1.0 Introduction

Any system that attempts to compensate (either temporarily or permanently) for the impairment and disability patterns of individuals with severe expressive communication disorders is Augmentative and Alternative Communication (AAC). It is imperative that AAC utilizes individual residual communication disabilities to the full extent (ASHA 1991). AAC systems can be used by anyone irrespective of age, socioeconomic status, ethnic and social backgrounds. However, the system itself may have to be culture specific, individual specific and probably language specific.

Until recently in India, in the management of speech language and communication disorders with children with disability, undue emphasis was given on oral speech language in spite of awareness that verbal language may not develop in some individuals.

There has been a shift from traditional methods of speech language therapy for children with disability. The outlook has changed from an individual centered therapy to a more holistic approach involving the family and community.

An insight into current status of health care and disability service in India will provide the basis for a discussion on the recent trends in delivering speech language therapy and making provisions for communication needs of individuals with disability.

The National Census Survey of India (2001) estimated the disabled population to be 2% of the total population of India, which almost amounts to 2 million. In case of disabled with speech disability, Census of India estimated that, in India there are 1,640,868 (7.49 percent of total disabled) persons with such disabilities, where as NSSO estimated them at 2,154,500 (11.65 percent of total disabled).

In a country like India where 80% of the population lives in the villages, the nature of healthcare services has been a matter of concern. Though there has been
progress in the form of Government policies, legislative actions, schemes and provisions for the disabled outlined, that give the impression of a State that is committed to human rights and equal opportunities, the ground reality is quite different and the practical implementation of these has been an uphill task. Measures to alleviate infectious conditions through immunization have been relatively more successful than prevention of disabilities, which have only increased at an alarming rate. As a developing nation, basic needs in terms of survival, nutrition and shelter remain a primary need to enable growth and development of individuals. Thus quality of life issues are only secondary. However as emphasized by Burkey (1993) focus on personal development of an individual would lead to better growth of family, community and thereof the whole nation.

In the sphere of individuals with disabilities, a particularly vulnerable and neglected group is those with communication impairments due to their inability to articulate their needs, feelings and rights (Thornburn & Marfo, 1990). Amongst this group there is a significant number of individuals with limited or minimal speech abilities. One of the reasons for this is the fact that the individuals with speech and communication disabilities in India are not exposed to Augmentative and Alternative Communication (AAC) strategies as it is still a new field of expertise in India. Furthermore, programs to address the communication needs of these individuals with disability are limited, scanty and exist only in certain pockets of major urban towns.

In this scenario the dilemma facing AAC service delivery in community-based rehabilitation is multifactorial. Ideally, individuals should at least receive services at a clinic which provides the clinical expertise needed to effectively evaluate communication needs, prescribe an appropriate system, and provide necessary training and support to the user and his or her communication partners. The medical model in which professionals take responsibility for intervention decisions is still prevalent. However there are relatively few specialists who can provide these services, especially in rural communities. Distance, lack of funding, inadequate transportation, and the frequency of required training sessions make it difficult or even impossible for clients to come to the clinic for these services or for an institution or clinician to provide services in rural areas. Also where service has been initiated,
sustainability, ongoing follow up and support have been difficult in spite of good intentions of some non governmental organizations (Crislip 1999).

In view of the fact that individuals with little or no speech have a right to communicate, have the same communication needs as others and are capable it is imperative that measures to boost Services in Augmentative and Alternative Communication be undertaken. Learning to use Augmentative Alternative Communication (AAC) devices requires extensive training and support from a speech therapist and communication partners. AAC devices are often abandoned by users due to mismatches between skills, expectations, and device capabilities (Culp, Ambriosi, Berniger, & Mitchell, 1986).

In light of the service availability in India, any initiative towards AAC service provision should adopt a transdisciplinary approach. This implies the crossing of traditional disciplinary boundaries, where professionals can work together, share their expertise and exchange certain roles and responsibilities to develop new ideas and strategies for service provision. Professionals delivering AAC intervention need to be play the role of trainer, prescriber/negotiator and collaborator (Parette & Brotherson & Huer, 2000). Multiskilling is one effective way of cross training professional or support workers. It would mean creating knowledge base, and developing skills for imparting training. It would also consider the role transition in the light of socio cultural factors. Consequently it will mean multiskilling of primary care workers, volunteers, parents or family members of the speech and language impaired individuals who are often the only and constant source of support and assistance. Role transition could assume various roles in terms of role extension, role enrichment; role expansion, role exchange, role release and roles support (Orelove & Sobsey 1996). Consideration of these aspects while developing a working model of AAC intervention in the community would mean the use of an asset based rather than a need based approach. This approach would ensure long term sustainable models of imparting intervention by gradually building on the strengths of the community and building capacities at the individual, family and community level. Self-reliance and ability to develop sustainable support systems will be the hallmark of this model of training caregivers.
It is with this aim of developing a service model of AAC intervention in the community, that the present research study is being proposed.

1.1 SIGNIFICANCE OF THE PROBLEM:

Communication is the essence of human existence. Every individual has the urge and potential to communicate. It is a well known fact that 93% of human communication is through non-verbal means and speech accounts for only 7% (Borg, 2010) though the importance given is the contrary. This also implies that an individual with little or no speech can have a good quality of life if provided with nonverbal or augmentative and alternative means of communication. In the case of individual with communication impairment, AAC is in fact a key to access learning, foster independence and establish healthy and sustained interactions with his environment. Therefore it is the responsibility of professionals to provide for AAC to realize the ultimate goal of rehabilitation, which is to maximize an individual’s potential within the realms of his physiological limit.

In reality the course of AAC has been extremely slow and fragmented in India. Little is known or has been published about communication intervention and AAC in India. Education research in India has not been given sufficient importance (Jangira, 1997; Panda, 1996).

Firstly awareness has been extremely limited both at the professional level and patient level. Competency in AAC has been wanting, as there is no comprehensive training in AAC in personnel preparation programs. The syllabus in recent times has consistently included AAC at diploma, graduate, postgraduate levels but the depth of knowledge and skills acquired by students have been inconsistent. Individuals with greater interest seem to acquire better skills whereas for the rest it has been limited to an awareness and sensitization level. Therefore the implementation of AAC has been sporadic. Interviews with students frequently site the main difficulty being in knowing the process of implementation in AAC. Often the students are able to identify the need for AAC in children with communication difficulties but wary about introducing it and unsure of the strategies and process to be followed to ensure successful AAC intervention. Successful intervention of AAC has also been
dampened by persistent myths about AAC and lack of conviction among families of potential AAC users.

AAC requires active participation of communicative partners with lot of opportunities made available in the environment. As the main objective of AAC is establishing communication in children with limited communication skills, it is important that effort initiated should suit the individual needs and be applicable in the natural environments of the individual. This requires considerable skill in engineering environments, creating opportunities in the various communicative contexts for the child and facilitating use of AAC in realistic contexts. However this is the major thread lacking among professionals as hands on and practical training in AAC is either extremely limited or virtually non existent.

Secondly training in AAC implementation has been limited to a few urban areas. Efforts of individual professionals or institutions has been isolated and a generalized thrust required for its development has been lacking due to persistence of myths about AAC, inadequate manpower resources, financial constraints, lack of indigenous culturally sensitive and appropriate materials and sustainability of initiatives undertaken and sometimes even reservations on the part of professionals to share knowledge. Implementation of AAC has not seen great successes because a medical model rather than a social model of implementation has been followed. Therefore the current status of AAC in India is way behind the trends seen in developed countries. Keeping in mind the technological barriers that India is breaking across the world, it is time for reckoning as far as AAC is concerned. One of the solutions to make headway in service delivery of AAC is to adopt a trans disciplinary approach and make training available to the members of the community who are relevant in the life of an individual with developmental disabilities. The Rehabilitation Council of India has started conducting caregiver-training programs to generate manpower working in the field of rehabilitation. However there are no training programs for training members of the community and specifically caregivers in AAC. India being a vast country, involvement of caregivers in rehabilitation is one assured way of service delivery in urban and rural areas as the supply of professionals is likely to be less than the demands. Caregivers are adults who opt for working in organizations and are often enthusiastic in acquiring skills and knowledge to
contribute better. It is these attributes that make them suitable candidates for multiskilling and training in AAC. Multiskilling of caregivers is going to help hold the ideals of rehabilitation from crumbling into idealistic oblivion.

Given the present scenario of resources, the need of the hour is to develop and provide the much-needed impetus for development of efficient AAC service delivery systems. This would entail developing a generic AAC training program that will facilitate a transdisciplinary action, reduce duplication and fragmentation of services and bring about uniformity, consistency and enforce practice guidelines based on sound scientific principles. Research undertaken in this perspective would set the trend for rehabilitation to be truly community based. This kind of study has the potential for applications not only at the rural level but also at the professional transdisciplinary level. The training module developed through this research would provide a system of working in AAC across several communities and would help overcome the current limitations in AAC service delivery in India.

1.2 THEORETICAL FRAMEWORK

Training developed to serve the purposes of enhancing communication in children with developmental disability should be based on a thorough understanding of the nature of speech language and communication difficulties experienced by them. The training should be based on sound principles of learning and development. The process of implementation based on principles of good practice and concepts in AAC. The theoretical frameworks used in this study are discussed in detail in the following section.

A detailed account on the models and tenets of language development, nature of communication difficulties seen in children with Intellectual disability and cerebral palsy and drawing from this account the significance of introduction of AAC for these children is presented. The discussion highlights the concept & considerations in AAC, the central theme of Trans disciplinary service delivery in AAC, basis of the training module developed, its salient features and the tools used in implementing this study.
1.2.1 LANGUAGE DEVELOPMENT IN TYPICALLY DEVELOPING CHILDREN

The development of language and communication in children with disability in this study is based on the model developed by Bloom and Lahey (1978). This model is helpful in showing how the key language skills interrelate. Bloom and Lahey describe three areas:

- **'Form'**: grammar, shown in word order, word endings, verb tenses. This is the ability to put together a grammatical sentence.

- **'Content'**: picking the right words to get the message across. This involves use of vocabulary and concepts. These are words with meaning. We need to understand the meanings of words and be able to use these words to create what we want to say.

- **'Use'**: making use of language in a variety of different ways, such as for greeting, describing, arguing. Using language also involves subtle communication such as the use of body language, facial expression, tone of voice and non-literal language as well as knowing how to take turns in talking.

Bloom and Lahey's model (1978) shows how these three areas are connected and include both reception and expression. They propose that, if each skill area is not well developed, communication will not be a straightforward process. Any program aiming to develop language and communication skills in children with disability needs to planned and organized to include the 3 core aspects of language. This is derived based on the following tenets of language development (Bates et al, 1975; Bloom and Lahey, 1978, Halliday, 1975):

1. The pattern of development in neurotypical children is same with individual differences in terms of rate and quality of acquisition,

2. The development follows a sequential pattern from simple to complex,

3. Speech and language develop in parallel with motor development; verbal and nonverbal language develop in a similar manner,
4. Certain communicative functions in the earlier period is attained through nonverbal or simpler linguistic ability (e.g., requests, greetings, and labels can be expressed nonverbally) whereas certain functions, for e.g. repair strategies require higher order language, and

5. Communicative competence emerges as a result of the child's interactions with both the social and physical world (Seibert, Hogan & Mundy, 1986).

Language intervention for children frequently focus on a set of pre determined vocabulary appropriate to the child’s level of development and functional needs. The base for vocabulary selection is also from evidence in normal development of vocabulary. Much is already known about early vocabulary development in typical children. First words typically appear between 10-16 months. Children learn .81 new words per day before 24 months and typically master 50 words between 18 and 24 months, with 24 months representing the outer limits of normal (Fenson et al., 1994). The average two-year-old has a vocabulary of 200 to 300 words (Owens, 2001). Between 24 and 30 months, children acquire 1.64 new words per day (Fenson et al., 1994). Sensorimotor cognitive abilities are developing at the same time as the ability to communicate.

In terms of lexical diversity; most children are “noun-lovers” (i.e., referential style), which has been attributed to parental labeling (Lederer, 2010) However, a continuum exists between “noun lovers” and “noun leavers” (i.e., expressive style), the latter considered a more peer-influenced style. The vocabularies of noun-lovers appear to grow initially at a faster rate than those of children with more of balanced lexicon(Owens ,2001).In her seminal longitudinal study, Nelson (1973) found that more than half of the first 50 words (65%) acquired by the 18 typical children in her study are nouns, called nominal or substantive words. The balance of the first lexicon is non-nouns often termed relational words. Nelson further categorized relational words as “actions,” “modifiers,” “personal-social words,” and “function words.” She defined the terms as follows:

- Nominal (65%): general and specific nouns (animals, foods, toys, family)
• Actions (13%): words that describe, demand, or accompany an action or that express attention or demand attention to action; in early language acquisition these may not be true verbs, such as “hi,” “bye,” “up,” “down,” “bath”
• Modifiers (9%): words that refer to properties or qualities (attribution, state, locative state, possession)
• Personal-Social Words (8%): words that express social relationships (“yes,” “no,” “thank you,” “please”)
• Function Words (4%): words relating to other words, such as question words (Nelson, 1973)

Two other cohort studies (Rescorla, Alley, & Christine, 2001; Fenson et al, 1993, 1994) show similar quantitative distributions and also a great overlap in lexical diversity. Substantive words from the categories of people (e.g., “mommy,” “daddy,” “baby”), food (e.g., “apple,” “banana,” “juice”), animals (e.g., “dog,” “cat,” “bird”), body parts (e.g., “eye,” “ear,” “nose”), common objects (e.g., “ball,” “car,” “keys”), and clothes (e.g., “sock,” “shoes”) were present in all studies. Absent from all three studies were true “adult” verbs. Greetings (e.g., “hi,” “bye”) were coded as action and used by children in all three studies.

With respect to the development in children with disability, Butterfield et al (1994) found a strong relationship between the development of object and social skills in a study of students with severe intellectual disability. Their study also indicated parallel development across these two domains as found in normally developing infants (Butterfield et al, 94) with significant increases in complexity of skills across the functional age groups. This supports the appropriateness of the developmental stages model for application in children with disability. Children with disability do appear to be progressing through the same stages of development of non-linguistic communication as normally developing infants.

However, some differences found in children with disability are noteworthy. Preliminary data on children with language delay suggest a profile not exactly like the children developing language typically or the late talkers in comparing production of nominal and action words. In all three populations, production of nouns was favored. In the population of children with developmental delays, the overall percentage of
nouns was somewhat lower than the other two groups (59% as compared with 65%-76%). Contrastively, the children with developmental delays produced many more action words than their peers (23% as compared with 11%-13%). Regarding lexical diversity, 33 words were produced by at least 50% of the children. While the nouns were similar to the nominal produced by other cohorts studied, the action words produced by these children with more severe language and cognitive delays included both protoverbs and true verbs including “open,” “eat,” “go,” and “gimme.”

Age alone can’t explain the use of true verbs by the three-year-olds with developmental delays, as these were not seen with the same frequency in the late talkers at age three. It could well be that just as noun-lovers’ vocabularies are attributed to parental influence and noun-leavers’ vocabularies peer influenced, perhaps noun-leavers (or “verb-takers”) are clinician influenced in this case.

The children with developmental delays receive speech-language intervention and these could be the first set of vocabulary words targeted in intervention. According to Bloom and Lahey (1978) when planning a first lexicon, speech-language pathologists (SLPs) should include representative lexical items from each of the early obligatory content categories (i.e., existence, nonexistence, recurrence, action, rejection, locative action). This will enable children to make the transition to syntactical structures. Bloom and Lahey note that true verbs are infrequently used in the early single-word period with children coding action by referring to the agent of the action (e.g., “Mommy” meaning “Mommy eats”). However, in terms of specific lexical items, they do identify a few true verbs which appear as first vocabularies reach the 50-word mark. These include “open” and “go.”

In this regard, this study is aligned with the findings discussed so far. Research suggests using traditional selection criteria such as developmental norms, functionality, motivation, lexical variety, and phonological information. Any word list prepared for language intervention should include the list containing both substantive and relational words from all of the obligatory Bloom and Lahey (1977) content categories.
1.2.2 LANGUAGE INTERVENTION STRATEGIES

The language facilitation model used in this study incorporates the natural Language teaching approaches derived from Bloom & Lahey (1978), McClean & Snyder McClean (1979). The key principle proposed is that language intervention should occur in a variety of communicative contexts that highlight the pragmatic force of language as well as its formal features and semantic functions. Bloom & Lahey emphasized that language learning for the most part is dependent on conceptual representation of the experience. They recommended that interventionists engage children in activities that are similar to the child’s experiences wherein the majority of the materials used are dynamic and not static. The use of sand play, cooking activities, artwork, water play etc. was recommended. Therefore the thrust in language intervention should address the semantic content, structural forms, and pragmatic functions of language.

Language intervention as in any therapeutic practice has diverse forms. The diversity reflects differences in the nature of the language disorders to be treated, the linguistic or communicative competencies to be developed, the theoretical orientations of interventionists regarding the nature of language and the clinical orientations that clinicians bring to the task of facilitating communication and linguistic skills in children who have difficulty acquiring those skills. Thus while there is no universally accepted, comprehensively defined concept of language intervention, it can be characterized generally as the practice of engaging children with language difficulties in experiences that promote communicative and linguistic abilities, which are progressive and are functional for interpersonal as well as intellectual activity (Johnston, 1983)

Therefore language intervention in this perspective involves designing events that are easily analyzable and highly functional for a child with language difficulties. Within these events, the various operations and relations that exist between systems of linguistic form, semantic content and pragmatic functions need to be made extremely transparent. Therefore language intervention entails making systematic and gradual modifications within these systems to gradually build the complexity of linguistic and communicative function that is viable for children with language difficulties.
Review of literature on language development suggests that all aspects of language need to be targeted in intervention. These include use of a customized target core vocabulary, focus on comprehension which will impact production and effective use of typical caregiver child communicative patterns which are characterized by use of natural consequences to encourage communication, simple linguistic mapping acknowledging communicative attempts, and communicative temptations (Yoder & Warren 2002; Warren & Yoder, 1998).

The developmental model also emphasizes that social and cognitive abilities develop in synchrony, and that in fact communicative competence emerges as a result of the child's interactions with both the social and physical world (Seibert, Hogan & Mundy, 1986). Such an emphasis removes the prerequisite aspect of the cognitive hypothesis, and stresses instead a participatory focus on the promotion of opportunities to further the development of both social and object related abilities, through quality interactions. Therefore training of communicative partners including caregivers becomes highly relevant in this scenario especially for children with limited verbal skills. The impact of training will be multifold. It will give due recognition that these children are communicators. Training will provide opportunities for children to develop an understanding of their power to have an effect on others around them. This in turn will mean that with the eventual application of a formal or symbolic means of communication, they are competent in communicating across a range of functions or purposes (Butterfield et al 94). The key to the children's acquisition of communicative competence is therefore dependent on the communication partner’s responsiveness and ability to provide opportunities for social interaction in a natural context. This is facilitated by teaching them effective strategies that will facilitate language learning, interaction and communicative competence. Three approaches which fall into this natural (Paul 2006) continuum include:

1. Clinician-directed approaches such as modeling, drill, and drill play

2. Child-centered approaches, often called indirect language stimulation. These include self-talk and parallel-talk, expansions, extensions, and recasts in which the Speech Language Pathologist (SLP) follows the child’s lead providing input appropriate to the materials and activities of the child’s choice
3. Hybrid approaches which are a combination of both wherein the SLP determines the language that is being targeted and selects materials to facilitate those targets. Unlike the formal operant approaches, intervention is conducted in natural environments and rewards are contingent responses or actions.

This study incorporates the hybrid approaches, which naturally draw the advantages of the other two approaches. One such effective strategy for facilitating language and communication is responsive input strategies. These strategies have been found to influence children’s developmental progress in pre-linguistic aspects of communication (e.g. joint attention/action, intentional communication acts), vocabulary and morphology (i.e. suffixes denoting plural forms, past tense verbs, possession, etc.), and early sentence forms. Responsive input strategies used in many well-known caregiver administered language intervention programs (Kaiser & Hester, 1994; Manolson, 1992; Warren & Kaiser, 1986) include: (a) child-centered strategies (e.g. follow the child’s lead, get down to the child’s physical level and wait for the child to initiate) (b) interaction-promoting strategies (e.g. encourage children to take turns in a conversation, ask questions and wait for a response); and (c) language-modeling strategies (e.g. label, expand utterances, extend topics).

A naturalistic language strategy also underlies Responsive input strategies. These refer to spontaneous instructions that occur when a child and adult are interacting in a naturally occurring interaction. Naturalistic language strategies are intervention techniques that closely resemble typical interactions and occur in typical settings, such as daily routines and play activities. Naturalistic strategies are considered child centered, in that the child takes an active part in determining the direction of the activity selected for therapy, and the adult follows rather than directs the interaction. Intervention tends to be natural extensions of typical adult-child interactions. Naturalistic language strategies can be used across a wide range of environments—in the therapy room, classroom setting, home setting, playground, or other everyday situations.

Some parent-administered programs also teach parents to target specific interaction and communication goals (e.g. pre-linguistic skills, vocabulary, two-word phrases, morphemes such as simple words and prefixes) using a focused stimulation
procedure (Fey et al 1993; Girolametto et al, 1996a). In focused stimulation, (Weismer & Robertson, 2006) the targeted goal is repeated several times within an interaction and the focus is on increasing the child’s receptive exposure to the form. The child is not asked to imitate the target. To use focused stimulation, the SLP must know the specific vocabulary words being targeted. She or he provides multiple models (5 to10) of each target in meaningful contexts. In its classic form, no elicitation is attempted. To illustrate, if one of the target first words is bubbles, the SLP might blow bubbles and say, “Ooohhh, bubbles, lots of bubbles, I blow bubbles. Pop the bubbles. Bye bye bubbles.” She might sing a made-up song about bubbles. The child learns the concept of bubbles learns to comprehend the word bubbles and when he is ready, will produce “bubbles” verbally or through alternative modes that have been used. This approach has been proven effective not only for use by SLPs, but by parents as well.

Another effective strategy included is Milieu teaching. Milieu teaching consists of naturalistic methods that have traditionally been used to encourage spoken language in children. These techniques have also been found to be effective in teaching children AAC and early communication-related skills (Yoder et al, 1994). The most prominent are incidental teaching, mand-model and time delay. Milieu procedures are typically used to increase the frequency of a child’s communicating a specific request, although they may be used to teach new communicative forms or vocabulary. Milieu techniques necessitate that the environment be arranged in such a way that the child is encouraged to initiate interactions. This ensures the child’s motivation, increasing the likelihood of success.

Milieu teaching methods are based on principles of behaviorism, including rewarding a child for successfully communicating a target message. However, because teaching takes place in natural settings and activities, rewards are natural positive consequences (i.e. the child gets the item that he or she requested). This means that after the skill has been mastered and formal teaching is discontinued, the child will still get the same natural rewards for communicating a request. This eliminates the need to fade out artificial reinforcers.

The three most well-known milieu teaching procedures (incidental teaching, mand-model teaching and time delay) mentioned above are very similar and, with
slight variations, consist of the following steps (Beukelman & Mirenda, 1992; Kaiser, Ostrosky, & Alpert, 1993; Kozleski, 1991; Reichle, York, & Sigafos, 1991; Westling & Fox, 1995).

- A target skill is chosen, usually a request. Typically it is one that the child is familiar with, but is still learning to master.
- The environment is arranged or an activity organized in a way that encourages the child to make requests. This might be placing favorite toys visible but out of reach, presenting the child with a new activity, or "forgetting" to provide a key component of a familiar activity.
- When the child appears to want the item, the adult makes eye contact with the child. The adult may simply look expectant, anticipating the child’s asking for the item. If the child makes the request (i.e. is able to produce the target skill), then he or she is praised by the adult and receives the item along with social praise. If he or she does not respond appropriately, then the adult may try one or more of a variety of prompts, usually starting with the least intrusive. These include: providing the child with a natural prompt ("What do you want?"), explicitly asking the child to make the request ("Make the sign" or "Point to the picture"), modeling the request for the child (adult uses the child’s AAC to make the request), or physically guiding the child in making the request (adult physically assists the child in using AAC to make the request).
- When the child has produced the target skill using whatever assistance was necessary, he or she receives the item along with social praise. It is usually not a good idea to use too many prompts because this can confuse the child, or make the child prompt dependent. Milieu techniques are often referred to as errorless teaching methods because the child successfully performs the skill at every session, albeit sometimes with assistance.

The main difference between incidental and mand-model procedures is that, with incidental teaching, the adult’s first reaction is to simply look expectantly at the child, while, with mand-model teaching, the adult begins by specifically asking (i.e. manding) the child to make the request: "What do you want?"
Time delay utilizes predetermined periods of waiting for the child to respond. Time delay also starts with the adult looking expectantly; however, the ensuing waiting period is carefully chosen. Prompts may be used if the child does not respond correctly after the designated time, and the time delay used at the next session may be increased. For example, the adult may start with a waiting period of 10 seconds. If the child requires prompting, at the next session the adult may add two seconds so that the waiting period is now 12 seconds long. At each session following one in which the child did not respond correctly, the waiting period may be lengthened, or kept the same, depending on the schedule determined in advance.

If the child seems to be getting overly frustrated (i.e. frustration is beginning to interfere with learning), the wait period can be reduced, before starting the progressive increases again. Correct responses are dealt with by praising and giving the child the desired item. Incorrect responses usually are followed by a single physical guidance prompt before the child is offered the item, although additional prompts may be given. Even though the wait period may seem to be growing very long if the child does not respond correctly over many trials, once the child "gets it," the delay often dramatically shortens. When only a single physical prompt is used as needed, time delay is an excellent way to prevent a child from becoming dependent on prompting, or to wean one that has already become overly prompt dependent (Yaack, 1999).

By carefully preselecting a small core of target vocabulary words, engineering the environment with activities that naturally require multiple models, and finally trying to elicit production of those targets through verbal or alternative means, research evidence suggests language and communication can be successfully enhanced in children with disability.

1.2.3 LANGUAGE AND COMMUNICATION DIFFICULTIES IN CHILDREN WITH DISABILITY

Typical nature of difficulties in children with developmental disabilities include significant delays in development which may lead to behavioral
problems, poor interactions with people, isolation leading to distress and poor quality of life. It is estimated that of the population with mental retardation, that the group having mild Intellectual disability constitute around 85% with moderate Intellectual disability constituting for about 10% and profound Intellectual disability accounting for 1-2% (American Psychiatric Association, 1994)

**Language and Communication Characteristics in Children with Intellectual Disability:**

Impairments in the understanding and production of spoken language are frequently found among children with mental retardation. In fact, language and speech disorders have been found to be the most frequent secondary disability among children with Intellectual disability (Epstein, Polloway, Patton, & Foley, 1989). Deficits in language and communication have been found to "constitute major impediments to the social, emotional, and vocational adjustment of retarded citizens" (Swetlik & Brown, 1977). Let's look at some of the specific language and communication characteristics of children with mental retardation.

**Phonology and Morphology**

Difficulties with speech production (articulation) are often seen among children with Intellectual disability. However, according to Shriberg and Widder (1990), estimates of the incidence of these speech-production deficits have been reported as low as 5 percent and as high as 94 percent. Most studies have found that although there are increased incidences of speech production problems among children with mental retardation, these children, appear to follow the same course of development as children without retardation and make similar phonological errors (Shriberg & Widder, 1990). The most common phonological errors are reduction of consonant clusters (saying bake for break) and final consonant deletion (saying call for cat) (Klink, Gerstman, Raphael, Schlanger, & Newsome, 1986; Sommers, Patterson, & Wildgen, 1988).
It appears that children with more severe Intellectual disability have a greater incidence of speech-production problems (Patton & Thomas 1994). It may be that because children with more severe disabilities often have many related physical problems (such as cleft palate, protruding tongue etc) and there is a higher incidence of otitis media (middle-ear infections) in children especially those with Down syndrome. It has been found to cause fluctuating hearing loss, which can cause impairments in articulation.

Studies of the development of morphological skills in children with mental retardation have generally found that these skills develop in a manner similar to that of children without retardation but at a significantly slower rate (Newfield & Schlanger, 1968). In other words, although children with Intellectual disability appear to be delayed in their ability to form words, they follow the same sequence of development as typically developing children.

**Syntax**

Research on syntactic skills development in children with Intellectual disability has also generally found that while there are delays in development of these skills, the pattern of development is the same as that found in typically developing children. In a classic study, Lackner (1968) examined the syntax production of five children with mental retardation, ages 6 and 16. He found that their sentence length increased with mental age and was similar to that of typically developing children of similar mental age. Lackner also found that the order of development of syntactic rules was similar. One difference that Lackner found in his sample of individuals with Mental Retardation was that they less frequently used the more advanced syntactic structures.

Kamhi and Johnston (1982) found similar results in their study of the language development of children with mild mental retardation. When compared to that of typically developing children of similar mental age, the syntactic development of the children with Intellectual disability appeared to be quite similar. Studies including the above (e.g., Naremore & Dever, 1975.) found that children with Intellectual disability had more difficulty with more advanced language constructs. For example, Kamhi and Johnston (1982) found that the typically developing children
produced more sentences with questions and with conjunctions. These findings suggest that there may be limits to the syntactic development of children with mental retardation. That is, although their early development may be similar to that of typically developing children (although with delays), there may be a plateau of development. After this plateau, further syntactic development may be difficult.

**Semantics**

There has been relatively little research on the semantic abilities of children with mental retardation. The research that has been done indicates that children with Intellectual disability tend to be more concrete in their understanding of words, having more difficulty, for example, interpreting idiomatic expressions (e.g. he broke her heart) (Ezell & Goldstein, 1991a). This tendency to be more concrete may be the result of delays in development of semantic abilities (Rosenberg, 1982).

Some studies have found that an area of strength for children with mental retardation is that of vocabulary skills. In a study of the comprehension of syntax and vocabulary conducted by Chapman, Schwartz, and Kay Raining-Bird (1991), the authors found that their subjects with Intellectual disability performed significantly better on the vocabulary comprehension task than on tests of syntactic skills, in fact, outscoring a mental-age matched control group on their vocabulary comprehension.

In other studies examination of language produced in natural settings showed children with Down syndrome to have a more diverse vocabulary than typically developing children matched for mental age (Miller, 1988). To understand these results, one should keep in mind that in these studies the children with mental retardation were older than the control group and, therefore, may have had more of an opportunity to learn vocabulary skills. Even so, their vocabulary skills are not equivalent to those of typically developing children of the same chronological age.

Another aspect of semantics involves the organization of language information. If children are given groups of pictures and asked to remember them, they tend to organize the pictures in their minds and recall them in groups. These
groups may be based on physical characteristics or function of the items or on the conceptual category to which the items belong (e.g., toys, animals). Children with Intellectual disability have been found to lag behind in their development of organizing strategies (Stephens, 1972) and to use more concrete concepts suggesting that children with Intellectual disability have some difficulty developing and using semantic concepts.

**Pragmatics**

There is a good deal of research on the pragmatic abilities of individuals with mental retardation, which is examined under the following three areas: speech-act usage, referential communication, and conversational skills.

**Speech Acts**

Children with Intellectual disability have been described as having delayed understanding of speech acts (Abbeduto et al., 1991) In their study, Abbeduto and colleagues found that in their ability to understand what the speaker actually wanted, adolescents with Intellectual disability were similar to younger, typically developing children matched for mental age.

Speech act usage also has been found to be delayed, although it is similar to that of typically developing children of equivalent mental age (Owens & McDonald, 1982). In other words, this study found that the speech-act usage of individuals with Intellectual disability was similar to that of younger, typically developing individuals. It appears that by adulthood, individuals with Intellectual disability can produce all of the basic speech-act categories (Abbeduto & Rosenberg, 1980).

It appears from the research on referential communication that persons with Intellectual disability have some difficulty getting their messages across to others; they may have difficulty putting themselves in someone else’s place. On the other hand they do better when they are in the listener role and perhaps, in more natural tasks, like explaining a game.
Conversational Competence

Studies of the conversational turn taking in young children with mental retardation (Tannock, 1988), as well as adults (Abbeduto & Rosenberg, 1980), have found that they take turns in conversations and make few errors, much as typically developing people do.

Although people with Intellectual disability appear capable of taking their turn in a conversation, what is even more important is what they do with that turn. Typically, people with Intellectual disability do not make significant contributions to maintaining the conversation (Abbeduto, 1991). They may make comments, such as “ok” or “um-n-unm” but do not extend the topic by adding new information.

Research on the conversational skills of people with Intellectual disability has also found that they have difficulty repairing conversations that break down. People with Intellectual disability have been found to be capable of using some conversational repairs, but fail to use them when they are needed (Robinson & Whittaker, 1985; Abbeduto, Davies, Solesby & Furman, 1991). Children with Intellectual disability have also been found to be slow in responding to clarification requests made by others (Scherer & Owings, 1984). Moreover, researchers have found that the development of conversational repair skills appears to plateau during the school years and not improve with experience (Abbeduto, Short-Meyerson, Benson, & Dolish, 1997).

In considering all of the research on the communicative abilities of persons with Intellectual disability Abbeduto (1991) concluded that "deficits in verbal communication are a defining feature of Intellectual disability and should figure prominently in assessments of adaptive behavior".

Speech and Language Difficulties in Children with Cerebral Palsy

Cerebral palsy (CP) is an umbrella term covering a group of non-progressive, but often changing, motor impairment syndromes secondary to lesions or anomalies of the brain arising in the early stages of development (Mutch, Leyland, & McGee,
Most of the studies in western countries showed a prevalence of CP at around 2–2.5 per 1000 life births. Associated impairments are, among others, speech and language disorders (Bishop, 1987; Largo, Graf, Kundu, Hunziker, & Molinari, 1990; Luoma, Herrgard, Martikainen, & Ahonen, 1998). Although the exact prevalence of the communication disorders associated with CP is not known, it has been estimated that approximately 20% of children with a diagnosis of CP have severe communication impairment and are classified as non-verbal. Many more will have less severe speech and communication disorders as a consequence of their motor impairment, or disorders arising from speech, language, and cognitive processing deficits associated with CP. Problems in communication, especially poor speech production, may be a direct result of the motor impairment due to a disturbed neuromuscular control of speech mechanism, i.e. dysarthria (Crary, 1995; Pennington & McConachie, 2001a, b; Pirila et al, 2004; Strand, 1995). And, the more severe the CP is, the less are the child’s abilities to speak and to be understood by family members (Kennes et al, 2002).

In a child with cerebral palsy the damage caused to the brain prevents the child from controlling and regulating the physiological mechanism (Chengappa 2002). Hence, the preparatory exercises for speech production, namely, breathing, sucking, swallowing, biting and chewing, laughing, crying, and coughing, phonation and articulation are all affected in such children. The child with CP has several kinds of breathing problems such as irregular cycling of breathing, rib flaring (abnormal and spasmodic expansion of the rib cage while breathing), and a process of reversed breathing (depression of the upper chest during breathing which is normal only in the first few months in a child). These problems are not generally found if the CP child is not talking. Because of these problems, the CP child is unable to produce stretches of sounds found normally in his language. The child has problems with the production of combinations of sounds in a normal fashion in his speech. Overall, speech problems are associated with poor respiratory control, laryngeal and velopharyngeal dysfunction as well as oral articulation disorders that are due to restricted movement in the oral-facial muscles. There are three major types of dysarthria in cerebral palsy: spastic, dyskinetic (athetosis) and ataxic. Speech impairments in spastic dysarthria involve four major abnormalities of voluntary movement: spasticity, weakness, limited range of motion and slowness of movement. Speech mechanism impairment
in athetosis involves a disorder in the regulation of breathing patterns, laryngeal dysfunction (monopitch, low, weak and breathy voice quality). It is also associated with articulatory dysfunction (large range of jaw movements), inappropriate positioning of the tongue, and instability of velar elevation. Athetoid dysarthria is caused by disruption of the internal sensorimotor feedback system for appropriate motor commands, which leads to the generation of faulty movements that are perceived by others as involuntary. Ataxic dysarthria is uncommon in cerebral palsy. The speech characteristics are: imprecise consonants, irregular articulatory breakdown, distorted vowels, excess and equal stress, prolonged phonemes, slow rate, monopitch, monoloudness and harsh voice (Love, 2000). Overall language delay is associated with problems of mental retardation, hearing impairment and learned helplessness. Children with cerebral palsy are at risk of learned helplessness and becoming passive communicators, initiating little communication (Beukelman & Mirenda, 1998) Thus, ultimately the motor disability in the CP child comes to hinder his oral communication.

Krista & Kertoy (2006) also found the language of children with cerebral palsy to be lower than of normally developing children. Children with an intelligence level below 70 (n=14, 38%) showed problems in motor speech skills as well as in verbal expressive and comprehensive skills (Pirilla et al, 2007).

Children with CP rarely initiate exchanges in conversation with familiar adults, taking a largely respondent role, while adults introduce topics and start most conversations (Jolleff et al, 1992; Light, Collier, & Parnes, 1985a, b; Pennington, 1999; Pennington & McConachie, 1999). They also take fewer turns in conversation than do their adult partners and often fail to reply unless obliged to do so (Light et al, 1985a). In addition, they produce many yes/no answers and seldom ask questions (Basil, 1992; Light et al, 1985b; Pennington & McConachie, 1999). In other words, many children with CP are hindered in their development of narrative skills and functional communication (Basil, 1992; Jolleff et al, 1992; Light et al, 1985a, b; Pennington, 1999; Pennington, Goldbart, & Marshall, 2004; Pennington & McConachie, 1999).
1.2.4 Augmentative and Alternative Communication

Communication is the act of giving or sharing thoughts, opinions, or information with speech, sign, expressions, or writing. The field of augmented communication addresses the needs of people unable to clearly communicate or express themselves using standard communication tools, such as spoken language, body language, sign language, and handwriting. When a person is unable to communicate using standard techniques, they may need an augmentative communication system with the ability to fulfill their communication needs.

AAC systems are classified into two types: aided systems such as pictures and unaided systems such as signs and Makaton (Mirenda, 1999) AAC emphasizes the need for multimodal communication as most communication exchanges are multimodal and social inclusion of individuals with developmental disabilities requires modes of communication that will be readily understood by a range of typical communicative partners. The AAC training in this study included training in Makaton and picture communication which is discussed in the next section.

The ultimate goal of augmentative communication is to enable the user to effectively communicate with others and become a contributing member of society. In order to determine how to reach this goal, studies have been performed to understand what type of communication interactions takes place between individuals. By understanding these interactions, professionals can determine how to incorporate the necessary vocabulary into an augmentative communication system in order to allow individuals to interact effectively. Through extensive AAC research, Light (1988) describes four types of communication interaction: (1) expression of needs and wants, (2) information transfer, (3) social closeness, and (4) social etiquette (Beukelman & Mirenda, 92).

Importance of AAC

The goal of AAC support is to provide children access to power of communication, language and literacy. This power allows them to express their needs and wants, develop social closeness, exchange information, and participate in social, educational and community activities (Beukelman & Mirenda, 98). In addition it
provides a foundation for language and literacy development (Light & Dragger, 2001). Timeliness in implementing AAC is paramount (Reichle, Beukelman & Light, 2001). The earlier the graphic and gestural modes can be put in to place the greater will be the advances in a child’s communication skills. AAC support must address the current and future needs of children so that they can effectively communicate as they mature. With children early communication development focuses on vocabulary that is needed to communicate essential messages and develop language. The vocabulary selection is an ongoing process and needs to include contextual variations relevant to the child. The AAC system must encourage and facilitate participation in social, educational contexts and encourage independence. It must be appealing to the children so that they find it attractive and will continue to use it (Light and Dragger 2001)

Therefore to help fulfill these needs of interaction, a multi-component communication system consisting of a collection of techniques, aids, symbols, and strategies in which the individual can use interchangeably depending on the individual's context, skills, communication partners, needs, etc is required. In order to be considered an optimal communication system, a multi-component communication system must fulfill certain requirements (Blackstone, 1986). The following is a brief list of the most important requirements that the communication system must fulfill in order to be effective:

1. All communication functions including basic needs, conversational needs, writing, drawing, and computer access must be fulfilled in order for the system operator to have the ability to communicate to his or her maximum extent. For instance, the individual must be able to tell someone they are hungry, carry on a typical conversation, or interact with a variety of people.

2. The multi-component communication system must also be compatible with the user's seating system, such as a wheelchair. It must not interfere with any environmental controls the individual may need to operate the controls in his or her home. Finally, the AAC system must not interrupt the user's mobility in any way.
3. The augmentative communication user must be able to communicate with not only people familiar with his or her device, but also with strangers. The system must be usable in group settings, classroom settings, and face-to-face conversation.

4. The multi-component communication system must be usable in harsh and noisy environments. Similarly, the user must be able to operate the system at work, school, home, church, and in an unlimited amount of contexts.

5. The communication system must operate at its maximum rate possible without fatiguing the user. The system must incorporate functions for the user to convey basic needs and yes/no answers at a distance. It must be interruptible and incorporate the ability to express emotions as well as words.

6. The augmentative communication system must promote growth in vocabulary, grammar, and topics for the user.

7. The communication system must be easy to use, as well as aesthetically pleasing in order to increase motivation by the user and his or her communication partners.

8. The price of the system must be affordable for the user, along with low maintenance.

**Need for AAC in Disability**

The nature of outcomes is apparent from the detailed account of speech language and communication difficulties in Children with developmental disability (CP & ID). Though no clear estimates of non-verbal children with CP and/or ID are available, a study by Matas et al (1985) gives a fair indication. Of the 6% of children enrolled for special education 47.3% were multiply handicapped, 28.2% had mild to moderate deficits, and 13% had severe to profound deficits. The total percentage of non-speaking population by handicapping condition was 100% for multiply handicapped and severe to profound deficits and 12.3% for mild to moderate deficits.
As the individual develops and moves into adulthood, an inability to communicate continues to compromise his or her ability to participate in society, limiting access to more advanced education and employment and closing off many leisure activities and personal relationships. Skills that appear effortless for most typically developing children and achievable with the aid of spoken language intervention for the majority of children and adults with Intellectual disability are never attained by a relatively low incidence sub group of individuals with Intellectual disability and cerebral palsy.

Typically, these are individuals who have received some speech and language intervention and still have not made significant advances communicating through speech. These individuals with developmental disabilities have severe communication impairment (Sigafoos & Pennell, 1995) and are obvious candidates for augmentative and alternative communication (AAC). Need for AAC is apparent on observation of outcomes in individuals with limited output. As they lack an expressive system they are more likely to act out in undesirable ways (Downing, 1999). Learned helplessness can occur when children become passive or choose not to participate in activities because they have decided that they can't control the situation (Guess, Benson, & Siegel-Causey, 1985).

Thus implementation of AAC for these children becomes imperative as an intervention approach that provides an avenue by which to replace or augment these types of existing spoken communication skills. (Romski et al, 2003)

**Components of the Augmentative Communication System**

The augmentative communication system is very complex and incorporates a variety of symbols, transmission techniques, vocabulary, strategies, and messages. The representation system or symbols used in AAC include gestures, hand signal, photographs, pictures, line drawings, words and letters (Beukelman & Mirenda, 2005). The choice of symbol system will depend on the AAC user’s abilities; many will use different symbol systems at different times. It is important to consider the individual user’s preference, visual acuity, and visual processing of information when
establishing which type of pictures are appropriate for their communication system. (Hoge, Debra, Newsome, Cheryl, 2002)

Picture symbols are used with those who cannot read or write. Some picture systems, such as Blissymbols have linguistic characteristics, while others such as the Picture Communication System (PCS) do not (Huer, Blake, 2000). Symbols can be realistic pictures in color or in black and white or simple line drawings. Some users understand the line drawings better than detailed colorful pictures or vice versa (Hoge et al, 2002). Symbols can be strictly visual when located on boards or screen displays or they can be tactile such as with the Picture Exchange Communication System (PECS) (Hoge et al, 2002). With this system, the pictures are on cards for the user to move around to form a message. Tangible items can also be part of symbol systems, such as miniature objects representing their real counterpart, or small items as abstract representations (Hazel, Gillian, Cockerill & Helen, 2001).

Both low and high tech devices may use alphabet-based symbols including individual letters, whole words, or parts thereof (Hazel et al 2001). Literacy is required for these symbols. In low-tech devices, the communication partner may see the symbols, such as with an alphabet board. In high tech devices such as Voice Output Communication Aids (VOCAs), the device will read the message put together with symbols out loud (Hazel et al, 2001).

**Organization of symbols**

Vocabulary organization refers to the way pictures, words, phrases, and sentences are displayed (Blackstone, 1993). In an AAC system, symbols must be organized to facilitate efficient and effective communication. This is especially important when the individual has a large number of symbols in an AAC system (Beukelman & Mirenda, 2005).

Individual pages of a communication book or device may be presented into several ways. In grid displays, individual symbols, words, phrases, or pictures are combined in a grid format (Beukelman & Mirenda, 2005). The grids may be organized in a variety of ways, including by spoken word order or frequency of usage, or specific activities. Research has shown that both children and adults use a small core
vocabulary and a large fringe vocabulary (Beukelman, Jones, & Rowan, 1989; Marvin, Beukelman & Bilyeu, 1994).

Access to AAC entails a complex interrelationship between the features of the AAC technology, the individual's physical abilities (e.g. motor, sensory, perceptual, cognitive and linguistic skills), and the device users' and their communication partner's abilities to interact (Higginbotham, Shane, Russell & Caves, 2007). Technological developments in direct selection and scanning have dramatically increased access to AAC technologies for individuals with a wide range of communications needs (Higginbotham et al, 2007). Some people with severe communication impairments can use their hands to use AAC; others who cannot do so use alternatives such as mouth sticks, head sticks, switches or eye pointing. In this "direct Selection" a selection is made by pointing to the desired symbol using a finger or an alternative pointing technique (i.e., head pointer, eye gaze, joystick, mouse).

Whenever AAC users are unable to choose items directly, usually due to lack of motor control, they use an indirect selection technique called scanning, whereby items displayed for selection are scanned visually by an indicator (such as small lights, highlighting, or contrasting borders) or auditorily by the communication partner or by the device. When the desired message is reached, the AAC user indicates his or her choice by using an alternative selection technique (i.e. switch access, head nodding) to confirm the choice (Beukelman & Mirenda, 2005).

Makaton Vocabulary Language Program

The program consists of an open - ended lexicon, based around a common core of functional concepts, which is taught with manual signs and/or graphic symbols accompanied by speech. The principles that govern the design of the Makaton Vocabulary program are derived from the belief that effective use of any communication depends on its consistent use in significant environments (Walker, 1987; Grove and Walker, 1990). The Makaton Vocabulary - Indian Version (Walker, Ghate and Lal, 1992) mainly comprises of words that are commonly used in India. The words have been matched with signs from the Indian sign language. The graphic symbols represent the words in the manner that is culturally appropriate to India. Research on Makaton documents its effectiveness for development of communication
skills in children and adults with intellectual disabilities (Lal 2006; Grove and Walker 1990).

**Picture communication**

Picture communication is an aided system of AAC wherein the symbols used include gestures, hand signal, photographs, pictures, line drawings, words and letters. The choice of symbols depends on the skills and users abilities including visual, motor and cognitive. Picture communication in the form of pictures, photographs and Makaton symbols are used in this study.

Three highly effective strategies in AAC implementation were incorporated into the training module for use with Makaton and picture communication. They include aided language stimulation, incidental teaching, and scripted routine.

Aided language stimulation is receptive language training wherein the facilitator is modeling the use of a communication overlay before the augmentative speaker is expected to use it. This approach utilizes multiple activity-based communication overlays that include relevant symbols to facilitate communication. Incidental teaching facilitates learning in ongoing activities in a natural context by using child’s interest and motivation. It is unique because it follows the child’s lead in naturally occurring contexts. Scripting provides the person information about what and how to communicate in a specific situation.

**1.2.5 Transdisciplinary model of service delivery**

The theme of transdisciplinary service is central to the development of an AAC training module and to this study at large. Transdisciplinary service is defined as the sharing of roles across disciplinary boundaries so that communication, interaction, and cooperation are maximized among team members (Davies, 2007). A key outcome of TA is that the family is considered to be a key member of the team to meet the complex needs of children with disabilities and their families (Carpenter, 2005). In contrast to other service delivery approaches, TA is considered to reduce fragmentation in services, reduce the likelihood of conflicting and confusing reports.
and communications with families, and enhance service coordination (Carpenter, 2005).

A key outcome of TA is the development of a mutual vision or “shared meaning” among the team (Davies, 2007; McGonigel, Woodruff, & Roszmann-Millican, 1994), with the family considered to be a key member of the team. A transdisciplinary model of service delivery—in which team members serve as consultants to one primary service implementer—is described and advocated as a solution to the problem of unequal distribution of professional responsibilities that plagues other service delivery models. (King et al 2009)

Role release, in which professionals assume responsibility for implementing interventions prescribed by other disciplines, is the cornerstone of the transdisciplinary team. (Odom & McLean, 1996). The process of role release involves several aspects, including role extension, role enrichment, role expansion, role exchange, role release, and role support (Johnson et al., 1994). Role release is an ongoing process rather than a series of linear steps. In the role expansion phase, a common vocabulary develops, along with expanded theoretical knowledge and the capacity to implement integrated interventions that meet the holistic needs of the child within the family context, resulting in a more naturalistic intervention (Foley, 1990). The presumed benefits of TA include (a) service efficiency, (b) cost-effectiveness of services, (c) less intrusion on the family, (d) less confusion to parents, (e) more coherent intervention plans and holistic service delivery, and (f) the facilitation of professional development that enhances therapists’ knowledge and skills (Foley, 1990; Polmanteer, 1998; Sheldon & Rush, 2001; Warner, 2001). These presumed benefits have not been extensively evaluated. Empirical research on the transdisciplinary model is very much needed (Foley, 1990).

These aspects form the framework for developing an AAC training module in this study which will enhance the knowledge and skill of caregivers who will thereby facilitate language and communication in children with developmental disabilities.
Transdisciplinary service delivery in early intervention emphasizes joint responsibility and collaboration of team members from a variety of disciplines (including parents) in the assessment of a child and in planning, implementing, and evaluating services for that child (McGonigal, Woodruff, & Roszmann-Millican, 1994). The model is among those recommended for early intervention service delivery (Odom & McLean, 1996).

Transdisciplinary models of practice aim to provide more family-centered coordinated, and integrated services to meet the complex needs of children with disabilities and their families (Carpenter, 2005). The transdisciplinary approach (TA) has been recognized as a best practice for early intervention (Bruder, 2000; Guralnick, 2001), and many early intervention programs adopt some form of TA (Berman, Miller, Rosen, & Bicchieri, 2000). In contrast to other service delivery approaches, TA is considered to reduce fragmentation in services, reduce the likelihood of conflicting and confusing reports and communications with families, and enhance service coordination (Carpenter, 2005; Davies, 2007).

The literature describing the use of the transdisciplinary model in early intervention typically focuses on individual children and their families (McGonigal et al, 1994). Historically, the model was developed for home-based programs in order to reduce the number of professionals who provided services in a child's home (Patterson & Hutchinson, 1976). With respect to service efficiency, it has been argued that more children can be served because fewer providers routinely see a given child.

In sum, TA fosters a holistic approach to care (Foley, 1990) through the development of more coherent intervention plans and a “shared meaning” or a mutual vision among the team and family (Davies, 2007). The mutual vision and good communication required by this model lead to services designed to best meet the needs of the child.

According to Akkok (1994) parent training and education about the nature of disabilities of their children can enhance the development of the children with
intellectual disabilities, because parents are the significant contributors to the
development of their children. They are the primary caretakers, managers, behavior
models, disciplinarians, and agents of socialization and change for their children. If
parents are adequately trained and taught they can be better teachers or trainers to
their disabled children than other formal professionals.

Golbert and Mukherjee (1999) contributed that professionally oriented training
program to the parents of the disabled children can reduce their feeling of
hopelessness, resentment, and increase the ability to cope with this chronic stress.
Those authors formulated a specially designed training program for the parents of
'spastic children' in a center namely, "Spastic Society of Eastern India" (now Indian
Institute of Cerebral Palsy, IICP). They commented that favorable results can be
expected if proper guidance program is initiated for those parents.

**Multi skilling in AAC AND TRANSDISCIPLINARY SERVICE MODEL**

AAC is a field (ASHA 2002) that requires skills that transcend the typical
discipline-specific training received by speech-language pathologists, physical
therapists, occupational therapists, educators, and other professionals who may serve
on an AAC team. These team members often collaborate in an interdisciplinary or
transdisciplinary manner of service delivery. AAC services should be consumer
driven; individuals, who use AAC, and their families, should play key roles as
members of a team. In most cases the service delivery model of choice is the
transdisciplinary approach, encouraging extensive collaboration between team
members, role release of skills to and from one another, and maximizing each team
member's skills and contributions to the team. All these features form the components
of multiskilling.

In the perspective of a transdisciplinary model, training is based on two main
principles, namely, multiskilling and adult learning principles. Caregivers have
diverse needs and role transition and adoption is important to ensure successful use of
augmentative communication with their children with developmental disability.
Therefore training the trainer and facilitating collaboration with caregivers requires a
multiskilling approach.
Multiskilling incorporates features of indirect services in transdisciplinary model. This implies that the professionals assume roles of collaborator but at the same time do not relinquish their individual professional skills and responsibilities towards children with disabilities and their families. The indirect service delivery or multiskilling is based on four assumptions (Orelve & Sobsey 1996):

- Milieu teaching yields best results
- activities should be functional
- rehabilitation and hence communication training too should be provided through out the day and in all settings relevant to children with disabilities
- Skills must be taught and verified in settings in which they occur naturally.

Development of a service delivery model through a training module is multifaceted. ASHA (2008) explicitly recognizes the concept of "role release" among professionals operating within a transdisciplinary team model, allowing for primary service provision by a single individual who is not necessarily the SLP. The role transition process is a key element of multiskilling. In the case of AAC, the key is that the primary provider is an individual with a significant level of insight about language development, disorder, and evidence-based intervention practices. In this case, the framework of the training module should enhance knowledge and skill base of caregivers in successfully introducing and implementing AAC. The role release can also happen with respect to the family and frequent communicative partners wherein they can be educated and empowered to facilitate development of skills using familiar and daily activities at home.

The family and caregivers have an important responsibility for the application of acquired multiskilling abilities in the home environment; direct family and caregiver involvement is a major determinant of intervention effectiveness. The interventions selected should be based on current research, principles of evidence-based practice (i.e., an integration of theory, research, professional judgment, and family preferences), and progress-monitoring data. In summary, appropriate
evidence-based intervention practices should be a collaborative effort that (National Joint Committee on Learning Disabilities, 2006)

- focuses on the child’s needs while capitalizing on the child’s existing strengths;
- is explicit, systematic, and comprehensive;
- links intervention activities to family activities;
- integrates intervention with the school curriculum and makes curricular adaptations as necessary; and
- results in functional and meaningful progress that can be sustained over time and across settings.

Thus knowledge and skills are critical features of multiskilling and the transdisciplinary approach for AAC intervention to be effective. Defining roles of caregivers in difficult as it remains transitory due to changing needs of the community. However with respect to this training module three generic roles can be identified. The caregivers will continue to fulfill the roles of basic care giving (helping children with disabilities in their ADLs/ activities of daily living such as feeding, toileting, seating and positioning etc) in the community setting and also adopt roles of communication trainer and AAC facilitator. Therefore Multiskilling is effectively used in a transdisciplinary approach. In essence it is the above tenets discussed which form the framework for developing a multiskilling AAC training module in this study which will empower caregivers and thereby enhance the communication opportunities and skills of children with developmental disabilities.

1.2.5 Training Module

Training is an extension and development of capabilities for better performance. It involves transfer of new knowledge, skills, behaviors and attitudes to perform specific roles to achieve progress. The training module in this study is designed based on the principles of adult learning put forth by Kolb and Fry's (1975), Knowles(1970) and Lieb (1991). The salient features of adult learning principles incorporated in the design of the training module are:

- Adults have the need to know why they are learning something
- Adults learn through doing. –experiential
- Adults are problem-solvers. –problem solving –drives learning
- Adults bring many experiences to the training program, which provides a rich resource for learning.
- Adults learn best when they see the connections between what they are learning and how they can apply it in their immediate work situation. Training programs, therefore, should provide opportunities to engage in discussion and in case studies, role-plays and experiential exercises that help participants talk about and address specific problems and challenges they face.
- Extending the use of adult learning principles from training to extension activities

The training module in this study is designed based on the principles of adult learning such as experiential learning put forth by Kolb and Fry's (1975), Andragogy by Knowles (1984), Fells principles (Fell 2005) and critical elements of learning prescribed by Lieb (1991). The salient features of adult learning principles incorporated in the design of the training module are highlighted below:

**Principle one:** Build on local experience; use the knowledge within the group/individual. Adults come to educational or training activities for a variety of reasons. What they bring with them is a wealth of experience that is there to be built on and used in the particular activity (Malouf 1993, Knowles 1990 and Rogers 1973). It is important to tap into this experience, to see what they already know and to then develop the material that you have from this base.

**Principle two:** Make the learning environment comfortable and encouraging. When adults are faced with a new (learning) experience they are often anxious about their own perceived deficiencies and about showing this in public (Rogers 1973). The caregivers also undergo a lot of stress and apprehensions thinking, planning and providing for the individual needs associated with disability. While the caregivers are willing and show self-motivation for acquiring skills, it becomes important to empower them in a stress free comfortable learning environment. This will maximize their learning curve and help achieve the purposes of training.
**Principle three:** Ensure that the learning activity meets the needs and relates to the problems of the client group. An important aspect to remember in any learning activity is that adults feel a need to learn (Malouf 1993, Knowles 1999) and they usually have problems or issues that they are concerned about. Thus they come into activities looking for answers to their concerns. The learning therefore needs to have practical pay off for the adults who are at the learning experience. Therefore the activities incorporated into the training have to be relevant to these needs.

**Principle four:** Involve the training recipients in planning their own learning experience. Involvement and participation in the learning process is also important for adults; activities need to be designed that cater for the four learning styles (Honey & Mumford 1986). The action learning process provides a basic framework for involving people and ensuring participation.

**Principle five:** Activities need to actively involve people, be stimulating and participatory. Adults seek learning experiences wanting to learn, so the training must make it possible for them to do so. Activities should therefore challenge and stimulate the individual in the learning process. It is also necessary to ensure that all four learning styles are covered by exercises, activity, and reflective practice and planning:

- Pragmatist (Prefers to apply new learning’s to actual practice to see if they work.),
- Activist (Prefers the challenges of new experiences, involvement with others, assimilations and role-playing)
- Theorist (Prefer to think problems through in a step-by-step manner) and
- Reflector(Prefers to learn from activities that allow them to watch, think, and review )

The methodology caters to different learning styles through interactive discussions with explanations on the status of AAC in developmental disabilities, a step by step approach of learning and actual application of new learnings by hands on approach.

**Principle six:** Allow time for people to reflect on what they are learning, take difficult subjects slowly and always be open to questioning. Reflection on what is being learnt is a key element when using adult learning principles – people need time
to think about what they are learning and what it means to them and/or their work. The time for reflection needs to be deliberately set aside in the schedule.

**Principle seven:** Build group and individual confidence by letting them know they are right, building a confidence that they are making progress towards their learning goals. All people need to feel they are making progress in their learning. It is possible to let people know they are making progress by rewarding “success”. Praise the individual or group when they do things right – take more time to do this that to correct their mistakes.

**Principle eight:** Learning must involve effective two-way communication. It is difficult to undertake any learning if there isn’t two-way communication. Dialogue between trainer and participant, between participants themselves and then between participant and client is inherent in the learning process. This must be central to the training or learning experience.

*Developing the contents of a training module*

Once the framework is clearly identified, three key areas need to be incorporated in converting needs into objectives, namely skills, knowledge and attitude (Swanson et al., 1997). Skills objectives indicate what the trainee can do, demonstrate or perform as result of the training. Knowledge-related objectives refer to the participants’ ability to identify, define or describe given concepts as a result of the training. Attitude objectives are less easy to measure although it may be useful to make explicit the desired attitudinal change. A training module which has these three facets interwoven in it will be effective in meeting the objectives it is designed for.

*Training method*

A training method is a strategy or tactic that a trainer uses to deliver the message so that the trainees achieve the objectives of the program (Wentling, 1993). Discussion of the methods also includes the materials used and modes of presentations and training. One or more training methods can be used in the presentation of a message. The AAC training module uses a variety of training
methods throughout the training course to maintain the interest of the caregivers such as Lectures, discussions, demonstrations, simulations and hands on exercises.

**Selection and Preparation of Materials**

Research shows that most people learn things through at least three of the five senses. The trainer should try to use training methods that appeal to the senses of sight, hearing, smell, taste and touch. In general, instruction by spoken or written word is more effective when it is supported by methods that stimulate the other senses (OSHA, 1996). When participatory, hands-on methods are used, they serve to convert the symbolism of words into images in the learners’ mind. Visual aids and hands-on exercises help make an abstract concept into a practical reality. This improves the chance for storage in long-term memory (improved retention and recall). The more senses to which instruction appeals, the stronger the impact of the message.

Training aids improve the effectiveness of the trainer (Cheek and Beeman, 1990). Visual aids are especially useful in reinforcing the key points made by the trainer in an oral presentation. A variety of print materials can be used to enhance the learning process. These may include handouts, summary notes, workbooks or manuals. They have a clear advantage in that they provide a summary and/or can present additional information and can reduce note taking. They can be made available to the trainees for reference after the training session.

**1.2.7 Operational definitions of the key terms**

The terms used in this research are operationally defined as follow to understand their context:

**AAC:** Use of AAC systems, namely Makaton Development Vocabulary Program and Picture communication.
Caregivers: group of people consisting of parents, carers, volunteers and health care workers in the community within the age range of 26 to 40 years and participating in the rehabilitation of children with special needs.

Communication: ability to receive, send, process, and comprehend concepts through verbal, nonverbal and graphic symbol systems as measured by the Communication Scale for Children (CSC)

Training Module: 21 hour training workshop consisting of theoretical information in language and communication development, AAC and hands on training in usage of AAC

Multi-skill: Refers to cross training of caregivers in skills and strategies to implement AAC and facilitate language and communication skills in children with developmental disabilities, namely Cerebral palsy and Intellectual Disability, as measured by Observational Schedule for Caregivers.


Research questions

1. Would Multi-skill Training Module in AAC be effective in enhancing caregivers’ ability in developing language and communication skills in children with disabilities?

2. Would use of AAC systems enhance the receptive language and expressive language of children with developmental disabilities?

3. Would training on AAC system effect change in caregivers’ opinion in favor of AAC usage?
Objectives of the study

1. To develop a Multi-skill training module in AAC for caregivers
2. To study the effect of AAC training on caregivers ability to develop language and communication in children with developmental disabilities
3. To study the effect of AAC usage on the development of language and communication skills in children with developmental disabilities
4. To study the effect of training module on the caregivers perception towards use of AAC.

Scope of the study

Limitations:

The study was conducted on randomly selected sample of caregivers (N=48) and children (N=48) caregivers and children were residents of Bangalore. The selected children belonged to 8 special schools in Bangalore.

Delimitations

The study was conducted on caregivers and children with disabilities. Hence the results may be generalized to the same population.