 184 questionnaires sent to the schools/institutions for mental handicap/cerebral palsy/autism, in 18 states all over India. 17 questionnaire were invalid as they were returned due to incorrect addresses. Totally 51 (30.5%) questionnaires (belonging to 13 states) were obtained and analysed.

Table-4. depicts the distribution of questionnaires to the various states of India and also shows that total responses obtained from 13 states and the total questionnaires returned due to incorrect addresses.

Data obtained through the questionnaire from 51 schools were analysed. Wherever appropriate the data was represented in terms of tables and graphs. But major emphasis was given to the description and analysis of information.

4.2. AAC SYSTEMS:

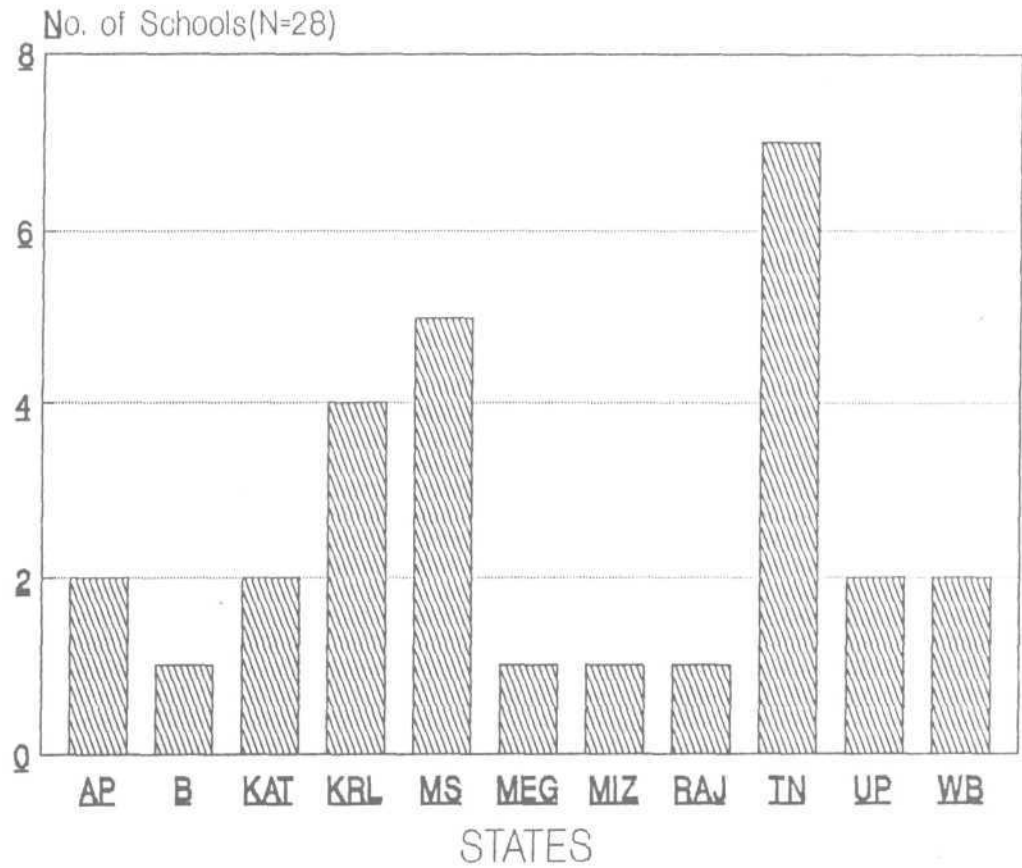
Out of the 51 responses obtained from 13 states, it was

found that only 28 (54.9%) schools/institutions for mental handicap/cerebral palsy/autism in 11 states of India are using various types of AAC systems.

Sl. No.	Name of the state	Total Q's sent	Total responses obtained	Total No. returned due to incorrect address
01.	Andhra Pradesh	11	06	01
02.	Assam	03	-	-
03.	Bihar	03	01	-
04.	Delhi	07	01	03
05.	Goa	01	-	-
06.	Gujarat	11	02	01
07.	Haryana	01	-	-
08.	Karnataka	28	07	05
09.	Kerala	34	07	04
10.	Madhya Pradesh	03	-	-
11.	Maharashtra	30	10	-
12.	Meghalaya	01	01	-
13.	Mizoram	01	01	-
14.	Orissa	04	-	-
15.	Rajasthan	04	01	01
16.	Tamilnadu	22	09	-
17.	Uttar Pradesh	06	02	01
18.	West Bengal	14	03	01
Total		184	51	17
Percentage			30.5%	0.92%

TABLE-4: Showing total number of questionnaires sent, total number of responses obtained and total number of questionnaires returned due to incorrect address, in different states of India.

It can be seen from table-5 and Graph-1 that out of 28 schools 25% are from Tamilnadu, 17.8% are from Maharashtra, 14.2% are from Kerala, 7.14% are from Andhra Pradesh, Karnataka, Uttar Pradesh and West Bengal, 3.5% are from Bihar, Meghalaya, Mizoram and Rajasthan are using various



GRAPH-1: Showing the No. of schools for MR/CP/Autism using AAC systems in different States of India.

[AP = Andhra Pradesh; B = Bihar; KAT = Karnataka; KRL = Kerala; MS = Maharashtra; MEG = Meghalaya; MIZ = Mizoram; RAJ = Rajasthan; TN = Tamilnadu; UP = Uttar Pradesh; WB = West Benagal].

types of AAC system with different handicapped population. This data indicates that Tamilnadu has the largest number of schools using AAC systems.

Sl. No.	Name of the state	No. of schools using AAC systems	
01.	Andhra Pradesh	02	7.19%
02.	Bihar	01	3.50%
03.	Karnataka	02	7.10%
04.	Kerala	04	14.20%
05.	Maharashtra	05	17.80%
06.	Meghalaya	01	3.50%
07.	Mizoram	01	3.50%
08.	Rajasthan	01	3.50%
09.	Tamilnadu	07	25.00%
10.	Uttar Pradesh	02	7.10%
11.	West Bengal	02	7.10%
Total		28	54.90%

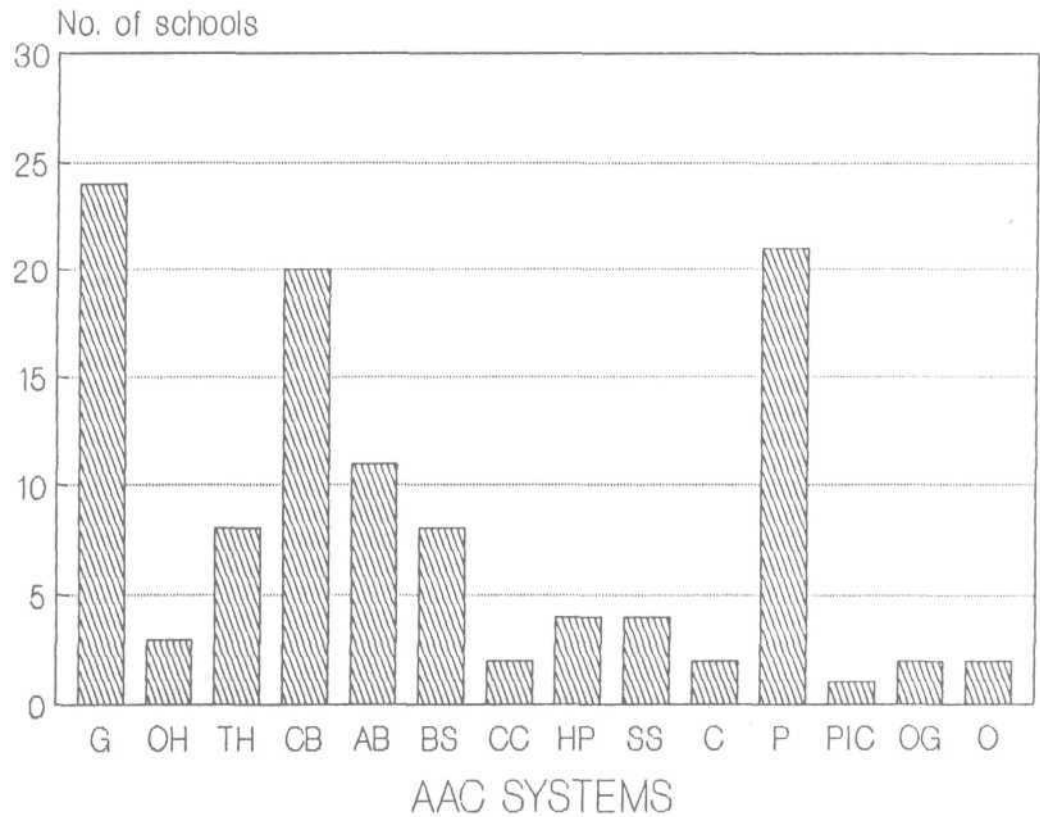
TABLE-5: Showing the number of Schools/ Institutions for mental handicap/cerebral palsy/autism using AAC systems in different states of India.

Table-6 shows the number of schools using various types of AAC systems in different states (11 states) of India. From this table-6 it can be inferred that gestures are still the most popular form of AAC system in India. The second most popular mode of AAC system in India is photographs or pictorial drawings and next is the communication boards. It has been seen that all the 11 states of India are using one or the other form of AAC systems with different clinical population.

Graph-2 indicates the following percentage of schools using various types of AAC systems: 85.7% Gestures; 75%

Sl. No.	HAKE OF THE STATE	GESTURES	SIGN ONE HANDED	LANGUAGE TWO HANDED	COMMUNI-CATION BOARDS	ALPHABET BOARDS	BLISS SYMBOLS	CANON COMMUNI-CATOR	HEADLIGHT POINTER	SYNTHETIC SPEECH	COMPUTERS	PHOTOGRAPHS OR PICTORIAL DRAWINGS	PICSYMS	ORTHO-GRAPHY	OTHERS
1.	Andhra Pradesh	02	01	01	01	01	01	-	-	-	-	01	-	-	-
2.	Bihar	01	-	-	01	-	-	-	-	-	-	01	-	-	-
3.	Karnataka	02	-	01	01	02	01	01	-	-	-	02	-	01	01
4.	Kerala	02	-	01	01	-	-	-	01	01	-	01	-	-	-
5.	Maharashtra	04	-	-	02	01	-	-	-	-	01	04	-	-	01
6.	Meghalaya	01	-	-	01	-	-	-	-	-	-	01	-	-	-
7.	Mizoran	01	-	01	01	01	-	-	01	01	-	01	-	-	-
8.	Rajasthan	-	-	-	01	-	-	-	-	-	-	01	-	-	-
9.	Tamilnadu	07	01	02	07	03	02	-	01	01	01	06	-	-	-
10.	Uttar Pradesh	02	-	01	02	02	02	01	-	-	-	02	-	-	-
11.	West Bengal	02	01	01	02	01	02	-	01	01	-	01	01	01	-
Total		24	03	08	20	11	08	02	04	04	02	21	01	02	02
Percentage		85.7%	10.7%	28.5%	71.4%	39.2%	28.5%	7.1%	14.2%	14.2%	7.1%	75%	3.5%	7.1%	7.1%

TABLE-4: Showing the number of schools/ institutions using various kinds of AAC systems in different states of India (N=28).



GRAPH-2: Showing the No. of schools using various AAC systems in India.
 [G = Gestures; OH = One Handed sign language; TH = Two Handed sign language; CB = communication Boards; AB = Alphabet Boards; BS = Blissymbols; CC = Canon Communicator; HP = Head Pointer; SS = Synthetic Speech; C = Computer; P = Pictorial drawings or Photographs; PIC = PICSYMS; OG = Orthography; O = Others].

Photographs or Pictorial drawings; 71.4% Communication boards; 39.2% Alphabet boards; 28.5% Two handed Sign language and Blissymbols; 14.2% Head light pointer and synthetic Speech; 10.7% One handed Sign language; 7.1% Canon communicators; Computers; Orthography; and Others (Rubber stamps and Makaton symbols); and 3.5% PICSYMS.

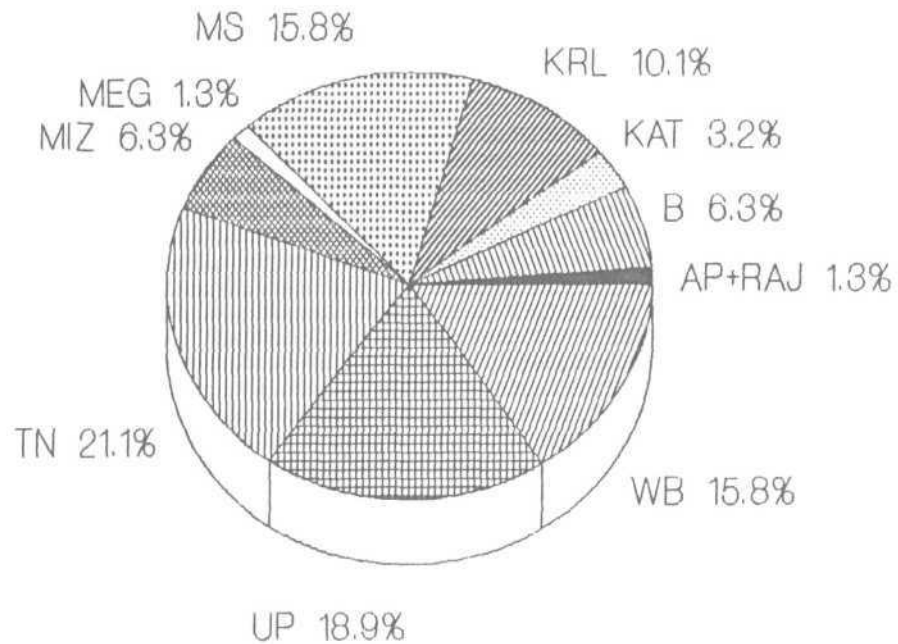
4.3. NUMBER OF STUDENTS AND THEIR AGE:

When asked about the number of students using AAC systems, reliable responses were obtained from 65% of the questionnaires. The age range of these students were also obtained.

Sl. No.	Name of the state	No. of students using AAC systems	Age range
01.	Andhra Pradesh	02	0.63%
02.	Bihar	20	6.30%
03.	Karnataka	10	3.50%
04.	Kerala	32	10.00%
05.	Maharashtra	50	15.70%
06.	Meghalaya	04	1.20%
07.	Mizoram	20	6.30%
08.	Rajasthan	02	0.63%
09.	Tamilnadu	67	21.10%
10.	Uttar Pradesh	60	18.90%
11.	West Bengal	50	15.70%
Total		317	

TABLE-7: Showing the number of students using AAC systems and their age range in different states of India (N=28).

From the above table we can see that the total number of students using AAC systems are 317. These students ranged in age from 2 1/2 - 30 years. However, AAC systems could be used in adults also. The maximum number of students using



GRAPH-3: Showing the percentage of students using AAC systems in different state of India (N = 28).

[AP = Andhra Pradesh; B = Bihar; KAT = Karnataka; KRL = Kerala; MS = Maharashtra; MEG = Megalaya; MIZ = Mizoram; RAJ = Rajasthan; TN = Tamilnadu; UP = Uttar Pradesh; WB = West Benagal].
 (AP & RAJ contributing to each other by .65%).

AAC systems are found in Tamilnadu. This follows respectively Uttar Pradesh; Maharashtra and West Bengal; Kerala; Bihar and Mizoram; Karnataka; Meghalaya and Andhra Pradesh and Rajasthan hierarchically, in the descending order. The percentage of students using various AAC systems in different states of India are depicted in graph-3.

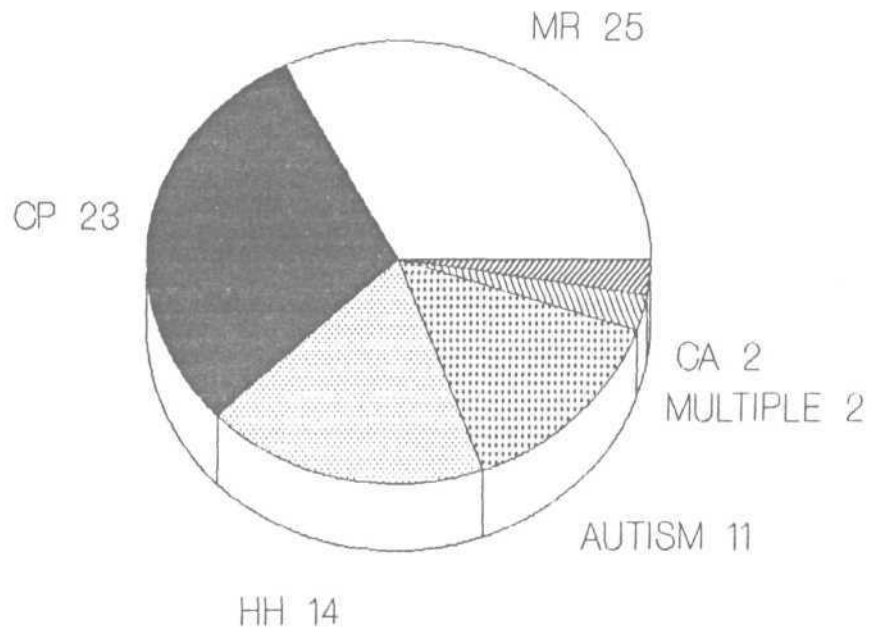
4.4. TYPE OF HANDICAP:

The data indicates that individuals having the following type of handicaps are using AAC systems. They are Cerebral Palsy, Mental Handicapped, Hearing Handicapped, Autism and others which include Multiple Handicapped and Childhood Aphasia.

Sl.No.	NAME OF THE STATE	C.P.	M.H.	H.H.	AUTISM	OTHERS
01.	Andhra Pradesh	01	02	01	01	
02.	Bihar	01	01	01	01	-
03.	Karnataka	02	02	02	01	01
04.	Kerala	03	04	03	02	-
05.	Maharashtra	04	04	01	01	01
06.	Meghalaya	01	01	-	-	01
07.	Mizoram	01	01	01	-	-
08.	Rajasthan	-	01	-	-	-
09.	Tamilnadu	06	06	03	04	-
10.	Uttar Pradesh	02	01	-	01	-
11.	West Bengal	02	02	02	-	01
	Total	23	25	14	11	04

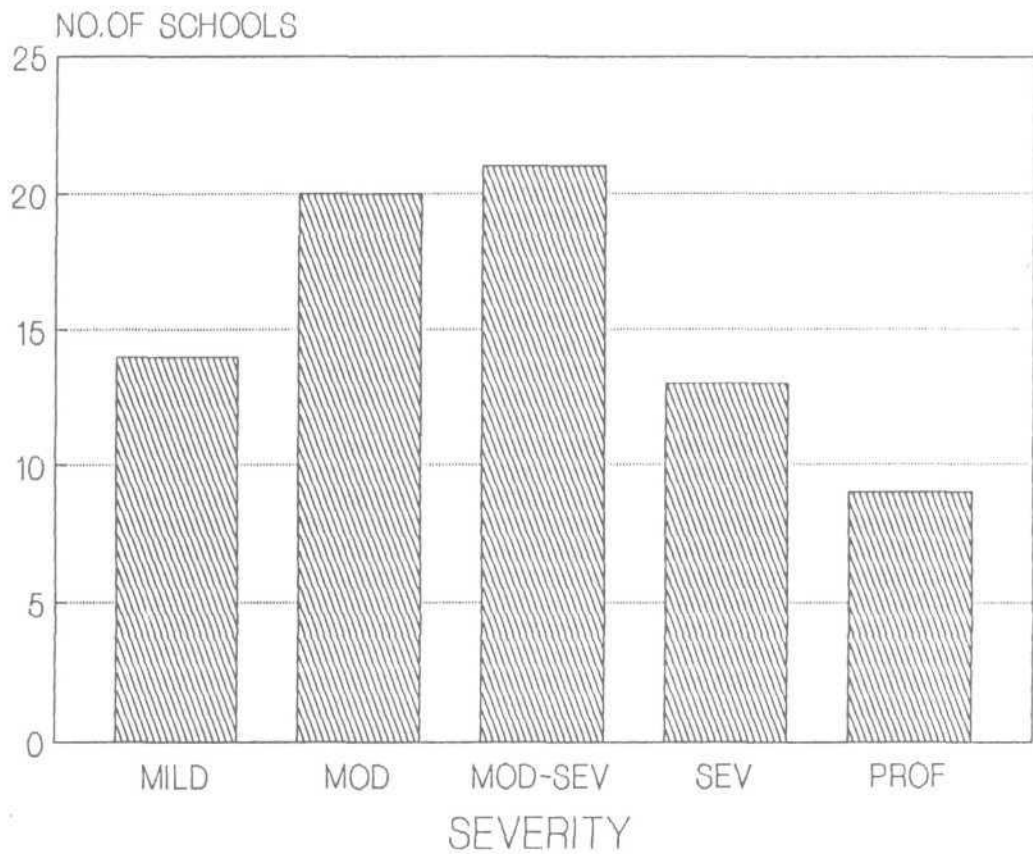
TABLE-8: Showing the number of institutions/schools for the Cerebral Palsy (C.P.); Mentally Handicapped (M.H.); Hearing Handicapped (H.H.); Autism and others using AAC systems in different states of India.

The table-8 indicates the number of schools using AAC systems in different states of India. It is found that maximum number of AAC systems are used by the mentally



GRAPH-4: Showing the No. of schools using various AAC systems with various handicapped population in India.

[CP = Cerebral Palsy; MR = Mental retardation; CA = Childhood Aphasia; MULTIPLE = Multiple Handicapped; HH = Hearing Handciapped].



GRAPH-5: Showing the No. of schools using AAC systems as against the severity of the handicapped in India.

[MOD = Moderate; MOD-SEV = Moderately severe; SEV = Severe; PROF = Profound].

moderately - severe handicapped population are using maximum AAC systems.

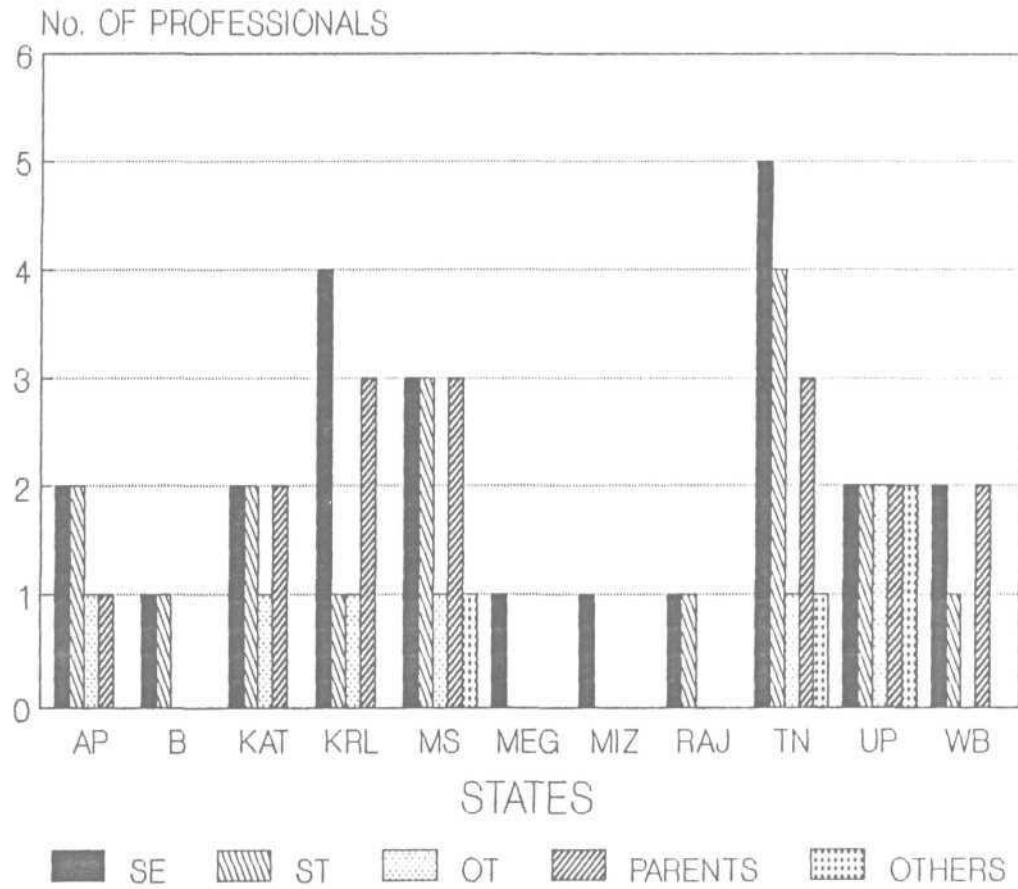
4.6. PROFESSIONALS IN AAC SYSTEM:

When asked about the personnel involved in implementation of AAC systems, it was found that one or more professionals are involved in each school/unit.

From table-10 it can be inferred that the maximum number of professional involved in implementing AAC systems are Special educators (S.E.)(36.3%); which is followed by Speech Therapists (S.T.) (26.0%); Parents (23.5%); Occupational therapists (S.T.) (10.3%); and others (6.0%) including Physio Therapist (P.T.), Psychologists (Psy) and Social Workers(S.W.). The same data is represented in a graphical form in graph-6 and graph-7.

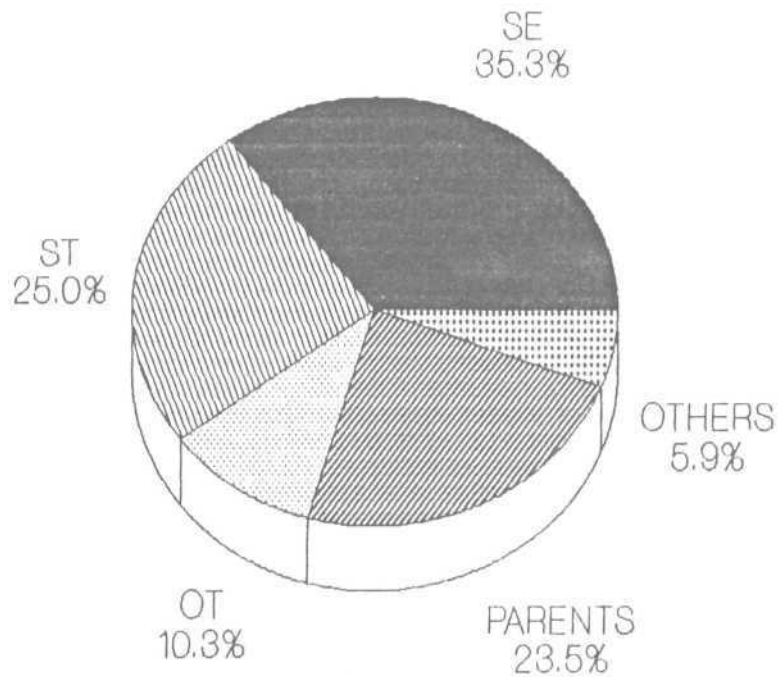
Sl.No.	NAME OF THE STATE	S.E.	S.T.	O.T.	PARENTS	OTHERS
01.	Andhra Pradesh	02	02	01	01	
02.	Bihar	01	01	-	-	-
03.	Karnataka	02	02	01	02	-
04.	Kerala	04	01	01	03	-
05.	Maharashtra	03	03	01	03	01(PT)
06.	Meghalaya	01	-	-	-	-
07.	Mizoram	01	-	-	-	-
08.	Rajasthan	01	01	-	-	-
09.	Tamilnadu	05	04	01	03	01(Psy)
10.	Uttar Pradesh	02	02	02	02	01(SW) 01(Psy)
11.	West Bengal	02	01	-	02	-
	Total	24	17	07	16	04

TABLE-8: Showing the number of schools/centers/institutions and the professionals involved in implementation of AAC systems in different states of India.



GRAPH-6: Showing the No. of schools/units and professionals in AAC in different states of India.

[AP = Andhra Pradesh; B = Bihar; KAT = Karnataka; KRL = Kerala; MS = Maharashtra; MEG = Meghalaya; MIZ = Mizoram; RAJ = Rajasthan; TN = Tamilnadu; UP = Uttar Pradesh; WB = West Benagal].
 {SE = Special Educators; ST = Speech Therapists; OT = Occupational Therapist;}



GRAPH-6: Showing the No. of schools/units and professionals in AAC in different states of India.

[AP = Andhra Pradesh; B = Bihar; KAT = Karnataka;
 KRL = Kerala; MS = Maharashtra; MEG = Megalaya;
 MIZ = Mizoram; RAJ = Rajasthan; TN = Tamilnadu;
 UP = Uttar Pradesh; WB = West Benagalj.
 {SE = Special Educators; ST = Speech Therapists;
 OT = Occupational Therapist;}

4.7. MEDIUM OF INSTRUCTIONS:

From the data it is seen that AAC systems are used in the following languages: Bengali; Gujarathi; Hindi; Khasi; Kannada; Malayalam; Marathi; Mizo; Tamil; Telugu and English.

4.8. CRITERIA FOR SELECTING A CANDIDATE:

No particular criteria was followed by the schools for selecting a candidate for AAC systems. However the respondents used different terms as 'limited speech'; 'communication needs'; 'no speech'; 'cognitive functions'; 'various degrees of subaverage intelligence etc., as criteria for selection of an individual for AAC system.

4.9. SPEECH AND LANGUAGE TESTS:

When asked about the tests administered to the AAC students, 53.5% of the responses were not using any tests; 21.4% of them are using informal tests; 14.2% of them are using REELS test; 7.1% of them are using criterion Based Assessment (CBA) developed by NIMH; and 3.5% of them are using Bankson Language Screening Test (BLST).

4.10. TRAINING HOURS:

When asked about the number of hours of training required by the students to master AAC systems. The responses were blank, most of them were one hour per day, few of them were three hours per week and five hours per week.

4.11. ACCEPTANCE BY PARENTS:

When it came to the acceptance of use of AAC systems, by parents most of the responses were positive.

4.12. MODE OF COMMUNICATION AT DIFFERENT PLACES:

From the responses obtained the mode of communication at different places was as follows:

i) At Home or Hostel or School: 71.4% of the individuals were using AAC systems; 10.7% of the individuals were using total communication, and 17.8% of the individuals were using limited speech with bodily movements and gestures.

ii) At work: 64.2% of the individuals were using AAC systems, 10.7% of the individuals were using limited speech with bodily movements, and 10.7% of the responses revealed as "not applicable" to their children.

4.13. FREQUENCY OF USING DIFFERENT MODES OF COMMUNICATION:

When asked about the frequency of using different modes of communication systems by the children, the responses were ambiguous and few of them were blank. The following responses however, could be noted.

i) Through speech: 10.7% - always; 35.7% - frequently; 10.7% - occasional; 14.2% - rarely; 3.5% - never; and 25% of the responses were blank.

ii) Through Gestures: 25% - always; 32.1% - frequently; 17.8% - occasionally; 3.5% - rarely; 21.4% - blank responses.

iii) Through Writing: 17.8% - occasionally; 32% - rarely; 3.5% - never; 46.4% - blank responses.

iv) Through other modes: 7.1% - always; 10.7% - frequently; 7.1% - occasionally; 25% rarely; 50% - blank responses.

4.14. PROVIDING DEVICES/SYSTEMS:

When asked about the devices/systems provided freely by the schools the following responses were obtained: 50% of the responses were 'Yes'; 42.9% of the responses were 'No' and 7.1% were blank responses. However, the positive responses did not describe the devices which are provided free of cost.

4.15. TEACHING PROGRAMMES:

When inquired about the individual teaching programmes given to the students most of the responses were positive.

4.16. REASSESSMENT OF COMMUNICATION ABILITIES:

When asked about the reassessment of communication abilities of an individual, most of the responses were affirmative and reassessment was reported to be done for every 3 to 6 months.

4.17. TRAINING LISTENERS:

Most of the responses were left blank when inquired about the steps taken to train the listeners. Few of the answers were irrelevant like "home steps"; environment communication training" etc., It appears from the data that

respondents did not understand the question totally.

4.18. INDIGENOUS Vs NON-INDIGENOUS SYSTEM:

When questioned about the use of indigenous or non-indigenous systems by the schools, 46.4% of the responses indicated that they use indigenous AAC systems. 7.14% stated that they use non-indigenous AAC systems and 10.7% use both the systems. 35.7% of the responses did not indicate the use of either of the AAC systems. However, no description of such systems are mentioned.

4.19. PUBLIC AWARENESS PROGRAMMES:

When enquired about the availability of the public awareness programmes for AAC systems the responses were vague. From the data it appeared however, that the following public awareness programmes for AAC systems are used: Seminars; Films; TV; AIR; Video cassettes; Exhibitions; Advertisements and Workshops.

4.20. PARTICIPATION OF FAMILY MEMBERS:

When asked regarding the participation of family members in teaching AAC system, most of the responses were positive. However, a complete description was not given for the same.

4.21. PARENTS TRAINING PROGRAMMES:

When enquired about the parent training programmes conducted by the schools 64.2% of the responses were 'YES'; 21.4% of the responses were 'NO'; 14.2% of the responses were blank.

However, proper description of the parent training programmes were not given.

4.22. MOST USEFUL AAC SYSTEM:

Considering the economic and other factors the respondents were asked to state the most useful AAC system. The responses were as follows: 25% responses indicated Gestures as the most useful form of AAC system, followed by 21.4% for Communication boards; 7.1% for Makaton symbols; 3.5% for Sign Language; computers; Blissymbols; Pictorial drawings and Vocaaid; and 28.5% responses were blank and difficult to say. From the data it appears that gestures are still dominating as most useful form of AAC system in the clinical population, in India. However, communication boards are given second preference.

4.23. PERSONAL EXPERIENCES:

Sharing of their personal experiences in the field of AAC was requested for. Only 25% of the respondents however, shared their personal experiences. From the response it appeared that the personal experiences of each professionals was different. Some of the personal experiences are highlighted as follows:

1. A Speech-Language-Pathologist says "Have been exposed to various systems. Attempted to use communication boards, Makaton vocabulary, PICSYMS with clients informally. Have a project on developing an automated communication aid on the anvil".

2. One special educator reported as "AAC systems are very useful. They provide an opportunity to establish communication. It seems a complicated exercise but it is not really difficult to learn and teach".
3. "People don't take much interest in communicating with AAC. This could be partly because these systems are very new and also they are not aware of the things being done in this right. Public awareness and professionals training programmes are a must in this field of AAC"
A Speech therapist.
4. One of the special school principal says "In 1983 we introduced Blissymbolics to the teaching staff and after some preliminary training we selected some students likely to benefit from the use of Blissymbols and individual lessons were begun. We devised and prepared many appropriate teaching aids and as the children mastered the symbols, we built up a chart for each of them. We had many headaches over the charts as many children were reluctant to carry them with them and soon lost them. Charts that were carried were soon dirty, torn etc., We tried table charts, wall charts and book charts. Each had every symbol on it explained in both Tamil and English. Our other big difficulty was getting parents involved and interested. Some lived too far away, others were content with their child's limited communication of gesture and facial

expressions. That we found in Makaton signs and symbols we found that except for the children whose physical disability makes hand movements too difficult, other students are rapidly acquiring a vocabulary of signs which most of them are using spontaneously and appropriately and with obvious pleasure. Some parents feel children with limited speech, will lose this by signing but all are taught to verbalize as they sign and we found that many who were slow to communicate are now much more eager and their speech has improved.

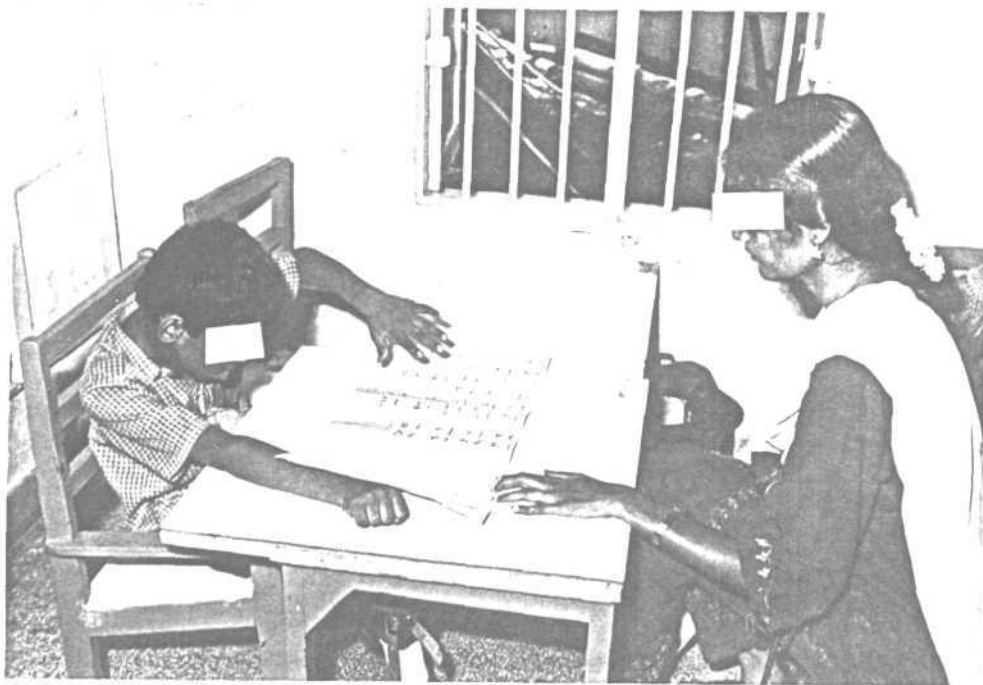
5. One of the Speech-Language-Pathologist reports from a special school that "most of the children do respond well to pictorial representations plus gestures. The meaningful imitation has increased. This is with respect to the children between 3 to 6 years of age. Along with this, the vocal imitation has increased through the use of gestural imitation with meaning. Since the home training is quite poor nothing can be said about the child's future progress. However, during the sessions of therapy the children have shown good improvement to the extent of multisyllabic utterances say two to three from no speech at all and that too meaningfully".
6. Here is a report from the Speech-Language-Pathologist. "I was first exposed to AAC in 1901 and had many doubts,

reservations about the usefulness of AAC. Will the use of AAC not hamper speech development? Will the use of AAC be a reflection on the professional abilities of the speech therapist? Blissymbols looked very complicated to me, how will the handicapped population learn them with ease? But I must confess, with in short span my doubts and reservations were replaced by a belief in the philosophy of AAC and the need for its application. It is vitally important for an individual to be able to communicate. The means may differ. We all use multimodal communication. So can a handicapped non-speaking individual. With AAC non-speaking persons control their environment, make their needs known, express happiness, anger, love, fear and frustrations. Our experience has shown that implementation of AAC reduces frustrations, relaxes an individual. This in turn facilitates speech production. AAC facilitates the development of language and communication skills.

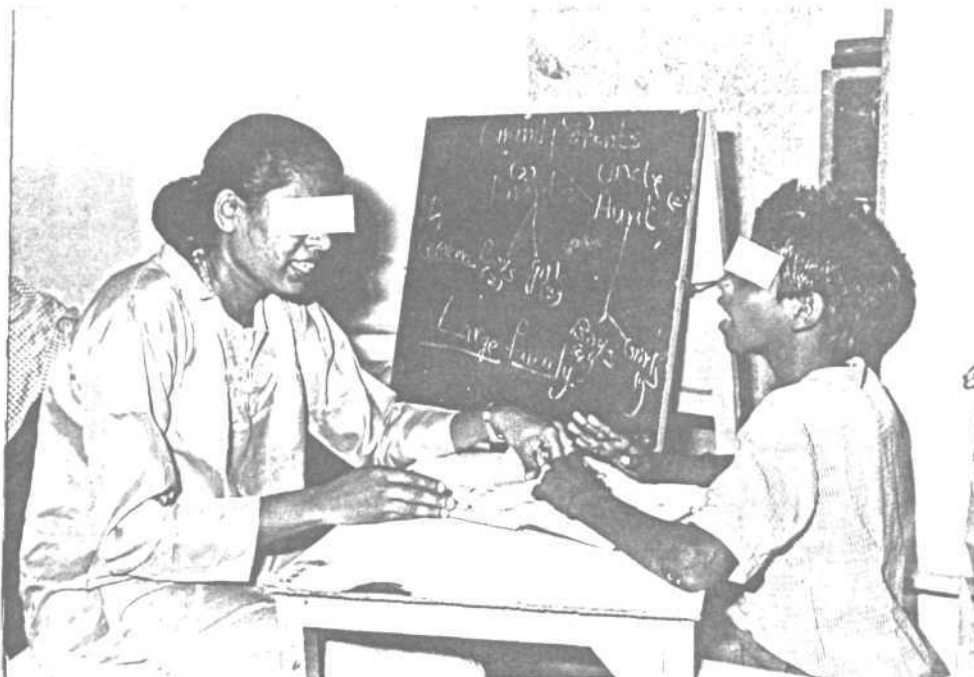
4.24. CASE REPORTS:

When queried about the case reports (if possible with photographs) 10.7% of the respondents presented their case reports. The case reports are as follows:

1. S, a 10 year old athetoid child is very intelligent. He is in academic stream and motivated to learn more things. He communicates with Blissymbols. He can say a few words like /amma/; Zappa/; /akka/. His training



PHOTOGRAPH-1: S, 10 year old athetoid child communicating with his speech therapist through his chart.



PHOTOGRAPH-2: A, 11 year old spastic child communicating with his class teacher through gestures.

with Blissymbols started from January,1991 with two hours per week. Now he knows 300 symbols and makes two word sentences and combinations of it. He points out the symbols with his thumb (Photograph-1).

He has severe involuntary movements.

2. A, 11 year old spastic diplegic with bilateral profound sensorineural hearing loss is a pleasant and happy child. He is in vocational stream. He communicates with gestures (Photograph-2), Blissymbols and picture charts. AAC was introduced to him 6 months back. He can imitate bilabial, labiodentals and palatal sounds. He can say 15 two syllable words. He uses AAC both at schools and at home. He gets 3 hours per week training on AAC.
3. M, an athetoid spastic was a nonverbal child but spoke with her eyes. She was learning to read and as her reading developed she was put on a word board which she accesses with a head pointer. Today Mithu, a 21 is well on the way to becoming a computer programmer.
4. P, a diplegic was thought to be severe mentally handicapped but the Blissymbols board opened up a new world for her. Today she has over 200 symbols on her board. She still forgets the symbols not frequently used, but is an effective AAC user. She has developed her own gestural system as well.
6. Az, an athetoid quadriplegic with moderate hearing

loss learnt to communicate with Blissymbols. He is very effectively manages to ask for his hearing aid to be repaired on his Bliss board.

7. J, who has cerebral palsy is 11 years old. Three years ago she could not talk and had no means of communication. She had no head control and she could not isolate a pointing finger. Now with consistent effort she has gained head control and can use a head pointer to isolate symbols on a Blissymbol chart. She can now say many words. Jayanti is eager to read Tamil so they have made a Tamil alphabet board for her. There are about 10 times as many letters in the Tamil alphabet as in English so it is not easy to learn. Jayanti has the determination to master it if provided a chance. She can now spell more than a 100 Tamil words.

10. S, 12 year old has cerebral palsy. He had no speech but now vocalizes though unintelligibly. His memory power is limited but in spite of this he uses his Blissymbol chart well. He is interested in reading and speaking English, like his brothers. So he has an English lesson each day. There are certain sounds he cannot make so his speech is very difficult to follow but he never ceases to try. He is beginning to read and understand simple written English.

Looking at the above results the following general observations can be made:

1. As it appears from the data, the responses (30.5%) obtained from the schools were poor. It may be because:
 - a) they are not aware about AAC systems,
 - b) they do not have sufficient knowledge in AAC systems.
 - c) because of the above two reasons they are not showing interest in use of AAC systems.

However, few of the schools who are not using AAC systems did mention in the questionnaire that they do not know about AAC systems. And they showed keen interest to know about these systems.

2. It was seen that more number of schools in Tamilnadu are using AAC systems. Hence, with the information available it could be said that Tamilnadu is a leading state in using AAC systems in India.
3. In India, the most commonly used AAC system is gestures. It shows that most of the schools are still using this, which is one of the oldest AAC systems.
4. The majority (89.2%) of schools are using AAC systems with the mentally handicapped population.
5. Special educators seem to be more involved group among professionals involved in implementation and use of AAC systems which is followed by speech-language-pathologists.
6. It also appears that none of these schools are adopting a particular criteria for selecting a candidate for AAC

system. This study warrants that there is a need to develop a set of standardized criteria for selection of a candidate for AAC system, which can be adopted by these schools/centres through out India.

7. This study also understands there is a need to develop various kinds of public awareness programmes for AAC systems. This will help both public and other professionals.
8. When asked to share their personal experiences about AAC systems by the different professional only 6 of them did so. This shows that professionals who are working with handicapped population lack the knowledge of AAC systems or lack the willingness to share such knowledge.
9. This study also cautions that there is a need of trained professional in the field of AAC systems. As Karanth (1991) pointed out an excellent place to begin would be in our professional training courses and institutions. The rest will follow. Once this awareness comes in the professionals there may be a wider scope and maximum use of AAC systems in India. This will show a brighter future to those children who are "locked in" in the sense that their speech is unlikely ever to be adequate for their communicative purposes unless resorted to alternate means of communication.
10. Lack of documentation 1 even though 54.9% of the respondents are using AAC systems but when asked for

case reports only eight case reports were reported. It shows that whoever is using AAC systems in their school/institutions/organizations/centers did not document the case reports. So this study suggests to bring out a news letter or a journal by any organization/institution to publish case reports on AAC. This will help most of the schools to document their case reports and various AAC systems. This will also help other professionals to keep their knowledge upto date in the field of AAC.

SUMMARY AND CONCLUSIONS

A survey was designed to gather information about the current status of AAC in India. Specific information about which schools/centers were using AAC systems, why they were using them, with which type of children and with what success in India, was obtained.

For the study a total of 184 questionnaires were sent to different schools for the mentally handicapped, cerebral plasied and autism throughout India. The responses obtained were 30.5%.

The questionnaires collected information on various relevant aspects as about the demographic information, medium of instructions, AAC systems, number of students, type of handicap, severity of the handicap, age, criteria for AAC system selection, tests used, personnel involved, hours of training, reactions of family members, mode of communication at different places, frequency of using AAC systems, school/centre providing any system/device freely, teaching programmes, reassessment, training the listeners, indigenous or non-indigenous systems, listeners understanding, programmes for public awareness, participation of family members, parent training programmes, most useful AAC system, personal experiences, case reports and addresses of the schools using AAC system.

Data was analyzed, computed for elaborate, appropriate percentage, tables and graphs wherever essential for data representation.

The following conclusions could be drawn from this survey:

1. 54.9% of the respondents are using various kinds of AAC systems in eleven different states of India.
2. Maximum number of schools for the mentally handicapped/cerebral palsied/autism, using AAC systems are seen in Tamilnadu, as per the present responses seen.
3. 85.7% of the schools are using gestures as the most common type of AAC system, which is followed by pictorial drawings and communication boards.
4. From this survey it found that 317 handicapped population are using different types of AAC systems in India. The maximum number of such population using AAC systems are found in Tamilnadu. Children as young as 2 1/2 years - 4 years are introduced AAC systems. This is continued in the adulthood also.
5. The clinical population using AAC systems are cerebral plasied, mentally handicapped, hearing handicapped, autism and other which include multiple handicapped and childhood aphasia. It is found that maximum number of AAC systems are used by the mentally handicapped followed by cerebral palsied, autism multiple handicapped and childhood aphasia in the descending

order respectively.

6. It is found that the moderately-severe handicapped population are using maximum AAC systems in India.
7. Special educators seem to be the more involved group, among the professionals involved in implementation and use of AAC systems which is followed by the speech-language-pathologists.
8. There is no specific standard criteria followed by the schools in selecting a candidate for AAC systems. Hence, such criteria have to be developed, uniformly accepted and implemented by the schools/centers/institutions in selecting a candidate for AAC system across the country.
9. Training hours for AAC systems ranged from 3 - 7 hours per week in the various schools.
10. Full-fledged acceptance by the parents, their children using AAC system is reported.
11. 50% of responses have reported that they provide devices/systems free of cost. However, no description of such devices/systems are mentioned.
12. 46.4% of the schools/centers are using indigenous AAC systems and 7.14 are using non-indigenous AAC systems. However, no description of such systems are mentioned.
13. The following public awareness programmes for AAC systems are used: Seminars, Films, TV, AIR, Video cassettes, Exhibitions, Advertisements and Workshops.

However, these efforts need to be boasted.

14. The most useful AAC system found by the different schools/centers/institutions are gestures, followed by communication boards, Makaton symbols, sign language, computers, Blissymbols, pictorial drawings and vocaid.
15. From the remarks of personal experiences by different professionals, it is seen that there is a need of trained professionals in the field of AAC for its effective implementation.
16. This survey stresses the need for documentation of case reports.
17. There is a need to develop low cost indigenous electronic or non-electronic communication systems, so that the clinical population will be practically benefited for efficient communication.

5.1. LIMITATIONS OF THE STUDY:

1. This survey did not include the schools/institutions for the hearing handicapped, assuming that they use only gestures and sign language.
2. Most of the schools selected for this survey were from urban areas and did not include schools from rural area.
3. Responses to the survey were limited which may restrict the generalization of the results of present study.

SUGGESTIONS FOR FURTHER TRAINING, RESEARCH AND CLINICAL SERVICES IN AAC:

1. A survey on the awareness, experiences and attitudes of different professionals towards AAC systems in India can be conducted.
2. To develop variety of public awareness programmes on AAC for both public and professionals.
3. To determine the efficacy of different AAC systems on various clinical groups.
4. Low cost AAC systems for different clinical population can be developed.
5. AAC can be included as a separate area/subject in the curriculum/syllabus of Speech and Hearing course at both graduate and undergraduate levels.
6. Surveys of this type should be conducted with large samples, so that up dated, regularized information on AAC can be sought.
7. A long term study on AAC implementation would be beneficial for clinical intervention with AAC.
8. A national committee on AAC can be formed which would keep constant touch with its counterparts in the Western (for e.g. ISAAC, Canada) to promote and facilitate implementation of AAC in India.

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7.APPENDIX - I

TERMINOLOGY

Alternative Communication: This is used only in special cases. It may be used to refer to an approach that is clearly a substitute for (or alternative to) natural speech and/or handwriting, See: Augmentative and alternative speech.

American Sign Language (ASL): This should be used only when referring to the manual sign language used by the deaf community in the United States. See: Manual signs; Sign language.

Assistive Communication Device: This should be used to refer to any electronic or nonelectronic aid for communication. Assistive communication device is used rather than augmentative communication device to avoid the issue of whether the device is used to augment and/or as an alternative to natural speech or writing. Assistive communication device is also more consistent with the use of the terms "assistive device" and "assistive technology" in other areas of rehabilitation. Use of an assistive communication device is considered aided communication.

Augmentative communication: This is used only in special cases. It may be used to refer to an approach that is clearly an addition to natural speech and/or hand writing. It should not be used if there is no natural speech and/or writing involved. See: Augmentative and alternative communication.

Augmentative and Alternative Communication: As a general practice, the term "augmentative and alternative communication" (or "AAC" after it is spelled out the first time) should be used rather than using the more restrictive terms "alternative communication" or "augmentative communication" (which would both be abbreviated "AC"). There may be some cases in which the author is specifically talking about only one aspect of AAC, either alternative communication or augmentative communication. In these instances the more specific term would be appropriate. We have adopted the policy of using "AAC" when one of the other two forms is not justified, for several reasons. One of the most obvious is the consistency with the journal's title Augmentative and Alternative Communication, and the sponsoring organization, International Society of Augmentative and Alternative communication. As an

international journal, there is another very important reason relative to translation in many non-English speaking countries can translate "alternative communication" relatively easily and have essentially the same meaning as we would have in North America. However, in some of the countries is a difficulty translation "augmentative communication" and conveying the same meaning as many people intend when they use it in North America.

British Sign Language: (BSL) This should be used only when referring to the natural sign language used by the deaf community in the United Kingdom. See: Manual signs, Sign language.

Disability: This should be used to refer to the activities affected by an impairment. For example, a motor impairment might cause a disability of mobility or a communication disability. See: Handicap; Impairment.

Gesture: This should be used to refer to the use of the body to represent an object, idea, action, or relationship without the linguistic constraints of manual signs. There may be a few natural gestures such as pointing, but most gestures are culturally determined. Although some cultures refer to "gesture" rather than "sign" in describing the natural manual language of its deaf community, other cultures find the term "gestures" offensive when used to refer to the sign languages. For consistency, "gestures" should be used to describe manual symbols, both natural and conventional, that do not have linguistic constraints as in sign language. See: Manual sign; Sign language.

Handicap: This should be used when referring to the role of the individual in society and impact of a disability or impairment on the individual's roles. Thus an individual with a severe physical impairment might experience a handicap in work or social environments. However, it is most important to distinguish impairment from handicap, as a handicap may be the result of an impairment, but it is not an inevitable result. The term "handicap" should be avoided unless the author intends to convey that there is a negative impact on the individual's role in society. See: Disability; Impairment.

Iconicity: This should be used to refer to the visual relationship of a symbol to its referent. It is the general term under which transparency and translucency, which describe degrees or types of iconicity, fall. See: Translucency, Transparency.

Impairment: This should be used to refer to a specific structure or function that is absent or deficient. In most

usages, the specific nature of the impairments should be identified. For example, rather than report that an individual is "severely impaired", one should state that the individual "has a severe motor impairment". See: Disability; Handicap.

Manual signs: Manual signs is a general term that may be applied to either a natural sign language (e.g., ASL, BSL, SSL) or to the use of manual signs as a code for a spoken language. This would include the simultaneous use of manual signs and speech, either when each word is signed or when each word is signed or when only key words are signed. See: Sign language.

Nonverbal: The use of the words "non-verbal" and "verbal" should be limited in order to avoid ambiguity. For example, a statement such as, "The child was non-verbal." may be interpreted as "The child has no use of any linguistic skills such as comprehension of speech or use of graphic symbols or manual signs." Although the term "nonverbal communication" may be used when referring to non-linguistic communication that does not involve the use of words in either the acoustic or visual form, in most cases "without speech". See: Verbal ambiguous that "nonverbal". See:Verbal.

Opaqueness: This should be used when there is no perceived relationship between a visual symbol and its referent.

Sign Language: This should only be used when referring to a manual signs when referring to a natural sign language (e.g., ASL, BSL, SSL) and not when referring to the use of manual signs as a code for a spoken language. Signing Exact English and Signed English are examples of manual signs used to code spoken English. It is not accurate to use the term sign language if one is referring to selecting a vocabulary of manual signs from a sign language, but using the manual signs as a code for a spoken language. See: Manual signs.

Simultaneous Communication: Simultaneous communication is the use of two modes of communication at the same time. For example, the simultaneous use of speech and manual signing. When simultaneous communication is used, the modes of communication must be specified early in the article.

Swedish Sign Language (SSL):This should be used only when referring to the natural sign language used by the deaf community in Sweden. See: Manual signs, sign language.

Symbol: Symbol refers to a representation of a referent. The type of symbol should always be specified to avoid confusion, for example, spoken symbols, graphic symbols, or

manual symbols.

Total Communication: This is a term borrowed from the literature related to the education of individuals with hearing impairments. As such, it is a philosophy rather than a method of communication. However, when it is used, it should refer to the use of whatever means of communication are appropriate for the particular individual and may include, but is not limited to speech, written words or other graphic symbols, manual signing, fingerspelling, and/or gestures. It should refer to the use of a combination of symbols. It is similar to multimodal communication. In many ways, total communication is the same as augmentative and alternative communication (AAC). Therefore, AAC is quite frequently an appropriate substitute. Total communication should not be used as a synonym for signing and speaking or for simultaneous communication. See: Simultaneous Communication.

Translucency: When one wants to be more specific than the general term, iconicity, this should be used to refer to the degree to which individuals perceive a relationship between a symbol and its referent when the referent is known. Translucency has been operationally defined by numerical ratings of the amount of relationship of a referent perceived to be present in the symbol. It is a term borrowed from linguists and others in the sign language research area. However, the term used by some psychologists to describe essentially the same phenomenon - the visual relationship of a symbol to its referent. Authors should use the term translucency unless a specific justification can be provided. For instance, representativeness may be used when referring to the Dual Coding Theory. See: Iconicity.

Transparency: When one wants to be more specific than the general term, iconicity, this should be used to refer to the degree to which the meaning of a symbol can be readily guessed in the absence of the referent. Generally, transparent symbols depict shape, motion, or function of the referent. Transparent symbols are frequently rated as highly translucent. See: Iconicity.

Verbal: The use of the words "verbal" and "nonverbal" should be limited in order to avoid ambiguity. While verbal frequently means speech, it can also refer to a broader meaning of the use of word or other language symbols. For example, it is more clear to say, "The test was administered with spoken instruction," rather than to say, "The test was administered verbally." In most cases "spoken" will be less ambiguous than "verbal". See: Nonverbal.

[Taken from L?oyd, L.L., and Blischak, M.D. (1992).]

7.1. APPENDIX-II

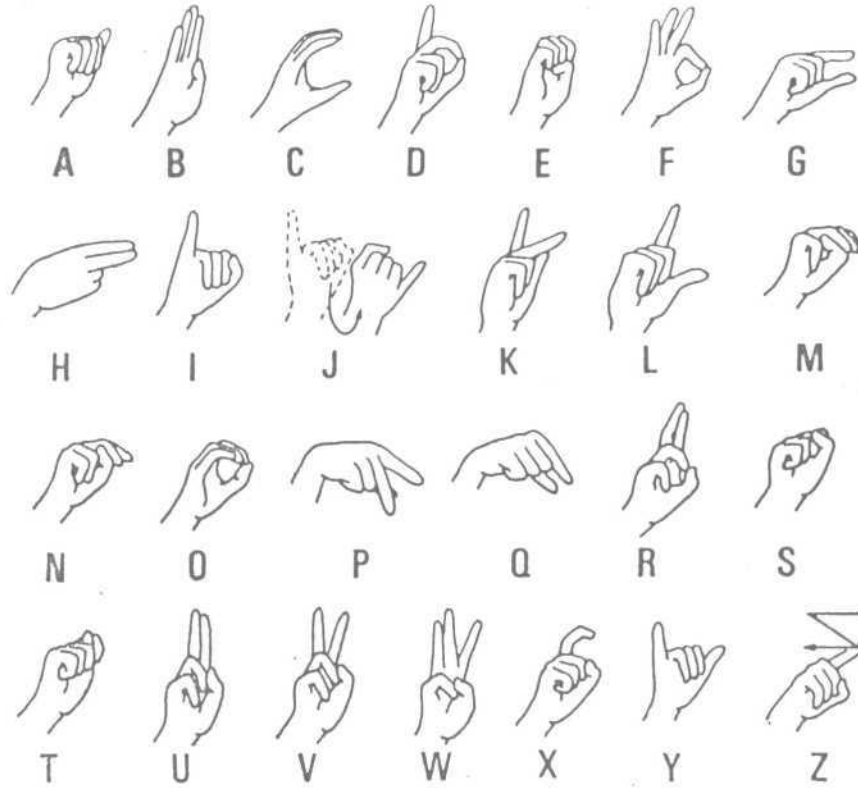


FIGURE-3: American Manual Alphabet (from Silverman, 1980).

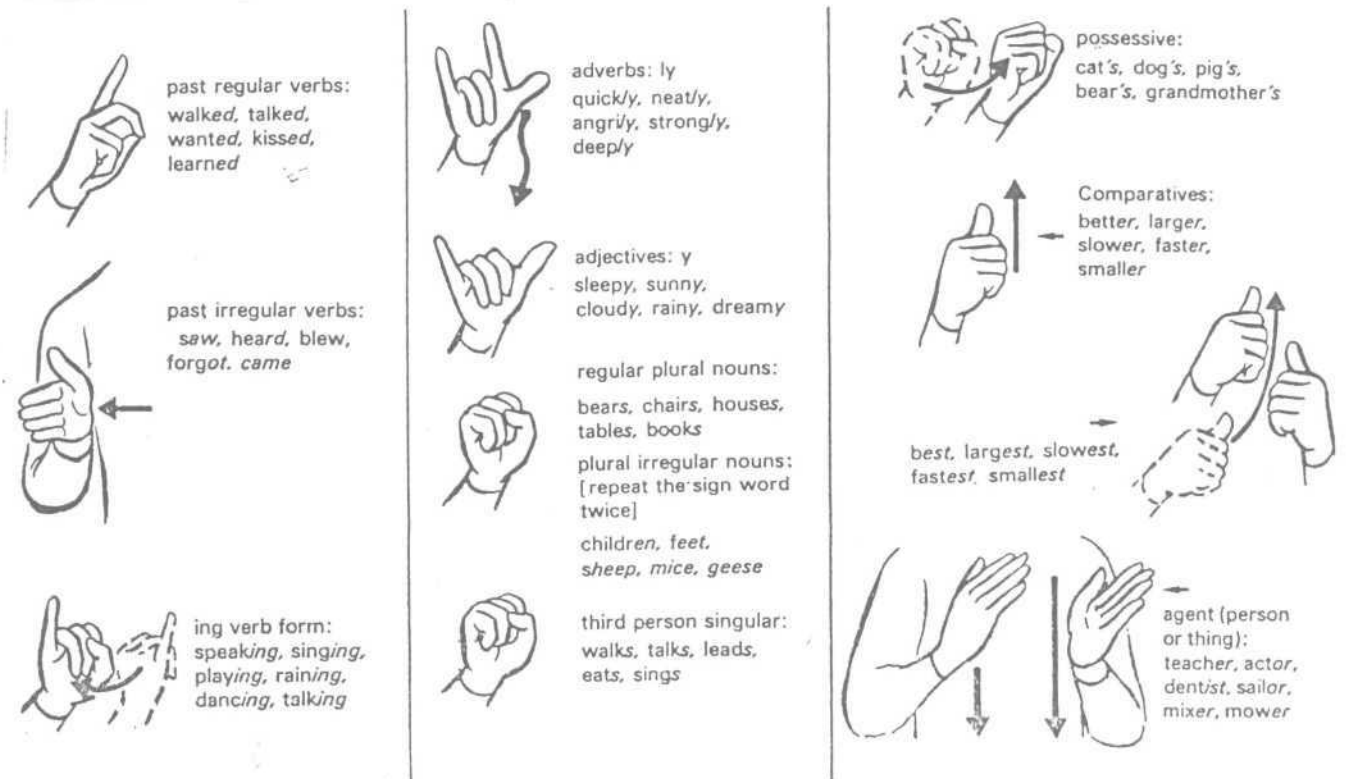


FIGURE-4: Sign markers used in Signed English (from Silverman, 1980).

FIGURE-5: Amerind sign a) for cry;
 b) for question (from Silverman, 1980).

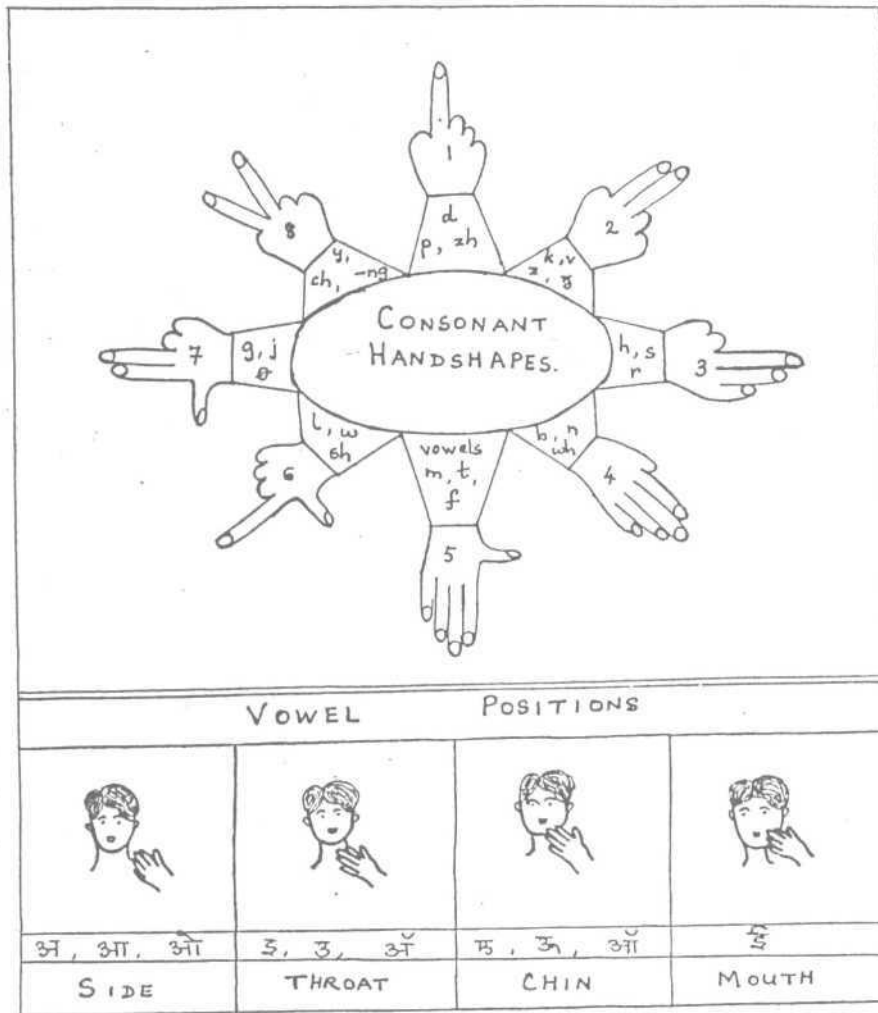


FIGURE-6: Cued speech diagrams (from Sarah Parekh, 1985).































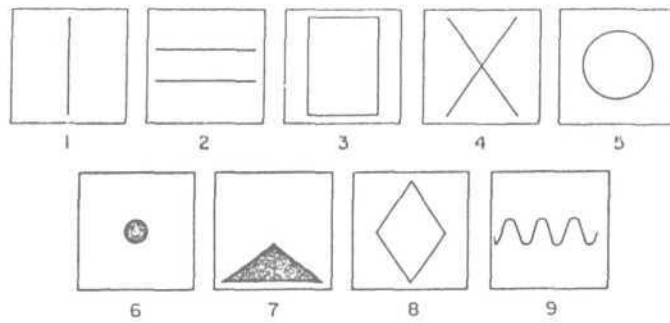
 bookshelves (-'s)	 brain (-ed, -s, -'s, -y)
 boot (-ed, -ing, -s, -'s)	 brake (-ed, -ing, -s, -'s)
 bottle (-ed, -ing, -s, -'s)	 bran (-s, -'s)
 bottlecap (-s, -'s)	 brand (-ed, -ing, -s, -'s)
 bottleneck (-s, -'s)	 brand (-ed, -ing, -s, -'s)
 bottom (-s, -'s)	 brat (-s, -'s, -y)
 bought	 brat (-s, -'s, -y)
 bout (-s, -'s)	 breach (-ed, -ing, -s, -'s)
 bowl (-s, -'s)	 bread (-ed, -ing, -s, -'s)
 box (-ed, -ing, -s, -'s, -y)	 bread (-ed, -ing, -s, -'s)
 boxer (-s, -'s)	 breadboard (-s, -'s)
 boy (-s, -'s)	 break (-ing, -s, -'s)
 boyfriend (-s, -'s)	 breaker (-s, -'s)
 brace (-ed, -ing, -s, -'s)	 breakfast (-s, -'s)
 brad (-s, -'s)	 bred

FIGURE-12: Representative Rebuses
(from Silverman, 1980).

1	2	3	4	5	6	7
8	9	0	+	-	×	÷
			addition	subtraction	multipli- cation	division
=	>	.	,	?	→	!
equal	relation	dot	comma	question mark	direction	medicine
8	d	/	↓	□	∧)(
money	music	cross out	opposite meaning	chemical THING	physical ACTION	time
∇	△	∩	♥	○	∪	∠
human EVALUATION	NATURE CREATION	mind	emotion	eye	ear	nose
○	∨	└	△	┆	∧	∩
mouth	hand	arm	legs & feet	individual	male human	female human
♁	♂	✈	🐟	♀	🌳	⌚
animal quadruped	insect hexaped	bird	fish	plant	tree	time
○	☾	*	♁	—	—	~
sun	moon	star	earth planet	earth line	sky	water
∪	⚡	⚗	└	▭	∧	∪
fire	electricity	chemistry	pen	paper	roof	vessel
⊗	♯	▭	⚖	✂	⊗	
wheel	fabric	flag	scales	knife	compass	line space

FIGURE-11: The main basic Blissymbol
elements (from Silverman, 1980).



EXAMPLES OF LEXIGRAMS

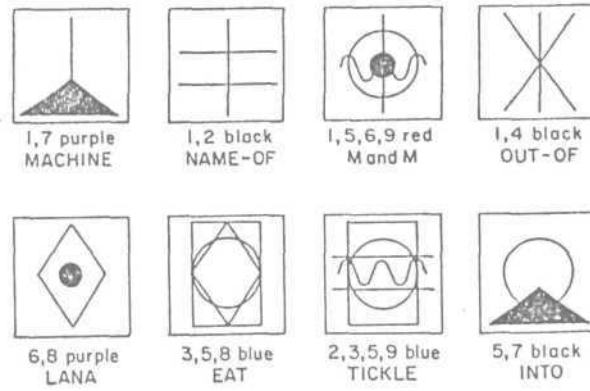


FIGURE-13: Yerkish (LANA) design elements and representative lexigrams (from Silverman, 1980).

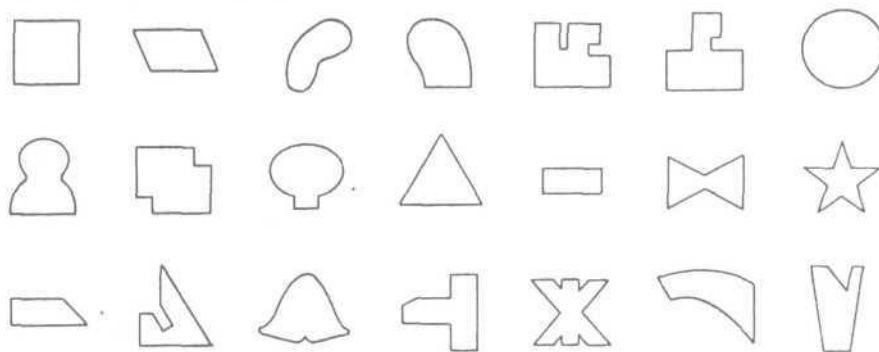


FIGURE-14: Representative Premack-type word symbols (from Silverman, 1980).

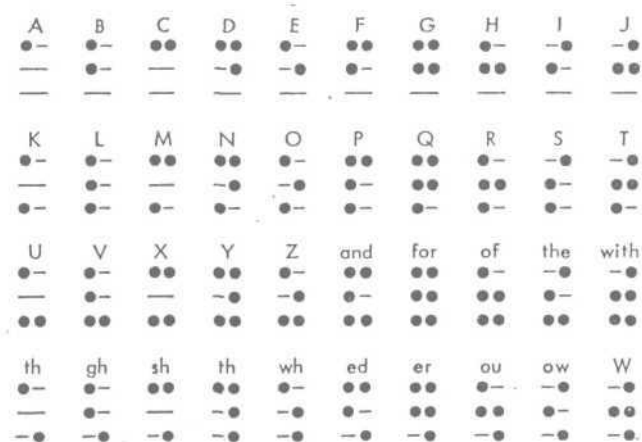


FIGURE-15: The Braille characteristics (from Silverman, 1980).

<i>Symbol</i>	<i>Code</i>	<i>Symbol</i>	<i>Code</i>
A	·-·-	V	···-
B	···-	W	···-
C	···-	X	···-
D	···-	Y	···-
E	·-·-	Z	···-
F	···-	1	···-
G	···-	2	···-
H	···-	3	···-
I	···-	4	···-
J	···-	5	···-
K	···-	6	···-
L	···-	7	···-
M	···-	8	···-
N	···-	9	···-
O	···-	0	···-
P	···-	Period	···-
Q	···-	Comma	···-
R	···-	?	···-
S	···-	Error	···-
T	···-	Wait	···-
U	···-	End	···-

FIGURE-16: The international Morse code (from Silverman 1980).

STUDENTS NAME	RED	YELLOW	ORANGE	GREEN	BLUE	PURPLE	BROWN	BLACK	WHITE
DADDY (MAN)	MOMMY (LADY)	BOY	GIRL	BABY	NURSE (SICK) DOCTOR	DRINK	BIG	LITTLE	
BED	BATH	CAR	FISH	SOMETHING TO EAT	CAKE COOKIES	LOLLIPOP CANDY	UP	DOWN	
PLEASE	SCHOOL	HOME	SPEECH	P.T.	I DON'T KNOW	TOILET	HAPPY	SAD	
I LOVE YOU	LETTER	T.V.	TELEPHONE	BALL	SUNSHINE	RAIN	NIGHT	THANK YOU	

FIGURE-17: Advance picture communication board (from McDonald., and Schultz, 1973).

0 1 2 3 4 5 6 7 8 9 10							
YES HI. HOWARE YOU? I DONT KNOW. PLEASE. THANK-YOU. GOOD-BYE. NO.							
WHO	VERB			WHAT	WHERE	WHEN	
I	HAVE	A	BIG	BALL	HOME	NIGHT	RED
MOMMY	PLAY	NOT	MY	COOKIE	PLAYROOM	YESTERDAY	YELLOW
DADDY	GO	AM	LITTLE	PRESENT	BATHROOM	TOMORROW	ORANGE
SANDY	READ	SEE	SICK	FUN	SCHOOL	WEEKEND	GREEN
LINDA	MAY	LOVE	WITH	PUZZLE	SCHOOL	SUMMER	BLUE
BOY	LISTEN	IS	AT	WORDS	OUTSIDE	EASTER	PINK
GIRL	WANT	ARE	AND	LETTER	ROOM	CHRISTMAS	PURPLE
YOU	WILL	EAT		GAME	PT.	THANKS-GIVING	BROWN
TEACHER	GET	LIKE		BOOK	STORE	TODAY	BLACK
THERAPIST				DRINK	INSIDE		WHITE
HOUSE-MOTHER					DOWN		
					SPEECH		
					DINING ROOM		

FIGURE-18: Early sentence construction board (from McDonald., and Schultz, 1973).

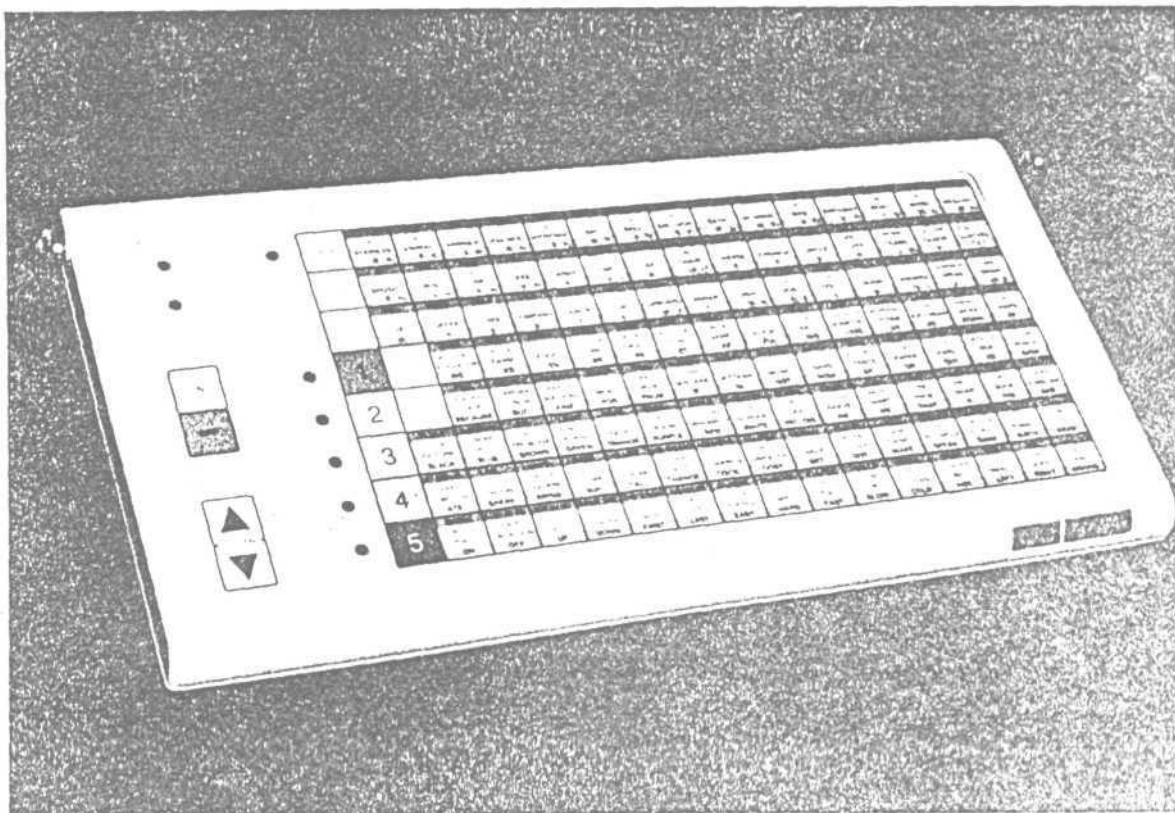


FIGURE-19: Handivoice 130 (HC Electronics) (from Beukleman.et.al., 1985).

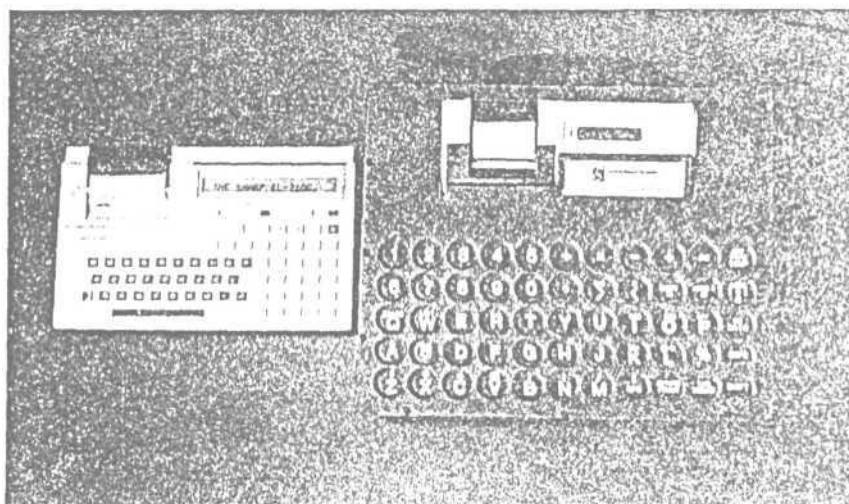


FIGURE-20: The sharp mcmowriters (from Bcukleman, et.a!., 1985).



FIGURE-21: A head-stick (Sweden) can be used by the physically handicapped person to select symbols or letters on a communication board or on a typewriter (from Lundman, et.al., 1378).

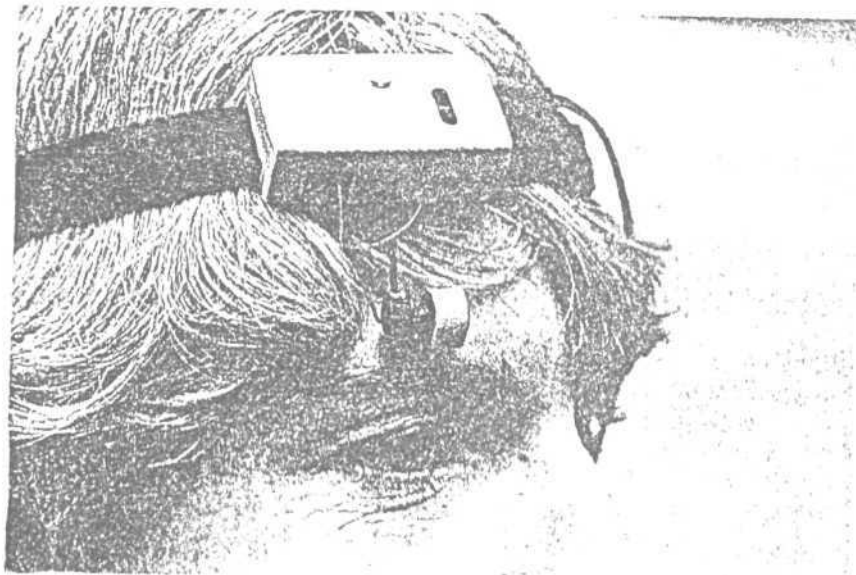


FIGURE-22: Eyebrow switch (from Beukleman, et.al., 1985).

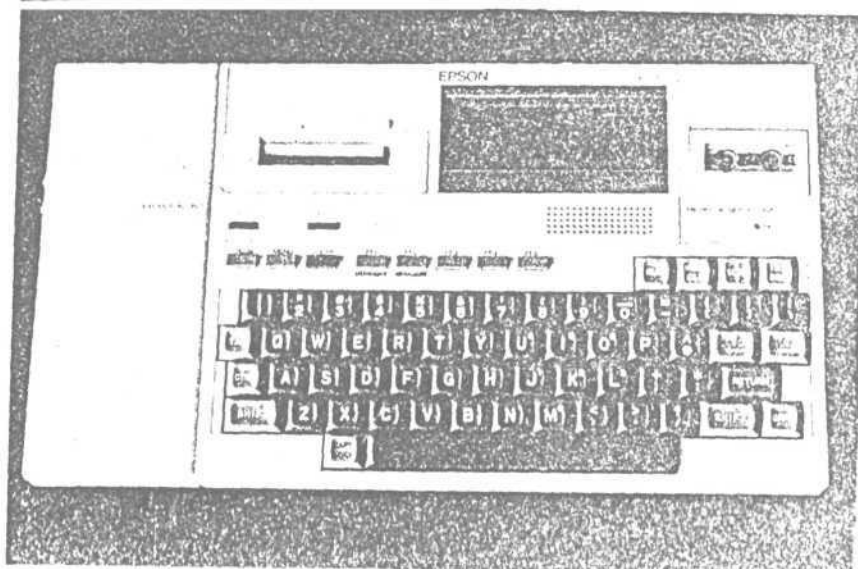


FIGURE-23: The Epson HX-20 computer with memory expansion module (from Beuklcmn.et.al., 1985).

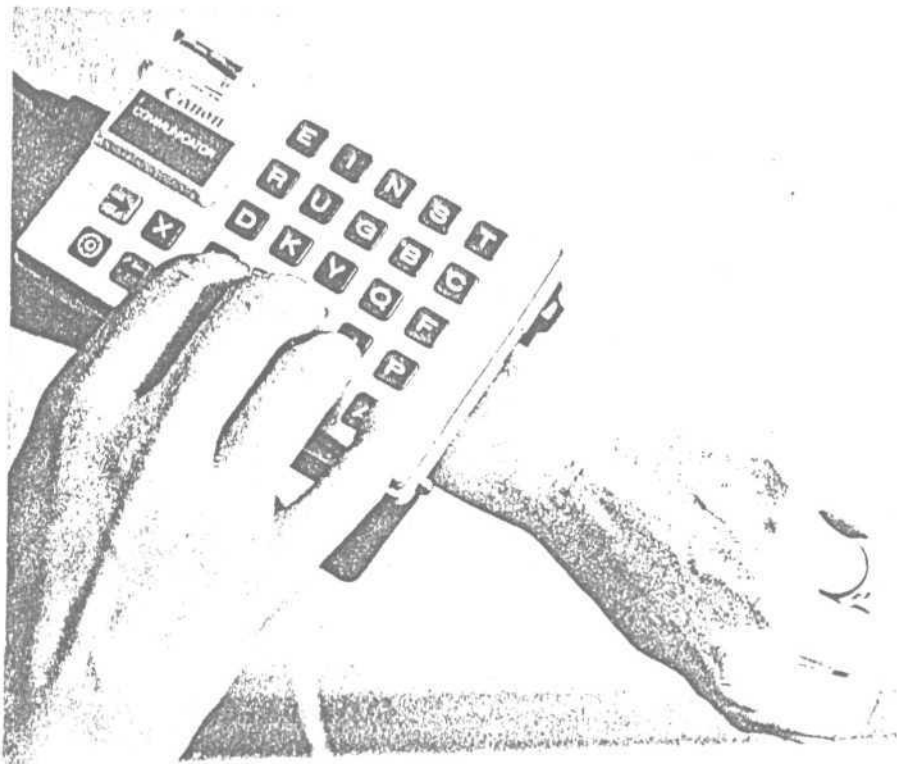


FIGURE-24: Electric typewriter with letter display (England) symbols light up in sequence. Row and column scanning is controlled by mechanical or pneumatic switches. After selection the desired letter is typed on the type writer (from Lundman.et.al., 1978).

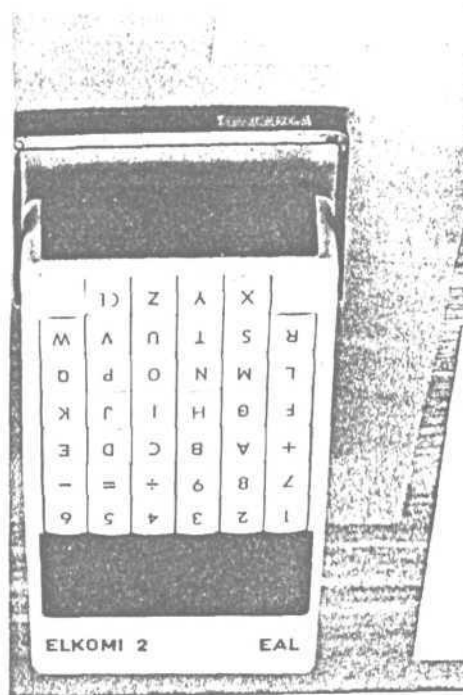


FIGURE-25: Portable electronic writing aid. Messages are printed on a thermosensitive tape (from Lundman,et.al., 1978).



FIGURE-26: The Canon communicator accessed via a customized mouth wand (Beukleman.et.al., 1985).

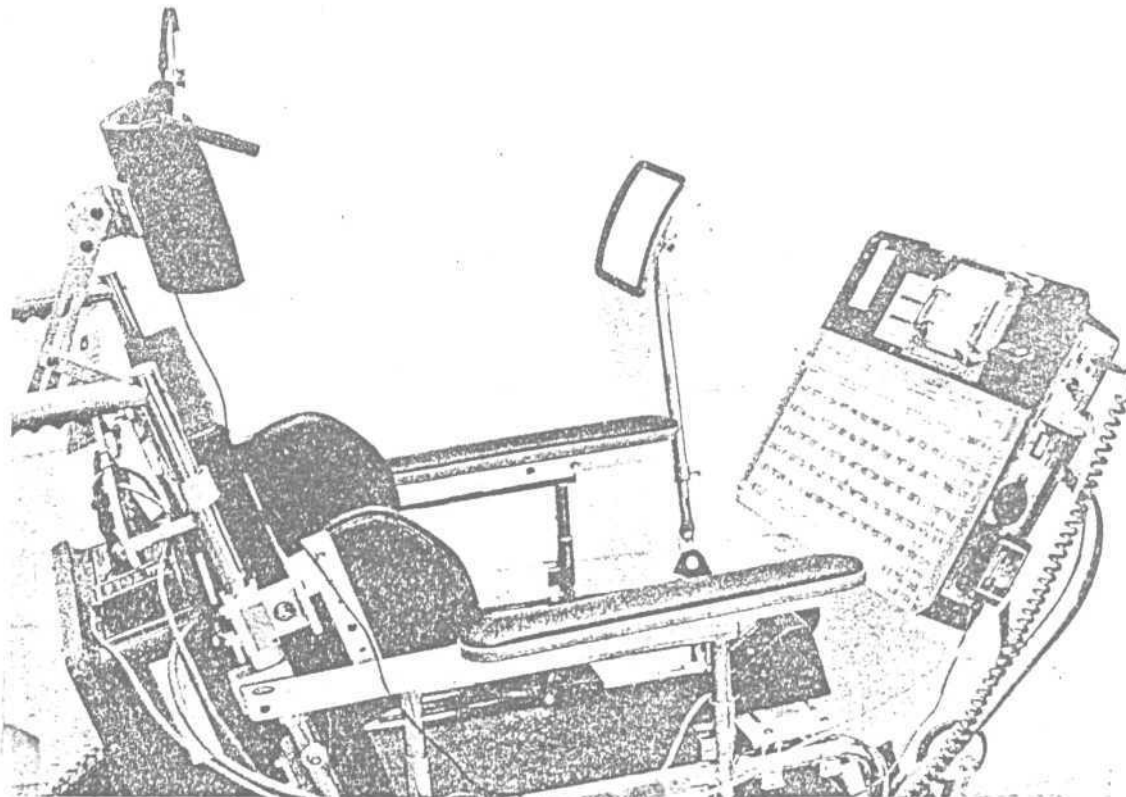


FIGURE-27: The Express-I mounted on a wheel chair (from Beukleman.et.a!., 1985).

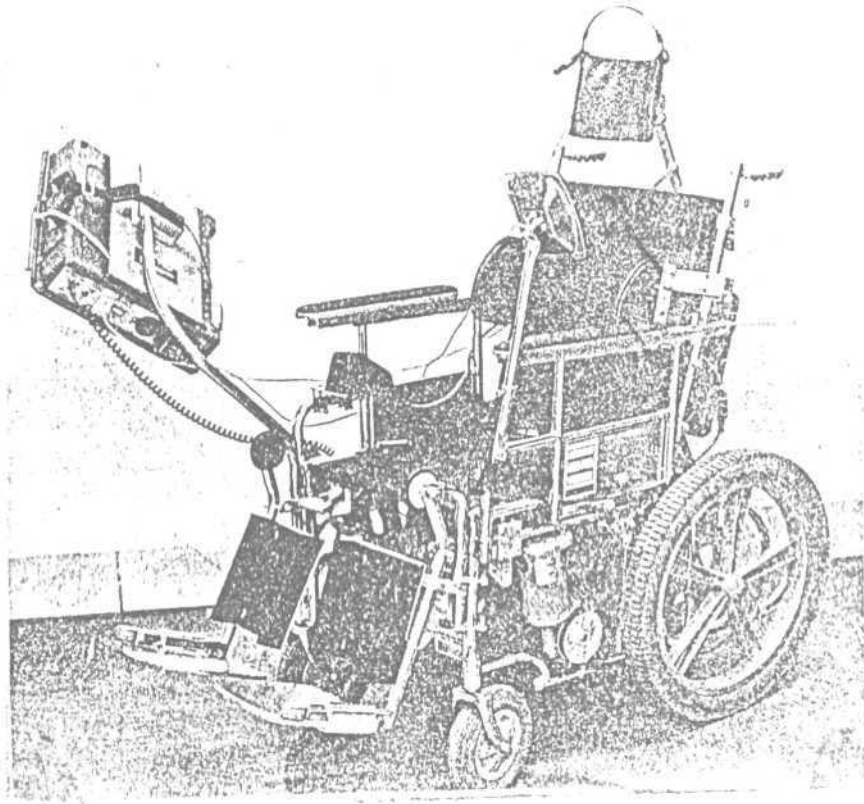


FIGURE 28: The Express-I mounted on a wheel chair and swung away in a position ready for subject's transfer (Beukleman,et.al., 1985).

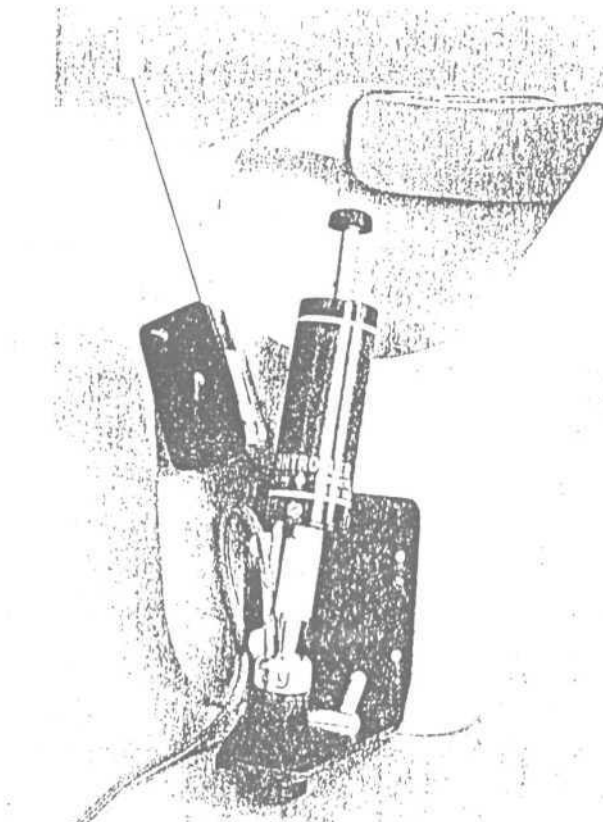


FIGURE-29: The collar-mounted joy-stick control for the Du-It wheel chair (from Beukleman,et.al., 1985).

7.3. APPENDIX - III

ORGANIZATIONS ASSOCIATED WITH AAC:

American Speech-Language-Hearing
Association,
10801, Rockville pike,
Rockville, MD 20852.

Applied Science and Engineering
Laboratories,
University of Delaware/
A.I.dupont Institute,
1600 Rockland, Wilmington,
DE 19899.

Artificial Language Laboratory,
Michigan State University,
Department of Audiology and
Speech Sciences,
405, Computer Center,
East Lansing, MI. 48824 - 1042.

Council for Exceptional Children,
1920 Association Drive,
Reston, VA 22091.

Foundation for Technology Access,
1307 Solano Ave.,
Albany, CA 94706 - 1888.

IBM's National support center
for persons with disabilities,
P.O. Box 2150,
Atlanta, GA 30055.

International Society for
Augmentative and Alternative
Communication (ISAAC),
P.O.Box 1762; Station R;
Toronto; Ontario;
Canada - M4G; 4A3.

IPCAS,
Canadian Rehabilitation
Council for the Disabled,
1 Yonge street, Suite 2110,
Toronto, Ontario, M5E 1E5.

National support center for persons
with disabilities,
International Business Machines,
P.O. Box 2150,
Atlanta, GA. 30055.

Rehabilitation Engineering Centre
on Augmentative Communication,
University of Delaware,
Dept. of computers & information science,
Newark, DE 19711.

RESNA,
1101 Connecticut Avenue NW,
Suite 700, Washington,
DC 20036

TASH (The Association for
persons with severe Handicaps),
7010, Roosevelt way N.E.,
Seattle, WA. 98115.

Trace Research Development Centre,
314 Waisman Center,
1500 Highland Avenue,
Madison, WI. 53706 - 2280.

Technology for Language and Learning Inc.,
P.O. Box 327,
East Rockway, Ny 11518 - 0327.

INDIA:

Spastic Society of Eastern India (SSEI),
P-35/1; Taratolla Road,
Calcutta - 700 088.

Spastic Society of Tamilnadu (SPASTN),
Opp: T.T.T.I., Taramani Road,
Madras - 600 113.

Department of Education,
AYJNIHH,
Bandra Reclamation,
Bandra (W); Bombay - 400 050.
(contact for sign language systems in
different Indian languages)

JOURNALS AND NEWSLETTERS:

AAC (Augmentative and Alternative Communication), (Journal)
Decker Periodicals Inc.,
One James street south,
P.O. Box 620, 2.C.D.I,
Hamilton, Ontario,
Canada L8N 3K7.

Augmentative Communication News (Newsletter),
Sunset Enterprises,
One surf way, Suite 215,
Monterey, CA 93940.

Assistive Technology (Journal),
Demos Publications Inc.,
156, Fifth Avenue,
Suite 1018, New York, NY 10010.

Apple Computer Resources in Special Education
and Rehabilitation,
DLM Inc, One DHL Park,
Allen, TX 75002.

Communication Outlook (Newsletter),
Artificial Language Laboratory,
Michigan State University,
405 Computer Center,
East Lansing; MI 48824-1042.

Closing the Gap (Newsletter),
Rt.2, Box 39,
Henderson, MN, 56044.

Communicating Together (Newsletter),
Easter seal Communication Institute,
250 Ferrand Drive, Suite 200,
Don Mills, Ontario, Canada, M3C 3PZ.

Computer Disability News (Newsletter),
National Easter Seal Society,
2023 West Ogden Avenue,
Chicago, IL 60612.

The Exceptional Parent (Newsletter),
1170 Commonwealth Avenue,
Third floor, Boston, MA 02134.

Technology and Media Division (TAM) (Newsletter),
The Council for Exceptional Children,
1920, Association Drive, Reston, VA 22091.

The ISAAC Bulletin (Newsletter),
Special Education, Purdue University,
SCC - E. Room 43, West Lafayette,
Indiana. 47907. U.S.A.

7.4.APPENDIX - IV

DATA COLLECTION ON AUGMENTATIVE AND ALTERNATIVE
COMMUNICATION (AAC) SYSTEMS.

From:

Dear Sir/Madam,

We have taken up the study on "A SURVEY OF THE USE AND IMPLEMENTATION OF AAC SYSTEMS IN INDIA". We seek your kind co-operation in this regard. We will be very thankful to you if you spare little of your precious time to go through and answer this questionnaire. The time you spent and the information you have provided will enable us to come to certain conclusions which will be useful for the upliftment of AAC systems in India. The data provided would be kept in strict confidence and used to work out results of the project only.

Thanking you,

Yours sincerely,

Sd/-

NOTE: PLEASE MAIL THIS QUESTIONNAIRE ON OR
BEFORE Dt. SELF ADDRESSED STAMPED ENVELOP IS
ENCLOSED. EVEN IF YOU ARE NOT USING ANY AAC SYSTEMS.
PLEASE DO MENTION AND MAIL IT TO US.

PLACE: MYSORE

DATE: 15.07.1992.



QUESTIONNAIRE

1. Name of the school/institute/
Center :
2. Address :
- Area :
- City/Town :
- District :
- State :
3. Medium of instructions :
4. What are the AAC systems you are
using or communication purpose :
- (Tic appropriate one)
- a) Gestures
- b) Sign language
- i) One handed
- ii) Two handed
- c) Communication boards
- d) Alphabet board
- e) Blissymbols
- f) Canon communicator
(portable Typewriter)
- g) Head light pointer
- h) synthesized speech(VOCAID)
- i) Computer based communication
augmentation system(computers)
- j) Photographs or pictorial
drawings
- k) Picsyms
- l) Orthography
- m) Others (Specify) _____

5. No. of students in AAC programme :
6. What are the type of handicap under-
going AAC training programmes :
- a) Cerebral Palsy
 - b) Mental Retardation
 - c) Hard of hearing
 - d) Autism
 - e) Others (Specify) _____
7. Severity of hnadicap :
- a) Mild
 - b) Moderate
 - c) Moderately-Severe
 - d) Severe
 - e) Profound
8. Age range of the students
using AAC systems :
9. What are your criteria for selection
of a candidate for AAC programe
(Specify) :
- 10 What are the speech and language
tests administered to these students:
11. The personnel involved in teaching
AAC system :
- a) Special Educators
 - b) Speech Therapist
 - c) Occupational Therapist
 - d) Parents
 - e) Others (Specify) _____

12. How many hours of training do these students require to master AAC system:
13. Is the AAC system well accepted by the family members and others in the society?(If not what are the reactions) : YES/NO
14. How do these students communicate now?
 - a) At Home/Hostel:
 - b) At School :
 - c) At work :
15. How frequently does the students attempt to communicate :
 - a) By Speech: Always/Frequently/Occasionally/Rarely/Never
 - b) By Gestures: Always/Frequently/Occasionally/Rarely/Never
 - c) By Writing: Always/Frequently/Occasionally/Rarely/Never
 - d) By Other modes: Always/Frequently/Occasionatly/Rarely/Never
16. Does your school/institute provide any device freely to the students: YES/NO
(If Yes describe the system)
17. Do you have programmes to teach individual student concerned :
18. Do you reassess the communication abilities periodically (If Ye3, how often) :
19. What steps do you take to train the listeners in the users environment :
20. Do you use indigenous or non-indigenous AAC systems : INDIGENOUS/
NON-INDIGENOUS
21. How well do the listeners understand the messages transmitted :

22. What programmes do you have for public awareness of AAC systems :
23. Participation of family members in teaching AAC systems : PRESENT/ABSENT
(If Present describe)
24. Do you conduct any parent training programmes (If Yes describe) : YES/NO
25. Keeping economic and other factors in mind which form of AAC system is most useful :
26. What is your personal experience with AAC systems (Please respond in the sheet provided along with) :
27. Please highlight a few interesting case reports using AAC system in your school/institute/centre (Case reports with photographs will be appreciated) :
28. Please give addresses of the schools who are using AAC systems (as many as possible) :