B.ED. SPL. EDUCATION

# ASSESSMENT AND IDENTIFICATION OF NEEDS

SES HI-01

MADHYA PRADESH BHOJ (OPEN) UNIVERSITY

# ASSESSMENT AND IDENTIFICATION OF NEEDS

**B.Ed. Spl. Ed**

**(SES HI 01)**

**MADHYA PRADESH BHOJ (OPEN) UNIVERSITY,**
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# Bachelor of Special Education

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&

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**SES HI – 01**
**ASSESSMENT AND IDENTIFICATION OF NEEDS**

BLOCK

# 1

# EARLY IDENTIFICATION OF HEARING LOSS: NEED AND STRATEGIES

# BLOCK 1 EARLY IDENTIFICATION OF HEARING LOSS: NEED AND STRATEGIES

## INTRODUCTION

Deafness is a hidden handicap which does not arouse immediate attention and sympathy. Yet it is a potentially devastating disability. The learning through interaction becomes almost impossible because of lack of verbal communication. It is only through language that we get fully assimilated into our human culture, communicate freely with our fellows, and acquire and share information.

Given below is what an anonymous poet has to say about disability:

*"…. Then walking down the street, I saw a child with eyes of blue.*
*He stood and watched the others play, it seemed he knew not what to do.*
*I stopped for a moment, then I said, "Why don't you join the others, dear?"*
*He looked ahead without a word, and then I knew he could not hear.*
*" Oh God!, forgive me when I whine, I have two ears – the world is mine.*
*With feet to take me where I'd go, with eyes to see the Sunset's glow,*
*With ears to hear what I would know, Oh God, forgive me when I whine,*
*I am blessed indeed! The world is mine."*

It is **this Deaf Child** who suffers from mental isolation (even when he is right amongst a group of hearing people) about whom we are going to talk in the 3 Papers on the subject 'Training in Hearing Impairment' covered in the MPBOU B.Ed. (SE-DE) Programme.

## OBJECTIVES

The study of the Units in Block1 will help the readers to understand deafness in general. The multidimensional problems arising out of deafness, and the various ways in which the family of the Deaf child, society, and the Deaf themselves try to tackle these, are discussed in these Units. The Deaf referred to in these Courses are in main the early severely and profoundly deafened children, i.e. before the acquisition of language and speech skills.

# UNIT 1: NEED FOR EARLY IDENTIFICATION OF HEARING LOSS

## STRUCTURE

- Sensory neural deafness
- Mixed hearing loss
- Central deafness

1.6.3 Terms used in classification of hearing impairment

- Terms used in medical profession and audiology
- Terms used to indicate degree of loss
- Terms used in education

1.6.4 The causes of deafness

**1.7 Factors that influence a hearing impaired child's normal development.**

**1.8 Society's role in dealing with the disability**

**1.9 The Achievers**

**1.10 Feelings as expressed by the deaf**

**1.11 Life style of the adult deaf**

**1.12 Psychological aspects of deafness –the need for understanding**

**1.13 Summary**

**1.14 Self-Study**

**1.15 Assignments/Activities**

**1.16 Points for Discussion and Clarification**

**1.17 References/ Further Reading**

## 1.1 INTRODUCTION

Deafness is inability to hear and understand conversation and speech in most situations. This also prevents the normal natural process of acquisition of language and speech in early childhood. Both blindness and deafness are sensory deficits and both the blind and the deaf are disabled at a functional level in their own ways. But a blind person attracts society's immediate attention and sympathy. On the other hand, deafness remains a hidden handicap till a deaf child/person tries to communicate with other persons or vice versa. In the words of Dr. Daniel Ling, "*Deafness can be regarded simply as an acoustic filter that either partially or totally excludes the perception of sound. Permanent forms of deafness are not usually associated with physical pain; nor can they be seen".* The deaf person outwardly looks so normal that the lay-public cannot realize the extent to which this impairment can create difficulties for him.

An effort has been made in this unit to help the readers to see and understand the problems arising out of deafness from different angles and perspectives. This should help all those who are involved in educating the deaf child, i.e. the parents, teachers and other professionals, to realize the disability that deafness imposes and to find ways of reducing its adverse effects in order to promote the child's learning in as many directions as possible. The teacher will be able to do his/her job well only when he/she can understand the exact nature of the handicap and realize that the needs of children will vary according to the child's level of deafness and his environment. (Except the Unit on 'Deafness and Associated Disabilities' in Block 3 in Paper I, the rest of the Units in Paper I and II mainly refer to straight forward deaf children with severe to profound hearing losses.)

## 1.2 OBJECTIVES

After reading this Unit, the reader will be able to :

- State what deafness is and its effects on the child/person,
- State the terms used by different professionals working in the field related to deafness,
- Explain discontinuance of the use of the term 'deaf and dumb',
- .Discuss the heterogeneous nature of the deaf population,

## 1.3 EFFECTS OF DEAFNESS

Learning for young children is a social activity where new skills and understandings are gained through interaction with both adults and their peers, i.e. the people around them.

**Communication Disability**

Severe to profound hearing loss, mainly in the case of a prelingually deaf child, imposes a communication disability on him. The infant/child is deprived of the natural everyday input of language that every hearing child receives from his mother at home and his immediate environment. The direct result of this is language deficiencies which involve severe to total absence of language and speech. A deaf child's thinking capacity is generally intact. He can see everything and understand a few things. But on his own, because he cannot hear, he cannot learn the words that represent these. He also cannot learn the way sentences are formed to express complete thoughts. He may try to use gestures to express himself but may not always be understood by others, nor can he understand the signs and gestures used by others beyond very simple directions and explanations. Unless very special effort is made to provide words / language for the signs / gestures that are used, the child will never learn language. Consequently his knowledge base will also remain very impoverished.

### 1.3.2 Effects of Deafness on Various Aspects of Development

The language retardation in the deaf child seriously affects the various aspects of development such as cognitive (understanding and knowing, in general, thinking, reasoning, solving problems etc.) speech, social and educational development. All these aspects of development are almost inextricably interdependent. Therefore, the progress or deficit in one area will invariably affect the other areas.

- **Educational Aspect** - Deafness itself does not affect a person's intellectual capacity to learn, yet deaf children generally require some form of special schooling and training to gain adequate education. . Since the child's education in school will almost entirely depend upon the child's mastery of language, his inability to hear will greatly hinder his intellectual development and educational/academic achievements in the absence of early appropriate measures of intervention.

- **Social Aspect** – Owing to difficulties in communication that is of language comprehension and expression, the child/person is very likely to feel mentally isolated, frustrated, suspicious of everyone and everything and will tend to resort to withdrawal from social situations.

- **Psychological Aspect** – There may be a degree of maladjustment in behaviour depending upon number of factors such as home background, innate abilities, emotional stability, additional disability, etc.

### 1.3.3 Primary and Secondary Effects of Hearing Impairment

In **Dr. Daniel Ling**'s words, *" Hearing impairment, if sufficiently severe, has numerous primary and secondary effects on the human.*

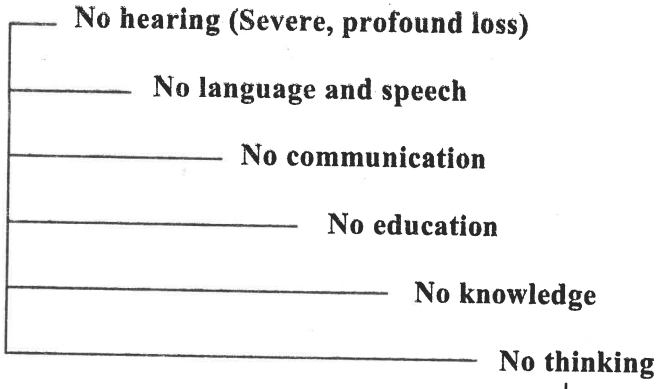
*Its **primary effect** is the restriction it can impose on acquisition and use of language in communication.*

*Its **secondary effects** are more widespread and (particularly because of inappropriate measures of habilitation) can include impoverished communication that restricts experience, hinder personal / social development, and prevent optimal educational attainment.*

*The **third level of adverse effects** is found when the child is due to leave school. Poor educational attainments will restrict employment options, limit income and circumscribe leisure activities.*

*These restraints can, in turn, substantially reduce the quality of a person's life in a myriad of ways. The effects of hearing impairment are not limited to the afflicted individual. Such effects extend to the family of the person and to the society at large."*

**Simply put, without early intervention and quality training and education for years, it will invariably be like:**




**Every cognitive and social aspect of human life is affected**

- **Early intervention through the use of hearing aids.**

Rapid advances in electronics and technology have given us access to high quality hearing aids suitable for different types and varying degrees of hearing impairment. Fitting these aids at very early age, coupled with intensive auditory training and active parent participation has yielded good results in a number of cases. (For details please refer to Paper III, Block I & II –Audiology.)

- **Communication Through Sign Language**

A number of studies of the 'Development of deaf children of deaf parents' have shown that an early use of sign language for interaction between the parents and the child facilitates communication required for the child's overall growth. This leads to better adjustment of the child to his surroundings and everyday dealings, emotional stability and satisfactory cognitive development.

( For details please see Paper – I, Block – II )

## 1.4 THE HEARING IMPAIRED AS VIEWED BY THE LAY PUBLIC

Deafness is the most misunderstood of all human disabilities. Different people have different misconceptions about deaf people's abilities. Some think the Deaf are intellectually deficient , while others think that though they may not be able to hear, they should not have any problem to use language and speak

naturally. This is not surprising because on the face of it, it is not easy to immediately correlate deafness with the ability to acquire language and speech skills. Another reason for this could be that they have perhaps met people who have become **postlingually** deaf and therefore are able to speak, (read and write) quite well. Most people who have not come in close contact with the **prelingually** deaf and have not been required to interact with them, are unable to appreciate the gravity of the problems arising out of this disability.

### 1.4.1 'Deaf and Dumb' – ~~Dumb~~

For hundreds of years, the congenitally deaf were considered 'dumb', not only in the sense of being unable to speak but also 'dumb' that is 'stupid'. In fact they were regarded by law as 'incompetent' to inherit property, to marry, to receive education, to do any challenging work, and were denied fundamental human rights. However, by the middle of the 18th century, it was generally realized that the deaf population does have the normal range of variation of intellectual capacity (same as the hearing population) and that they are educable both in learning language and speaking and being educated if taught in the way they can learn. As a result, efforts are now being made to educate the general public and change the social attitude and the terms such as 'deaf and dumb' or 'Behara-Gunga' or 'Behara-muka' are slowly being replaced by the terms 'the deaf' or 'the hearing impaired'. However, it is needless to add that the change merely in the usage of terms is not going to make the Deaf 'speaking persons' or easily turn them into 'educated persons'. It is only the consistent, systematic and intelligent efforts towards stimulation and training of the HI children individually over a long period of time that is likely to bring about the desired change.

### 1.4.2 The Heterogeneous Nature of the Deaf Population

The Deaf, same as hearing people, are a heterogeneous population. In dealing with deaf children, account must be taken of the wide individual variation in degree and the type of loss, in the psychological adjustment to the loss, and their environmental background. The several studies of the profoundly deaf children indicate that the degree of deafness, age of onset of deafness, language ability, the teaching method used in the school, and parental support, all influence the performance of the deaf child. (The research studies on the performance levels of deaf children should provide detailed and careful description of every group of deaf individuals used as subjects. ) In fact, it is because of this heterogeneity, that no single method of education or one mode of communication can be followed with all deaf children. The modalities of

communication and methods too must be chosen and tried out as per needs of the individual child.

## 1.5 HOW WE LEARN

Our senses are the gateways to learning. Information and knowledge that one gains through experience is acquired by us through the distance senses – hearing and vision, and the close senses – smell, touch and taste. Of these, we are constantly in touch with our environment through hearing because we cannot close our ears completely, not even in sleep. Also, sound signals reach us from all around whereas visual signals are received only from what is in front of us and when our eyes are open and focused on it. However, most of what we know of the world external to us is learned through distance senses and the languages that the most people know are normally acquired through hearing (except the sign language of the Deaf which is a visually based system of communication).

### 1.5.1 The Primary and Secondary Signals That Provide Information :

In animals too, same as in human beings, information about the environment is provided through the five senses – the first/primary signaling system. Both human beings and other primates (such as apes, dolphins, etc.) have an inborn ability to think, perceive and mentally process (i.e. to analyze, reason, form concepts, solve problems etc.) the information received from the environment through these senses. In addition to this, man also has the ability to receive and interpret the secondary signals namely the words of a language. Words are mainly the arbitrary spoken symbols which stand for almost everything that we perceive through our senses and these are stored in our brain along with the rules of language for ready use. Words also enable us to store in our mind/brain the labels for concepts which are the results of our conscious as well as unreflective thought processes.

The word 'arbitrary' means there is no direct connection between the word symbol and the actual object that it represents; e.g. the concepts of action or objects refered in different languages are the same but the words are different, e.g.'kairi' in Gujarati, 'aam' in Hindi, 'awakaya' in Tamil, etc. for the object/concept of 'mango', or 'daud' in Hindi, 'pal' in Marathi,. 'dodwu' in Gujarati, for the action of running. In man however, the secondary signals i.e. language, later serves as the main source of information and a most efficient tool for intellectual functioning.

### 1.5.2 Main Distinguishing Feature Between Man and other Animals :

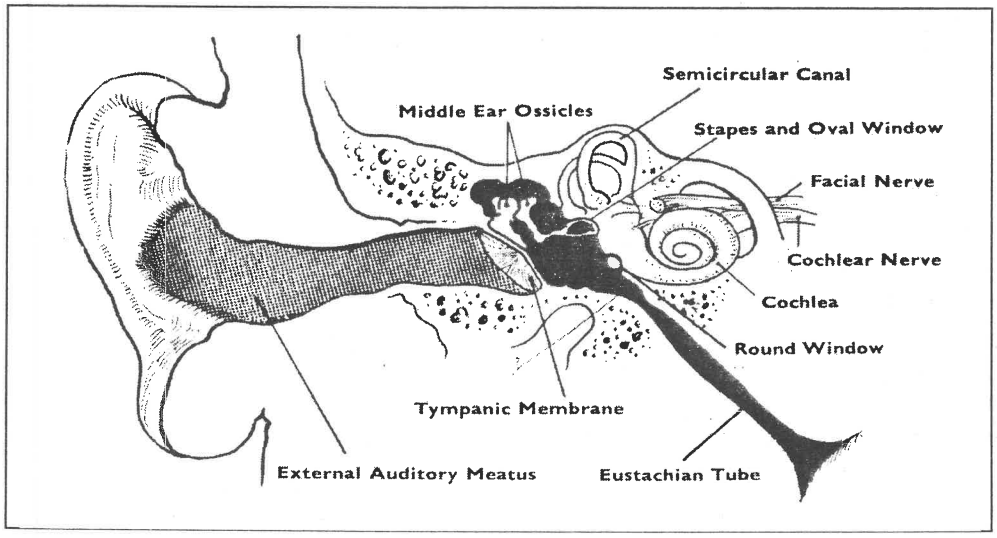
Possession of language is probably the most important distinguishing feature between man and other animals. Animals are seen to use some sound signals,

but these are extremely limited and completely non-productive, e.g. parrots do not create novel sentences and dogs do not understand complicated commands. As against this, man has the ability to reproduce the world symbolically through language which sets him free from his immediate temporal and spatial environment. This allows man to think and talk about not only here and now, but also about things and events from a distance and from the past and the future. Then again, animal communications are genetically transmitted. They are completely determined by the genetic structure of the animal. Therefore the crows all over the world will crow the same way and all bees will use the same system of the genitically acquired dance with only occasional variation among different colonies of bees. On the other hand, human beings in different parts of the world speak different languages, and although the potential to learn is genetically acquired by man, the details of the linguistic system must be learned anew by each speaker. Only Man has the inborn ability/brain potential to learn language the complex system of verbal language **mainly through the sense of hearing.**

## 1.6 HOW WE HEAR AND HOW DEAFNESS IS CAUSED :

### 1.6.1 The Ear :

The ear is one of the most delicate parts of the body and can easily be damaged. There are three main divisions of the ear :




The figure of the ear

- The **outer ear** which is the part we can see and which leads to the ear canal going down to the eardrums which cannot be seen easily.

- The **middle ear** which is the other side of the ear drum. It contains 3 little bones linked together which move as a unit along with the ear drum. The ear drum vibrates when the sound waves press on it, and the 3 bone unit passes on these vibrations to the adjoining inner ear.

- The **inner ear** is a very complicated organ. It receives and sorts out all the vibrations as different sounds, so that the brain, through the auditory nerves and the auditory pathway, can receive them and after processing, interpret them.

Damage to any of these parts including the auditory area of the brain itself, can cause deafness.

### 1.6.2 Types of Deafness

- **Conductive Deafness:**

Functionally, the outer and middle ears form the conducting apparatus whose function is to carry the sound to the inner ear. Thus any damage to these parts prevents sound wholly or partly, from reaching the inner ear and resulting deafness is termed conductive deafness. This kind of deafness often responds to medical treatment. Also, a person with conductive deafness can hear and understand speech when it is loud enough.

- **Sensory Neural Deafness:**

The inner ear is the end organ of peripheral hearing. Damage to this apparatus creates deafness, which is termed as **'sensory-neural deafness'.**

Sensory-neural (and central) deafness cannot be cured by medicine or surgery but can be alleviated, that is the loss caused due to the damage can be lessened, only through use of amplification devices and other modalities of teaching language, training at home and through special education.

- **Mixed Hearing Loss :**

Sometimes a child might have both sensory-neural and conductive deafness i.e. mixed hearing loss. In such cases, the conductive part of the deafness only can be treated. However, new devices such as the 'Cochlear implant' are now being surgically installed in a deaf child's /

person's inner ear in selected cases as a remedial measure to sensory neural loss. (Details are given in Paper No.3 ,Block No.1.)

- **Central Hearing Loss :**

This is an abnormality in the central nervous system from brain damage or disease.

### 1.6.3 Terms Used in Classification of Hearing Impairment

A brief glance at the classification, which is discussed in detail in other Units, will help to get a better picture of hearing impairment.

Hearing impairment is termed by different professionals in different ways. It is related mostly to how it helps them to deal with deafness:

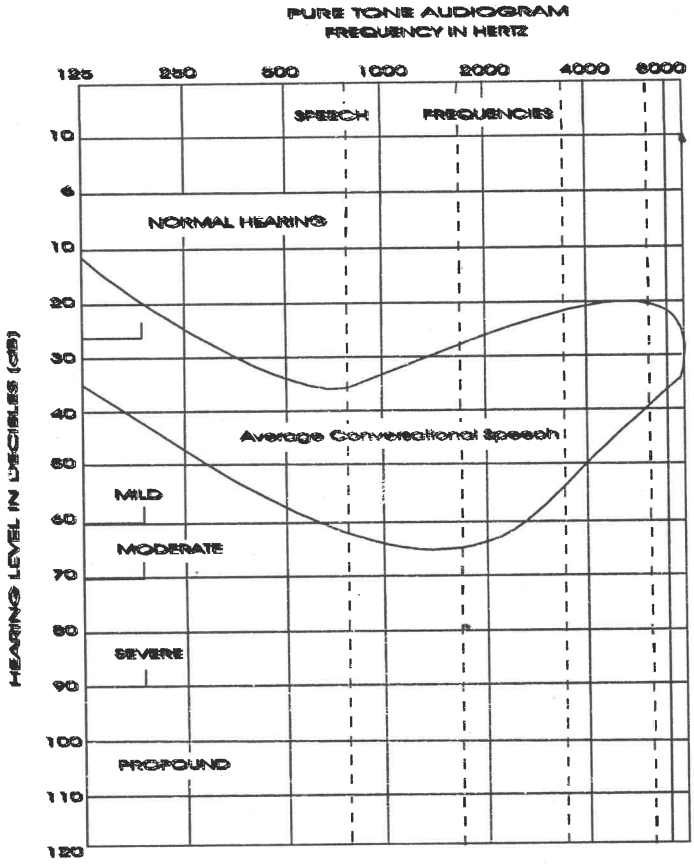
Medical professionals and audiologists are mainly concerned with the diagnosis of the exact degree and type of deafness and then based on this diagnosis, provide medical or surgical help if possible and also provide suitable amplification devices (hearing aids) to the hearing impaired person. Accordingly,

**Terms used in Medical Profession and Audiology :**

- Medically / Audiologically, hearing loss, as per the nature of the loss, is termed as:
  - i conductive
  - ii sensory-neural
  - iii mixed
  - iv central

- Deafness has a degree, some children are totally/stone deaf, who just cannot hear any thing, while others can have a varying degree of ability to hear sounds.
  The degree of hearing loss is termed as :

| | | |
|---|---|---|
| i | mild | 26 - 40 dB |
| ii | moderate | 41 - 55 dB |
| iii | moderately severe | 56 - 70 dB |
| iv | severe | 71 - 90 dB |
| v | profound | Greater than 90 dB |




These terms approximately indicate the extent to which a person can make use of the residual/ remaining capacity to hear sound and then how he can function in the Society. Hearing aids of different types are available to suit the varying degree and type of hearing loss..

A person with mild or moderate loss will be able to hear speech in quiet surroundings if it is sufficiently loud. A person having severe to profound loss may not be able to acquire language and speech adequately sometimes even with the use of hearing aids. The degree of hearing loss and the time of its onset are important in determining the effect of the impairment upon the personality, psychological and educational development patterns.

- **Terms used in Education :**

Educationally hearing loss is termed on the basis of the stages in a child's development when the loss occurred:

i congenital / from birth
ii pre-lingual – before the acquisition of language by a child.
iii post-lingual – after the child has acquired language.
iv post-vocational

These terms indicate to what extent a person can make use of the residual /remaining capacity to hear sound and how he can function in the society. These stages will decide the severity of the problem that the child / person will face in his life.

### 1.6.4 Causes of Deafness:

The main causes of deafness are heredity, accident and illness. In about 50% of all cases of deafness, genetic factors/heredity are probable cause of deafness. Environmental factors (accidents, illness, auto toxic drugs, etc.) are responsible for deafness in many cases. Rubella or other viral infections contracted by the pregnant mother may deafen an unborn child. Hazards associated with process of birth, e.g. a cut-off in the oxygen supply may affect hearing. Illness or infection may cause deafness in young children. Constant high noise level can cause progressive and eventually severe sensory neural hearing loss. Similarly, tumors, exposure to explosive sound, injury to skull or ear could lead to deafness.

## 1.7 THE FACTORS THAT INFLUENCE A HEARING IMPAIRED CHILD'S NORMAL DEVELOPMENT:

A Hearing Impaired child (mainly who suffers from severe to profound hearing loss) needs to spend considerable time on learning language and speech as communication skills that will help him to gain education and develop social skills.

Principal factors affecting the child's progress are :

- Age of onset of hearing impairment
- Degree and type of impairment
- Age of discovery of impairment and age of diagnosis
- Age at which effective intervention was begun
- Effective use of hearing aids and/or use of other communication modalities to suit the child's needs
- Mental ability
- Personality
- Home and surrounding environment

- Guidance to parents and their ability to follow guidance
- Parental support
- Quality of teaching in schools.

## 1.8 SOCIETY'S ROLE IN DEALING WITH DISABILITY

Society/Government generally establishes the Institutions/schools to train and educate all children. In India, prior to independence, responsibility of running these for the disabled was shouldered mainly by non-governmental philanthropic organizations. After independence, the Government has played a major role in supporting educational institutions for the disabled.

- There are about 550 special schools for the hearing impaired, spread over the Country,
- Maximum number of these schools are in Maharashtra and Tamil Nadu states.
- Except Mumbai, many places have residential schools.
- Since early intervention is of paramount importance to H.I. children, many Institutions have started preschool section with facility for all kinds of services including parent guidance and counseling.
- Integrated education of the Deaf has been stressed a lot in recent years. However, a firm foundation of language and speech communication skills as a prerequisite are absolutely essential for integration.
- The use of hearing aids is advocated very strongly in the education of the deaf. Many agencies who deal in hearing aids and other amplification devices abound in the Indian market. But providing suitable hearing aids of good quality to all school-going children and maintaining and repairing these is an uphill task.
- **Vocational training** centers for adolescent and adult deaf are set up by both GOs and NGOs. (for details see Paper I, Block 3.)
- Special Employment Exchanges have been set up by Governments in addition to the efforts by the NGOs. ( For details, kindly refer to other Units in Paper I.)

## 1.9 THE ACHIEVERS

As per the census of 1991, there are approximately 4 million hearing impaired persons in India. A few of them are seen to have struggled (with the help of their families and/or professionals) their way against all odds and have been leading well adjusted lives. Some of them are working at Titan Watch Co. in assembly section, a few as draftsman in companies like Telco, etc. some in

banks. Many work as unskilled labourers in rail yards, shipyards, and packaging section of different companies. They are happier if they get to work along with some deaf companions. It is understandable that the deaf tend towards occupations in which ability to communicate is not of major importance. It is obvious that a permanent job, even a menial one, gives them the security and sense of self-esteem that any man would desire and strive for.

## 1.10 FEELINGS AS EXPRESSED BY THE DEAF

As mentioned earlier, there is considerable heterogeneity in the Deaf population.

There are some high functioning Deaf who have achieved great academic success and have therefore integrated well into the hearing world. These people are fluent lip readers and normally have fairly clear speech. These individuals are privileged few who move comfortably between both the worlds.

There are those at the other end of the spectrum whose lip reading and speech skills are very poor and they are totally dependent on sign language. They are then at home only with other deaf people. Some are disgruntled, frustrated, about their lot, but are unable to voice their feelings.

There are also some in between with varying degrees of speech, speech reading and signing skills. Attitudes among them vary.

Given below are some of the feelings expressed by some adolescent and adult deaf (through their signs and gestures and a few words) regarding the treatment meted to them by the hearing world. ;

- " I wish I was educated /taught the language of the society as is being done now in Special Schools with special techniques."
- "I wish my parents had communicated with me through systematic signs as you are doing now. Then they could have understood us and vice a versa."
- "All teachers and parents should learn sign language for easy and effective communication with us"
- "Tell us to do anything but studying in school."

## 1.11 THE LIFE STYLE OF ADULT DEAF :

The psychology and life style of adult deaf persons as described by **Frank Furth** in his book "Thinking without Language" is an eye-opener. Furth talks about the obvious facts of deaf people's every day life, such as working, engaging in social life and raising a family. He says that most deaf are very poor in language ability. However, the life of a mature deaf seems to differ only minimally from the adult life of a hearing person. Both are motivated by similar

values, show interest in similar questions, and are engaged in similar recreational and professional activities. The noticeable difference is the tendency of the deaf to seek each other's company and the small range of occupations to which they are generally limited. These differences can be explained by the fact that deaf person have not been informed of many things that the average hearing persons learns, not through formal training, but merely through experience and social contacts.

Furth was struck by the contrast between the deaf adult and the deaf child. The deaf children prove failures in academic subjects. The time required for them to cover the usual primary and secondary education is much longer as a rule than for average hearing child. Seeing the difficulty they have with ordinary school subjects, it is difficult to imagine them growing up to live normal adults' lives. Yet they do just that. Could this change be attributed to the facts that the whole scholastic curriculum is based upon verbal skills while real life does not depend so exclusively upon it.

But the deaf do have serious shortcomings – they are frequently under-educated and similarly under-employed. Some live an isolated existence or neglect family or civic obligations. They miss the sense of belonging and a feeling of strength and power that is provided by the peer group to the deaf. .

## 1.12 PSYCHOLOGICAL ASPECTS OF DEAFNESS – THE NEED FOR UNDERSTANDING

Deafness is a serious handicap .Unless we take steps to prevent its ill effects right from early childhood, a deaf child's development will be influenced adversely from early infancy by his defective hearing. Not only the deaf child himself, but also his family and the community around him are affected.

### 1.12.1 The child:

- Tends to get isolated from normal life,
- Is cut off from many of the experiences and opportunities that hearing children enjoy, e.g. voices associated with people, dishes tinkling which means food, singing and rhythm of music, the mother's loving voice and the guidance, comfort and reassurance that follows from the words, etc.
- Has to make constant and considerable efforts to achieve things that come easily to the hearing children.

### 1.12.2 The Family:

- Has to make efforts to understand what the handicap exactly means to the child, how it impinges on his life,
- Has to work out ways of lessening its effects and promoting the child's learning in as many directions as possible,
- Has to realize clearly that the parents are the first teachers of the child and nobody can
  contribute as much as they can in the natural setting of their home,
- The siblings of the deaf child too may vary in their behaviour towards the deaf child. Sometimes they have to, at a young age, take the responsibility of caring for their deaf brother/sister.

### 1.12.3 The adolescent and the other deaf :`

The adolescent years are a trying time for all children and more so for the deaf child. The possibility of tension within the family increases. The adolescent deaf often experiences difficulty in establishing a personal position within a family structure. It is during these years that the child is trying to establish his own identity and maintain and develop relationships. "Who am I?" "Where do I belong?" "How do I fit in?" "What am I worth as a person?" are all very important questions faced by all adolescents including deaf ones. Establishing peer groups becomes critical. There is increased dependency on verbalization among peers and the deaf adolescent often feels isolated and a burden to his family. It is therefore during this period that the adolescent deaf, together with the family, is subject to strong psychological and societal pressures.

### 1.12.4 The grand parents:

The grand parents have difficulties to overcome a denial stage because they have to bear a double pain. They have to get over the pain of having a deaf grand child as well as their own child, who is a suffering father or mother and help in what ever way possible to promote the progress of the deaf child.

### 1.12.5 The community at large:

Many a time, the general public is unaware of this unseen but formidable disability of deafness. Community awareness programmes will help to minimize its effects to some extent.

## 1.13 SUMMARY

This unit discusses the disability of deafness from all dimensions with a specific view of acquainting the trainee with the complex, multidimensional problems arising out of it. The solution to these lie in early intervention and quality training which is discussed in the units to follow.

## 1.14 SELF STUDY :

1. State the effects of deafness on the functioning of a deaf child /person.

2. Explain the terms,

   - Prelingually Deaf
   - Postlingually Deaf
   - Deaf & Dumb
   - Heterogeneity in the deaf population
   - Primary signaling system and secondary signaling system of communication

3. Explain the similarities and differences in the life-style of the adult deaf and the hearing adult population.

## 1.15 ASSIGNMENTS/ACTIVITIES

1. State the effects of deafness on the functioning of a deaf child/person.
2. Compare the life style of 'adult deaf' and 'adult hearing' population. Give examples of two H.I. adults.

## 1.16 POINTS FOR DISCUSSIONS AND CLARIFICATION

After going through the unit you may like to have further discussion on some points and clarification. Note down those points:-

### 1.16.1 Points for Discussion

### 1.16.2 Points for Clarification

## 1.17 REFERENCES/ FURTHER READING

Hans G. Furth, *Thinking without language – Psychological Implications of Deafness* (New York : The Free Press, 1966)

J.M. Bamford and J.C. Saunders, *Hearing Impairment, Auditory Perception and Language Disability,* (London : Whurr Publisher, 1994

National Information Centre on deafness & National Association of the Deaf *Deafness : A fact Sheet* (Washington DC : Gallaudet University Press, 1984, 1987.

*Gallaudet Encyciopedia of Deaf people and Deafness*. Ed. : John V. Van Cleve; Volume I (McGraw Hill Inc., 1987.

# UNIT 2: OVERVIEW TO BEHAVIOURAL AND OBJECTIVE TECHNIQUES IN SCREENING FOR HEARING LOSS

**STRUCTURE**

## 2.1 INTRODUCTION

The invisible nature of deafness and the difficulty in discerning its presence in young deaf children led to thinking that the deaf were not suited for education. So, the pages of history of the deaf remained silent, as did the deaf-mutes for a long-long time.

Here, we have attempted to trace the progress made in the education of the deaf from 16th Century onwards in Europe, U.S.A. and India.

## 2.2 OBJECTIVES

After going through the unit you will be able to -

- Learn the historical development of the education of the deaf in Europe, U.S.A. & India.
- Enumerate contributions made by different eminent educators and other professionals.
- Describe factors responsible for charges in methods of teaching the H.I. children.
- Describe different educational programs available for the H.I. children in India.
- Explain different Teacher Education Programs in India know Govt. policies regarding disabled.

## 2.3 CIVILIZATION

Civilization is defined as an advanced stage or a system of serial development and education definitely has played a significant role in its history.

## 2.4 EUROPE

There has been no mention or record of the status and role of deaf-mute persons in society in the early period of European civilization. Their plight must be very bad indeed because Hebrew Law and Ten commandments state, "Thou shall not curse the deaf or put a stumbling block before the blind, but thau shall fear the God - I am the Lord".

### 2.4.1 Aristotle & Socrates

In those days, the deaf-mutes were clubbed with the mentally retarded. In the pre-Christian era, Aristotle observed that there was some relationship between congenital deafness and muteness. The Greek philosopher also explained that education was to create "a sound mind in a sound body,"

Socrates (470 to 399 B.C.) felt that the only way that the mute could express or communicate was by means of gestures or pantomime. The idea that deaf and dumb persons were poor educational prospects persisted through medieval times.

### 2.4.2 The Romans

The Romans also gave no status or recognition to the deaf in their society. During Justine reign (525 to 565 A.D.) Justine code excluded deaf and dumb from the rights and obligations of citizenship. A sharp differentiation was made between deaf mutes and those who acquired deafness later in life and who could speak and write.

Prior to 16th Century, only fragmentary bits of information area available about any attempts made to train the deaf in any skills. One such example is Quintas Pecluis son of counsel of Caesar Augusts, who was given painting lessons.

### 2.4.3 16th Century

After renaissance period, role of Education changed. Education became more systematic instructions, which helped to develop character and knowledge in students.

**The honour of hearing the modern day pioneer of education of the deaf, goes to 'Pedro Ponce de Leon', a Spanish monk. As early as 1555, Pedro Ponce de Leon started oral education of deaf children of nobility. He believed that the deaf could be taught to write, read and speaks. He started his work in a small monastery of San Salvador. He had maintained a detailed record of his experiences but unfortunately; his records were destroyed in a monastery fire.**

In 1620, another Spaniard, Juan Pablo Bonet taught the deaf children of his employer. His deaf students were taught articulation and

language supplemented by a manual alphabet system and language of signs. The first book, exclusively to the deaf, was written by Juan Pablo Bonet. In it, we also find the first known comment on lip-reading.

### 2.4.4 17th Century

Spaniards " success in educating the deaf generated a lot of interest in the field of education of the deaf in Europe.

John Bulwar, an Englishman (1614 – 1684), also wrote about deafness and said, 'dumbness was not necessary effect of deafness' and suggested special methods for educating the deaf. John Bulwar kept his methods secret.

John Konrad Ammann (1660-1724), a Swiss person settled in Holland developed lip-reading and other methods and published in his book Konrad was the first to realise that speech reading is an intrinsic part of teaching language and speech to the deaf.

The education of the deaf till 17th Century was mostly confined to the rich and elite persons of the society.

### 2.4.5 18th Century

Two great educators rise above all others in their contribution to the cause of deaf in 18th Century. Abbe Charles Michel De L'Epe'e (1712 to 1789) of France and Samuel Heinicke (1729-1790) of Germany.

To Abbe de L'Epe'e goes the honour of making the education of the deaf a matter of public concern. He founded the first public school for the deaf in 1775 in Paris. He taught by manual method. He published the first dictionary of signs including grammar. His teaching method is known as " The French Method'.

Though de L'Epe'e and his successor Sicard, taught by using manual method, de L'Epe'e also believed that spoken language is the most perfect form of communication. They both considered that oral education was good for several reasons.

He also trained few willing teachers. One of them was Sicard.

In Germany, Heinicke founded the first special school for the deaf at Leipzig, Germany. It was recognised by the Govt. Heinicke and de L'Epee disagreed about using signs as a method of instruction.

Heiniche preferred writing and speech reading. While de L'Epee preferred signs. So widespread was the influence of these two men, that the pattern of their controversy was reproduced subsequently over many years.

The education of the deaf spread to other parts of Europe and more and more creative methods were used to impart education to the deaf. Thomas Braidwood (1775-1806) from Scotland started a school. After his death, his nephew Joseph Waston (1765-1829) published Braidwood's work in a book 'Introduction to the deaf and Dumb'.

By the end of 18th Century the social attitudes changed and it was convincingly shown that the deaf were capable of instruction.

### 2.4.6. 19th Century

The 19th Century saw a new era in the formal education of the deaf. Johan Baptist Greaser started a special unit for the deaf in a regular primary school in 1821.

The Magna Carta of oralism emerged in 1880 in the Milan Conference presided by Abbe Tar. The conference spelt out the philosophy of oralism; or the oral method of educating the deaf. These methods were non-aud[illegible]ory.

Nine teachers from U.S.A, with Edmund Miner Gallaudet as their leader, also attended Milan conference.

A college of the Teachers of the Deaf (C.T.D.D.) was set up in Britain in 1885. After passing the Education (Bl[illegible] and Deaf) Act in 1893, an elementary teacher's Certificate was considered as sufficient qualification for teachers of the deaf. This institution later merged into National Association of the Teachers of the Deaf. In 1916 (N.C.T.D.) was formed.

## 2.5 UNITED STATES OF AMERICA

The moral and intellectual advancement of the social attitudes towards deafness in Europe and the Milan Conference (1880) had its influence on the education of the deaf in U.S.A.

### 2.5.1 The First School, USA

There had been scattered attempts to teach the deaf, attempts to start special schools etc. The first permanent school for the deaf in U.S.A. was established in 1817 at Harford Connecticut. It was named as '

Connecticut Asylum for the Education & Instruction of Deaf and Dumb Persons.' It was founded by Mason Cogswell who had a deaf daughter. The school had more than 100 students and one of the teachers was Thomas Hopkins Gallaudet, who showed a great interest in teaching deaf students.

Cogswell then sent Thomas H. Gallaudet to Europe to study teaching methods. After being in England for some time, Gallaudet went to Paris and learned from Sicard. After three months of training, Gallaudet-returned to America with Sicard. The school at Hartford is now known as American School for the Deaf.

The good work of Thomas H Gallaudet was recognised and the federally sponsored first college for the deaf in Washington D.C. was named after him (Now it is known as Gallaudet University). His work was carried out by his son Edward Miner Gallaudet. Sarah Fullen promoted the day school for the deaf. Gallaudet College (now a University) was established in 1864. President Abraham Lincoln signed an Act to grant and confirm degrees in Liberal Arts and Science. The land for the college was donated by Amos Kendle Women students were admitted in the college from 1886. It was world's only college to the deaf students till 1967.

### 2.5.2 Alexander Graham Bell

Alexander Graham Bell was another trailblazer. His mother had lost her hearing during her childhood. His father, Melville Bell was pioneer of "visible speech", a system that described oral sounds through written symbols.

A.G. Bell, at the age of 21, began teaching two deaf pupils. Later, he taught at the Boston School for the Deaf Mutes, Later he established Volta Bureau to disseminate information on deafness, worked on visible speech. And of course his invention of the telephone (1876) laid a firm foundation for the electrical transmission of sound. Bell always spoke and wrote in support of oralism and opposed sign language.

### 2.5.3 Clarke School

Caroline Yale implemented many of Bell's principles and started a college for teachers of the Deaf. Max A. Goldstain founder of the central Institute for the Deaf, was the one who took home the needs of the deaf to the medical profession and who also developed methods for training residual hearing.

The Clarke school in Northamption, was the once who took home the needs of the deaf to the medical profession and who also developed methods for training residual hearing.

The Clarke School in Northmption was founded by G.G. Hubbard in 1867. John Clarke offered money for it.

Slowly awareness spread. Agencies for vocational rehabilitation and guidance for the deaf were established.

The first orgainisation of the deaf people in USA was established in 1853. Nearly 30 years after that National Association for the Deaf (NAD) came into existence.

### 2.5.4 Helen Keller

Helen Keller became world-famous for the determination with which she conquered her deaf-blindness Born on June 27th, 1880, she was taught by Anne Sullivan, a graduate from Parkins Institute. Helen's book, 'The story of my life' is well known. She maintained contact with others by finger spelling, reading lips with her fingers and reading Braille. She awoke public concern and awareness for all handicapped persons.

## 2.6 INDIA

Education has always been accorded an honoured place in Indian Society. But, the awareness and thrust of Education and training the Hearing Handicapped started only at the end of 19th century.

### 2.6.1 The first schools, India

The first school 'Bombay Institute for Deaf Mutes' was set up by some Christian Missionaries in 1885-86. The small school for the deaf, with only 5 students was started by Dr. Leo Meurin S.J., at his residence in Fort, Mumbai. Mr. T. A. Walsh, an Irishman trained in Belgium, was brought to India by Dr. Leo Meurin to teach in his school. Later teachers were not trained, so, signs and writing was used for teaching. The school was residential till 1968. In 1969, the I.C.M. sisters took over the management of the school.

During May 1893, the second school 'Calcutta Deaf and Dumb School' was established by stalwarts like Mr. E. D. Dutt, Mr. J. N. Banerjee (trained in England and at Gallaudet USA), and others.

The third school was started by Ms. Florence Swainson in Palayancottah, near Chennai.

### 2.6.2 Pre & Post Independence Period

Traditionally, children with disabilities were admitted in special schools, but the development of special schools in the country was slow. The British Govt., ruling in India, was not keen on the subject of Education. Only N.G.O.s continued to establish the schools for the disabled motivated by a sense of dedication and sympathy. Till 1947, there were about 37 schools for the deaf in India.

During the World War II, freedom struggle and communal riots, the education of the H.I. suffered. Some schools were closed and some were shifted to some remote places in eastern India.

We can also observe that one of the main reasons for unsatisfactory quality of education is special schools was the lack of professional manpower.

Since Independence (1947), the Indian Govt. paid increasing attention to the education in general. The Indian constitution was adopted in 1950. The Article 45 says,'

"The state shall promote, with special care, educational and economic interest of all weaker sections of the people, and shall protect them. From social injustice and from all forms of exploitation."

In most of the states, the State Govt. and Municipalities have also started special school for the deaf. Most of these schools were in major cities and towns. The coverage is still inadequate compared to the educational needs. Till year 2000, there are about 550 special schools for the Deaf.

The important fact is, many children are getting some opportunities to study. Mumbai and Chennai have greatest no. of schools.

### 2.6.3 Educational Programs in India.

It is widely accepted that the success of any educational programme purely depends on early identification and intervention. The prospect for H.I. children have been transformed in last 20/25 years. An increasing number of H. I. Children have are getting education and entering adult life as articulate, literate individuals with good academic achievement. New horizons have been opened up for H.I. children.

During and after 1981, the International Year for Disabled Persons (IYDP) setting up of various educational programmes for the deaf gained momentum.

### 2.6.4. Home Training and Infant training.

The H. I. Child is a child first and for most and that child is a part of family. This does not change by a diagnosis of deafness. The family's role is of critical importance. Early years of any H.I. child's life is important and critical for the acquisition of language in most natural way. The family needs effective support in making choice of medium of instruction, type of school. Hence parent training is important.

In metro cities, some parent-infant. Training programs are available. Some of these are costly and beyond the reach of common man. Each programme follows its own curriculum. Bala Vidyalaya in Chennai, Maitri and P.I.P. programme in A.Y.J.N.I.H.H. are some of the infant centres.

Isolated attempts have been made to translate the popular John Tracy Clinic's correspondence course in Indian languages. Since most of the parents are illiterate, in rural crease, its use is limited.

### 2.6.5 Pre-School Education:

The pre-school years are also critical for laying the foundations of spoken language and cognitive and social development. They are the basis for later educational achievement. A good support from the teacher of the deaf in different aspects of audiological management, language development. A good support from the teacher of the deaf in different aspects of audiological management, language development, social and cognitive development is vital investment in future. The whole idea of is to give children the same start in life as their heaving peers.

Now a days, most of the city schools have pre-school programs. These schools now admit children form 2 ½. to 3 peers.

A.Y.J.N.I.H.H. had started a pre-school movement and now is helping more than 20 pre-school centres in India. With the help of UNICEF, it has developed a pre-school curriculum for young deaf children.

Bala Vidyalaya in Chennai has also developed a curriculum for young deaf children. Central Govt. also gives grants for pre schools)

### 2.6.6. Primary and Secondary Education

After Kothari commissions report, schools have adopted 10+2+3 pattern of education Out of 550 school, most of the special schools in India are upto 5th to 7th standard. Most of them are under the jurisdiction of Social Welfare. Department. They follow the same curriculum and text books as regular schools.

In the sixties, there had been an effort towards re-formulation of syllabus for H.I., especially in Chennai.

The H.I. children find it difficult to follow the 3-language formula.

Parent counseling is rarely done. Parent meetings are held only as a formality, they have no say in forming curriculum. Parent groups like "Suniye" in Delhi are few and scattered. They do not have a strong lobby.

### 2.6.7 College Education

Language and financial constraints make it difficult to start special colleges for H.I. Children.

In 1962, St. Louis Institute for the Deaf & Blind started schools for disabled. In Kerala, C.S.I.'s college is affiliated to Indira Gandhi Open University.

Some 30 odd H.I. students from Mumbai and other parts of India had gone to study in Gallaudet University or Seattle central community college in U.S.A. These children went on their own with some private scholarships.

### 2.6.8 Open Schools and Universities

Due to various constraints in higher education, a parallel system of Education, evolved. National Open School (NOS), in 1985 and Indira Gandhi National Open University (IGNOU) in 1989. These help school dropouts to continue their education the flexible nature of these programmes attract many H.I. children.

In the new millennium AYJNIHH also received accreditation NOS and has started courses affiliated to NOS.

## 2.7 MULTILINGUALISM.

A serious problem confronting the deaf students and teachers is multilingualism, as India is a multilingual nation. So, the language of medium of instruction may differ from school to school in cities, and form region to region. Even scripts are different.

## 2.8 METHODS AND APPROACHES.

India has an oralist tradition of teaching. Most of the schools profess the use of oral aural method on theory. We find that hearing aids are not adequate to support oralism. Use of signs is suppressed in the classroom but we find that children are gathers, sighs while communicating with each other or parents.

In 80's one or two schools in Mumbai tried to use cued speech while teaching but the effort was not successful.

Serious attempts to study Indian sign language I.S.L. began in 1977. A dictionary of I.S.L. signs was published in 1980. Awareness of total communication began in 80. But again mostly in cities. UNICEF and AYJNIHH also conducted a project and published a book of same signs words used in school curriculum and also developed same grammar signs.

An attempt also was made to do a research on Indian signing system to help classroom language teaching.

Helen-Keller School for Deaf and Deaf-Blind was the first school for deaf-blind children.

## 2.9 INTEGRATION (PLEASE SEE PAPER I, BLOCK II) .

## 2.10 VOCATIONAL EDUCATION

Disability is a loss to the Nation both in maintenance and manpower. To overcome this, govt. of India has emphasized on vocational training. Since the Kothari commission's recommendations, the schools also offer pre-vocational and vocational subjects. The emphasis now has been shifted from cottage level handicrafts to modern engineering and computer base traders, thus enlarging the scope of education and employment.

17 V.R.Cs have been set up a train and place disabled persons in regular services. These V.R.Cs have been further strengthened by establishing 6 skill training workshops and II Rural Rehabilitation Training Centres under the Ministry of Social Justice and Empowerment.

Govt. also established a Training Center for Adult Deaf (T.C.A.D.) in Secunderabad for teaching Vocational Trades. There are some sheltered workshops for Adult Women.

All India Federation of the deaf in Delhi prepares deaf persons for vocational training and self – employment. It also brought out a journal called, 'Mook Dhwani'.

The National Society for equal opportunities (NASEOH) was started in 1970. It conducts vocational courses and presents annual awards

## 2.11 MAN POWER DEVELOPMENT

### 2.11.1 Teacher Training

The first Teacher Training Center for the teachers of the Deaf started in a Calcutta at the beginning of 20th Century. Then, other teacher training centers followed in Delhi, Mumbai, Lucknow, Chennai, Gujarat etc.

In 1974--75, University of Bombay started the first Dip. Education (Deaf), a Diploma course in India. Till then, each training center had its own syllabus and certificates.

In 1935, the Convention of the Teachers of the Deaf was formed. Its aim was to promote education of the Deaf, stimulate public awareness and give better facilities of employment & Research. It published the books 'Deaf in India.

The National Council of Educational research & Training (NCERT) was established in 1961. It is set up to advise the central and State Govts on academic matters related to school education. NCERT provides in service training to the teacher at various levels. It also has many regional centers in special education. Conference, seminar, workshop are organized as regular on going programmes

In 1983, Govt. established Ali Yavar Jung National Institute for Hearing Handicapped (A.Y.J.N.I.H.H.) to train the teachers of the Deaf and other needed manpower. In 1987, Mumbai University started the first B.Ed. (H.I) course in India and in 1994, the first M.Ed. (H.I.) course in A.Y.J.N.I.H.H.

The 1st all India Speech & Hearing Institute was established in 1965 in Mysore to give a B.Sc. degree in Audiology & Speech and Language Pathology. Now there are many centers all over India giving B.Sc. & M.Sc degrees.

Govt. of India set up the Rehabilitation Council of India (R.C.I) in 1986 to form training policies and programmes, standardize the training courses for the disabled grant recognition to Institute running teacher training courses and to register the professionals.

## 2.12 REHABILITATION COUNCIL OF INDIA (R.C.I.)

After Independence, till 1985, there was dearth of trained teachers & other manpower in the field of rehabilitation services in India. The existing teacher training and other programmes in the country were isolated & adhoc in nature. There was no uniformity in their curriculum or even duration of the course.

So, Govt. of India decided to set up R.C.I. in 1986. The statute R.C.I. Act was passed in 1992. The R.C.I. will be responsible for:

a) Giving recognition to the qualifications granted by any University or Institution in India in area of rehabilitation.
b) Conducting Inspections of schools/colleges/Institutions relate to disability field and withdrawing recognition of defaulting Institutions.
c) Forming training policies & standardizing the training courses.
d) Maintaining a register for rehabilitation professionals

R.C.I. has also formulated Bridge Courses formulated teachers working in the field of rehabilitation in a long time. Till March 1996, R.C.I. had finalized 47 courses.

## 2.13 SUMMARY

As we have seen, the awareness for the need for special education and schools for the Deaf, started at the end of the 19$^{th}$ century in India. During the first half of the 20 $^{th}$ century, only 37 NGO-initiated special schools were established. The British Government was not keen on education. After independence, our Government

took interest and formulated number of policies culminating in the PWD Act 1995. NGO sector also made considerable progress. Many special Teacher Training Colleges for Special Education also came up and the Government established National Institutes, and RCI for the welfare of the disabled. NCERT was also entrusted to work in this area. Apart from regular education, now H.I. children can complete their education through National Open Schools and IGNOU. Simultaneously, there has been technological progress resulting in much improved quality of the hearing aids and other equipment.

## 2.14 SELF-CHECK

1. Write notes on :
   (a) First school for the Deaf in India
   (b) College education for the Deaf in India
   (c) A.G. Bell
   (d) de L'Epee
   (e) Thomas Gallaudet
2. Write the importance of the following :
   (a) Year 1981 (b) Tear 1995 (c) Year 1885
3. Write the long form of the following Institutes
   (a) AYJNIHH (b) NCERT (c) RCI
   (d) NPE

## 2.15 ASSIGNMENTS/ACTIVITIES

Locate the nearest institute on deaf in your nearest locality and prepare a brief report about its function since its inception.

## 2.16 POINTS FOR DISCUSSION/CLARIFICATION

**After going through the unit you may like to have further discussion on some points and clarification. Note down those points:-**

### 2.16.1 Points for Discussion

### 2.16.2 Points for Clarification

## 2.17 REFERENCES

1. Dr. A.K. Mukherjee and M.C. Narasimhan : Disability
2. D.S. Mehta : Handbook of Disabled in India.
3. Hollowel Davis of Richared Silverman : Hearing & Deafness.
4. Mrs. Dhun Adenwala : India – In Gallaudet Encyclopedia, Vol. II.
5. Bombay Institute for the Deaf – Annual Report
6. Loewe : Historical Development of Oral Education (Papers presented at All India Workshop for Teachers and Parents of the Deaf.)

# UNIT 3: TEAM MEMBERS INVOLVED IN HEARING SCREENING AND THEIR ROLE

## STRUCTURE

3.6.2 Chapter 11 and 111

3.6.3 Chapter 1V –Prevention and Early Detection of Disabilities

3.6.4 Chapter V – Education

3.6.5 Chapter V1 – Employment

**3.7 Summary**

**3.8 Self Study**

**3.9 Assignment/Activity**

**3.10 Points for discussion/clarification**

**3.11 References**

## 3.1 INTRODUCTION

There are several provisions made by the Government for the rehabilitation of the disabled. This chapter gives information about the facilities and concessions for the hearing handicapped.

## 3.2 OBJECTIVES

After reading this unit the teacher trainee will be able to :

- List out the schemes for H.I. school children and adolescent deaf separately.
- Guide /help the parents to avail of the various schemes of the government for the rehabilitation of the hearing impaired.

## 3.3 NATURE OF FACILITIES

The facilities available are quite comprehensive such as

1. Diagnostic facilities
2. The scheme of assistance to disabled person for purchase / fitting and aids/appliances
3. Scheme of integrated education for the disabled children
4. Scholarship for the disabled
5. Children's education allowance
6. Railway travel concession
7. Vocational training rehabilitation centres

   - Special employment exchange for the physically handicapped
8. Reservation of jobs
9. Income tax concession

10. Economic assistance

The Ministry of Social Justice and Empowerment has special forms for applying for its various schemes of assistance mentioned above. The details of the scheme are available in the book "Facilities & Concessions for the Hearing Handicapped – A Hand Book – Published by Ali Yavar Jung National Institute for the Hearing Handicapped , Mumbai – 400 050. [Under the Ministry of Social Justice and Empowerment (SJ & E), Govt. of India]

## 3.4 MODE OF APPLYING FOR THE VARIOUS SCHEMES.

1. Medical certificate from registered medical practitioner / ENT Specialist of Govt Institution/Hospital
2. An audiogram
3. Statement of marks duly attested by a gazetted officer.

## 3.5 THE SCHEMES

### 3.5.1 Diagnostic Facilities

The Diagnostic facilities (Audiometry, Hearing aid trial, Issue/ fitment of hearing aids, etc.) are available at the following centres for the H.I. run by the Government.

1. Ali Yavar Jung National Institute for the Hearing Handicapped, **K.C.Marg, Bandra Reclamation, Mumbai – 400 050, and its regional centres at New Delhi, Calcutta, Secunderabad & Bhubaneshwar, (Orissa).**
2. **The District Rehabilitation Centres** that are established to provide comprehensive Rehabilitation services to disabled in rural areas. The services include diagnosis, treatment, fitment of aids and appliances, vocational counseling and guidance.

   As on date there are 11 DRCs working in different parts of the country.

### 3.5.2. The Scheme of Assistance to Disabled Persons for Purchase/Fitting and Aids/ Appliances. (SADP Scheme)

Under this scheme of the Ministry of SJ & E, assistance is given to the disabled person for the purpose of fitting aids. The objective is to promote their physical rehabilitation as well as their capacity to participate in economic activities. Thus, hearing aid are provided for the deaf (Only for whom it is beneficial) through the centres where the scheme is operated.

The person whose income is less than Rs.5000/- will get a hearing aid free of cost. The person whose income is Rs. 5000 to 8000, will have to pay 50% of the cost.

### 3.5.3 Scheme of Integrated Education for the Disabled Children

This is a centrally sponsored scheme the implemented by the Ministry of Human Resource Development (HRD) under which the handicapped children are sought to be integrated in normal school system.

The hearing handicapped (with mild and moderate deafness only ) are provided following allowance and facilities under the scheme.

1. Books and stationary allowance of Rs.400/- p.a.
2. Uniform allowance of Rs.50/- p.a.
3. Children residing in school hostel get paid boarding and lodging charges as admissible under Govt. rules/schemes.

### 3.5.4 Scholarships for the Disabled

The scheme of scholarships is operated by the Union Ministry of SJ & E through state Govt.s to disabled persons from the 9th class onwards for general technical or professional education. The condition is that student must obtain at least 40% marks at the last annual examination.

**Eligibility criteria for the scholarship :**

- The hearing handicapped person should have a hearing loss of more than 70dB in the better ear.
- The disabled person must be a citizen of India
- No scholarship will be admissible if the combined monthly income of the parents / guardian of the candidate is more than Rs.2000/- .

- The scholarship for vocational training courses will be available only to those disabled persons who are receiving training in a Govt. organization or a voluntary organization which is recognized by the Central /State Government.

### 3.5.5 Children's Education Allowance :

As per the Central Civil Services Orders, 1988, the reimbursement of tuition fee of Rs.50/- p.m. in respect of physically handicapped and mentally retarded children of the Central Government employee is permissible. The disabled children will however, get other assistance under this scheme as per rates described for the normal children.

### 3.5.6 Railway Travel Concession

The Ministry allows the disabled persons / patients to travel at confessional fares on the Indian Railways.

Deaf persons are allowed 50% concessions in single and return journey rail fares on production of medical certificate issued by a Govt. Medical Officer.

No concession will be allowed for the escort of the deaf person.

A copy of the certificate of disability and two Xerox copies of the concession certificate are to be submitted to the station master at the time of purchasing ticket. The candidate should carry original certificate with him during purchasing of ticket and the journey.

### 3.5.7 Vocational Training /Rehabilitation Centres

The Govt. of India has set up 17 Vocational Rehabilitation centres. The main purpose of these centres is to evaluate the capabilities of disabled persons, assisting in developing rehabilitation plans depending upon the specific needs after providing in-plant training. They also sponsor the candidates after training to potential employers.

The Govt. of India has also set up 22 special employment exchanges and over 40 special cells in ordinary exchanges to register deaf and other handicapped person and put them in touch with potential employers.

### 3.5.8 Reservation of Jobs

The Govt.of India has reserved 3% vacancies against identified posts in group 'C' and 'D' for disabled persons. The categories of handicapped persons benefited by this scheme are the blind, the deaf and the orthopaedically handicapped, and 1% reservation for each category in the Central Govt. Services, Public sector bank and Govt. undertaking .

There are some facilities for them such as age relaxation up to 10 yrs for appointment, posting near their native place if requested, etc.

### 3.5.9 Income Tax Concessions:

As per the Finance Act 1987, the amount of deduction of total income of a resident individual who suffers from blindness or permanent physical disability, has been increased to Rs.15,000/- from the 1st April 1988. A certificate of permanent physically disability has to be procured from a Govt. Medical Practitioner.

The concession allowed by the Govt. to the disabled persons is over and above the general exemption.

Handicapped persons are also exempted from payment of professional tax subject to submission of the disability certificate to the employer for such exemption.

### 3.5.10 Scheme of Economic Assistance:

Such assistance is provided by the Public Sector Bank if they satisfy the following conditions.

- Should be pursuing a gainful occupation.
- Family income from all sources should not exceed Rs.7200/- p.a. in urban and semi-urban areas and Rs. 6400/- p.a. in rural areas.

- Should not have land holding exceeding 1 acre it irrigated, and 25 acres if un-irrigated.
- Should not incur liability to two sources of finance at the same time.
- Should work largely on their own.
- Amount of loan will depend on the particular scheme proposed to be financed.
- The rate of interest, keeping in view the social objectives will uniformly be charged 4% p.a.. Physically handicapped persons are eligible under DRI Scheme for a certain amount of loan to purchase aids and appliances.
- The manager of any Public Sector Bank or its subsidiaries can be contacted for further details.

## 3.6 PERSONS WITH DISABILITIES ACT – 1995, No. 1 of 1996 (PWD ACT)

**THE PERSONS WITH DISABILITIES (EQUAL OPPRTUNITIES, PROTECTION OF RIGHTS AND FULL PARTICIPATION) ACT, 1995 (PWD Act)**

**This Act was passed in December, 1995 in the Parliament of India. The Law came into force from 1996.**

The express objective of the Act is to give effect to the Proclamation on the Full Participation and Equality of the People With Disabilities in the Asian and Pacific Region.

India is a signatory to the said Proclamation.

The document published in the Gazette of India on 1st January, 1996 on PWD Act contains 24 pages.

There are 14 chapters to this Act. Some selected information from these chapters, applicable to the Hearing Impaired, is given below :

### 3.6.1 Chapter 1 : Definitions

The definitions of various disabilities are given in this chapter.

(i) The term **Disability** as included under the Act means –

a) Blindness;
b) Low vision
c) Leprosy cured
d) Hearing impairment
e) Locomotor disability
f) Mental retardation
g) Mental illness

(i) **'Hearing impairment'** means loss of sixty decibels or more in the better ear in the conversational range of frequencies;

(m) **'Institution for persons with disabilities'** means an institution for the reception , care, protection, education, training, rehabilitation or any other service of persons with disabilities;

(t) **'Person with disability'** means a person suffering from not less than forty per cent, of any disability as certified by a medical authority;

(v) **'prescribed'** means prescribed by rules made under this Act;

(w) **'Rehabilitation'** refers to a process aimed at enabling persons with disabilities to reach and maintain their optimal physical, sensory, intellectual, psychiatric or social functional levels;

(x) **'Special Employment Exchange'** means any office or place established and maintained by the Government for collection and furnishing of information, either by keeping of registers or otherwise, regarding employment of disabled persons.

### 3.6.2 Chapter II and III

These deal with the formation and functions of the Central Coordination Committee, State Coordination Committee, and the

Central and the State Executive Committees etc. which are responsible for the implementation of the Act.

### 3.6.3 Chapter IV - Prevention and Early Detection of Disabilities

This chapter deals with the measures to be taken by the appropriate Governments and local Authorities, to prevent disabilities and identification of disabilities at an early stage.

### 3.6.4 Chapter V - Education

This chapter states that the appropriate Government and the local authorities shall –

(a) ensure that every child with a disability has access to free education in an appropriate environment till he attains the age of eighteen years;

(b) endeavour to promote the integration of students with disabilities in the normal schools;

(c) promote setting up of special schools in Government and private sectors for those in need of special education, in such a manner that children with disabilities living in any part of the country have access to such schools;

(d) endeavour to equip the special schools for children with disabilities with vocational training facilities.

The appropriate Government and the local authorities shall, by notification, make schemes for –

(a) conducting part-time classes in respect of children with disabilities who having completed education up to class fifth and could not continue their studies on a whole-time basis;

(b) conducting special part-time classes for providing functional literacy for children in the age group of sixteen and above;

(c) imparting non-formal education by utilizing the available manpower in rural areas after giving them appropriate orientation;

(d) imparting education through open schools or open universities;

(e) conducting classes and discussions through interactive electronic or other media;

(f) providing every child with disability free of cost special books and equipments needed for his education.

### 3.6.5 Chapter VI – Employment

This chapter states that the appropriate Governments shall be responsible for the identification of posts for the disabled, the reservation of posts and other schemes to ensure that they are given suitable jobs.

The Act states that that the appropriate Governments shall make schemes to provide aids and appliances to persons with disabilities.

The Act further states that many other facilities for the welfare of the disabled should be provided under various schemes by the Governments.

**The PWD Act 1995**, is a very comprehensive Act; however, no specific machinery for implementing the educational facilities has been spelt out. Hence, implementation of this law will not be without its problems.

## 3.7 SUMMARY

This Unit gives information about various welfare schemes and facilities available to the disabled.

## 3.8 SELF STUDY

List out the schemes and facilities that you, as a teacher of the deaf, think would be beneficial to the parents of young deaf children and the adolescent deaf who have passed out of the school.

Answer the following questions:

1. Give a list of schemes available for the deaf.
2. Prepare brief notes on: (a) Eligibility criteria for the scholarship, (b) Children Education Allowances, (c) Railway travel concession available for the disabled.

3. What is the mode of applying of various scemes?
4. What is PWD Act 1995.?

## 3.9 ASSIGNMENT/ACTIVITY

1. A parent of a H.I. 18 year old adolescent with no educational background has come to you for help. How would you guide him?
2. Give names and addresses of 2 Semi Government / NGO Centres in your State which provide diagnostic facilities. Describe the facilities that these Centres have for the purpose.

## 3.10 POINTS FOR DISCUSSION/CLARIFICATION

**After going through the unit you may like to have further discussion on some points and clarification. Note down those points:-**

### 3.10.1 Points for Discussion

### 3.10.2 Points for Clarification

## 3.11 REFERENCES

1. Facilities and concessions for the Hearing Handicapped – A Hand Book Published by AYJNIHH, Mumbai 400050

3. The Gazette of India – Part Section 1

# UNIT 4: USE OF CHECKLISTS AND BEHAVIOURAL OBSERVATION IN EARLY IDENTIFICATION OF HEARING LOSS BY SCHOOL TEACHERS (CONGENITAL & ACQUIRED)

## STRUCTURE

4.5.1 Gallaudet College / University, Washington D.C. U.S.A.

4.5.2 John Tracy Clinic, Los Angeles, Calif., U.S.A.

4.5.3 Central Institute for the Deaf (CID), St. Louis, Missouri, U.S.A.

4.5.4 A.G. Bell Association and Volta Bureau, Washington D.C. U.S.A.

4.5.5 National Technical Institute for the Deaf, Rochester, N.Y., U.S.A.

4.5.6 Royal School for the Deaf, Manchester, UK.

4.5.7 Mary Hare Grammar School, Newbury, UK.

4.5.8 Mill-Hall School for the Deaf, Newbury, UK.

4.5.9 Education of the Deaf in People's Republic of China

4.5.10 The Deaf Way – A Unique Event in the deaf World, U.S.A.

**4.6 Associations / Clubs of the Deaf in India**

4.6.1 All India Federation of the Deaf, New Delhi

4.6.2 All India Sports Council of the Deaf – Head Quarters in New Delhi

4.6.3 Some other Associations of the Deaf of long standing in India

**4.7 Summary**

**4.8 Self Study**

**4.9 Assignments/Activities**

**4.10 Points for Discussions/Clarification**

**4.11 References**

## 4.1 INTRODUCTION

The Deaf, because of their inability to learn through the channel of hearing in a normal and natural manner, need special type of educational provision and also certain types of institutes to cater to their social needs.

The Governmental (GO) and Non-Governmental Organiz... (NGO) have set up service centres, schools and v... tional training centers for education and rehabilitation of the hearing im... The educational centres require trained staff for which teacher training centers have been set up in most of the States in India. These courses of these centres have to be recognized by the Rehabilitation Co... of India, New Delhi. Then, the Deaf the... clubs/associations for socializing among themselves.

There are about 550 specials schools for the Deaf in India. It may be noted that though most of them profess to be following oral – aural approach for communication, in reality the teachers, for explaining difficult concepts and ideas, freely use gestures and some improvised signs or signs they have picked up from children while teaching. The children of course use their own sign language for communication amongst themselves. A few schools strictly follow oral-aural approach at least up to the primary level.

The Unit provides information about some institutions in India and abroad, with the objective to help the readers to get a general idea of the ways in which efforts are being made to tackle the multidimensional problems of educating the hearing handicapped children and adolescent population. The schools and institutes mentioned below, are mainly those who have completed **more that 20 years of operation .**

As for the education offered in schools, a majority of schools provide education up to IVth std. or VIIth std. only. This is because of the complexity and difficulties involved in providing academic education to the deaf children who have a very poor language base. As can be seen from some of the schools described below, a few schools do train their children to appear for S.S.C. exams. However, the sad part is that not all children who have passed S.S.C. have become literate in the true sense of the term.

## 4.2 OBJECTIVES

After reading the Unit the teacher-trainee will be able to -

- State the differences, if any, in the schools in India and the schools in England and America
- Enumerate the extra facilities seen in the Mary Hare Grammar School as against the higher secondary schools in India.
- Specify the number of schools from the given list which use Total Communication approach.
- State the unique features of Gallaudet College/University.
- Describe the activities of A.G. Bell Association.

## 4.3 PLACEMENT OF DEAF CHILDREN

All early schools for the Deaf were residential in nature with a thrust on Vocational Training Courses. Over the years the number of schools has increased and they have become more oriented towards literacy, and still later towards academic education programmes.

Since independent State Govt. and Municipalities have started special schools in many States but the number is still inadequate to meet the needs of the population. Many schools for the Deaf are still run by non-government organizations.

There are at present 3 options available to parents for educating their deaf child:

1. Residential school
2. Day programme in a special school
3. Integrated education programme in a regular school.

### 4.3.1 Residential Schools

As the number of special schools for the deaf are few, coupled with the fact that these are located mainly in urban areas, many parents from non-urban areas are forced to admit their child into residential schools far away from their home.

This has a number of disadvantages but also a few advantages. These schools are designed with the needs of the deaf student in mind. The opportunity for peer interaction is available. Other activities including prevocational and vocational training for older children are also often available without having to commute long distances to different places. A deaf child who may otherwise be

living in a community where he is the only deaf person has a chance to meet, interact and be with others like him and gain confidence and understanding.

On the other hand, there are many down sides to this as well. Many families are not happy sending young deaf children away to school nor is it advisable. A loving, nurturing home and family is obviously the best environment for any child. Residential supervisors are not capable of meeting the emotional and physical needs of every deaf child. Children in residential schools naturally sign to each other after school hours. They become fluent signers. Because of the lack of opportunities and commitment towards oral-aural habilitation most do not develop adequate speech and listening skills and integration into a hearing world becomes very difficult. Children also grow up alienated from their families as the parents have never really learned to communicate with their deaf child. The child is isolated even in his own family.

### 4.3.2 Day Schools

The day school placement is one that comes between residential schools and mainstreaming. Children can remain at home and still take advantage of a special school equipped to meet their educational needs. Parents can get closely involved in the education of their child and are present to meet their emotional and physical needs.

The only real problem here is the availability of these programmes. As their number is limited to bigger cities and towns, this option is obviously not available to a large proportion of deaf children.

### 4.3.3 Integrated Education or Mainstreaming or Inclusion

Our country has a huge population of deaf children. According to the last survey 4 children per 1000 suffer severe to profound deafness. It has been estimated that with the current birth rates, about 22,000 are born deaf making a total of 110,000 children between the ages of 0 and 5 years. Improvement in medical services and aggressive neo natal intervention has ensured that a large number of babies who would earlier have not survived do so but often with different disabilities including hearing loss. The number of deaf children is on the increase but it is not possible to create the required number of special schools in the country to meet this challenge due to the high cost and also due to the fact that the population is so scattered.

The best alternative under these circumstances is to make use of the infrastructural facilities already present in terms of regular schools and integrate children into the mainstream of education.

In 1974, the Central Government introduced a scheme called "Integrated Education of Disabled Children in Regular Schools" to do just this. This scheme was later revised and a plan of action formulated.

Integration in to a regular school requires a solid language base. The deaf child has therefore to be adequately prepared and the programme monitored if it is to be successful.

Well implemented integrated programmes afford the child greater opportunities to interact with the hearing world. This translates into better adaptation at home and later in the work place. It also sets higher goals for the disabled thereby helping them strive to achieve their maximum potential.

(For further details on mainstreaming please see Paper I Block III)

## 4.4 INSTITUTES AND SCHOOLS FOR THE DEAF IN INDIA

### 4.4.1 Ali Yavar Jung National Institute for the Hearing Handicapped - (AYJNIHH), Mumbai-400050.

Established in 1983, AYJNIHH is an apex institute in the field of re/habilitation in the Country under the Ministry of SJ&E. As an autonomous, science and technology institute, it deals with the problems of the speech and hearing impaired. It has regional centers at New Delhi, Kolkota and Secunderabad. Its center at Bhubaneshwar (Orissa) is in collaboration with the State Government. The Institute has also set up NGO collaborated centers at Valakom, Chennai, Allahabad, Bangalore, and Mhow for diploma courses, under the RCI. New Delhi. The first ever Composite Regional Center (CRC) has been set up at Bemina, Srinagar to be followed by 5 more in the different parts of the Country.

The AYJNIHH and its regional centers provide comprehensive diagnostic, therapeutic, educational, and vocational services to the hearing and speech impaired.

**The training programmes conducted at the centers of NIHH are :**

- Diploma in Special Education (D.Ed. HI) – at various centers.
- Diploma in Hearing, Language and Speech. (DHLS) - at Delhi and Patna.
- Bachelor of Education (HI) – (B.Ed. HI) - at Mumbai, Kolkata, Secunderabad.
- B. Sc. in Audiology, Speech & Language Pathology - Mumbai, Secunderabad.
- M.Ed. (HI) – Mumbai.
- M. Sc. in Audiology, Speech & Language Pathology – Mumbai
- Short term training programmes are designed to refresh and update the knowledge of the experienced professionals and also to acquaint the professionals with specific skills.

The Institute is specially concerned about creating awareness about hearing impairment among the masses. This is achieved through printed booklets, posters, audio visuals such as TV spots, films etc., exhibitions and radio programmes.

An Extension and Outreach Service programme was set up in 1989 to provide diagnostic and training facilities in the remote parts of the Country.

The Institute is concerned about the growing number of hearing impaired people in the Country and has therefore outlined a number of future objectives in the areas of Genetic counseling, Sign Language and Interpretation, Enhancing vocational avenues, undertaking more applied research, etc.

**4.4.2 The Central Society for Education of the Deaf, (CITD) Mumbai.**

The Society was established in 1966. It conducts two programmes. Children on roll are 60.

The Central School for the Deaf is a primary school which admits young deaf children from 2-1/2 years onwards. Education is imparted in both Marathi and English mediums. At the school the young deaf children are taught to lip-read and speak as against the use of 'sign' language. Once the child is ready to enter secondary school, he is

integrated into a school for children with normal hearing. This of course does not happen in all the cases.

The CID trains teachers in the most up-to-date methods of educating young deaf children through the oral method. Training is imparted in both English and Marathi medium along with practical demonstrations and lectures.

The Society has recently (1998), set up an early intervention centre named Maitri – Centre for Hearing Impaired infants - using a multidisciplinary approach by offering the services of an audiologist, psychologist and special educator all under one roof. Thus the parents no longer have to run from 'pillar to post' trying to get the best for their child.

At Maitri, children from the ages of 4-6 months onwards, are being screened for the hearing loss. By careful testing, fitting of correct hearing aid, parents' involvement and early intensive speech and language training, it is hoped that many of these young H.I. infants will move into nursery schools for children with normal hearing.

In U.K., USA, and Holland, such infant centers have been immensely successful and are doing admirable work in mainstreaming children to a better and more enriched future.

### 4.4.3 Helen Keller Institute for the Deaf and Deaf-Blind (HKIDB) Mumbai.

The institute was founded in Mumbai in February,1977.
The school for the deaf and deaf-blind started in July,1977. Its present strength is around 150.

The objectives of the Institute are to teach and train –

- Straight-forward deaf children,
- Deaf children with minor additional disabilities,
- Deaf-blind children, and
- Deaf-blind multiple handicapped children.

- Age group trained is from infancy to young adults.

- Teacher pupil ratio is, 1:8 for the straight-forward deaf ,
  1:4 for deaf children with additional minor disability,
  1:1 for deaf-blind children.

At the deaf section the regular school curriculum is followed for the straight forward deaf children and the classes are conducted up to VII standard. After that, according to their progress, the children are either integrated in to regular schools for further education or sent for vocational training. For others with additional disabilities, a functional curriculum is implemented to enhance the development of their capabilities and endeavors are made to take them right up to vocational training.

The Institute which was originally established in Byculla in a Municipal school has now developed its own infrastructure. But due to lack of space and demand for more admission, its deaf-blind section has now been shifted to Vashi, Navi Mumbai in their own building.

The Institute has plans to develop low-vision center, a recreation center for young deaf adults (18-38 years) and Braille Computer education.

The Institute conducts a Teachers' Training Course for teachers of the deaf-blind. It has hostel facilities for the teacher-trainees and also for the deaf-blind children who reside outside Mumbai.

### 4.4.4 School for young deaf children – Bala Vidyalaya, Chennai

The school has been established since 1969 in Chennai, T.N., and is recognized by the State Government. It is a non-residential special school. Present strength is around 200.

**The Aim** is early educational intervention. The school gives intensive training to young deaf children with a Teacher Pupil ratio of 1:4 with the objective of helping children to acquire language and speech skills and get integrated into the mainstream of education

The following programmes are carried out on a regular basis :

- Infant training and parent counseling,
- Parent guidance programme,

- Pre-school section, and Extension & Out-reach Project,
- Teacher training programme.

- Tuition is free for all the students.

- There is no lower age limit for admission. Even new-born deaf are admitted in the infant

training programme.

- Children between 2 to 3 years are admitted into preparatory programme.

- Children residing outside Chennai are helped under the Outreach programme.

- The mode of communication is strictly oral-aural. As such, great stress is laid on constant

wear of suitable hearing aid coupled with a constructive auditory training which enables deaf

infants and young children to make full use of their residual hearing, however minimal it may

be. The medium of instruction is either Tamil or English.

In school parents are counseled, guided and ultimately trained to be the Resource Persons for their child. The school organizes regular meetings of the school's Parent-Teacher Association in which experts from the field of medicine, education, etc. are invited to lecture to the parents.

Each child develops his potential at his own pace. Hence the duration of the training at school ranges from 3 to 4 years depending upon the child's intelligence , residual hearing and aptitude, and the ability of his parents. At the end of the course, most of the children join an ordinary school and get integrated, though this may not happen in every child's case.

The school has recently started a Teachers' Training Course to prepare teachers to work at the infant level.

### 4.4.5 Little Flower Convent Higher Secondary School for the Deaf, Chennai.

This school is located at the heart of the city of Chennai. It was established in 1926 and was recognized by the Government of Tamil Nadu in 1931. It was upgraded as a High School in 1968 and as a Higher Secondary School in 1980. Present strength is around 500.

The main aims of the school are :

- To provide full time education free of charge.

- To train teachers in the modern methods of educating the Hearing-impaired.
- To integrate capable Hearing –impaired children into regular schools.

The students are taught by the oral-aural methods supported by modern techniques namely Maternal Reflective Method (MRM). Medium of instruction is either Tamil or English.

The age for admission is between 2 ½ and 4 years. The classes range from Pre-K.G. to Std. XII. Boys have to leave the school after the completion of Std. IV. Students are exempted from studying a second language. The school follows the State Board syllabus from Std. I onwards.

The facilities available at the school are :

- Home training and Parent Guidance Programme.
- Audiology Centre, Ear Mould Lab., and Hearing Aids Maintenance Centre.
- Early Identification and Early Intervention Centre (EIEI).
- Computer Section and Typewriting Section.
- Special English Course after the completion of Std. XII for Tamil Medium students.
- Noon-Meal Programme and hostel for outstation students

Scholarships, free supply of hearing aids for deserving students and free bus pass are available.

The classrooms are equipped with high fidelity Group Hearing Aid System and Induction Loop System.

The school has many co-curricular activities such as music, dance, drama, arts and crafts, sports and games.

A diploma course in teaching the hearing impaired children is being conducted for teachers with B. Ed. or D. Ed.in General Education in the school premises by the Government of Tamil Nadu.

### 4.4.6 St. Louis Institute for the Deaf & the Blind & College for the Deaf, Chennai.

The Institute was established in 1962 at Adyar, Chennai -20. The present strength is around 73 in the College and 250 in the school.

**Education of the Hearing Impaired**

The Institute runs a full-fledged school for the deaf. It follows the syllabus and text books of the Tamil Nadu Education Department. Students of 12th standard have been appearing for the Higher Secondary Govt. examination for the past few years and most of them are doing quite well.

The **St. Louis College for the Deaf** offers a 3 year Degree courses leading to B.Com. & B.Sc. The medium of instruction is Signed English (visual communication). Computer training is compulsory subject for all these students.

Great deal of importance is given to sports and games at the Institute.

**Technical Education :** The school is known for the training offered at the Institute for the following trades –

- Hand composing
- Letter press machine operation
- Offset press machine operation
- Desk Top publishing
- Process camera operation
- Plate making
- Book binding

All these trades are recognized by the Director of Technical Education, Govt. of T.N. except the course in book binding which is recognized by the Directorate of Employment and Training, Govt. of T.N. Training is also given for screen printing, lamination and spiral binding.

Minimum qualification needed for technical training is standard VIII passed. Hostel accommodation is provided for the trainees.

### 4.4.7 The Clarke School for the Deaf, Chennai.

The Clarke School for the Deaf was founded in Chennai in 1970. Present strength is around 350.

Its objectives are :

- to identify the disability as early as possible,

- to provide the necessary corrective and rehabilitative training and aids,
- to develop the potential skills and abilities to the fullest possible to prepare them to integrate, and mainstream,
- to enable them to live on their own.

The school provides academic education from pre-primary to Higher Secondary level. Training in typewriting and computer science is compulsory for children at the secondary level. Oral-aural Approach is followed for instruction. The teacher pupil ratio is 1:10. Great stress is laid on classroom amplification and individual hearing aids. Scholarships are given to the poor, needy and merited. There is hostel facility for children.

A teachers training programme at the D.Ed. level is conducted for the teachers of the deaf at the Institute. Bharatanatyam dance as a therapeutic and cultural activity is taught to the deaf children with utmost care. It helps to teach them rhythm and movement which correlates with their speech training.

The school also conducts a programme for mentally retarded children.

### 4.4.8 N.C.Chaturvedi School for the Deaf, Lucknow.

- Co-Educational Deaf school established in 1938
- Follows oral-aural approach
- Strength 223 students, about 100 residing in hostel
- Medium of instruction – Hindi
- Classes recognized from Pre-Primary to Std. VIIIth (Jr. High School)
- Syllabus followed of the Education deptt.of U.P.Government
- Vocational training imparted in press printing, tailoring, embroidery and clay modeling,
- The society conducts a training programme for Teachers of the Deaf

### 4.4.9 School for the Deaf and Blind, Assisi Mount, Neerpara Vadakara, Kerala.

- Co-Educational Residential School

- Established in 1968
- Strength of pupils – 260
- Age range – 4 to 19 yrs.
- Type of education – Pre-school, Std. 1 to $10^{th}$ .
- Oral- Aural method
- Vocational training in cutting & tailoring, composing & printing, book binding, craft, computer training etc.
- A lot of importance is given to other activities such as sports and arts, gardening, excursions, study tours, scouting and guiding, etc.

### 4.4.10 Some Other Schools for the Deaf of long Standing in India.

There are approximately 550 schools for the Deaf in India. Most of these, because of the difficulties and complexities involved in imparting academic education to deaf children, conduct classes only up to $4^{th}$ grade or $7^{th}$ grade. Only a few schools prepare them for SSC Board examination.

**Some other schools for the Deaf of long standing in India are :**

- School for partially deaf children Hyderabad, A.P.
- School for the Deaf Mutes, Ahmedabad, Gujarat.
  The school conducts D.Ed. H.I. course.
- K.L. Institute for the Deaf, Bhavnagar, Gujarat.
  The school conducts D.Ed. H.I. course.
- Sheila Kothawala Institute for the Deaf, Bangalore, Karnataka.
- Speech & Hearing Institute, Bangalore.
- CSI Vocational High School for the Deaf, Post Valakom, Dist. Quilon, Kerala.
  The school conducts D.Ed. H.I. course.
- Asha Niketan School for the Hearing Impaired, Bhopal, M.P.
- The Deaf & Dumb Industrial Institute, Nagpur 10 , Maharashtra.
  The school conducts D.Ed. H.I. course..

- V.R. Ruia Mook Badhir Vidyalya, Pune 30, Maharashtra.
  The school conducts D.Ed. H.I. course..
- Vikas Vidyalaya for the Deaf, Dadar, Mumbai 7.
- Stephens School for the Deaf and Aphasic, Mumbai 28.
- Sadhana Vidyalaya for the Deaf, Naigaon, Mumbai 14.
- The Education Audiology & Research Centre, Mumbai 6.
- Govt. Lady Noyce Sec. School for the Deaf, New Delhi 2.
- Balwantrai Mehta Vidya Bhavan, New Delhi 48.
- Pratibandhi Kalyan Kendra, Hooghly, 3, W.B.
- Parents' Own Clinic for the Deaf Children, Kolkota 6.
- Muk-Badhir Vidyalaya, Bhilwara, Rajasthan.

(For further information kindly refer to the ' Directory of the Institutes for the Deaf ' published by AYJNIHH, Mumbai – 50.)

## 4.5 INSTITUTES FOR THE DEAF IN OTHER COUNTRIES

### 4.5.1 Gallaudet College / University, Washington D.C.

This is the only college of and for the Deaf in the U.S.A. It was established by Edward Miner Gallaudet in 1864. His father, Thomas Hopkins Gallaudet was the founder and the first Principal of the American School for the Deaf in Harford. His mother, Sophia Fowler, was deaf and had been a pupil of her husband. This family influence has perhaps led Edward Gallaudet to do a life long work in the field of deaf education.

Gallaudet College is an accredited post secondary institution functioning within the system of higher education in the United States. It serves primarily severely hearing impaired students. The College evolved from a small elementary school for deaf children established in1866 into a liberal Arts College. Eventually it has become a multi-purpose institute which responds to many educational needs of deaf people nationwide. In 1985, it was granted the status of a University.

The main campus of Gallaudet University is located in Washington D.C. on 99 acres of land. There are several academic buildings and dormitories, the Old Gymnasium, and the learning centre which houses the library, classrooms and educational technology centre. It has a new Kendal Demonstration Elementary School opened in 1980, and a Model Secondary School opened in 1976. It presents high school diplomas to those students completing secondary education requirements. The elementary school enrolls annually approximately 200 day students from nearby Counties. The college annually enrolls over 400 students.

Gallaudet University offers an Associate of Arts Degree in interpreting for hearing people who wish to become Certified Sign Language interpreters. The college gives Bachelor of Science or Bachelor of Arts Degrees in 26 major fields of study. The Graduate school offers two-year programmes of studies leading to the Master of Science Degree in audiology, and the Master of Arts Degree in Education, rehabilitation counseling, school counseling, educational technology and linguistics, a Ph.D. in different subjects to both hearing and hearing impaired students. The Research efforts of Gallaudet College/University are focused within the Gallaudet Research Institute and its 3 centres. Many foreign students get admitted and receive degrees from Gallaudet University.

The University has athletic programmes, student Government, and social organizations which help the students to more independent thinkers and learn about the external world. It houses a theatre where the Deaf perform regularly – mainly through the American sign language (ASL).

- **Communication : Policy and Practice**

Gallaudet college offers educational programmes with the same goals held by all general elementary, secondary and postsecondary institutions. However, their main aim is to provide instruction through clear communication for early and profoundly deafened individuals. **The communication strategy in the instructional setting is the Simultaneous method of communication (Sim Com).**

**This method requires the use of English grammar and syntax in spoken or mouthed form accompanied by signs and finger spelled words.** Use of hearing aids is encouraged. The American Sign Language which is a nonspoken native language of deaf persons, may be used on the campus to meet special needs.

Gallaudet College is a unique institution. It has proved that people who are early and profoundly deafened can achieve a bonafide college degree if the mode of communication is clear. Through appropriate educational opportunities, the individual largely overcomes the inconveniences of disability, leads a normal life and in most instances, make a significant contribution to society.

### 4.5.2 John Tracy Clinic, Los Angeles, Calif., U.S.A.

**Correspondence Course for Parents of Young Deaf Children.**

John Tracy Clinic, founded in 1942 by Mrs. Spencer Tracy, wife of the film star, is located in Los Angeles, California near the University of Southern California. The clinic is named in honour of the Tracys' son , John, who was born profoundly deaf.

It is an educational centre for pre-school deaf children and their parents. The main focus is on educating the parents. Mrs. Tracy felt that from the start, in order to help deaf children, their parents must be helped first. The Correspondence Courses are one of the many services available at no cost to parents of young deaf children anywhere in the world. They have put the growth and development of the whole child first even before lip-reading, language and speech, because communication is not a separate unrelated skill which one can acquire. Communication is part of living. Through all the courses, great emphasis is laid on the development of oral communication skills. In summer holidays and periodically, camps are held at the Centre where the parents, who are asked to come with their young deaf children, interact with the tutors, watch the demonstrations, and receive appropriate guidance and counseling for the upbringing of their wards. The facilities of the Clinic are also available to the parents of the deaf-blind children. Many parents all

over the world have benefited through these courses and the services provided at the centre.

The Canadians ( residents of the neighbouring country of USA) make extensive use of the John Tracy Clinic Correspondence Courses.

### 4.5.3 Central Institute for the Deaf (CID), St. Louis, Missouri, U.S.A.

**Central Institute for the Deaf (CID)**: was founded in 1914 in St. Louis, Missouri. It operates as a private non-profit-organisation providing services to the hearing impaired and persons with disorders of communication. The Institute has beneficial interaction of its departments of research, professional training, and service through the activities of a number of interrelated divisions. Applied Research projects include creation and application of sensory aids to assist speech perception and speech production, and evaluation of testing & teaching procedures for hearing impaired children and adults.

- In 1931 the Institute set up the first training program for teachers of deaf students in the U.S. to be affiliated to Washington University St. Louis.
- The Institute has set up hearing, language, & speech clinics which serve persons of all ages.
- The treatment and rehabilitation services include hearing aid consultation & fitting, speech-reading & aural rehabilitation. Speech therapy & language therapy.

The CID's school which was established in 1914, has the followings features.

| | |
|---|---|
| • Enrollment of Hearing Impaired Children | - at age 3 |
| • **Mode of communication treatment** | **- oral with intensive auditory** |
| • Teacher Pupil Ratio | - 1 to 3. |
| • Stress on - | - Individualised instruction. |
| • Enrolment of students residential students. | - as both day-students or |
| | - Geographic representation includes all 50 states in USA and many foreign countries. |
| • Tuition fees | - Well below the actual cost. |

A high proportion of students leave the school before the eighth - grade level to enroll in classes with hearing children, and many children attend colleges with hearing students.

### 4.5.4 A.G. Bell Association and Volta Bureau, Washington D.C., U.S.A.

A.G. Bell. Association was founded in 1890 as the American Association to promote the Teaching of Speech to the Deaf. In 1953 its name was changed for the second time to the A.G. Bell Association for the deaf.

The primary purpose of the Association, from the very beginning, is to promote the use of hearing, speech and speech reading by hearing impaired persons.

The Association over the years has developed three sections to cater to the needs & interest of its diverse membership.

1. **The International Parents Organisation ( IPO –1958 )**:- Here they have a special emphasis on aiding families of hearing impaired children with focus on fostering oral-aural education for these children. I.P.O. has a parent-to-parent network throughout Canada & U.S. as well as family workshops.
2. **Oral-Deaf Adult Section: - (ODAS – 1964):-** Their main aim is to exchange, help & inspire all concerned with hearing impairment to improve the educational, vocational, and social opportunities for the hearing impaired children & adults in the hearing environment through cultivation of their speech, speech rehabilitation, and residual hearing capacities.
3. **International Organization for the Education of the Hearing Impaired (IOEHI-1967)**: - Its main objective is to promote excellence in the education of the hearing impaired children with emphasis on:
   - Teaching of oral communication and development of quality oral programs,
   - The encouragement of scientific study of the educational and verbal communication processing, and
   - The exchange of information among educators through publications, dissemination of research findings, professional meetings & seminars.

**Volta Bureau** :- Is a part of the association and was founded and endowed by Bell in 1887 for the increase and diffusion of knowledge relating to the deaf. The Volta Bureau is funded by the money of the Volta Prize which was conferred on Bell by the Republic of France for his invention of the telephone. The Volta Review (a

bimonthly) has been the professional journal of the Association since 1899.

The publications dept. of the association presents texts for teachers of the hearing impaired students, parents and deaf adults on subjects like teaching of speech to the deaf, curriculum for science & reading, and mainstreaming hearing impaired students.

### 4.5.5 National Technical Institute for the Deaf (NTID), Rochester, NY, U.S.A.

NTID: National Technical Institute for the Deaf – USA. The establishment of NTID was authorised by the Congress in 1965. This was the outcome of the legislation mandating equal access to education for disabled Americans, provision of vocational education money for disabled people, and a greater societal acceptance of and accommodation to diversity. It included federal support for post secondary educational opportunities specifically for deaf students. The Institute was developed in affiliation with the Rochester (N.Y.) Institute of Technology. The NTID Program is a National Programme serving highly qualified deaf students. Most beginning students go through a programme that offers career sampling, technical mathematics, science, engineering, & certification, a two-year associate degree or a 4-year baccalaureate degree. Interpreters and note-takers are provided for students taking classes with hearing peers.

By 1969 three more federally supported Vocational Training Programs, like NTID, were approved in St. Paul Minnesota, New Orleans, Louisiana and Washington Community College in Seattle, Washington. Each of them provides preparatory instruction in mathematics, English, and job sampling. They provide support services, including note-taking & vocational counseling; and vocational placement.

These programs are found to be quite effective in providing training and vocational placement for deaf students, at a relatively low cost. After seeing the results there has been considerable growth of institutions of higher education offering special support services to deaf students.

### 4.5.6 Royal School for the Deaf, Manchester, UK

- Founded in 1823 by Robert Philips and William Bateman
- Day / Residential school for the Deaf and Deaf-Blind
- For children who have additional or complex needs using a Total Communication Method.

The other two Royal Schools for the Deaf are at Southport and Boston Spa.

They have a multisensory support unit for the students with impaired visual and / or auditory function and who may have one or more additional disability. It is particularly suitable for those requiring one to one basis to acquire basic skills and also need physiotherapy, occupational therapy, speech and language therapy, hydro therapy and monthly training as an integral part of their routine.

Creative music is a regular aspect of the curriculum for all children.

### 4.5.7 Mary Hare Grammar School, Newbury, UK

- Secondary school for high functioning deaf children
- Founded in 1947 and run by a charitable trust.

The curriculum stands comparison with any school in the country promoting high levels of achievement. Subjects like music and foreign language are also taught. This school strictly follows oral-aural approach.

Facilities include 6 laboratories, computer suites, library, and technology suite.

The Princess Margaret art and design center was opened at the school on 31st October, 1999. Facilities teaching art, graphics, textiles, photography and design technology are available. The center also has resources including computers with CAD& DTP software.

### 4.5.8 Mill-Hall School for the Deaf, Newbury, UK

- Primary school for all children attached to Mary Hare Grammar School
- Day and Weekly boarding
- Committed to oral-aural approach
- A large number of children have cochlear implants
- Broad curriculum which includes the national curriculum is followed

- Spoken language acquisition through conversations is the heart of the programme

**Two of the other schools in UK which strictly follow oral-aural approach are**

- **Berkdale school for HI children – Southport, and**
- **St. John's RC school for the HI. – Boston Spa**

### 4.5.9 Education of the Deaf in People's Republic of China

There are about 3.5 million deaf people in People's Republic of China – our neighbouring country.

The first school for the deaf children in China was established in 1887. By 1948, China had 23 schools for the deaf children. In 1949, the People's Republic of China was founded, and this brought about major changes in the education of deaf Chinese. In 1951, through the document entitled 'Decision on reforming the education system', deaf education was accommodated into the National Education System. This advanced its growth. The Government specified policies and missions for the schools for deaf students and required that deaf people be fully educated in mind and body, to promote their overall moral, intellectual and physical development. Academic education and vocational skills received equal stress in schools. The budget levels for schools for deaf students were higher than those for regular schools.

There are two main types of schools for deaf students : Full time schools and work-study schools. In the former, primary education comprises of 8 years and secondary education 3 years. In the work study schools, deaf students are instructed in the fundamentals of general education as well as vocational skills and knowledge to prepare them to cope with their hearing impairment and to be productive.

Spoken language is the primary method used in education, but sign language and finger spelling are used as supplementary classroom tools for deaf children. The facility for special classes for the deaf in hearing schools also exists.

- **Communication system**

The communication method used by deaf people in China was not well unified in the past. In 1958, the Sign Language Reform Committee was founded consisting of various specialists and deaf people. In 1963, based on the principles of the Chinese pronunciation scheme, the Government adopted the Chinese Finger spelling Alphabet scheme.

A meeting to launch the Asia-Pacific Decade of Disabled Persons (1992-2002) was convened by the Economic and Social commission for Asia and Pacific at Beijing, China from 1st to 5th December 1942. It adopted the Proclamation on Full Participation and Equality of People with Disabilities in the Asia and Pacific region. India was a signatory to this proclamation.

The Deaf people in China have their own organizations.

### 4.5.10 The Deaf way, A Unique Event – Washington D.C., U.S.A. 1989

In July 1989, deaf people and friends, families, and colleagues of deaf people – totaling over 6,000 – came to Washington, D.C. from 80 countries to participate in The deaf Way Conference and Festival, a first-of-its-kind event. During the week-long occasion, participants shared information – both formally and informally – about the sign languages, cultures and histories of deaf individuals and communities around the world. In the mornings and afternoons, a total of more than 300 presentations were given. In the evening, Festival events occurred, including plays, storytelling, dancing, and socializing in an "International Deaf Club" tent. Although much of the information shared in Conference presentations reflected the misunderstanding and oppression of deaf people that persists in many countries, deaf humor- much in evidence – was also an important topic that repeatedly lightened the tone of the Conference. The overall mood of participants was celebratory, largely because the Deaf Way itself represented a breakthrough in deaf people's success at promoting pride in the accomplishments and potential of deaf people around the world.

## 4.6 ASSOCIATIONS / CLUBS OF THE DEAF IN INDIA

Associations of the Deaf are usually voluntary, self-help organizations with the objectives to bring the Deaf of different sections together in close contact and to deliberate on the needs of the Deaf as a class. The initiative usually comes from the deaf persons themselves who wish to associate with others through a common method of communication and culture. The activities normally held in such clubs are sports, recreational programmes, training in hobbies, interpretation, handicraft, exchange of news, etc. Deaf people tend to establish strong bonds with each other because they lack easy means of communication and common interests with their family members.

### 4.6.1 All India Federation of the Deaf, New Delhi.

Apart from organizing weekly meetings for socializing, free and easy communication and exchange of information, the Federation has a Vocational Section providing training in several occupations such as photography, printing, bookbinding, computer operation, etc. Some such Associations conduct activities on similar lines.

### 4.6.2 All India Sports Council of the Deaf – Headquarters in New Delhi

The Council shoulders the responsibility of all activities related to sports of the Deaf. These include cricket, badminton, swimming, football, athletics, etc. Many States have set up Sports Councils of the Deaf which are affiliated to the Sports Council in New Delhi and the Associations of the Deaf in each State are in turn affiliated to the Sports Council of the State.

Human nature being the same all over, a lot of politics and consequential bickering are part and parcel of the social activities of the Deaf too. This has resulted into proliferation of associations many of whom do not function systematically and regularly.

### 4.6.3 Some Other Associations of the Deaf of Long standing in India.

- Andhra Pradesh Association of the Deaf, Hyderabad,
- Deaf-Reach, Hyderabad
- Tamil Nadu Sports Council of the Deaf, Chennai,
- Orissa Sports Council of the Deaf, Bhubaneshwar,
- Kolkota Sports Council of the Deaf,
- India Deaf Society, Mumbai
- Association of the Deaf, Bangalore
- Hariyana Welfare Society of the Deaf,
- J & K Association of the Deaf, Srinagar,
- Pondichery Association of the Deaf,
- Tripura Association of the Deaf, and so on.

## 4.7 SUMMARY

This unit gives an overview of different educational options for placement of deaf children and their availability in the country

It also gives a brief introduction to the facilities available abroad. Again in gives some insight as to the ways the deaf try to socialize & interact within themselves.

## 4.8 SELF-STUDY :

1. Write a note on Day Schools & Residential Schools for the H.I.
2. Which of the schools in India have program upto primary level with strict oral-aural approach ?
3. How many Institutes in India provided college education to the deaf?
4. State the unique features of the Gallaudet College ?
5. State the main objectives of the A.G. Bell Association ?
6. Find out about different educational facilities and associations and organizations dealing with the problems of the hearing impaired in your place of residence and state.

## 4.9 ASSIGNMENTS/ACTIVITIES

1. Give information about one day school and one residential school in your State.

2. State briefly the different educational facilities, and Associations and Organizations of and for the H.I. in your place of residence and State.

## 4.10 POINTS FOR DISCUSSIONS/CLARIFICATION

**After going through the unit you may like to have further discussion on some points and clarification. Note down those points:-**

### 4.10.1 Points for Discussion

_____

_____

_____

_____

_____

_____

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_____

_____

_____

### 4.10.2 Points for Clarification

_____

_____

_____

_____

## 4.11 REFERENCES


- **Gallaudat Encyclopedia**
- **Web-site**
- Brochures of schools.

# UNIT 5: REFERRAL OF CHILDREN BASED ON SIGNS AND SYMPTOMS OF HEARING LOSS

## STRUCTURE

**Introduction**

**Objectives**

**Communication**

Animal versus Human communication

Human Communication

- Non verbal (Non linguistic) Communication
- Verbal (linguistic) Communication

**What is Language ?**

Definition of Language

Sign and Symbol – The Difference

What is Speech ?

**Nature of Language**

Arbitrariness

Rule Governed

Creativity / Productivity

Displacement

1.5.1Cultural Transmission

**Language Acquisition and Social Conditions**

**Linguistics, the Science of Language : an Explanation**

Study of the Structure of Language

Scientific Study of Language

Grammatical Description and Competence

**The Structure of Language**

- Phonological System
- Morphological System
- Syntactic System
- Basic Syntactic Pattern
- Semantic System
- Role of Context

**Functions of Language**

- Interpersonal Communicative Functions

**Summary**

**Unit Activities – Self Study**

**Assignments**

**References**

**Suggested Readings**

# INTRODUCTION

Communication means exchange or transfer of information, ideas, feelings, opinions etc. achieved in many different ways such as by mere touch, raising of eyebrows, signs, use of drawings, speech, written language, etc. In ordinary everyday dealings we use any one of these or a combination of these for exchanging messages, and we are not even aware of these as being different means of communicating. Therefore, for many people, the terms **communication, language and speech** are one and the same thing. However, it is important particularly for teachers and parents of the deaf children to bear in mind that although **not all communication is linguistic, language,** by far, is the most powerful medium of communication, and their efforts must be geared to helping their HI child to move on gradually from use of signs and gestures to words and then sentences.

All known human groups possess language. The verbal language system is capable of referring to an infinitely wide variety of subjects, objects and concepts through the minute refinement of its grammatical and semantic structure. As for the acquisition of this system by human beings, it happens without any conscious effort on part of the human child just through ample exposure to verbal interaction in meaningful situations. At the same time, it must be realized that this **verbal interaction is a social and most natural process** in which utterances are selected in accordance with socially recognized norms and expectations, and this gradually leads the child to learn and use language for social and other purposes.

Though communication has been the primary function of language, it has been claimed by scholars that language also enhances the intellectual growth of an individual. The scholars have also argued that such a system is acquired over a period of time in one's life and the system is internalized in each one of us. Such an organization or internalization is feasible only when language is viewed as a structured unit.

In the next few pages we will try to understand the differences between :

- communication and language and speech,
- the nature of language and its structure, and
- concentrate on the science that deals with such a study.

## OBJECTIVES

The readers after reading this unit will be able to :

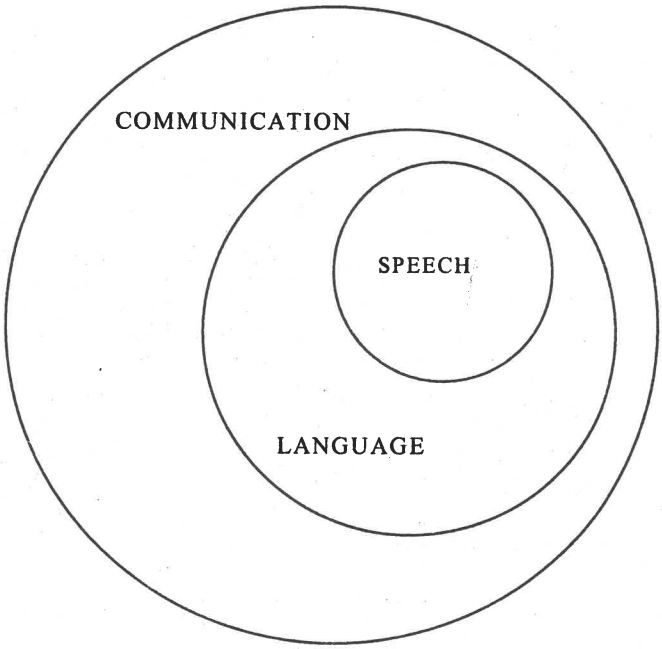
- Explain the difference between the key terms used in the study of language and linguistics,
- Define language and describe its chief properties,
- Explain the structure and functions of language.
- State the difference between modes of communication and methods of education.

## COMMUNICATION

Many of us have perhaps faced the difficulties in communication while visiting places where the language used is not known to us. We experience same difficulties in trying to communicate with a hearing handicapped person who does not speak or understand any verbal language. In such situations, we resort to the use of physical guidance, gestures, signing, drawings, miming, pointing, etc. to convey intended messages. Thus all of these are **different ways of communication** used by us.

The use of **verbal language** (oral/written communication) is one way of communicating which is specific to human beings.

Then **speech** has always been the primary medium of use of language for communication. (Then came writing. But the oral language/ speech is the base of writing which is nothing but an effort to capture oral language that is sound and meanings on paper.) Thus graphically these can be viewed as :




It can be seen from this figure that the word communication is most general of all these terms and language and speech come within it.

**Animal versus Human Communication**

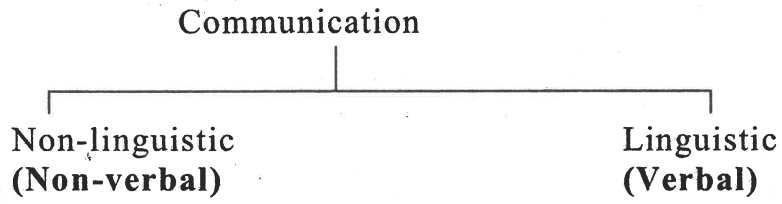
Human beings as well as animals, communicate amongst themselves. e.g. ants, bees and primates (mainly apes and monkeys) establish contact in certain ways; dogs express their pleasure, anger, fear, through movements of the tail, barking, eye-gaze etc. But the level of this communication is primitive. Moreover it is habitual, specific to the situation, and is initiated by internal or external physical cues. Also, these are only a few limited sounds or other types of signals - these are **not symbolic**.

Learning and using language is solely a human activity. It is this ability to communicate using language that differentiates humans from other known animals. Several attempts have been made in the past to teach the higher primates language (in the verbal mode), but all of these have met with failures. This inability in higher primates to learn language, has been attributed to the structural differences between them and the humans in the peripheral sensory area (hearing) and the central nervous system (brain), that facilitate to process **the incoming speech** and help in acquiring the language.

Primates have systems of vocalizations (signals) for indicating danger and source of food etc. which are related to survival and emotional needs which they express through grunts and howls. But these again are not symbolic and are very limited in number (maximum 9/10) as compared to the thousands of words/symbols of a language. Also the primates, due to the structure of their vocal organs, are capable of making only a few sounds. In comparison, human beings can produce a wide range of meaningful characteristic vocalizations through permutations and combinations of some 40/45 speech sounds that human languages use. Man, with his more flexible vocal apparatus, has developed his cries (as against specific cries of animals) into a very efficient system of verbal communication i.e. language. By means of this, man can attain such complex social coordination as that of a moving army or can communicate to his fellows a theory of universe. In addition, the human language system has the potential to create new meanings such as **'space ship'**, or **'mouse'** and **'byte'** in a computer system. Research has shown that some animals (apes) after much training, have acquired some modified form of language; but these are only a very limited number of messages produced in non-vocal modality. Moreover, none of these has the complexity and versatility of even a 4 year old human child's language. Also, human language allows us to talk about an infinite number of topics. As far as we know, primate communication refers only to the 'here and now', and neither bees nor primates, nor any other species other than man, can discuss abstract concepts like kinship, justice, democracy, peace, etc. (please see 1.5.3 and 1.5.4)

**Human Communication**

Communication in human beings can be classified mainly in two ways;




**Non-verbal (Non-linguistic) Communication**

In communication, lot of information is conveyed by non-verbal means, such as gestures which involve not only hand movements but also facial expressions and body movements and postures. A person's clenched fist, bared teeth, frowns, stamping feet in tantrums, voice intonation, all help in revealing the mood of the person. Mime, dance, drawing, painting, sculpture, are yet other ways of communicating ideas and information. However, exclusive use of such means not only will be difficult and cumbersome but also, not truly efficient and effective. As has been stated earlier, only the system of language can be truly effective for exchange of ideas and information of any kind.

- **Verbal (Linguistic) Communication.**

This comprises the use of spoken and written (and also sign**ed** – non-oral modality) language of the society for communication. (In sign**ed** language – a manual code/mode to represent spoken/written language – and not just concepts, all words and word-parts such as 'eat' and 'ing' in eating are signed. For details see **Unit 3** of this Block – Modalities of representing language.)

## WHAT IS LANGUAGE?

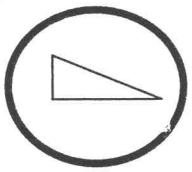
**Language** has been defined by P. Herriot (1970) as the term denoting '**the psychological processes which regulate speech.**' Language is a mental phenomenon, a body of knowledge about the speech sounds (vowels, consonants), meanings and syntax, which resides in the mind (brain) of the users. This knowledge can be put to use of course, but the speech or writing that results is merely a representation of language. It is not the language itself. The term 'a language' is used to refer to all systems of speaking, writing or signing common to a group of people. Thus 'Gujarati' is thought of as ' a language spoken by Gujarati people' or 'American Sign Language' as ' a language used by the deaf community in USA.'

Almost all of us possess one or more languages in which we communicate irrespective of the degree of competence (knowledge) that we may have in these languages. But the irony is that when asked to define language, we find ourselves in an uncomfortable position and find it difficult to define or explain language without

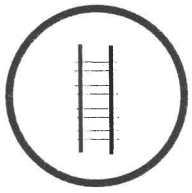
mentioning to its structure, nature or use. The standard definition of language thus goes like this: ***Language is a system of arbitrary vocal symbols used for human communication.*** Such a definition will make no sense unless we understand the terms such as 'system, vocal symbols, arbitrary' used in the definition and the characteristics of language.

## Sign and Symbol

Here it is necessary to understand clearly the difference between a sign and a symbol. A Sign is a gesture, a signal or a mark expressing a meaning, e.g. road signs :



This sign indicates that there is a slope ahead.



This sign indicates that there is a railway track ahead.

Thus, as you can see, there is a direct or a somewhat indirect relationship between the **Sign** and the object or concept that it denotes. Similarly, the dark clouds, thunder and lightning in the sky are direct indications/signs of rain to come; a smoke is a sign of fire. But a **Symbol** is something that by custom or convention, represents something else (See 1.5.1). There is no connection between the sounds that people use and the objects to which these sounds refer. Language is a symbolic system, a system in which words are associated with objects, ideas, and actions by convention, e.g. our forefathers have been calling frozen water as ICE, but in fact, ICE by any other name would feel as cold. Or an object which we use to keep things on and which has 4 or 3 legs is named TABLE in English or MEJ (mej) in Hindi, but it could have been called BATEL or LABET conventionally through generations by all English speaking population instead of TABLE, and still people would have understood the meaning. Thus language is a system that uses symbols for communication. This is further in 1.5.1 – Arbitrariness.

**Speech**

Speech is the primary and most common mode/modality/channel/code of language expression. Any manifestation of language by means of speech is a result of a highly complicated series of events. In the first place, the formulation of the thought/concept will take place at the linguistic level i.e. in the brain; this first stage may therefore be said to be psychological. The nervous system then transmits this message to the speech center, again in the brain. The message then, from there, goes to the so-called organs of speech, which produce a particular appropriate pattern of sound. This second important stage may thus be said articulatory or physiological – which is the motor aspect of speech. Then it is transmitted to the listener who receives it and decodes it; thus communication has taken place.

The growth and development of speech requires –

- firstly that there should be full functional activity of the peripheral and central processes by which the child hears and imitates sounds accurately, and
- secondly that he should gradually learn to associate these sounds with objects and with meaning. This requires that his general intelligence and mental development should be such that he is able to recognize, associate, recollect and reproduce the sounds of speech with or without meaning.

## NATURE (CHARACTERISTICS) OF LANGUAGE

The language spoken across nations with different cultures, races and religions are governed by certain principle properties. Some such Universal properties include:

- Arbitrariness
- Rule governed
- Creativity or productivity
- Displacement
- Cultural transmission

**Arbitrariness**

In languages words have meaning, that is, they stand for concepts and the spoken words are composed of sequence of sounds. The relation between the words and what they refer to is **arbitrary**. By this we mean there is no reason why these words stand for these meanings. The words do not fit the objects they denote. For instance in the word 'elephant' there is nothing that can denote its huge size, color or any other feature. Similarly in the word 'cat' nothing stands for its fur or paw. Such a relationship that is referred to as arbitrary has become conventional and it is difficult to divorce such a relationship. Of course there are certain exceptions to this. Words have sounds, which seem to 'echo' the sounds of objects or activities. For instance words like 'baw-baw', 'dum-dum' refers to the sounds produced by dog or generated by a drum. Such words are called as **"Onomatopoeic"** and these are very few in number.

**Rule governed**

Native speakers of language produce words and sentences. It is a fact that the words consist of sequence of sounds and sentences which are the linear combination of words. These combinations of sounds to form words and words into sentences follow certain rules or principles and can't be done in an unorderly manner. For instance the sentence ***Govind met Lakshmi*** consists of three words ( N(oun), V(erb) & N) and they can't be combined in any other sequence. Any such sequencing either leads to the generation of an ungrammatical sentence or sentence with a different meaning. This property refers to ***rule governed*** nature of language. Such rules apply not only to the formation of sentences but are also true for the formation of words. But for this nature, language will be highly unorganized and communication would be chaotic as each one can generate sentences or words as per ones whim. The result would be that people would not understand each other's speech. Another supporting evidence for this property comes from language acquisition studies in children. It is believed that children learning language have to learn the knowledge of language. This knowledge can't be collection of sentences as the sentences that occur in a language are potentially infinite. So children should learn how to generate these sentences from a set of rules, e.g. in a sentence like 'Ram is eating a banana', a child who has learned the rules of language will replace the word 'Ram' with any animate object, and the word 'banana' by any eatable object.

**Creativity/Productivity:**

This property of language refers to the capacity of native speakers to generate and understand a number of novel sentences that they have never heard or produced before. This is possible because as mentioned in (1.1.2) the knowledge of language exists in us in the form of rules. But the interesting aspect is that we are able to produce and understand sentences without the conscious application of such rules. Animal communication lacks this property. While children of three or four years are able to say any number of sentences, of course appropriate to their age, even highly trained apes are able to do so either verbal or any other means only in a rudimentary way.

**Displacement**

Human who possess one or more languages are able to talk not only about people, objects or events present in their immediate environment but also can talk about or describe the aspects which are not available in their immediate environment. That is we are able to displace ourselves in place and time and talk about past and future besides talking about the present. This is referred to as "**displacement nature of language**". One might wonder whether it is the property of language or the capacity of the mind. But nevertheless animal communication definitely lacks this property. It will be interesting to note that while children acquire language, they first talk about present followed by past and finally about future. But it should be noted here that certain animal communication, say for instance, the dancing of the bees seem to communicate about the past in a limited way.

**Cultural transmissions**

Language acquisition in children needs to meet certain basic requisites. Biological mechanism is one such requirement. Though the capacity to learn language can be said to be biologically transmitted, the language is not. Rather the language is culturally transmitted. Children learn language in a social context. And this process whereby language is passed from one generation to the other is called as cultural transmission. This concept of cultural transmission of language will be strengthened by the fact that if children born to parents of a particular speech community, are brought up by others in a different linguistic environment they will learn the language spoken to them.

Besides the above the properties, languages are said to include a series of other properties such as discreteness, oral-aural etc.

## LANGUAGE ACQUISITION AND SOCIAL CONDITIONS

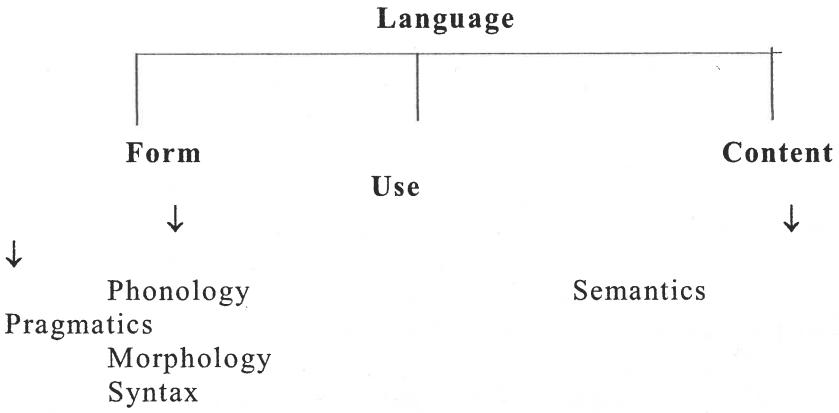
So far we have seen what language is, what its component parts and its main characteristics are. We have learned and have been using our language so effortlessly and easily that we have never paused to think about language itself. However, when we think of a languageless, speechless deaf child, merely this knowledge will not be enough for the teacher to help the child to learn functional language. She must also know the social settings and situations which enhance and facilitate this process of learning.

( The methods and techniques of teaching language are discussed in detail in Paper III, Blocks 1 & 2.)

Quoted below are a few paragraphs by M.A.K. Halliday from his Paper 'Language and Social Man'. In that he has very well described the role language plays in the child's development into a social being as part of the society. This will also help the teacher to understand the social situations and interaction that greatly assist and enhance acquisition of language by the child. The insight thus gained in the process of acquisition will give her ideas to plan, contrive and simulate similar types of situations within the four walls of her classroom stimulate thinking and activity and provide appropriate language.

'In the development of a child as a social being language has the central role. Language is the main channel through which the patterns of living are transmitted to him through which he learns to act as a member of a society. This happens through his interaction with the various social groups, the family, the neighborhood, and so on, - simultaneously he adopts the society's culture, its modes of thought and action, its beliefs and values. This does not happen by instruction, not in the pre-school years. It happens indirectly, **through the accumulated experience of numerous small events,** in which his behaviour is controlled and guided and in the course of which he develops personal relations of all kinds. **All this takes place through the medium of language.**

*The striking fact is that* ***it is the most ordinary everyday uses of language, with parents, brothers and sisters, neighbourhood children, in the home, in the shop and trains and buses,*** *that serve to transmit to the child the essential qualities of society and the nature of social being.*
(M.A.K. Halliday : Language and Social Man.)




**Scientific study of language**

Linguistics often has been defined as the science of language or scientific study of language. What is scientific in studying the language? This could be a possible question anyone can pose. In any scientific field before one sets up a theory or makes any law, the following procedures are adopted: Observation of events before setting up a hypothesis, collection of data, scientific analysis of data, hypothesis formation, hypothesis testing and hypothesis reformulation. Similarly in the field of linguistics, the same scientific procedure is being adopted before one arrives at the structural status of a language. Since linguistics too follows this scientific tempo, it is called as the scientific study of languages.

**Grammatical description & Competence**

All native speakers of a language have to have the knowledge of their language in order to speak and understand that language. This knowledge is nothing but the **mental grammar** of the language and should reside in all of us in the form of **finite sets of rules.** The rules are said to be finite as the number of sentences in a language are infinite and we can't store it. Rather it is easy to store a finite set of rules. These finite sets of rules that are acquired when we learn the language are also known as the **competence** of language. It is the competence that allows us to generate and understand an infinite number of grammatical sentences. However this knowledge is internalized and tacit and we don't have a direct access to it. We as children just learn the rules of language to which we are exposed to by interacting with parent and other people in the speech community. This aspect will be discussed in detail under "the development of language in children". On the contrary **performance**

# LINGUISTICS, THE SCIENCE OF LANGUAGE: AN EXPLANATION.

The term linguistics has been popular among language teachers, educationalists and mass media people. Though linguistics is basically concerned with language it has been defined and explained in multiple ways. The different ways of looking at linguistics include:

1. The study of the structure of language.
2. Scientific study of language or science of language.
3. Offers grammatical description to language.
4. Explains the competence of language.

**Study of structure of language**

All biological and physical entities have definite structure, w identified in terms of shape, size and other units. S it has argued by Linguists that language too will have ctur hence define linguistics as ' **science that deals with language**'. Linguists, then, by analyzing a language are able t the structural properties of language. The structure of the language is recognized in terms of the various internal components of language, viz., sounds, meaning and sentences. Seen in term nponents, languages are said to have form, content and use. (1) indicate the three components of the language, which will be discussed under section 1.9. Here the term **form** refers to the ph aspect of language. Forms can be described in terms of soun d or sentences. It would be best to conceive the physical from of the language, in the spoken mode, as consisting sequence of articulated sounds. The term **content** refers to meaning or **semantics** – the linguistic representation of what people know about the world of objects, events and relations. The term **Use** stands for the functions of language as well the social use of language. That is why people speak what they speak and how the speaker's intention is interpreted by the listener. Details of form, content and use will be discussed under section 1.9.

refers to the psychological or the mental operations involved in the act of expression and comprehension. That is how the native speakers are able to apply the knowledge while communicating. While competence refers to the knowledge, performance refers to the knowledge in action. In short competence gets reflected in one's performance and similarly by examining the performance one is able to have access to the competence. In short competence is similar to the rules of the game one should know in order to play that game and performance is the use of such a rule. The primary concern of Linguistics is to describe the native speaker's language knowledge or linguistic competence.

## BRANCHES OF LINGUISTICS

Language - its origin, nature- has always been something of a mystery to man just as the Universe and its creation have always been. There are different aspects of language which man has tried to study in order to unravel its mystery. There have also been different ways in which these aspects have been perceived and tackled. One of these ways has been to study the nature and function of language most scientifically. The persons who do such studies are called linguists and this science is known as linguistics.

Linguistics, whose basic concern is to describe a language in a scientific way, has many branches. They are descriptive linguistics, historical linguistics, psycholinguistics and sociolinguistics, to mention a few.

- **Descriptive linguistics** investigates the way people speak in a speech community at a given time. That is, this branch is essentially concerned with describing the language at given point of time.

- **Historical linguistics** on the other hand basically investigates the development of languages through time. That is it studies the history of language itself. It is primarily concerned with the study of how a language changes (sounds, words etc. of a language), how the same processes of change are responsible for the diversity of dialects within a language etc.

- **Psycholinguistics,** the most interesting branch of linguistics, is the fusion of. two independent but related fields of Psychology and Linguistics. Its primary concern is to explain the psychological or mental processes that take place in an individual when one is engaged in the act of communication. To be precise Psycholinguistics is concerned with explaining the linguistic

performance of an individual. An important area of study in psycholinguistics is the acquisition of language in children and its relation to cognition.

- **Sociolinguistics** includes the study of structure and use of language that relates to its social and cultural functions. That is, it is the study of language as part of culture and society. Children learn the language in a social context by interacting with their parents and other caretakers. It has been documented that cultural variations have a definite impact on the language children learn.

- **Computational linguistics** mainly deals with the possibility of translation automatically from one language into another. Bott says that the technological aspects of mechanical translation are almost trivial by comparison with the difficulty of providing the computer with all the information required for the successful identification and interpretation of utterances.

- **Neurolinguistics** is the study of language as knowledge is an attempt to find out what goes inside the individuals head, what are the mechanisms of the brain that are involved in speaking and understanding, and what must be the structure of the brain like in order for the individual to be able to speak and understand language, and to be able to learn to do so. (Please see the next Unit – Biological Foundation of Language.)

Some knowledge of Psycholinguistics and Sociolinguistics would be quite useful to a teacher of the Deaf to understand the process of language acquisition by children and to plan her teaching activities accordingly. However, to some teachers these skills come intuitively in the process of trying to teach language to deaf children.

## THE STRUCTURE OF LANGUAGE

As pointed out earlier language too has a structure like any physical or biological entity. And the system of language can be recognized to consist of various subsystems or organized in various levels. For illustration if one tries to describe the structure of say, a pen or flower, then one would do so by identifying its various components or parts. Similarly the structure of a language can be described only in terms of its internal constituents. By simply observing a language even a layman can recognize the existence of sounds, words and sentences in a language. One need not have to be a specialist to understand this simple fact. But a linguist is trained to look at this structure in a different way

by doing a linguistic analysis. The different sub-systems of a language identified by him are:

- Phonological system
- Morphological system
- Syntactic system
- Semantic system
- Pragmatic system

**Phonological system**

Phonology is that subsystem of language that describes the structure and pattering of sounds. Part of phonology involves the study of sounds of the language, that is Phonetics. Phonetics is the scientific study of sounds that are produced by the human vocal mechanism and that occurs in a language. Phonetics poses and answers a series of questions such as:

1. How are speech sounds produced?
2. What are the organs involved in the production of speech sounds and their function in the formation of speech sounds?
3. How to describe and classify speech sounds?
4. How to use this knowledge of phonetics in speech correction or teaching pronunciation?

Phonology on the contrary is used to refer to the rules and principles that govern the distribution of sounds in a particular language. One of the important concepts in Phonology is that of **Phonemes.** Phoneme is generally considered to have meaning differentiating function and meaning building block of language. In other words a phoneme brings about difference in words / meaning. And different language will have different number of phonemes. If we apply our mind a little, it will become apparent that an individual is able to produce several sounds using his/her vocal apparatus and that not all the sounds one produces occurs in one's language. Further, one has to understand that even of the sounds that occur in the language, not all will have a phonemic status. Phonology is precisely focused on identifying the phonemes (distinctive sounds) of the language and the distribution of non-distinctive sounds. Generally phoneme is defined as the minimal sound which is responsible for differentiating meaning between two words that have similar phonetic sequence in all but one place. For instance in the pair of words [pit] & [bit] the substitution of [p] by [b] causes a meaning difference and hence they are called as two different phonemes. Similar pair words are [tin] & [din], [meat] & [neat], [sit] & [hit] etc. It will be clear from the above illustrations that by employing substitution principle one

is able to establish the phonemes. It may happen in the languages that substitution of a sound by the other may not cause meaning difference and phonetically similar sounds (sounds that have common place and manner of production) may occur in definite context. Under such occasions the different phonetic sounds are classed into a single phoneme and their distribution is specified. In such situations the sounds that grouped in to a single phoneme are called the **Allophones** of that phoneme. For instance in English phonetically related sounds [p′] & [p] have a definite distribution, with [p′] occurring word initially and [p] in non-initial position.

**Morphological system**

Though phonemes have meaning differentiating function, they do not themselves have meaning and they combine in definite ways to form words. Morphology is the level in which the linguists are interested in describing the words, their internal structure and morphemes which are the basic units of word formation. . **Morpheme** has been defined as the minimum meaningful unit of language that is, the smallest unit of meaning. What one can infer from this definition is that the physical form of a morpheme should be minimal, that is, it shouldn't be possible for one to analyze it without disturbing its meaning. Sound sequences such as [cat], [boy], [ball] will lose its meaning if one cuts them further. That is the forms should appear as such to convey what they mean. But in sequences like [boys], [girls] & [tops] one can isolate, in addition to base forms, a unit (marker) [s] which conveys plural (number) concept. Because [s] carries a meaning we call them as a morpheme though it may not occur on its own.

**Free and bound morphemes**

Morphemes are usually classed into tow types, viz. **free** and **bound.** Free morphemes are those that can occur independently whereas bound morphemes are the ones which can't occur alone and they need a base form to occur with. Common nouns and verbs like "boy, girl, chair, eat, sleep" are free morphemes. The plural marker such as {s}, tense marker like {ed} in walked, moved are examples of bound morphemes. These are also popularly called as **content words** and **functional** markers. The other class of words knows as **function words** includes words such as conjunctions, articles which have meaning but don't stand/occur on their own. The morphological markers also known as **Affixes** are further divided into three types depending on where they occur in the word. Of these three the prefixes and suffixes occur quite popular not only in English but also in Indian languages. The affix that precedes the word or a free morpheme is called as **Prefix.** For example the markers 'in' in incomplete and 'un' in unclean are prefixes. The affix that follows the free morpheme is known as **suffix.** The markers 's' as in boys, girls, and 'ing' in walking and talking are illustration of suffixes.

The concept of word is closely related to morpheme. Our knowledge of English tells us units such as " play, plays, played, player & players" are words. But at the same time a simple analysis based on what we have been discussing presently would lead us to conclude that they all have a base word "play" and one or more markers attached to it. While play is a morpheme as well as a word, the others are words and are formed by adding bound morphemes to the base form 'play'. So one is compelled to make statement that ***all words are either morphemes or combination of morphemes, but not all morphemes are words***. The discussion will lead us to conclude that what is necessary on all occasions to form a word is a free morpheme and words can be derived using the free morphemes by adding bound morphological markers.

**Syntactic system**

As we pointed out earlier, a language has several layers or sub-systems and syntax is one such sub-system. Syntax refers to the arrangement of words within a sentence, or more specifically, to the structure of sentences. It is a common fact that sentences in a language are sequential collection of words arranged not randomly but in an orderly manner. Syntax studies the parts of the sentences and the way these parts are put together. We can illustrate with certain examples. While we say that the sentence " *The boy chased the dog* " is grammatically correct and makes sense, the sentence " *The book is the table on*" is ungrammatical because in the latter the parts of the sentence are not stringed properly as per the rules of English language.

In analyzing the structure of a sentence Linguists often talk about word order, that is, the order in which the words need to be combined. Different languages use different word order. The word order generally is identified with reference to the parts of the sentence, viz, Subject (S), Verb (V) and Object (O). Some languages may exhibit a fixed word order, in that the word order can never be changed while others may use a free word order. English is a **fixed word order** language where as Indian languages have a **free word order**. Then how one is able to judge the grammaticality and the intended meaning of the sentence in Indian languages? The **case markers (Vibhakti Prattay)** that are added to the subject and object nouns basically determine this. Unlike English, in Indian languages, verbs not only take tense markers but also take person (P), number (N) and gender (G) markers. So irrespective of the place where the nouns occur in the sentence, the objective case markers that go with the object noun determine its grammatical status. For instance consider the sentences in Hindi: ***'laDke ne kutte ko maara'*** [ boy (S) dog (acc) hit (past) ], 'The boy hit the dog'. Now if one says this sentence in whatever order, the meaning and the grammaticality of the sentence remains the same. That is one can say the sentence in the following ways: *kutte ko laDke ne maara, laDke ne maara kutte ko.*

This together with other knowledge regarding the structure of sentences constitutes, what is popularly called as syntactic rules. Of course one acquires these rules as part of language acquisition and once we possess this knowledge it enables us to generate and understand a wide range of sentences, besides allowing us to differentiate between grammatical and ungrammatical sentences and so on. Several models are available in the literature to explain this mental knowledge of the native speakers, which may not be relevant here.

**Basic syntactic patterns**

As we discussed earlier each and every sentences in the languages are made up of linear sequence of words that belong to different class. On the basis of the presence of different constituents five basic sentence patterns have been recognized in English.

**Pattern I:** Sentence (S) = Noun phrase (NP) + Auxiliary (aux) + Intransitive verb (Vi)

Some illustrations of this sentence pattern are:

The boys ran

She laughed

**Pattern II:** Sentence = NP + aux. + Vt +NP

A few illustrations of this pattern are:

The boys played the ball

The principal distributed the certificates.

It should be noted that while intransitive verb (Vi) may or may not take a direct object transitive verbs (Vt) need a direct object to complete the sentence / meaning.

**Pattern III:** Sentence = NP +be + N

Rama is a Teacher

**Pattern IV:** Sentence = NP + be + Adj.

Gowri is beautiful

**Pattern V:** Sentence = NP + be + Adv.

The car is in the garage

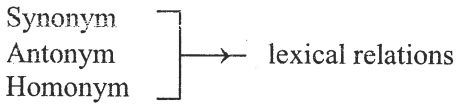
The NP, VP and PP stand for noun phrase, verb phrase and prepositional phrases. In Indian languages since the word order is not rigid, the VP unlike English occurs in the sentence final position (post-position) following both the subject and object noun. Similarly while preposition such as on, under etc. occur between the verb and

object noun in English they occur after the object noun in Indian languages. Otherwise the same pattern is also applicable to Indian languages. (Please see the Unit on 'Assessment of Language' in Paper iii, Block 3.)

**Semantic system**

Semantics, the study of meaning, also is an important level of language. The message conveyed by the speaker simply exists in the form of strings of sounds. It is from these sound signals that the hearer has to interpret meaning. This is a very complex process. But how such a thing happens can be explained like this: The hearer by his prior knowledge of his language is able to recognize in the sound sequence the presence of words and their meanings. Then by applying his syntactic knowledge he establishes the syntactic relations among the words such as agent, action and recipient of action and offers a final interpretation.

There is yet another theory, which states that whenever we assign a meaning to a word we generally do so with reference to other words we know. For instance if someone is asked to say the meaning of the word 'conceal' one might reply it is nothing but 'hide'. In the same way one may say the meaning of 'deep' is opposite of 'shallow'. This procedure is often known as lexical relations. The types of lexical relations that are usually mentioned in the textbooks include:




**Synonyms** are two or more forms which have similar meanings and which can be very often, but not always, intersubstitutable in sentences. Examples of synonyms are the pairs of words *broad –wide, answer – reply, cab – taxi.* It should be remembered that the idea of sameness of meaning when used with reference to synonym is not total sameness. There are occasions when one word is appropriate in a sentence, but its synonym would be quite odd. For instance the synonym of 'answer' is 'reply'. But one can appreciate that the two words can make different sense in the sentence "**Peter had only one answer correct in the test**". Here answer and reply can never have the same meaning.

**Antonyms** are two forms with quite opposite meanings and examples are pairs of words such as *'small – big, old – new, above – below'*. They may refer to the shape, size, prepositions, adjectives etc. to mention a few.

The term **Homonyms** is used when one form written or spoken has two or more unrelated meanings. That is one form – multiple meanings. Examples of homonyms

include ' bank' (bank of a river and financial institution), pupil (students and part of eye).

**Role of context**

Besides the linguistic knowledge and the concepts of lexical relations one more factor that seem to play an important a role in meaning interpretation is the context. Such a context could be either linguistic context or physical context. Hence scholars say that language makes sense in context. It is believed that children acquiring language are believed to depend upon the context/situation of what is being said to them and also parents depend upon the context to decode what the children talk to them. The two arise out of two different reasons. The former is due to lack of linguistic knowledge and the latter due to non-use of standard structures.

## FUNCTIONS OF LANGUAGE

Of course one major function or use of language that would come to the mind of all of us is that Language is used as a vehicle/tool for communication. Besides, the functions of language have traditionally been represented in linguistic structures such as declarative, interrogative, imperative etc. In recent times the functions of language is considered to include social aspects such as interaction, regulation or guiding other persons behavior and personal control. Language is also said to be used for both interpersonal and intrapersonal communications. The interpersonal communicative function refers to the exchange of information between individuals where as intrapersonal communicative function refers to the communication within oneself.

**Interpersonal communicative function**

Between the speaker and the hearer this has the following function: to express intention and receive, to convey about external information and to learn, to persuade someone and to be influenced and finally to display ones knowledge and to be evaluated. In an individual the functions include to learn, to store and to evaluate and interpret messages.

## SUMMARY OF THE UNIT

Language, one of man's highest cognitive functions is a highly organized phenomenon. Though all known species other than human are said to possess language either as verbal or non-verbal form, only human are found to be using it for a wide variety of functions. While most of the animals are using their communicative behaviors to "here and now" function, human are known to use for "past, present as well for future" function. It involves a systematic learning and organization. Linguists have found that the languages across world are said to contain well-defined

structures that are identified as Phonology, Morphology, Syntax, Semantics and Pragmatics. The study of language and its structures is not only the domain of linguists but also of people from other interdisciplinary areas too. It is true in the case of special educators, as their primary concern is to intervene with children who lack in learning language in particular. Specialists' agree upon early identification of the language problem and initiating appropriate intervention is one of the primary goals in any rehabilitative work. This brief introduction about language and language structure, it is assumed will infuse certain enthusiasm in special educators to go into details of language, its structure and organization.

## UNIT ACTIVITIES / SELF STUDY

b. Define language and state the functions of language.

c. Explain the term arbitrariness.

d. What is Linguistics?

e. What are the different sub-systems of language?

f. What is the difference between phonetics and phonology?

g. Give a few examples of synonyms and homonyms from you language

## ASSIGNMENTS

a. List the other properties of language and state which of them are important for language acquisition?

b. State the difference between a word and a morpheme and give illustrations from your language.

c. With illustrations from your language, differentiate free and bound morphemes

d. What are the basic sentence patterns discussed in this unit? Give the equivalents from your mother tongue.

## REFERENCES

1 Lyons, J. (1970). 'New Horizons in Linguistics'. Penguin.

2 Elgin, S.H. (1979). 'What is Linguistics ?' (2nd Edition). Prentice Hall

3 Ronald Wardhaugh, Introduction to Linguistics, (New York:McGraw Hill Book Co.)

4 David Ingram, First Language Acquisition, (Cambridge; Cambridge Uni. Press, 1969)

5 Frank Smith, Reading without Nonsense, (New York : Teachers' College Press, 1985)

## SUGGESTED READINGS

1. Akmajian,A., Demers,R.A. & Harnish,R.M. (1984) Linguistics: An Introduction to Language and Communication. (2nd edition) M.I.T. Press.
2. Fromkin,V. and Rodman,R. (1993) An Introduction to Language.(5th edition).
   Harcourt Brace Jovanovich College Publishers..
3. Yule,G. (1985) The Study of Language. Cambridge Uni. Press

# BLOCK 2:
# AUDIOLOGICAL ASSESSMENT

# UNIT 1: ORIENTATION: SOUND, PHYSICAL AND PSYCHOLOGICAL PARAMETERS/ATTRIBUTES, CONCEPT OF DBHL *VS* DBSPL, AUDITORY MILESTONES IN TYPICAL CHILDREN (0-2 YEARS)

## STRUCTURE

## 2.1 INTRODUCTION

Acquisition of language is one of the most important achievements of childhood. A language system is extraordinarily complex as can be seen from what we have discussed in the previous unit. The system involves highly abstract organizational principles.

It still amazes linguists that the young child is able to acquire the rules of a language and gradually use them more like the adult version. If a child gets sufficient exposure to two languages in childhood, he will probably learn both equally well. Since the child is not taught these formally but makes it as if it

was all by himself, it has been suggested that human children have an innate capacity (generic ability) to acquire language.

Study of language acquisition covers three areas.

1. Factors leading to development of language (innate abilities plus the environmental factors).
2. Theories of language acquisition,
3. Developmental stages : how language is developed.

In this unit we will study somewhat in detail the brain mechanisms that underlie its acquisition and use, the process of language acquisition by hearing as well as hearing-impaired children, and will briefly talk about the theories of learning language.

## 2.2 OBJECTIVES

After studying this unit you would be able to ;

- Understand how the human brain controls language behaviour,
- State the main factors responsible for language acquisition,
- Explain the stages in which language development occurs,
- Discuss the theories of language learning,
- Explain the areas of difficulty in language usage for the hearing impaired.

## 2.3 LANGUAGE - A PART OF HUMAN BEHAVIOUR

Language is defined as a "System of arbitrary vocal symbols by means of which two or more Persons interact and communicate". It is a part of communication. It is described as a code for communication. Language is known to have developed / evolved as a highest form of behaviour present only in human beings. Although animals do communicate, that behaviour is considered as lower to human language. This is mainly so because of the nature of language. Language is a generative behaviour governed by specific rules. Thus, it depends on :

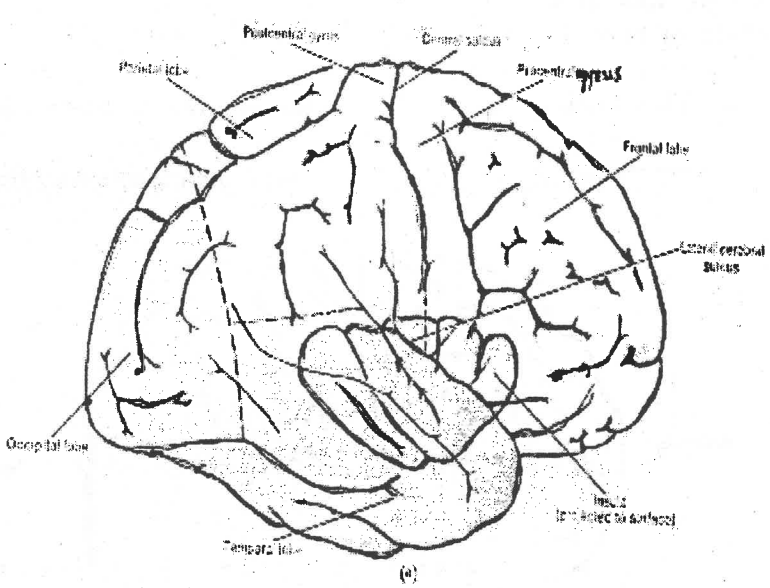
- inputs from sensory receptors,
- decoding of input signals,
- analysis of information, and

- organization of motor system for language expression (output).

Thus, it is a brain oriented cognitive process.

## 2.4 BIOLOGIC BASES OF LANGUAGES

The physical substrate responsible for human language is the human brain that controls and processes the language. It has been recognized that the brain has two identical halves called hemispheres. Each hemisphere is further subdivided in to four lobes. Starting from anterior to




posterior (front to back), they are named as frontal, parietal, occipital & temporal lobes:

**(Fig 1) : Explaining the basic lobes of brain**

Though both right & left hemispheres look identical and same, there are anatomical (structural) and Physiological (functional) differences observed between them.

Lenneberg (1967) in his book on Biological foundations of language explains that the language is the highest behaviour observed in human beings and

contends that biological mechanisms responsible for language is specific to man. It is well known that when some portions of the human brain get damaged, deficits in language function are observed. Following landmark studies have proved this :

### 2.4.1 Localization of the Functions of the Brain

#### i) Broca's Work

One of the major neurological discoveries of the nineteenth century showed that the **left hemisphere of the brain primarily carries out the language functions**. This feature that language is lateralized to left-brain was first noticed and explained by Paul Broca (1861). Paul Broca provided postmortem evidence for **loss of speech** due to injury to the frontal portion in the left hemisphere of brain in his patient. By 1863 Broca could show in 18 of his patients, that injury to posterior portion of 3rd frontal convolution results in loss of speech. This finding led to further research on localization of functions in Brain.

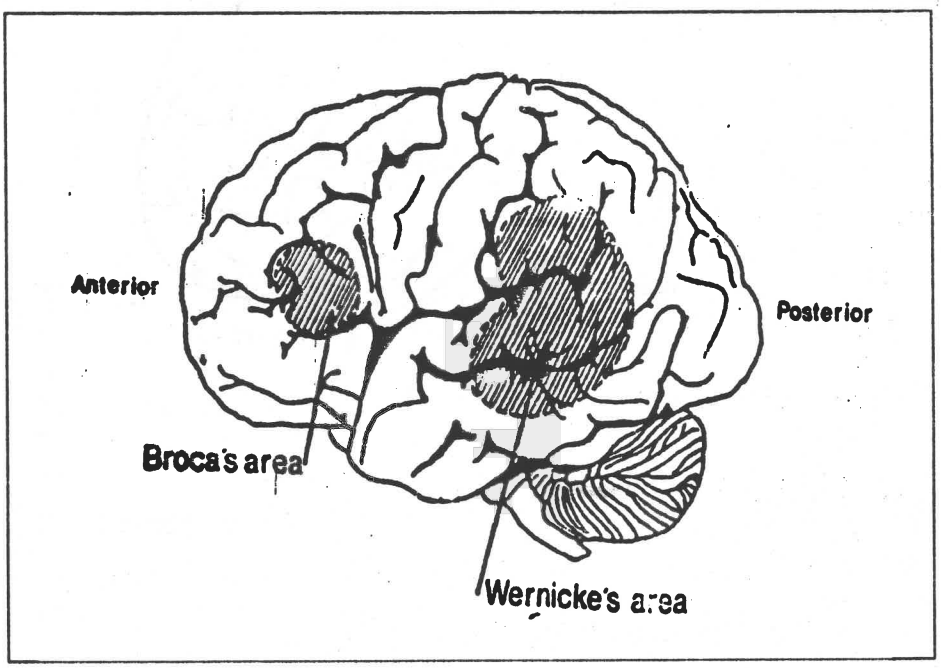



**Figure 2: Showing Broca's and Wernicke's area in the left cerebral cortex of the brain.**

#### ii) Carl Wernicke's work

Carl Wernicke's (1875) soon after presented findings that language function could also get disturbed and disrupted when there is damage to areas in left temporal lobe of the cerebral cortex. He suggested a relation between hearing and speech and described Aphasia (loss of language due to brain damage) resulting from damage to auditory projection area. The language disturbances seen in Wernicke's patient were different than that were seen in Broca's patients. Wernickes' patient suffered damage to their first temporal gyrus & could speak fluently. Their speech however was confused and made little sense. They could hear speech but could not understand or repeat what they heard. Wernicke hypothesized that this type of disturbance is because of disconnection of nerve fiber which connect the **two speech areas**; one which involved in **speech movement (Broca's area),** and the other involving the **comprehension of speech (Wernicke's area).**

Wernicke attempted to explain through his neuro automic model of Speech production and perception, the different types of language disturbances that could occur because of damage to different portions of the brain. According to this model the temporal lobe played an important role as sensory receptor organ. He produced evidence that damage to the first temporal convolution in left temporal lobe causes sensory aphasia, which supported that it is the second speech centre in addition to motor speech centre in the frontal lobe explained by Broca. He further explained that anatomical disconnection of these areas from one another, as well as, damage to any of them could cause aphasia.

## 2.5 SIZE OF DAMAGE THAN SITE OF DAMAGE IS MORE IMPORTANT – A DIFFERENT THEORY

The findings cited above lead to mapping of brain for localization of functions by several scientists. However, Henry Head countered the localizationists and stated that they tend to over simplification of the deficits following the brain damage. Ann Goltz conducted a series of experiments on dogs by removing specified areas in brain and studying the behavior. Goltz's experiments suggested that size of damage (lesion) than site or location is more important and revealed that removal of parts of cortex did not result in abolishing of movement as expected, instead decortications (crossing over of nerves) resulted in reduction of all functions.

## 1.6 FUNCTIONAL HIERARCHY OF THE BRAIN

John Hughlings Jackson – founder of modern neuropsychology explained that the human brain and nervous system are organized on the basis of functional hierarchy. His explanation views nervous system in terms of levels. Spinal cord, Mid brain, diencephalons, basal ganglia, and cortex. Each level controls more complex aspect of behavior.

i) **The Level of Spinal Cord :** At the level of spinal cord simple motor reflexive functions are controlled. They are mostly related to somatosensory system.

ii) **The Level of Brain Stem :** At the level of brain stem, postural support, righting reflexes and regulation of sleep/ wake functions are mediated.

iii) **The Level of Mid Brain :** The mid brain supports at least 3 functions :

- First – auditory, visual stimulation control,
- Second - linking these sensory systems to voluntary motor systems.
- Third - control of automatic stereotype behaviour – such as chewing & sucking etc.

iv) **The Level of Thalamus, Hypothalamus and Basal Ganglia :** Next stage of Thalamus, hypothalamus and basal ganglia add dimensions of increased energy and coordinated voluntary movements, and control such behaviour as rage & fight.

v) **The Level of Cortex :** Finally, the cortex controls and constructs sequences or patterns of **voluntary movements in response to internal & external cues & discriminates patterns of sensory input.**

According to Hughlings Jackson – disorder or damage to highest corticular level results in dissolution of behaviour (regression). The organism can retain and perform only simpler behaviour as seen in organisms which have not evolved higher level behaviours. He believed these symptoms to be an expression of released activity of lower centres of brain when their higher centres are damaged. Haughling Jackson instead of attempting to explain organization of language with reference to structures that have been damaged in aphasics – tried to suggest that aphasia be regarded as a reflection of activity of the undamaged parts of the brain.

Alexander Luria (1966) a Russian Psychologist also proposed a similar hierarchic organization of brain function.

NORMAL

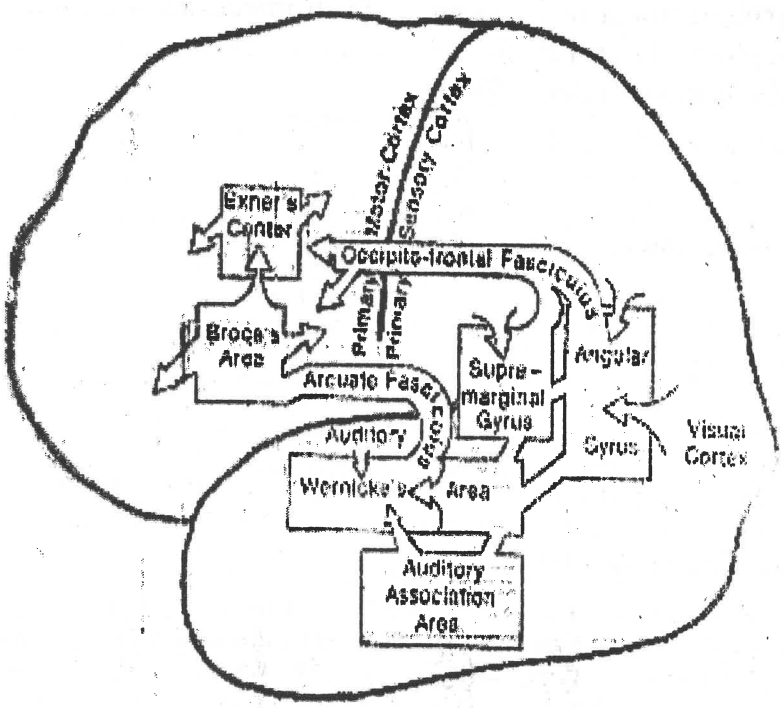



**Figure explaining major areas responsible for language governance in brain.**

## 2.7 THE ASYMMETRY OF CEREBRAL HEMISPHERES

Cerebral hemispheres as explained earlier though look alike, are functionally asymmetric. Various tests used to study hemispheric functions like WADA test, dichotic listening test etc. proves that language is primarily controlled by left hemisphere of brain.

### 2.7.1 Wada Test:

Sodium Amytal is known to be a fast acting chemical. When Amytal sodium is directly injected to the carotid artery of each hemisphere, it is known to effectively block the functions governed by that hemisphere for a few minutes. Such injections are used for finding hemispheric laterality for speech in patients prior to brain surgery. (Wada & Rasonussen, 1960).

Lateralisation of speech and memory functions are determined by having the patient count, name the days of the week, name objects and remember information presented after the injection. If the drug has inactivated the hemisphere, speech is temporarily distorted or lost.

Therefore, when the drug deactivates the hemisphere speech of the patient is halted or seriously disrupted temporarily for the period the drug is active. This happens only when dominant hemisphere for speech is injected with Amytal sodium. 96% of right-handed patients and 70% of left handed patients speech disturbance after injection in to the right hemisphere. Only 4% of right handed patients showed speech getting disturbed when right hemisphere was injected with the amytal sodium. In contrast 15% of left-handers had their speech preponderance to right hemisphere and 15% had bilateral speech prepondence (Wada & Rasmussen 1966).

More recent investigations of atypical speech representation (Mateer and Dodrill 1983) have shown that in cases of Bilateral speech representation, there is no duplication of functions i.e. two "left hemispheres", but relative separation of different speech/language functions between the two hemispheres. Still even in bilaterally dependent persons Articulation and syntactic functions of language are localized to left hemisphere.

### 2.7.2 Dichotic Listening Studies :

It is one of the behavioural studies to explore the functional asymmetries in normal brain. It involves indirect comparison between left and right temporal lobe regions. (Primary and secondary auditory projections.) With this procedure two stimuli are presented simultaneously, one to each ear. Although both hemispheres receive neural projection from each ear, there is a preponderance of the contra lateral connections, which are better developed and may actually inhibit ipsilateral pathways; thus information presented to the right ear has preferred access to the left hemisphere. This is called Right Ear advantage.

Kimura (1961) used this behavioural technique with patients having temporal lobe lesions. She reported that when brief verbal stimuli such as digit were presented, all subjects regardless of lesion focus reported hearing the digit presented to the Right ear more often than digit presented to the left ear.

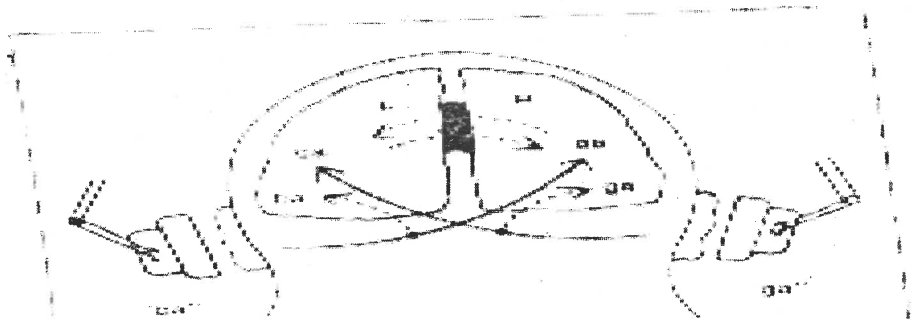


**Figure : Dichotic Listening Test**

In general, REA (Right ear advantage) are found for verbal or language based stimuli (e.g. words, nonsense, syllables, backward speech & stop consonants). A right ear advantage for simultaneously presented cords thus suggest **better left hemisphere processing of verbal stimuli.**

Left ear advantages (LEAs) suggesting greater right hemisphere processing have been shown for stimuli such as melodic patterns and non-speech sounds (e.g. cough, laugh). Vowels have typically failed to yield strong ear advantage in either direction.

Studies by Efron (1963) have suggested that an REA is seen whenever rapid or referential processing is required. The acoustic nature of most speech sequence involves rapidly reference transitions

(the exception is isolated vowels) and this processing capacity may underline the left hemisphere's role in speech perception indeed.

Tallal has demonstrated that impaired rate of auditory processing may underlie comprehension problems in both developmental and acquired aphasia. (Tallal & Newcome, 1978 , Tallal and Piercy , 1974).

Researchers have used dichotic listening studies to develop theories about the nature of hemispheric specialization but limitation of techniques should be noted. Not all subjects show the expected Ear Advantages in dichotic studies, the ear difference are often small when the occur and dichotic results are significantly affected by various contextual and practice effects. Nevertheless dichotic listening will undoubtedly continue to be used as a technique for exploring hemispheric asymmetry in the normal brain.

## 2.8 PROOF OF BIOLOGICAL FOUNDATION FOR LANGUAGE ACQUISITION

All the above findings relate **language to brain behaviour**, thus proving that language is an highly complicated behaviour governed by brain.

There are also evidences provided by the studies of language during infancy & childhood. All normal infants coo and babble during the first 6 months of life. Even deaf infants demonstrate this behaviour though later it may stop. These milestones of development of language invariably occur at the same period of time in all children across the world irrespective of cultural, ethnic, Linguistic & geographic difference. This suggests a **biological preponderance** for language acquisition.

Also the evolution of a visual gestural highly complicated and structured language like sign language of the deaf indicates the enormous potential and plasticity of the human nervous system which, when faced with a new challenge adapts to it suitably.
Thus, language is considered as a biological phenomenon found only in man.

## 2.9 ACQUISITION OF LANGUAGE

The acquisition of language is the process whereby all normal children achieve a **fluent control** of their native language (mother tongue) without any conscious effort. Again it may be noted that there is no intrinsic connection between 'race' and language. Any normal child, regardless of his genetic or 'racial' characteristics, will acquire the language of the country in which he is brought up. If not, then there is sociological rather than genetic reason : he has not been fully integrated in the community.

In helping a hearing impaired child to acquire verbal communication skills it has always been recommended to follow and focus upon the normal process of language development. This is because **hearing impairment does not change the basic nature of the child's central nervous system and how it deals with the verbal material.** The central nervous system of a hearing impaired child is tuned by nature to process spoken language patterns. The teacher's task is to ensure that the hearing impairment does not prevent verbal stimuli from reaching the child's nervous system. This point is dealt with in Paper III, Blocks 1 and 2.

### 2.9.1 Speech – An Intrinsic Part Of Spoken Language

We have already seen that language is a mental phenomenon. The code resides in the mind of the speakers / users, and unless the talker and the listener both know / share the same underlying language code, the messages will not be meaningful.

Normally, speech is the main modality for use of language and hence we do not think of speech and language as two distinct abilities. But at times, in the training and education of hearing impaired children, these are to be treated as two distinct aspects of linguistic communication, which need to be attended to separately. Thus while dealing with a young hearing impaired child, the teacher's efforts will be geared to :

- Assisting the child to acquire the language code so that he will understand and act in social situations and educational situations; and
- Then helping him to learn the mechanics of speech, so that having developed an understanding of the language code, he can become articulate and use his language knowledge for communication.

Spoken language can be learnt in a natural way only via audition. We shall now see how language code is acquired by hearing children.

('Speech and Teaching of Speech' are dealt with in 'Paper II, Block 3 and 4.' )

## 2.10 CONDITIONS CONDUCIVE TO LANGUAGE ACQUISITION

Linguists and others who have been interested in the study of the process of acquisition of language by children have still not understood it quite clearly. Yet, from whatever has been the outcome of these studies, certain factors have emerged as quite important for learning of a verbal language. The studies indicate that, though children have the brain potential for verbal learning, it will occur only if suitable conditions are present in the child's environment. These are :

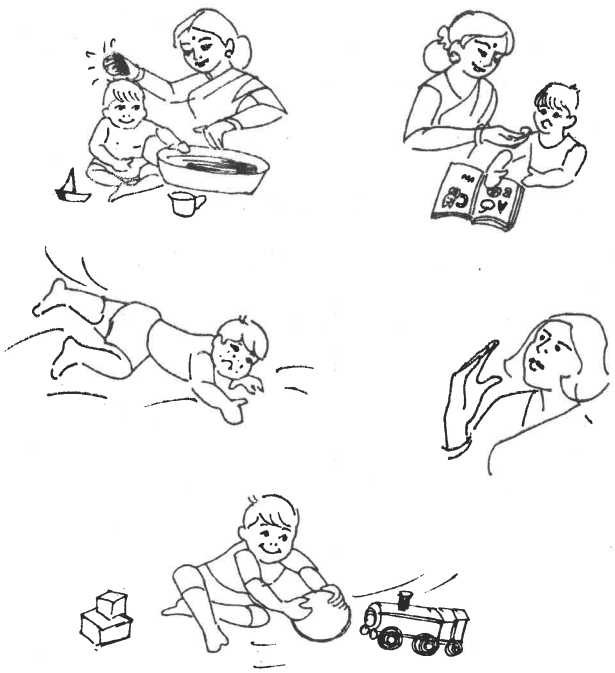
- Ample exposure to adult language related to shared experiences,
- Language usage focused on child's needs and interests.

### 2.10.1 Ample Exposure to Adult Language Related to Shared Experiences

As the child grows and starts moving around, he understands and learns more about the people and things in his surroundings. He gradually realizes how these affect him and how he can influence their behaviour and actions – cognitive development. The accompanying language interaction, related to the experiences shared by the adult and the child, helps the growth of vocabulary and comprehension. It is important to note that the child's comprehension always precedes his expression, i.e. he understands before he can use particular words and phrases. Day by day, out of a multitude of apparently small events, his vocabulary grows. However, it is essential to remember that in the initial stages, since the child does not speak yet, it is the mother/caretaker who plays a double role by asking questions as well as providing the answers herself. This makes the child aware of the role of language in everyday dealings. Soon he realizes that his own vocalizations are an efficient tool to draw adult's attention and to satisfy his needs. His attempts at speech, however small and incorrect, are always rewarded by approval and interest by the people around him, and gradually he finds himself able to communicate his needs and excitements by this new means. Thus, it can be said that children usually learn their first language through abundant experience of its reception and production, and in situations that are interesting and meaningful to them. By the age of two, they acquire the knowledge and use of syntax too quite effortlessly as they communicate.

## 2.10.2 Repetitive Language usage focused on child's needs and interests.

The interaction between the child and the caretaker usually is focused on the child's needs, interests, and the child's first hand experiences gained through play, other routine activities, and the situational context.



ACTIVITY

SITUATION

EXPERIENCE.

All of these, the play, activities, adult's actions in response, the situational context and the accompanying speech, which most of the times are simultaneously perceived by the child, **form the base** for communication by speech. The important components of such communication are:

- **The adult's and child's shared attention to each other and to the same objects and events, and**
- **The adult's spoken commentary such as explanations and descriptions on them.**

The words uttered in the course of experiences shared between the child and the adult get attached to their meanings (objects, events, actions, relationships between these, etc.) for normally hearing children **over many months before they utter their first word.** The everyday activities in which babies hear spoken language are greatly **repetitive and enjoyable** for them. The adult's speech is directly related to the care giving activities such as bathing, dressing, feeding and play situations. Adults often **comment on and explain** the salient features of whatever has attracted the child's attention. Normally they do not expect or stress that the child should respond by imitation or answering questions. In fact the adults themselves do this job. Thus initially, **for a long time,** children are helped to understand how to respond verbally.

( This particular aspect of language development is greatly significant for teachers of the deaf.)

### 2.10.3 Summary of factors that have relevance for developing language in H.I. children

McAnally and others have outlined certain factors vital for development of language. These are as given below:

1. The need to communicate precedes the ability to communicate.
2. Interaction is essential to language development.
3. Prosodic elements of language appear to be more important initially than words.
4. The form of adult input influences early language development.
5. Feedback to children on how well they have represented their intended meanings is important to language development.
6. Children's vocabularies grow rapidly and follow patterns through several repetitions.
7. Children's syntax also grows rapidly and follows patterns with opportunities and encouragement to use language.

## 2.11 IMPORTANT FEATURES OF THE PROCESS OF LANGUAGE LEARNING:

1. The child is interacting with his environment and gaining varied experiences through his senses.

2. He is receiving some sample utterances from the language mostly related to his firsthand experiences, e.g. Mother brings the ball to the child and says," Here is a big ball for Munna, a big red ball." Then she rolls the

ball and says,". Oh! Oh! The ball is gone, go get it." Then she may herself go and get the ball and say," Ah! I have got the ball." The child has now become aware of the words ball, big, red and the action word 'get/got. Simultaneously, he has observed the situation, object and the language used in the event. The repetitions of such concrete play situations will provide the necessary input for learning language.

3. Many linguistic interactions allow the child to see the situation and sentence in opposition against each other that make it meaningful, e.g.

I am here You are there

One can see that there is a fundamental opposition of situations that are matched by the words in the sentences. The child is deriving meaning from the **mental comparison of the elements of the situation with the elements of language**. This kind of **situation - sentence pairs** constitute the input to language learning where the child is learning meanings and the related forms of words and sentences, e.g. the child sees an ice cream, tastes its sweetness, feels its coldness, likes it, and simultaneously hears the words 'ice cream', 'cold', 'sweet' 'Do you like it?', 'Do you want some more?', etc. This means that he is learning different sound combinations (words) for these meanings, may try to repeat these words and those get fixed in his mind for future use.

4. The spoken language is reinforced for the child by **tens of thousands of repetitions in meaningful situations.** Thus the language becomes so familiar to a normal hearing child that it not only provides a means of communication but also a tool for thought. Every time a person speaks to a hearing child, he is exposing that child to the pronunciation of the word and to the patterns of phrases and sentences which the child masters in time.

## 2.12 STAGES IN LANGUAGE DEVELOPMENT :

The typical child uses single word sentences at about the age of eighteen months. The one word that he says may represent a whole sentence, e.g. 'water' may mean 'I am thirsty' or 'I want water'. When he says his own name, it may mean to him, 'That thing belongs to me.'

Shortly after this stage, he puts two or more words together to form short sentences that do not necessarily correspond to adult sentences.

By the age four, the child will be in possession of the essential structure of the language. He begins to ask questions and initiates and enjoys conversations. Up until now, the child has asked concrete questions like 'what?' and 'where?'. Now the child begins to use the more abstract questions like 'why?' and "when?'. The child, being inquisitive by nature, wants to know about everything that he sees around, and these early 'why?' questions are asked quite persistently which provide opportunities to get exposure to language usage in varied situations. However, it must be remembered that acquiring / learning language is practically a full time occupation for the child over a period of three years, which represents a very large number of language learning hours.

### 2.12.1 The growth of vocabulary:

With age and with entry in the school the child's general knowledge and language knowledge increases very rapidly. The size of vocabulary is a good indicator of the general mental growth of an individual. One's vocabulary grows in proportion to one's education, but it also grows in proportion to one's inborn power to acquire verbal ideas.

### 2.12.2 Reading and writing

The use of graphic language, both for reading with comprehension and written expression, comes later in the child as it came later in the human race. An average child is taught to read at the age of 5/6 and to write a year or two later in school. Learning to write is a matter of acquiring skills in the use of some rather fine muscular pattern. Just copying is a mechanical skill. The child may not necessarily understand what he is writing. (The teacher of the deaf has to take special care to see that does not happen in her class.)

### 2.12.3 Language Competence and Literacy

It has been observed that millions of people in this world have not learned to read and write, i.e. they are not literate. Yet they are seen to lead lives quite normally; they can all speak and understand and can participate in discussions as well as literate persons can. However, anybody who has acquired a language can learn to read and write that language with some effort and training. But learning a language and learning to read are somehow different. The latter is almost entirely dependent upon one's ability to use language fluently, and same as speech, reading too is a modality of linguistic communication. It is not language itself.

This point is very important for the teachers and parents of the H.I. children. Reading should not be introduced to **young** deaf children unless they have acquired sufficient functional verbal language.

(For details see Paper III, Block 2)

### 2.12.4 Summary of Stages of Language Development

Stern & Stern (1907) is generally considered to be the first real classic in child language. He starts his periods of acquisition at 1;0, with the onset of the first word, because he feels that speech really begins 'from the moment in which the child, for the first time, utters a sound with full consciousness of its meaning and for the purpose of communication'.

**Summary of Stern's (1924) Preliminary stage and four periods of language acquisition :**

| | |
|---|---|
| **Preliminary stage**<br>**First year** | The stage consists of three behaviours :<br>i) babbling, (ii) unintelligible imitation,<br>(iii) preliminary understanding . |
| **First period**<br><br>**1; 0 –1; 6 yrs** | The child acquires a small number of sounds with special meanings, which express the idea of an entire sentence. There is, however, no evidence that the child understands grammar. |
| **Second period**<br><br>**1;6 – 2; 0 yrs** | The child realizes that everything has a name, with: (i) a subsequent spurt in word acquisition, (ii) questions about the names of things. Soon after, the first multi-word utterances appear, first hesitantly, then more fluently.<br>There are three stages of vocabulary growth:<br>Substance – increase in nouns ;<br>Action - increase in verbs<br>Relation and distinction – increase in qualifying and relational words |
| **Third period**<br><br>**2; 0 – 2; 6 yrs** | Sentences become well formed in that they contain words for the major grammatical relations, like 'subject and object'. The acquisition of inflections begins, and may last for years. Syntax consists of the loose linking of words together where word order may vary. The range of questions expands. |

| | |
|---|---|
| **Fourth period**<br><br>**2; 6 onwards** | The simple juxtaposition of words in syntax is replaced by hierarchical structure and the acquisition of embedded or subordinate sentences. The acquisition of some grammatical morphemes continues. The child's questions now include those of time and causality. |

## 2.13 THEORIES OF LANGUAGE LEARNING

We have already seen that language is a learnt behaviour and that the child does not learn the language all at once but in stages. As such, the theories of learning have been applied to language learning also. These are discussed in the paper on psychology. In this unit we are mainly interested in the theories that have been suggested to explain the acquisition process.

- The **Imitation Theory** claims that children learn their language by imitating the speech of adults.
- The **Reinforcement Theory** proposes that children are conditioned into speaking correctly by being positively reinforced for "correct" language usage and negatively reinforced for "errors" in usage.

However, none of these theories can give a satisfactory explanation as to how children learn the rules that they are seen to use to produce novel sentences. There is no doubt that imitation is involved to some extent. But it cannot account for language usage such as 'I goed' at the word level, or 'he go out' at the sentence level. Studies indicate that children are not able to imitate sentences that cannot be generated by the grammar that has been formed in their own mind at a particular level.

The reinforcement theory assumes that children are being constantly corrected for using incorrect sentences and are encouraged when they use correct grammatical constructions. Here again it has been observed that the correction that takes place is more for the content of the message than for its grammar. Besides, adults are really delighted that their toddlers are talking at all and just are not bothered about correcting their children's speech for grammar. (It must be noted here that the mother often repeats the child's one word or two word utterances by just expanding them into full correct sentences. She does not insist that the child should repeat after her.)

- Children form their own rules and construct a grammar.

From the Studies on language acquisition, it looks as though children form their own most simple and general rules from the language input they receive and use these in expression till they learn to use the correct ones .

### 2.13.1 Language and cognition

Several studies have been done in the past concerning the relationship between 'cognition' and 'language'. The early position, known as **language dominant position**, was that language was primary and that thinking (beyond early and primitive stages) took place in language. In this view, the child's linguistic development is determined largely by experience with language, and language accounts for the concepts that are expressed within it (Quigley & Kretschmer, 1982).

The opposing and the presently prevailing view is the **cognitive-dominant hypothesis** which proposes that basic perceptual and cognitive development precedes language and provides the basis / underpinning for linguistic development. Language in this view is a natural extension or subset of the previously developed cognitive processes (Slobin, 1979).
Furth (1966) perceived his research as confirming that cognitive operations exist largely independently of language and that language is of minor concern in investigating cognition. His research can also be interpreted, however, as being supportive of the view that language and its acquisition are natural outgrowths and the direct result of basic cognitive processes and operations.

Bowerman's (1981) argument in this regard is worth mentioning here. 'She suggests an interactive model, in which meaning is promoted out of cognition into domain of language,- what is to be learnt. New forms can still be mapped onto meaning derived from cognition; but meaning can also be developed through attention to linguistic forms, presumably using cognition (discriminating, categorizing etc) as a vehicle. This **interactionist view of cognition and language** is now popular. Language skills are not isolated from rest of the cognitive development; level of intelligence is not always independent of language level (Wells 1979); what children are doing is attending to **both linguistic form and perceptible properties of the** situation to understand meaning.'

## 2.14 LANGUAGE DEVELOPMENT – THE MAIN PROBLEM OF THE DEAF

A severely and profoundly deaf child will most probably never develop any language and speech unless very special help is given from the early stage. Deaf children with mild and moderate loss of hearing are likely to develop some

language and speech skills. However, the quality and quantity of these skills will depend not only on the degree of the hearing loss but also on the child's intellectual level and his total environment. The table given below will give some idea of the difference that may be seen in the development of communication skills between the hearing and the average profoundly deaf children.

| Stage | Hearing children | Hearing impaired children |
|---|---|---|
| **At 1st Year** | Comprehension of a lot of language. Expression at one word level and use of gestures. | Without the hearing aid and special intervention, there is no receptive verbal language except understanding of a few gestures. Expression is through gestures only. |
| **At 4/5 years** | Acquisition of a vocabulary of 2000 to 6000 words, depending upon their exposure to language. Mastery of the basic structure of language – simple transformations like the negatives, yes/no questions, and conjunctions. | They may have a vocabulary of about 15 to 250 words depending upon the use of residual hearing and training from parents/caretakers. Early intervention through training of good quality may bring about considerable difference. |
| **At 6 years** | Ability to make and use complex sentences, can speak most of the vowels and consonants and can communicate easily with strangers too. | Through teaching only, they may know some basic nouns, adjectives and a few verbs. Sentence formation will be still at 2/3-word sentence level. Find it very difficult to communicate verbally. May speak some vowels but can manage very few consonants. |

## 2.15 PREMISES FOR LANGUAGE DEVELOPMENT OF THE HEARING IMPAIRED

- A typical child is born with a biological predisposition / capacity to learn language,
- Not all children learn language equally well and at the same rate,
- The pattern of language development is the same in the normal hearing child, the hearing impaired child or the language delayed child,
- The majority of hearing impaired experience language delay,

- With good school programme and early training, the child is likely to move at a normal pace,
- Exploitation of the residual hearing is a very important factor,
- Language development is dependent upon the communication between the child and those in his environment,
- Parent involvement is necessary for the development of language,
- Good programmes of language development are based on a developmental model following the pattern of normal language development,
- There is no conclusive evidence that indicates the superiority of one communication approach over any other,
- Language is learnt by seeing and hearing connected language in discourse with others, and not through use of single words. (The child must gain competence in all aspects of language – pragmatics, semantics and syntax.)

### 2.15.1 The Language Difficulties of Hearing Impaired Children

Severe hearing impairment from birth in most cases imposes a language handicap. Such a child will acquire language with difficulty even with special help. Considering the nature of his handicap, whatever he learns in terms of language and speech is truly quite an achievement. The incidental exposures and reinforcement of colloquial language patterns and knowledge are greatly limited owing to his poor social contacts. The retardation in both comprehension and expression adversely affects his educational performance and tends to mask his potential ability.

### 2.15.2 Errors often seen in the language usage of H.I. children

The following errors often occur in the speech and written language of the severely hearing impaired children :

- Errors and omissions in the use of **verbs**. The number of verbs in the stock or a deaf child's vocabulary is generally very limited. A determined and conscious effort has to be made by the teacher and the parents to help him learn and use verbs in his speech,
- Incorrect use or omissions of functions words such as articles, prepositions, etc.
- Errors or omissions in use of **plurals** and **tense endings**,

- Great difficulty in learning the **gender, number, person concord** that exists in most of the **Indian languages**. E.g. 'Lada**ka** rota tha', and 'Lada**ki** roti thi', or 'ba**da** kutta' and 'ba**di** billee', or 'eak gho**da** 'and 'char gho**de**'.
- Errors or omissions in the use of **case markers** which appear at the end of the nouns and are not heard or seen that easily on the lips by the deaf children.
- Use of stereotype sentences such as 'subject–verb-object' patterns.
- Sentences are telegraphic in quality and both the speech and the written work lack in abstract concepts.

Many teachers and parents feel (wrongly though) that the difficulties in understanding spoken language can always be overcome through reading. However, a hearing impaired child whose language base is weak, may also show retardation in the area of reading. In such cases focus will still have to be on reinforcing, consolidating and strengthening his language base through sustained efforts along the lines described in Paper III, Block 1 and 2.

Some of the strategies to assist H.I. children in developing their knowledge and language comprehension and expression through reading are discussed in Paper III, Block 2, Unit 3.

### 2.15.3 Teaching Verbal Language Skills

It is generally agreed that at least three overlapping stages are required in order to assist language development. These are :

- Reception (listening with understanding)
- Internal symbolization (interpreting, reasoning, and concept building), and
- Expression (communicating by speaking or by writing).

Between reception and internal symbolization, we require a process of decoding the incoming signals into a form that is readily interpreted in terms of previous traces in the brain. Similarly the outcome of reasoning is thought to be converted or encoded into a form, which enables an individual to communicate to his fellows. (For hearing children these forms would be spoken or written words; where as for the deaf, these may be stored in the brain as visual patterns of signs or patterns seen on the lips.)

The teacher of the deaf will have to make special and planned efforts to provide opportunities to her children to go through all these stages repeatedly in an

enjoyable and interesting manner so that the linguistic forms get fixed in their brain through their use. For the purpose she can make use of natural situations or contrived situations such as visits, story telling, directed activities, conversations based on news, daily routine, etc. It must be borne in mind that in the case of deaf children, results will not be seen immediately. She will have to make sustained efforts over a long period of time to get responses in terms of language from these children.

## 2.16 SUMMARY

Language usage is the highest form of behaviour present only in human beings. Since its acquisition depends on input to the brain through the sensory organs, decoding and analysis of the information and the output (expression) monitored by the speech center in the brain, it is said to be brain oriented cognitive process. It is seen that children achieve a fluent control over the language of their speech community regardless of their genetic or racial characteristics. Though the process of language acquisition by children is still not understood very clearly, certain factors have been identified as vital for it, such as repetitive language usage focused on child's needs and interests, the adult's and child's shared attention to each other and to the same objects and events, and, the adult's spoken commentary such as explanations and descriptions of these.

A child begins his one-word utterances by age 1 year, which represent his full thoughts, and by age 4, the child will be in full possession of a vocabulary of minimum 2,000 words and the essential structures of the language. It is generally accepted now that the basic perceptual and cognitive development precedes language and directly influences its acquisition.

Deaf children do have innate ability i.e. brain potential to acquire language, and with special efforts and training, many of them can achieve a somewhat limited use of language. However, grammar happens to be the stumbling block for the hearing impaired. There is no conclusive evidence that indicates the superiority of one communication approach (modality of linguistic communication) over any other.

## 2.17 SELF STUDY

1. Collect random language samples (about 10 to 15sentences each) of 5 H.I. children of 8 to 15 years of age in spontaneous conversation and / or through picture description. Analyze the errors in language usage. Also note for each child the age at onset of deafness, degree of hearing loss, age at intervention and the quality of the training. See if there is a connection between these factors and the child's performance.

## 2.18 ASSIGNMENTS

1. Study the language development of 2 hearing children of 3 and 6 years of age. Note these against Stern's table of Stages of language development citing the examples of utterances.
2. State with examples the main factors responsible for the development of language in hearing children.
3. Write a brief note on biological foundations of language.

## 1.19 REFERENCES AND SUGGESTED READINGS

1 Broca, P. Remarques surle siege de la faculte de la parole articulee, suivies d'une observation d'aphemie (perle de parole). Bull. Soc. Anat. (Paris) 36:330,1961.

2 Brown, J.W. and Perecman, E Neurological Basis of Language Processing. In Speech and Language Evaluation in Neurology : Adult Disorders, 3 : 45-59, 1985, Grune & Stratton.

3 Efron. R. Temporal perception, aphasia and déjà vu.Brain 86:403, 1963.

4 Head, H. Aphasia and Kindred Disorders of Speech, Cam bridge: Cambridge University Press,1926.

5 Kimura, D. Cerebral dominance and the perception of verbal stimuli. Can. J. Psychol. 15:166, 1961.

6 Kolb, B. and Whishow, I.Ce. Fundamentals of Human Neuropsychology San Francisco: W.H.Freeman, 1985.

7 Lenneberg, E.1967. Biological Foundations of language, New York: Wiley.

8 Luria, A.R. Traumatic Aphasia. Reprinted in translation by Mouton, The Hague, 1971

9 Mateer, C.A., and Dodrill, C.B. Neuropsychological and linguistic correlates of atypical language lateralization: evidence from sodium Amytal studies. Hum Neurobiolo. 2:1235,1983.

10 Tallal, P., and Piercy.M. Developmental aphasia : the perception of brief vowels and extended stop consonants. Neuropsychologia 13:67,1974.

11 Tallal, P., and Newcombe, F. Impairment of auditory perception and language comprehension in dysphasia. Brain Lang. 5:13, 1978.

12 Tortora, C.J. and Anagnostakos, N.P. The Brain and the cranial Nerves, Principles of Anatomy & Physiology, 4th Ed 14:322-324, 1984.

13 Wada, J.A. and Rasmussen, T. Intracarotid injection of sodium Amytal for the lateralization of cerebral speech dominance: experimental and clinical observations. J. Neurosurgery, 17:266, 1960.

14 Wada, J.A., Clark, R., and Hamm, A. Cerebral hemispheric asymmetry in humans. Arch. Neurol. 32:239, 1975.

15 Dennis Child, psychology and the teacher : 2nd Ed ISBN 0 03 – 910161-4

16 Hans G. Furth, Thinking without language – Psychological Implications of Deafness, (New York :The Free Press, 1966)

17 J. M. Bamford and J.C.Saunders, Hearing Impairment, Auditory Perception and Language Disability, (London : Whurr Publishers, 1994)

18 National Information Centre on deafness & National Association of the Deaf. Deafness : A fact Sheet, (Washington DC : Gallaudet University Press, 1984. 1987)

19 Ronald Wardhaugh, Introduction to Linguistics, (New York : McGraw Hill Book Co., 1972)

20 Patricia L. McAnally and others, Language Learning Practices with Deaf Children, (Boston, Mass. : Little Brown & Co. (Inc), 1987)

21 Gallaudet Encyclopedia of Deaf people and Deafness. Ed. : John V. Van Cleve; Volume I (McGraw Hill Inc., 1987)

22 Hans G. Furth, Thinking without language – Psychological Implications of Deafness, (New York :The Free Press, 1966)

23 J. M. Bamford and J.C.Saunders, Hearing Impairment, Auditory Perception and Language Disability, (London : Whurr Publishers, 1994)

24 National Information Centre on deafness & National Association of the Deaf. Deafness : A fact Sheet, (Washington DC : Gallaudet University Press, 1984. 1987)

25 Patricia L. McAnally and others, Language Learning Practices with Deaf Children, (Boston, Mass. : Little Brown & Co. (Inc), 1987)

26 David Ingram, First Language Acquisition, (Cambridge; Cambridge University Press, 1969)

# UNIT 2: ASSESSMENT & METHODS OF ASSESSMENT: SUBJECTIVE & OBJECTIVE TESTS; ORIENTATION TO THESE TESTS AND THEIR IMPORTANCE

- **STRUCTURE**
  - **Introduction**
  - **Objectives**
  - **General Characteristics of Counselling**
  - 1.3.1 Nature of Guidance and Counselling
  - 1.3.2 The Specific Goals of Counselling
  - **The Conditions Offered by the Counsellor**
  - **What Counselling is not**
  - **Counseling parents**
    - Importance of co-operation between Parent and Counselor
    - Counseling should be aimed at preventing the Problems that may be brought about by the Disability
    - Apprehension felt by the Parents
    - The important points to be stressed in Parent Counselling
  - **Characteristics of Deaf Clients**
    - Language Limitations
    - Conceptual Limitations
    - Communication Difficulties
    - Presence of other neurological defects
  - **Things the Counsellor should bear in mind with respect to deaf clients**
  - **Unit Summary**
  - **Check Your Progress (Self Study)**
  - **Assignments**

- **Points for Discussion and Clarification**
- **References**

## 1.1 INTRODUCTION

The number of professionally trained counsellors qualified to serve deaf clients of all ages fall grossly short of the demand. This chapter has been written with an aim to sensitize teachers of deaf children to the special needs of parents and their deaf children. It is not intended to be a substitute for the services of a counsellor.

## 1.2 OBJECTIVES

After reading this Unit, the reader will be able to :

- State the main role of a counsellor,
- Explain the important points to be stressed in counselling parent of a deaf child.

## 1.3 GENERAL CHARACTERISTICS OF COUNSELLING

### 1.3.1 Nature of Guidance and Counselling

**Guidance is the assistance given by a qualified person (trained as a counsellor) to parents /people (deaf clients of all ages and their parents in this case), to identify their problems, to help them understand and develop the capacity to cope with their problem, to choose appropriate solutions and manage their life activities.**

Counselling is a process of enabling people/parents to know/understand their past and present situations, and to make efforts to solve their problems through a therapeutic relationship with the counsellor.

### 1.3.2 The Specific Goals of Counselling

Counsellors help change a client's behaviour if that is what the client desires. But counselling is a particular way of influencing this behaviour, using particular methods for achieving specific goals.

- First of all counselling is concerned with voluntary behaviour change in the client. That is, the client should be wanting to bring about the change in her/his behaviour and should seek the help of a counsellor for the purpose.

- Second, the purpose of Counselling is to provide the conditions that facilitate such voluntary change. These conditions respect the right of the individual (client) to make his own choices. He is treated as an independent, responsible individual capable of making his own choices under appropriate conditions.
- Third, as in any sphere of life, there are limits that are imposed on the individual. These limits are determined by the goals of counselling accepted by the counsellor.
- Counseling is conducted in privacy, and the discussion is confidential. It is a relationship between a client with a psychological problem and a counsellor who is trained to help clients with such problems. The relationship between counsellor and client includes acceptance of and respect for others, understanding, mutual confidence and trust, genuineness, sincerity, openness, honesty and integrity.

## 1.4 THE CONDITIONS OFFERED BY THE COUNSELLOR

The counselling relationship is one in which an atmosphere is created in which the individual client is able to take responsibility for him/herself, to begin developing, or restoring the self esteem that is necessary for his/her functioning as a healthy, responsible, independent human being, able to make adequate decisions and resolve problems. However, at the same time :

- When the client is a parent (mother), she needs to recognize the special problems brought about by deafness of her child. But such recognition must be coupled with precautions against the natural tendency to view all or most of the child's growing-up problems as deafness connected.
- The parent needs to understand the different means that may have to be used in the education of her child.
- The parent will have questions about medical aspects – cause, course and treatment. There will be anxious questions about hereditary implications regarding future children and grandchildren. Here is the place where the all too common

feelings of guilt can be brought to the surface and with proper handling, to some extent if not largely dissipated.

- Parents need to reach some understanding of the relative roles of maturation and learning in the child's development and to realize that the child has to be ready for the next step in his progress before he can take it.
- The dangers of comparison with other children need to be realized, and the child's own progress needs to be accepted as the primary basis for evaluation.
- Instructions as to how the parent can best help the child at home in the development of specific skills should be given. But the counsellor cannot make too great a demand on the parent's time and energy (or the child's of course), appreciating that the parent has many other responsibilities in regard to maintaining the family.
- Parents have to be made aware of the threats to the emotional security of their children caused by continuous quarrelling in the home, major disagreements between the parents in regard to child-reading practices, inconsistent or baseless discipline, dominance or coddling of the child, the playing of favorites by the parents, and the feeling on the part of the child that he is a burden.
- Parents need to understand the important practical principles of child guidance. The usual areas of concern have to be explored, such as toilet training, sleeping, eating, thumb sucking, nail biting, bedwetting, temper tantrums etc. Parents also need understanding with respect to sibling relations, sexual development and sex education, and the development of constructive social patterns of behaviour, shyness and aggression, problems of discipline.
- Parents too, need to be prepared for the ordinary frustrations and gratifications aroused by their child's deafness. Help in meeting the curiosity, rejecting attitudes, sympathy, and devaluating pity of neighbors and friends are a part of the Counselling effort.

## 1.5 WHAT COUNSELING IS NOT

There are several misconceptions about what counselling is. Hence, it is sometimes useful to approach a definition by exclusion, designating what a thing or concept is not. Let us consider **what counseling is not :**

- First of all, counseling is not 'giving of information', though information may sometimes be given in counselling. Nor is it 'giving of advise, suggestion and/or recommendation'.
- Counselling is not influencing attitudes, beliefs or behaviour by means of persuading, leading or convincing, no matter how indirectly, subtly or painlessly. Counselling is not brain washing.
- Nor is counseling influencing of behaviour by admonishing, warning, threatening, or coercing without use of physical force; discipline is not counseling.
- Counseling is not selection and assignment of individual for various jobs or activity.
- Finally, interviewing is not synonymous with counselling. Interviewing is involved in the kinds of relationships listed above, as well as in other non-counselling situations. The intake interview to gather information about a client, or to orient her may be a prelude to counselling but it is not counselling.

## 1.6 COUNSELLING PARENTS

### 1.6.1 Importance of Cooperation between Parent and Counsellor

Parents are the pivotal figures who determine in large measure, the eventual psychological fate of their children. Because of the influence of parents on their children, the realization of the best that is known concerning the health, education, and welfare of the children with disabilities, requires co-operation between parents and counsellors. Therefore persons who work with deaf children must perforce, work through and with the parents of deaf children.

### 1.6.2 Counselling should be aimed at preventing the Problems that may be brought about by the Disability

When a family first discovers that it has a deaf child, the reaction is generally traumatic. Grief, guilt and overwhelming helplessness are normal responses. These feelings and the accompanying anxiety leave parents desperate for help and highly vulnerable to anyone who offers direction, regardless of how inappropriate it may be. Effective counselling at this crucial time would help parents to overcome their feelings and shock and direct their efforts toward constructive endeavors for the deaf child. It is the absence of appropriate parent-counselling at this crucial time when deafness in the child is first discovered, which is basically responsible for the later family pathological and other related difficulties faced by parents and their deaf child. If the major psychological, educational and later, the vocational problems of the deafness, are to be met at the preventive, not the rehabilitative level, professional parent-counselling as soon as deafness is diagnosed, is absolutely essential.

### 1.6.3 Apprehensions Felt by the Parents.

A parent often enters the relationship with number of well-defined fears. She may expect for example, to be blamed for any and/or all the difficulties that beset her child and fear that her guilt as a parent, will be exposed. She may be worried that demands that she is unable to meet, will be made on the family's financial resources, on her time, strength and emotional involvement. She may fear that the expert will shatter her strands of hope that her child can be cured or at least appreciably helped. She may believe that the specialist will not understand her as a parent and will become impatient with her desperate wish that all will be well. She may also fear that the worst aspect of the reality will be kept from her. Finally, she may be anxious lest the child becomes 'too attached' to the therapist, this being no small threat to a parent already uncertain of her relation to her child.

### 1.6.4 The Important Points to be Stressed in Parent Counselling

In addition to the significance of the underlying emotional relationship between counsellor and parent, there are many specific topics and insights that should be borne in mind by persons working in the field, in any early intervention work with deaf children, e.g.:

- Parents must be helped to realize that deafness in children are part of the general problem of human imperfections, which all must face in themselves and in all other human beings. The problem of parent of deaf children is therefore not unique but applies to all parents. All parents must learn to accept the limitations of their children.
- Parents must be made to realize that frequently it is not the handicap that hinders a child's adjustment, but what the parent feels about the child's deafness and the child's perception of this feeling.
- Parents must be helped to bring about understanding of the potentialities of their children. The important point is that every parent must adjust herself/himself to what the handicapped child is capable of doing.
- Parents need to understand that their deaf child is fundamentally like all other children, that "all children need an adequate and balanced diet, sufficient rest and sleep, and activity when well rested, that all need to be loved and wanted, to have a reasonable independence in running their own lives and in making their own decisions, to feel a sense of achievement, to win the approval of others for shat they are and do, and to feel that they are worth while individuals who reasonably come up to their own standards" (Laycock and Stevenson, 1996; 123).
- **Parents need to appreciate that their feelings and attitude towards their deaf child, and their unconditional love for him is of utmost importance to him.** But at the same time, Parents should be made to realize that if acceptance leads to overprotection then it will further harm the child.

- Parents need to realize that a deaf child :
  - Because of lack of clear communication in most situations, will need consistency in their behaviour towards him,
  - Will need to feel included in the family and a feeling of success, e.g. he could be given responsibilities (small tasks such as helping the mother) same as his hearing siblings so as not to be singled out. (If he is left out he will develop a feeling of being different. Participation in all family affairs and the related activity will make the child feel like any other member of the family.)

## 1.7 CHARACTERISTICS OF DEAF CLIENTS

There are a number of characteristics of most deaf people that present unusual difficulties in the counselling process. The range of abilities and needs among deaf people is as great as, or greater than, among the hearing. Yet, within this range, deaf clients do tend to have more of the following characteristics.

### 1.7.1 Language Limitations

Some deaf people are seriously handicapped in their knowledge and use of spoken and or written language, although many possess verbal or linguistic abilities that are superior to the majority of hearing people. Their handicap is manifested in poor reading ability, underdeveloped vocabulary, and language where syntax and meaning are either distorted or incomprehensible. (Deafness Research and Training Centre, 1990)

### 1.7.2 Conceptual Limitations

Individuals who have been deaf since birth or early childhood often have limited ability in dealing with concepts that have no immediate and specific referents. This problem may result from language limitations, isolation, and lack of adequate stimulation during the development years.

### 1.7.3 Communication Difficulties

Counselling with deaf clients is made more difficult because of communication problems than by any other factor. Some clients do not speak or speech-read well enough to communicate with the counsellor. Sign language is the communication modality preferred by & effective with most deaf clients, and every counsellor who works with deaf clients should be proficient in this form of communication.

It should be obvious to the counsellor that there is no place for personal bias as far as methods of communication are concerned. It is a basic tenet of all counselling approaches that the client be permitted to be himself in a counselling interview. With deaf clients, this includes allowing them the freedom to express themselves, as they feel most comfortable.

### 1.7.4 Presence of Other Neurological Deficits

Another consideration for the counsellor to keep in mind is that the leading causes of deafness are also etiologies of neurological disorders. This means that a significant number of deaf clients will be further handicapped by neurological deficits that may impede perception and learning and contribute to behavioural pathology. Thus, change in such clients through counselling may be considerably slower and more difficult than normal, considering these apparent problems (Deafness Research and Training Center). Communications skills will be much more restricted with young deaf children because more often than not they enter school with practically no language, speech or sign language skills. Such children have an extremely limited vocabulary if any at all. As a consequence, they are generally unable to make all their needs known and have no practical way to communicate verbally.

The counsellor working with young deaf children needs to encourage them through psychodrama, play therapy. Drawing in watercolours, crayons and pencil, is another way of communicating with deaf children.

## 1.8 THINGS THAT THE COUNSELLOR SHOULD BEAR IN MIND

It is important to remember that deafness often isolates the deaf person within the family circle, cuts him off from free interaction with his peers, restricts the input of information from the world about him, and curtails learning behaviour that will permit independence as an adult.

These facts have important implications for the counsellor. Although information giving is not counselling, in the absence of other helping persons the counsellors frequently must provide information of different kinds to his client. For example, with the client who feels that hearing people talk about him at work, it is not enough to deal with only his feelings about the situation. An explanation to the effect that deafness is rather unusual and that others sometimes react against someone they do not understand is as useful and important as trying to help the client to deal with his hostile feelings.

Many deaf clients will be dependent on the counsellor and will often look for immediate and sometimes 'magical' solutions to their problems. **Overcoming dependency and unrealistic expectations** requires that the counsellor help the client to understand the purpose of counseling, the responsibilities of the counsellor and the client, and how the two can work together to achieve their goals.

Deafness often results in disturbed relationships between the individual and others in his life who can hear and may lead him to fear and/or distrust hearing people in general.

The counselling profession in India has made little inroads into the area of deafness – in contrast to counselling with other client groups. The conflicting roles and the variety of functions demanded of the counsellor with other groups. The conflicting roles and the variety of functions demanded of the counsellor make the counselling a delicate task. Included are skills ranging from the ability to establish and maintain a counselling relationship to utilising community resources and functioning in a public relation role.

## 1.9 UNIT SUMMARY

Parents are the main influence on their deaf child's all round development. They are also in a position to take all the important decisions for their child. Therefore Guidance and Counselling procedures are mainly aimed at assisting the parents to identify their problems in the upbringing of their deaf infant / child in the best possible manner. They need help to come out of the stages like shock of discovery of a deaf child in the family who may never talk or understand things easily, the feeling of intense grief, guilt and a overwhelming helplessness which are normal responses to the situation. They need to be made to realize that their unconditional acceptance of and a positive attitude in dealing with the child will ultimately lead to child's psychological well-being and progress.

If the major psychological, educational and later, the vocational problems of the deafness, are to be met at the preventive, not the rehabilitative level, professional parent-counselling as soon as deafness is diagnosed, is absolutely essential.

The Counsellor is often required to work with deaf adults individually. In such cases, it must be borne in mind by him/her that changes in attitude and behaviour and the development of independence and the sense of responsibility (mental health) in an individual will occur only under condition of absence of threat to the self and the self concept. Respect for the client and for his right to self direction and to make his decisions, interest in acceptance of him as a person, absence of evaluative attitudes, and understanding him by seeing his point of view – all contribute to an atmosphere devoid of threat and one which will be conducive to success in the counseling efforts.

### Points To Remember

- Parents are the pivotal figures that determine in large measure the eventual psychological fate of their children.

- The realization of the best that is known concerning the health, education and welfare of the children with disability requires co-operation between parents and Councellor.
- Parents should be helped to think positively, to focus on what they can do to see their child as someone who can grow up, learn and progress in spite of his impairment.
- Counselling relationship is one in which an atmosphere is created in which the individual is able to take responsibility for himself, able to make adequate decisions and resolve problems.

## 1.10 CHECK YOUR PROGRESS (SELF-STUDY)

1. The main concerns of the parents of the deaf child are ----------
.

2. List out the important points that the parents/caretakers need to know.

## 1.11 ASSIGNMENTS

1. Write an imaginary conversation of about 10-15 minutes in the first meeting of the Counsellor and the parents of:
   a) a 2-year old profoundly deaf child,
   b) a 4-5 year old moderately severe deaf child.

## 1.12 POINTS FOR DISCUSSION/CLARIFICATION

After going through the unit, you may want to have further discussion or clarifications of some points.

### 1.12.1 Points for discussion

### 1.12.2 Points for clarification

## 1.13 REFERENCES

1. Bromwich, R. (1981). *Working With Parents And Infants.* Baltimore: University Park Press.
2. Luterman, D. (1987). *Deafness in the Family.* Boston : Little Brown and Company.
3. Van uden. *A World of Language for Deaf Children.* (P.I) Amsterdam : Swets and Zeitlinger. 1977.

# UNIT 3: AUDIOMETER: BLOCK DIAGRAM, PARTS & USE; TYPES OF AUDIOMETRY [SOUND FIELD (BOA, VRA) & CLOSE FIELD]; ROLE OF SPECIAL EDUCATORS IN CONDITIONING FOR PURE TONE AUDIOMETRY

## STRUCTURE

**Introduction**

**Objectives**

**Definition of integration**

**Types of integration**

Partial integration

Total integration

Peripheral integration

Social integration

**Hearing Impairment, special schools and Integration**

The Role of special schools

When and in which class should a hearing impaired child be integrated ?

**The ill-effects of premature integration**

**Readiness for Integration**

**Role of Parents**

Early identification

Providing Suitable Hearing Aids Maintenance of health

Auditory training and lip-reading

Socialization

Discipline

Maintenance of health

Academic responsibility

Interaction with special teachers

Participation in an Integration Programme

**The Role of Specialists**

- Educational audiologist
- Speech therapist
- Social worker
- Resource teacher
- Integrated programme
- Resource teachers

**The environment in the regular school**

- Problems faced by the integrated children
- Orientation of the regular teacher
- Acceptance of the disabled child by the peers
- Orientation of the hearing children

**Advantages of Integration**

**Other Factors affecting Successful Integration**

**Unit Summary**

**Check Your Progress (Self study)**

**Assignment**

**Points for Discussion and Clarification**

**References and Suggested Readings**

## INTRODUCTION

The main objectives of special education are the same as those of regular education: the optimal development of the individual as a skillful, free and purposeful person, able to plan and manage his own life, and to reach his highest potential as an individual. Since the goals of education are the same for both the normal and the disabled, it is generally agreed that if a handicapped child can manage successfully in an ordinary school he should go there. Some take the view that if the handicapped children are to live within the normal community; they should not be segregated for their education in special schools but should be educated alongside other children in ordinary schools. Also since there is hardly any provision for special education in small towns and villages and remote areas, integrated education remains the only viable option for these children.

## OBJECTIVES

At the end of this unit the teacher –trainees will

- Understand the concept of integration as related to the hearing impaired,
- Understand the role of parents, specialists and the regular school,
- Know the problems faced by the deaf children in regular schools and to understand the importance of training for them,
- Identify the children who can be integrated and train them,
- Know the importance of preparation for integration,
- Be motivated to work for the cause of integration.

## DEFINITION OF INTEGRATION

It is very important to define precisely what is meant by integration. The placement of a hearing impaired child in a regular school is generally referred to as integration. It is also termed as 'mainstreaming'. Many children with handicaps and with proper preparation may be able to take part in the physical, social and

academic work of the class and by doing so, to feel equal and respected partners. But there are other children whose handicaps are far more severe; they are already separated from other children by the extent of their disability.

**For any handicapped child if 'integration' is to have real meaning there must be a sufficient proportion of the activities of a school in which the handicapped child can participate on equal terms, in which he can feel a sense of achievement and earn the respect of others. It must be evident that learning is taking place and that the child is not just sitting in the classroom with hearing children - what is known as only 'physical integration'.** Only then we can say that he is truly integrated.

## TYPES OF INTEGRATION

Integration can take many forms. It may be partial and it should where ever possible be progressive.

### Partial Integration

Here the deaf children attend ordinary schools for some subjects like craft, art, free play and sports whereas the special unit for the H.I. attached to the regular school provides the special language input and takes care of academic subjects. The main aim is to expose them to a hearing environment so that they are motivated to adopt speech as a means of communication. Social interaction also becomes easier as they gain confidence in competing with the hearing counterparts in the above activities in which they might be as good or even better.

If the child shows good progress, then gradually he/she can be integrated for academic subjects too. This type is called **'Progressive Integration'.**

In this type of integration, a room is often set aside to which the children withdraw from time to time if the programme becomes too exhausting for them; such a room (termed resource room) can also serve as a place where any necessary additional help or counseling can be given by the resource teacher.

**Total Integration**

It implies the presence of a deaf in a regular school for all the academic subjects as well as for the extra curricular activities. The aim here is to make him realize his maximum potential in an environment, which demands oral communication and interaction with hearing children.

### Peripheral Integration

Here the deaf children attend the special school for the deaf children, which is situated in a school or in the school campus of the school for hearing children. Later the H.I. children, who are considered fit for integration, may be integrated in that school itself.

**Social Integration**

If a deaf child is not capable of handling the academic subjects in a normal school, he can be allowed to join it for some competitions, school gathering, sports, visits etc. But it is difficult for a single child to be integrated like this, but the teacher can send the whole class for social integration. This helps the hearing impaired children to adjust in the hearing society. This will provide them an opportunity to enjoy a near normal, competitive school experience along with his normal peers. This type of integration is mainly practiced in western countries. A few schools in India, which tutor borderline, multiple handicapped children, too practice this type of integration. Nevertheless it must be borne in mind that in India, our society, by way of its life and culture too, is an **'Inclusive Society'** and it generally accepts a handicapped child in whatever way it is possible under the circumstances.

In India the pattern of integration that is followed is generally full / total integration.

## HEARING IMPAIRMENT, SPECIAL SCHOOLS AND INTEGRATION

A hearing disorder can adversely affect a child's development of communication skills. It has been seen that H.I. children whose language is not well developed will find it extremely difficult to cope with studies, particularly in higher classes, in integrated settings.

They often feel that they are missing a great deal of what is happening in the class and quickly lose the sense of belonging to the group. They are constantly aware of the barrier produced by inadequate communication. Some become oppressed with a sense of failure; those who possess a high level of language ability and intelligence are best able to overcome the problems posed by imperfect communication.

In this unit we are going to see what the factors are that would lead to successful integration of the H.I. children.

**The Role of Special Schools in Integration**

A question often arises, whether or not a deaf child could be integrated straight into a regular school without attending a special school for the deaf. This is possible only if the parents become aware of the child's hearing impairment in the early infancy, supply him a hearing aid immediately and encourage listening to speech and, depending on the extent of the hearing loss, also draw his attention to lip-movements of the speaker for facility in comprehension of speech at the same time. There are a few cases of deaf children who with the able guidance of their parents have been able to cope well in an integrated atmosphere. Thus the success depends entirely on the home training received by a deaf child in the early infancy. If a parent needs guidance one can approach the nearby special school, speech therapist or a nearby Institute for the Hearing Impaired.

**When and in which Class should a Hearing Impaired Child be Integrated ?**

Preferably, the hearing impaired child should, as far as possible, be close to the chronological age of his hearing peers at the time of integration. It is beneficial for a hearing impaired child to be integrated as early as possible as this gives more exposure to oral language. The oral environment in the regular school is likely to bridge the gaps in communication, information and learning. Younger children, both hearing and hearing impaired, adjust socially better to each other, whereas older children may find it more difficult.

The age at which a deaf child is integrated depends on when the child is ready for integration. Though we should encourage early integration, much depends on early diagnosis and the home training received by the deaf child in his infancy.

.With good preparation, a deaf child can be integrated at any age if his level of intellectual and verbal functioning matches with the level of the class in which he is going to be integrated. For example a deaf child of 6 to 8 years can be integrated along with the 1st std. children if he is found suitable for that class. The readiness of the child is measured in terms of his language ability to use it in verbal communication, reading and writing. It is not advisable to integrate a much older child in a class even though his level of functioning is suitable for that class. The child may feel shy to be with much younger children, thus feel much inferior, or he may tend to boss over other children.

## THE ILL-EFFECTS OF PREMATURE INTEGRATION

In some rural areas, where no schools for the deaf exist, deaf children from villages attend a regular school with other hearing children but the parents lack guidance in understanding the problems involved, and in training the children to lip-read and make use of a hearing aid. Thus these children just gesture and sign though they might eventually learn to lip-read a few words on their own. As no hearing aid is supplied, they do not develop the habit of listening to speech and therefore remain dumb. The partially hearing children might however pick up some language and learn to express themselves in words, but oral communication as such remains beyond their reach. Such children might somehow make the primary grades but as the language concepts get complicated in the upper standards., they drop out of regular schools. Though they learn to adopt some normal patterns of behavior because of their exposure to hearing children, their mental growth gets stunted due to lack of language. The teachers of the regular schools are also at a disadvantage, as they neither have knowledge of the educational techniques used with the deaf nor the know-how of the electronic equipments needed for training. When a deaf child is thus prematurely integrated without being equipped with the ability of understanding the speech of others, he remains completely at sea in the hearing environment. Thus mere physical proximity to the hearing children does not lead to successful integration.

## READINESS FOR INTEGRATION

A special plan based on language development and speech should be chalked out much before the preparation for integrating the child. At the time of integration the child should be :

1. Able to hear/lip-read the teacher and the other normal children in the class and comprehend (understand) others speech.
2. Socially and emotionally stable to adjust himself in the new atmosphere

3. Good at least in the elementary rules of grammar of the language of instruction.
4. At the reading level of the grade in which he is going to be integrated.
5. Endowed with at least average I.Q. A hearing impaired child with normal or high intelligence will find it easier to function in an integrated setting.
6. Able to understand the different question forms –Who?, What?, What...do/did?, Where?, When?, What kind?, How many?, Why?, What happened?, Whose?, How?, etc. and to answer the simple questions correctly.
7. Able to make simple sentences on his own.
8. Able to do his homework independently.
9. Able to communicate at least in phrase level with others.

Reading is the foundation for all information and a poor ability in reading is bound to hamper the academic achievement. With adequate internal language, reading ability develops and this in turn allows the written language to develop. The ability to write is a direct effect of the ability to read and both reading and writing abilities put together help a deaf child to achieve the required level in an integrated set up.

Integration is effective when it brings about optimum intellectual development and enhances emotional stability and social adaptability of a deaf child.

## ROLE OF PARENTS

Parents have the unique opportunity of educating their deaf child. First of all their attitude towards this handicap is of paramount importance. They must accept his handicap and start his education as early as possible. His social adjustment, inner stability, personality and his integration depend on the help and guidance offered to him throughout his life.

### Early identification

Parents are in a better position to identify his deafness at an early age and take steps to have it confirmed from an otologist or a clinical audiologist. Quite often the parents do not become aware of the hearing impairment until the child is unable to talk by the age of 21/2 to 3 yrs. And much valuable time is lost. If a mother for example becomes suspicious that the child does not respond to sounds of his toys and especially when she calls to him, this lack of response must alert the mother and she should immediately have her suspicion cleared from an otologist. But mostly parents make themselves believe that their child does not respond to sound because he or she is lazy or obstinate and that there is nothing really wrong with the child .But during this time of vain hopes, the mental growth starts getting stunted due to his handicap and due to his inability to understand the verbal interaction around him he is unable to grasp clearly what is going on. Thus many parents take months and years to get reconciled to the fact that their child has a hearing impairment. Such parents pose more of a handicap to a deaf child than deafness does.

### Providing suitable hearing aids

If the parents suspect hearing loss they should visit an audiologist or an otologist and procure a hearing aid advised by them.

### Auditory Training and lip-reading

Once the child has been diagnosed as deaf, very often the first reaction of the parents is to stop talking to the deaf child. They start using gestures instead of words, thus stopping all exposure to auditory experiences. They should understand that a hearing aid does not overcome deafness but helps the child to utilize its residual hearing. They should provide him an environment to listen to everyday sounds as well as speech and learn to interpret meaning. Along with this the child has to be encouraged to watch the face of the speaker and start to lip-read his mother tongue. For achieving good auditory input and lip-reading parents must provide them with enough opportunity like -

- Constantly talking to the child while playing a game, bathing, dressing, eating, traveling etc.
- If an oral atmosphere is maintained wherever he goes, the child develops the invaluable habit of using words in his thinking and expression.

**Socialization**

The parents must allow the deaf child to play with the other normal children. Interacting with the guests and visitors will help them to develop confidence. The child's social awareness can also be increased by family visits to relatives, functions, theatre, parties, museums and vacation trips to places of historic and general interest. Thus it is through perseverance, sustained interest and intelligent guidance that the parents can lead the deaf child to get adjusted comfortably to his hearing environment in the school and society.

**Discipline**

Along with the linguistic training the parents need to give their deaf child an appropriate home training to make him socially accepted. Discipline is another important factor that needs to be considered by the parents. Just because the child is deaf, he does not need to be pampered so much as to become disobedient and unruly. An over sheltered childhood may lead to the development of an over dependent, timid and immature personality which would be a definite disadvantage to a deaf child in the rough environment of a regular school. Thus good manners and independence must be inculcated as early as possible in a deaf child's life .He should be encouraged to feed himself, dress himself, tidy his clothes and books and as he grows to run errands and generally make himself useful. He should also be encouraged to say ' please','thank you', wait his turn, and share his things. Such good habits along with proper communication skills are a key to success in an integrated surrounding.

**Maintenance of health**

Parents should see that their child enjoys good health by giving him a sensible diet, exercise and lot of play activities, fresh air and plenty

of rest. Correct posture is also important as it helps the child breathe freely. This sort of regulated breathing has a direct effect on the intelligibility of his speech. If he is also able to move quietly and gracefully, he will naturally be more acceptable socially.

**Academic responsibility**

The parents should cooperate with the special teacher in preparing the hearing impaired child for integration. They must take over the responsibility of his home work and reinforce his vocabulary and language concepts covered at school. Provision of good reading materials will enrich his vocabulary and help in language development.

**Interaction with special teachers**

The parents should regularly attend parent guidance meetings held in the school, so that they may observe their child at work in the classroom and give simple repetitive help at home to stimulate vocabulary and language expansion. If the parents wish the child to attend an integrated programme in the future, then they are naturally expected to be supportive of the educational staff and maintain an oral atmosphere at home in order to equip him with the necessary linguistic background, which is one of the necessary prerequisites of integrated education.

**Participation in an integrated programme**

The participation of the parents has to continue even after a deaf child is enrolled in a regular school. Though the resource teacher may be available to help the child whenever needed, the parents have to take the responsibility of his homework, his general behavior and that of adhering to the objectives and rules of the regular school. However, the parents at this stage might not be able to visit the school and talk to the teachers as often as they did to the teachers of the special school. A teacher in the regular classroom has 60 to 70 children in the class and cannot spare time to talk to the parents during the school hours. But something can be worked out with mutual agreement.

- The parents must not expect special considerations for their child. The child has to be taught to follow any reasonable programme that has been planned for his class.
- They can however ask for the curriculum of the class in advance, to go over the lessons with their child.
- They should never compare the deaf child with other children. The demand for vocabulary requirements keeps on increasing. Though he might have stood at the top of the class in the special school, he might go down in his grades in the regular school due to change in the study approach.
- Parents should continue their efforts to increase their child's language knowledge by helping him to read with understanding. Eventually extensive reading with comprehension alone can provide the required knowledge, language and information. It is only by means of reading that a deaf child can keep up to date on current events. Parents can stimulate interest in reading by subscribing to a magazine that he enjoys.
- Visits to relatives, functions, parties will increase his social awareness.
- Encouragement must be provided to the child in taking part in the competitions, sports and excursions will help him to socialize with the hearing peers.
- If needed they can take the help of speech therapist or a special teacher for speech correction or any other problem which they come across.

Thus it is through perseverance, sustained interest and intelligent guidance that the parents can lead the deaf child to get adjusted comfortably to his hearing environment in the school and in the society.

## ROLE OF SPECIALISTS

Apart from the special teacher and the parents, audiologists, social workers, speech therapist, resource teacher and regular teacher do lend a hand in promotion of the integration of a deaf child. At present in our country the responsibility of education and integration are entirely borne by the special school, especially educating the deaf, finding a suitable school for integration, orienting the teacher and the children of the regular school, and even finding a suitable employment for the deaf children after they leave school, are complex and varied responsibilities and should be shared by all. Each of these has to focus on one particular area of work: the parents on early identification and guidance, the audiologists on early diagnosis and audiological treatment, the special school on the development of personality and communication skills, the social worker on the understanding of the deaf child's home and the regular school on making him live and learn confidently and happily with his hearing counterparts. It is this type of team approach that can lead to effective integration of a deaf child in a regular school and in the hearing world.

### Educational audiologist

Whenever the parents approach them because they are doubtful of their child's ability to hear, these specialists should seriously consider their suspicion and sincere endeavor should be made to provide the correct diagonosis. It often happens that the specialists are unable to make a definite diagnosis before the age of one year and a lot of valuable time is wasted. Sometimes even when the assessment is made by the age of 2 yrs. the specialist is reluctant to convey the parents the true nature of the handicap as he does not want to be the bearer of bad news and gives ill founded reassurance to the parents. When such an attitude is accepted, the parents remain in the dark about the child's deafness and unnecessary delay is caused in tackling the problems. On the other hand he can accelerate the deaf child's chances of integration in the following ways.

1. Conduct a series of tests to confirm deafness to diagnose deafness and convey the result as early as possible to the parents.
2. Prescribe a suitable hearing aid to him.
3. Guide the parents to follow a proper home-training programme.

4. Encourage the parents to enroll the child in a nursery programme or an infant training programme where a teacher of the deaf would know how best to utilize the formative years of the deaf child.

5. Conduct Periodical hearing assessment as the child grows and prescribe suitable hearing aids if necessary.

6. Chalk out a suitable auditory training programme.

7. Analyze the performance of the hearing aids (preferably in a hearing aid analyzer) at regular intervals to ensure that it is in good working condition.

8. Suggestions on the change of ear moulds can be given as the child grows up.

9. Even when the deaf child joins a regular school, he can send his hearing aids for a regular check-ups to the educational audiologist.

10. The audiologist can even give a simple demonstration to the parents and teachers of the regular school as to how a hearing aid needs to be checked daily and how to replace cords and batteries. He may however advise them to refer the malfunctioning aids to him for a detailed survey. This way, the hearing aid of an integrated child can be kept in proper order for everyday use.

**Speech Therapist**

Speech therapist is another specialist whose services are priceless. The deaf child needs training in speech throughout his education in a special school and needs correction of speech in an integrated setting. The teaching staff of a special school is usually too preoccupied with language teaching, curricular and extra-curricular activities and it is difficult to find enough time to devote to speech training on an individual basis. Intelligible speech is an asset to a deaf child when he joins a regular school, so to achieve good results, the speech therapist should work along the guidelines provided below:

1. Initially he works with the children in preparing them for developing speech. Developing breath control, increasing the capacity of lungs for optimal usage of exhaled air and for longer duration, tongue exercises for better articulation working on vocalization, correction of voice quality are the prerequisites of good speech.

2. After the development of speech he helps the children in developing rhythm and intonation, correction of speech to improve the intelligibility

of speech. He continues his work even after the integration of the child in normal school.

3. The resource teacher can discuss his special needs with the therapist in order to improve the intelligibility of the deaf child's speech.

**Social Worker**

A social worker may be attached to a hospital or to a school for the deaf or even to a regular school in which a deaf child is to be integrated. In any of these positions, he can render invaluable help to the deaf child and his parents.

1. When the parents of a deaf child first realize that the child is deaf they are unable to accept the truth. It is that time; the social worker can explain the implication of deafness and help them in accepting the handicap.
2. He can counsel them to have hopes and make them realize the value of hard work, which could train a deaf child to learn along with hearing children.
3. Referring the parents to special schools for the deaf for initial training is his main duty. Any parents especially coming from low socio-economic groups do not understand the importance of early training. They remain under the misconception the their deaf child would learn to talk after a few years. The social worker should see that such a child is immediately enrolled in a school for deaf children and that he or she continues to attend regularly and punctually.
4. Considering their socio-economic status he should contact different social welfare agencies to meet the educational expenses, audiological treatment, and the cost of hearing aids.
5. The social worker attached to the special school pays surprise home-visits and guide the parents and the teachers to overcome the problems, which they may come across.
6. He helps the special teacher in finding a school, which can accept the deaf child who is ready for integration.
7. He helps the class teacher of the regular school to accept the deaf child as a part of the teaching environment.
8. He can visit the normal school and explain to the hearing children about hearing impairment, acceptance of the hearing handicapped child in the class, the necessity of helping him in his studies.
9. The social worker can maintain a regular contact between the parents and the class teacher and keep the parents informed about classroom and school activities. Thus the parents and the class

teacher can help the deaf child to gain more understanding of the new environment.

10. Even when the deaf child finishes school, the social worker will be continuously assisting the child to get vocational training according to his aptitude and capacity. He can eventually contact organizations, factories and government centers to find a job suitable to the child's educational and vocational background.

In a special school where there is no social worker it is the duty of the special teacher to see that the above things are taken care of.

## Resource teacher

The resource teacher is a trained teacher of the deaf who extends a helping hand to a deaf child throughout his integrated career. The resource teacher keeps contact with the class teacher of the deaf child in the regular school, and discusses his linguistic and other problems with her. She also attends the regular class periods to observe the reaction of the deaf child towards classroom instructions, so that help is rendered in subjects or topics he has not understood well, for example, the resource teacher reinforces mathematics and language principles not grasped by the child. Along with the coaching given to the deaf child, she plays an important role in orienting the teacher of the regular school. A resource teacher should have knowledge of the following in performing her function satisfactorily:

- Different types and degrees of hearing loss.
- Methods and instruments used in measuring hearing loss.
- Problems of speech development in hearing impaired children.
- Developing language in deaf children.
- Different tests used in assessing language, intelligence and their emotional problems.
- Speech corrections of the hearing impaired.
- Different supportive services.
- Resource facilities.

The resource teacher is the key person in the integrated education programme for the deaf. He has to work closely with handicapped children, the class teacher, parents and other specialists needed to help the impaired child. In order to handle the educational problems of the hearing impaired children in

integrated setting, the resource teacher should be a specialist of hearing impaired children. The following are his duties:

- The resource teacher is required to seek new and innovative ways of teaching the disabled child.
- He is expected to give individual attention to the problems of the child and to help him to grow to be a useful member of the society.
- Auditory training, leading to speech readiness and articulation readiness could be used to develop speech in the hearing impaired.
- He can help the class teacher in teaching the hearing impaired and make sitting arrangements for them.
- He can enquire about the academic performance and social adjustment in the class, so as to find ways of helping them.
- He should have occasional meetings with the parents in order to know problems at home and to give them necessary counselling .
- He should see that the hearing impaired children are well adjusted to their fellow students.
- He is also a speech correctionist, a language teacher, who helps to develop the language skills of the hearing impaired so that they can communicate.
- He is a remedial teacher for the hearing impaired children.
- He has to adapt instructional material suited to their needs and prepare more visual aids for these children to understand the difficult concepts.
- He should be able to seek help from the supportive staff such as speech therapist, the psychologist, the physician, the ENT specialist, the audiologist etc.

It is clear that the resource teacher is mainly responsible for the handicapped child in the integrated school. Ideally, he may not have more than 8 to 10 hearing impaired student belonging to a particular grade. By keeping the number down to this limit, the resource teacher will be able to give individual attention to each child.

# THE ENVIRONMENT IN THE REGULAR SCHOOL

## Problems faced by the integrated deaf children

Most of the special schools do make an attempt to integrate capable children in the regular schools so that eventually they are equipped with the educational backgrounds needed to learn a vocation and to become independent earning members of their house-holds. Yet, the numbers of integrated children are so limited. The integrated atmosphere is far from being a bed of roses to a deaf child who is entering a regular school. He/she has to face simultaneous problems of moving from a relatively sheltered atmosphere of a special school to an acutely competitive atmosphere of a regular school. The deaf child needs to adjust to the noisy conditions of a classroom consisting of 50 to 60 children. The reverberations of sound make listening difficult as a hearing aid amplifies all sounds equally.

During the lessons, the integrated child requires proper lip-reading clues and more repetitions, especially when the vocabulary and the thought content of the topics are unfamiliar to him. This strain of continuous lip-reading leads to fatigue, particularly in young children and adds to difficulty in comprehension during the last few periods of the day.

Another difficulty that the deaf child faces in the integrated school, is the new study approach that is essential to keep pace with the hearing children. In a regular school even in the 1st std. the emphasis in studies is more on memorizing the notes given than on freethinking. Though picture books are used to explain a topic in a lesson, no active participation or discussion is encouraged. Very few schools have projects or excursions and outings in connection with the portion covered. The deaf child is at a disadvantage in this situation, as he has to solely rely on his memory, he hardly gets any stimulation to his intelligence or encouragement to his curiosity and power of observation.

Before he is able to digest the initial information given in a lesson, new and more information is forced on to him. In special schools independence of thought and action were encouraged, learning experiences were provided and he was always free to discuss and ask questions. But in a hearing school, the pace of study is too fast for him. That is why it is best to integrate a deaf child in the 1st std. after completing the curriculum of that std. So that he finds it easy to keep pace with the class during the first year of his integrated life. As he is confident of his class work he is free to devote his attention to other problems such as those of lipreading different teachers and classmates and making friends with his hearing peers.

As the hearing children derive more information from outside sources also, their verbal expression becomes more fluent and precise. As the deaf child goes to the upper standards, his language handicap multiplies because the academic

concepts become more complicated and abstract. Understanding these concepts without visual aids or detailed explanations becomes difficult for a deaf child. For example, in the primary classes up to 4th std. hearing children who are generally 7 yrs. old have to learn about famous leaders of India in their history. Here they come across words such as bondage, liberation, parliament elections, Quit India Movement and so on. Though these concepts can be properly understood only through maturity and experiences, a hearing child is able to reproduce these by rote without much difficulty. To a deaf child however, such concepts and vocabulary need proper explanations before he is able to understand and reproduce them.

1. When children speak among themselves they tend to use the local language, which the deaf child may not know. This causes frustration to him.
2. Sometime unknowingly the teachers may use another language while giving instruction.
3. Insufficiently prepared children face the problems from the beginning itself due to lack of language, lip-reading, etc.
4. Even the children who are prepared well may not benefit by integration due to lack of support or guidance from home.
5. From 5th std. up to 10th std., the text books in science and social studies have advanced vocabularies, the language structure used becomes more and more complex. Thus deaf child along with his hearing peers is required to learn the text book, its grammar, understand and write characterizations, compositions, précis and so on. All these complex items are covered rapidly in the regular school due to lack of time. Even a hearing child of average intelligence finds them difficult to tackle. Thus a deaf child naturally needs a lot of practice.

**Orientation of teachers in the regular school:**

The teachers in the regular school should see that the deaf child gets the maximum benefits from his classroom experience without the routine procedure of the class getting unduly disturbed. The principal or the resource teacher of the special school has to discuss and familiarize the teachers, the class teacher of the integrated deaf child, with the educational, emotional and social needs of the deaf child so as to remove all misconceptions and apprehensions that they may have regarding the deaf child in their class. The class teacher's interest has to be promoted if an honest rapport has to be established. It is her attitude towards the deaf child that will affect the attitude of the hearing children towards the integrated child and lead him to a life of normalcy. For this she must understand the requirements of the integrated child. They are as follows:

1. The teacher must know the optimum conditions required for learning by a deaf child in the integrated surroundings. If the deaf child has to lip-read well, the teacher must face the child and the light must fall on her face.

2. The ideal distance between her and the child would be 3 to 4 feet, for even a powerful hearing aid becomes ineffective beyond a certain distance.

3. This seating position should remain flexible and he should be allowed to change his seat, in case he feels it is advantageous for better comprehension. From his seating position he must have a clear view of the teacher's face.

4. It would be useful for all children, but especially to the deaf child, if she writes the key phrases and vocabulary words that the students come across in their lessons. This way verbal instructions can be reinforced in written form. The teacher would write on the black board without speaking and then turn to the class and speak, so that the deaf child can keep pace with the proceedings of the discussion.

5. It would be helpful to the deaf child, if the teacher speaks with moderate speed and with clarity and does not move around while teaching.

6. In case he does not follow a question asked or a statement made by the teacher, it is useful to rephrase and repeat it, to ensure greater comprehension.

7. A nod or a smile on the part of a deaf child does not necessarily indicate comprehension, thus a regular check is necessary.

8. The teacher must see that he participates in oral discussions sometimes, so that he feels a part of his environment.

9. His imperfect speech must be accepted and repeated with corrections and the teacher should make a mental note to discuss his speech defects or his incorrect language expressions with the resource teacher.

10. The teacher should also notice if the child comes without his hearing aid and must inform the social worker or the resource teacher immediately.

11. In group activities such as physical education or games though he may require more explanations of the rules and regulations of the game, he should not be allowed to be a passive observer. If a short demonstration is given the deaf child will follow the rules easily.

12. In the class however, it is helpful to the deaf child to have a 'Hearing Helper' to sit next to him, who can help him in taking down notes,

writing homework or turning to the right page when oral reading is going on in the class.

13. The teacher should not expect the deaf child to be keenly attentive throughout the day as the strain of continuous lip-reading is too heavy. He gets worn out because he needs to concentrate hard in order to understand the meanings of many simple words, which the hearing children learn casually without particularly attending to their meaning. Thus he may not understand at all times what is being discussed even though he may be a smart and bright child and tries diligently.

Teaching deaf children may be a new experience for the regular teacher and she may not be aware of the needs of the hearing impaired child. So orientation of the regular teacher is necessary for the better understanding of learning environment of the deaf child. With a positive attitude she can prepare the class for the arrival of the special child and encourage the hearing peers to accept him.

**Acceptance of the disabled child by the peers**

If a deaf child has to work effectively and happily in the integrated surroundings, he needs to be first and foremost accepted by his hearing peers. Thus the hearing children of the class need to be oriented to understand the problems the deaf child faces. Acceptance of the deaf child by his hearing peers makes him feel more confident and it increases his self-esteem. He will be able to become independent and concentrate in what is going on in the class. If proper orientation is not given to the hearing children, they may tease him; they may pull his hearing aids and make him feel uncomfortable.

In the primary grades, children are usually curious about the hearing aid that the deaf child wears. The necessity of wearing the hearing aid has to be explained to them in a simple way. It is useful to satisfy their curiosity by making them listen through the hearing aid, for they understand how all sounds are amplified through the aid thus they can be made to realize the necessity of not shouting when talking to the deaf child but of speaking naturally at a quiet conversational level.

**Orientation of the hearing children:**

Parents of the disabled children often fear that their child will feel unsure and ill at ease in his relationships with non-disabled peers as they will mock at him or simply ignore him. It is the fact that very often children do not know how to react to

disability and it will be effective when a teacher or another adult introduce the deaf child properly to the children to be accepted as one of the group members with his individual abilities and limitations.

The needs of the deaf child may be explained to them on the following points.

1. The need for lip-reading.
2. The importance of wearing the hearing aids.
3. The speakers need to wait for him to look at them before talking, otherwise not being able to hear their conversation correctly, he may not give answers pertinent to the subject under discussion.
4. Difficulties involved in lip-reading should be demonstrated to the children.

This way the hearing children develop a better understanding of hearing impairment and the necessity to help a deaf child in his studies as well as in adjusting to the school routine and environment. If the deaf child is not able to explain some of his difficulties to the class teacher, the hearing friends try their best to interpret his speech, or during music and singing classes they encourage the deaf child to stand near the teacher and to touch the harmonium or the piano so that he may feel the vibrations and beat and the rhythm of the song, thereby remaining an active participant. They help the deaf child to understand the portion rapidly covered in the class. Thus it is not only the deaf child who benefits in a hearing environment but also the hearing children who learn to show patience and compassion towards him. On the whole having a deaf child in the class has a positive value for all the children.

## ADVANTAGES OF INTEGRATION

In spite of all the difficulties stated above integration of capable deaf children is essential because,

- It widens the educational and social horizons of these children. Education in common with others provides a natural environment for socialization through interaction with other children, thereby facilitating the ultimate goal of social integration.

- Studying with hearing peers in a regular school set up gives the hearing impaired children the opportunity to play and learn with the hearing children, which results in better oral expression and reception.
- It develops self-respect and independence in them.
- Functional language is presented via normal and clear speech. The setting provides excellent models, which motivate a deaf child to communicate well.
- It provides natural basis for adult life experience so that the disabled become proper contributing members of the society.
- The segregated atmosphere of a special school often produces a 'deaf personality' because a deaf child is confined to the company of other hearing impaired children. Gestures accompany his speech and he relies on physical contact for attention. This activity is not tolerated by the hearing children and thus the hearing impaired child is forced to use speech for communication. Being in the hearing environment constantly helps him to practise speech continuously and thus the intelligibility of the speech will be improved.
- It has been observed that a large portion of disabled children can be educated in common with others thus ensuring equal educational opportunity for the handicapped.
- Parents receive a clear picture of the child's abilities and limitations through comparison.
- In a country like India where the bulk population lives in the rural areas and special schools exist only in the cities, integration seems to be a good alternative because a regular school could meet the needs of the disabled child at no extra cost or infra structural changes except the supportive services of resource teachers.
- It is desirable for fuller utilization of the scanty resources available.

## OTHER FACTORS AFFECTING SUCCESSFUL INTEGRATION

We have already discussed the problems faced by the deaf children in an integrated setting due to deafness. Here some of the other problems in promoting integrated program are given.

- At present the responsibility of education and integration is entirely borne by the special schools especially by the principal and the special teacher. Parent counseling, educating the deaf, finding a suitable school

for integration, orienting the teacher and the children of the regular school, educating public opinion and even finding suitable employment for the deaf children after they leave school are complex and varied responsibilities and should be shared by the parents, the special school and the regular school in which he child is to the integrated, the audiologists and lastly by the social worker and the speech therapist.

- Many of the special schools lack properly trained teachers for teaching deaf children. Insufficient auditory training, speech and language development produce failures.
- Parents of the hearing impaired are carried away by the advertisements and end up in buying an unsuitable hearing aid for their deaf children, which may not be of any use to them.
- The delay in diagnosing deafness is harmful. If there is any suspicion, it should be diagnosed quickly.
- In rural areas people believe that deafness is a curse of god and they waste their valuable time in visiting 'tantriks'.
- It is often observed that the parents bring their deaf children either with too much protection or leniency. Both have damaging effect on the children. They should be brought up in the same way as their siblings with the same treatment.
- Many of the regular schools are reluctant to admit a deaf child as is increases their burden.
- The regular teachers do not have any idea about deafness and find themselves incapable of handling a "special child" in their class.
- Parents of normal children express some reservation when they come to know their child is going to study with handicapped children.
- Due to lack of funds many institutions find it difficult to start a highly coordinated approach like integration, which needs multidisciplinary team to work together.

Integration is something that the people working with the deaf child must believe in and work for with confidence and dedication. If dealt with properly, it is a challenging social and educational environment in which the deaf child learns at an accelerated pace, develops his abilities and talents and from which he eventually emerges as a matured person with a sound conviction in his worth as an

individual, who is able to lead a contented life happily and function productively in society.

## UNIT SUMMARY

Mainstreaming the deaf child provides a natural atmosphere wherein he learns like a normal child, which prepares him for adult life. Closeness towards hearing world helps him to communicate, interact freely and brings about better socialization. The support of the parents, special teachers, regular school, speech therapist, audiologist and social worker facilitate the successful integration of a deaf child. It must be borne in mind that the welfare and progress of handicapped children in ordinary schools does not depend solely on the knowledge and expertise of a few specialist teachers. If more children than at present are to be educated in ordinary schools, many more teachers will need to know something of the effects of a disability and how to minimize them. Opportunities for such training will have to be increased, and support services - medical, psychological, psychiatric and advisory – will need to be available to schools to a greater extent than at present.

Ultimately one has to remember that our goal is to ensure that handicapped children are educated in conditions that offer the most favorable possible opportunities for their growth and development.

## CHECK YOUR PROGRESS (SELF STUDY)

- Observe a hearing impaired child in a regular school. Make a report on his socialization and communicative skills.
- Visit a nearby regular school and find out the number of disabled children admitted every year.

## ASSIGNMENTS

1. What is integration? Will it help a hearing impaired child?
2. Assessment of a deaf child to be integrated is very important. – Why?

3. Describe the role of the parents and the regular teacher in integration.

## POINTS FOR DISCUSSION

1. Do you think it is worth integrating a hearing impaired child in a regular school? Give reasons for your answer.

   i) Discuss about today's condition of integration.

   ii) Explain briefly the importance of early intervention.

   iii) Discuss the role of parents in the process of integration.

   iv) State the duties of the resource teacher in helping the deaf child in the regular school.

   v) Discuss the role of specialists in helping the hearing impaired child to get adjusted to his hearing environment of a regular school.

***Others Points***

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## REFERENCES/SUGGESTED READINGS

1. Freeman, Roger D. and others – Can't your child hear- A guide for those who care about deaf children, Croom Helm Ltd., publishers, London – 1981.

2. Kirk, Samuel A. Educating exceptional children, Houghton Muffin Company, Boston-1962..

3. Miles, M. 1982 - Integrated Education for Handicapped Pupils: Some Practical Drawbacks in Developing Countries, The Journal of Rehabilitation in Asia. Vol. XXIII, No. 2, 28-32, April 1982.

# UNIT 4: AUDIOGRAM: UNDERSTANDING OF AUDIOGRAM AND ITS IMPLICATION IN ASSESSING THE EDUCATIONAL NEEDS OF CHILDREN WITH DIFFERENT TYPES AND DEGREES OF HEARING LOSS.

STRUCTURE

Introduction

Objectives

Employability of the H.I. -Present Status

**Enormity and Diversity**

**Govt. and Non-Govt. Vocational Training Centres**

**Availability of Qualified Vocational Instructors**

**Available Courses**

**Existing Attitude**

**Employment**

**Education**

Vocational Guidance

**Vocational Training Programmes**

**Need Today**

Suggested Courses

**Competency Based Vocational Courses**

**Vocational training for the disabled**

Basic Principles of Training

Selection of occupations in which training is to be provided

Techniques and Methods of training

Matching the worker with the job

Possible obstacles in the way of placing the disabled

Employers' apprehensions

Overcoming the obstacles to employment for disabled people

Role of Employer's Organization

**Unit Summary**

**Exercises**

**Assignment**

**Points for discussion and clarification**

**References**

## 4.1 INTRODUCTION

The Hearing Handicapped (H.H.), like any other non-handicapped children have their basic and fundamental right for a dignified and independent life. It is comparatively easy for an able-bodied person to create opportunities in many ways to fulfil his aspirations to become financially independent.

The term Vocational Rehabilitation normally has been understood as part of continuous and co-ordinated process of Rehabilitation, which involves –

**Vocational Guidance, Vocational Training,** and **Selective Placement.**

The end result of 'rehabilitation' is not only securing employment suitable to the capacity of the person and making best use of his/her residual ability and skill but also helping the disabled to retain the employment.

## 4.2 OBJECTIVES

After going through this Unit you will be able to know about :

- the problems of vocational placement of HI persons;
- the need for proper training for suitable specific jobs;
- the necessity of training for developing attitude towards self employment.

## 4.3 EMPLOYABILITY OF THE H.I. - PRESENT STATUS

### 4.3.1 Enormity and Diversity

As per National Sample Survey conducted in 1991, the adult Hearing Handicapped population is about 5 million in the country. The existing facilities for Vocational Training are meager compared to the very large adult Hearing Handicapped.

Hearing Handicapped form a heterogeneous group. Their educational achievement, ability to communicate, ability to socialize are diverse. Majority of the Hearing Handicapped in our country are still illiterate, lack basic skills and do not get opportunities for improving their knowiedge and access to information. Besides these circumstances, other factors like on set of impairment, parental cooperation and prevailing attitude of the society influence the person's Vocational Rehabilitation.

**Govt. and Non-Govt. Vocational Training Centres**

At present, the Vocational training facilities to the Hearing Handicapped are offered by seventeen **Vocational Rehabilitation Centres (VRCs)** under the Ministry of Labour, Training Centre for the Adult Deaf, Hyderabad (TCAD) under the **National Institute** - Ministry of Welfare, Two Polytechnics under the World Bank Project at Kanpur and Mysore, Government run **Industrial Training Institute (ITI)** in the country (Seats reserved). In addition there are about 200 non-governmental organizations having schools for the deaf with a vocational stream from primary level. Under the Craftsmen Training Programme there is a provision of reservation of 1% for the Hearing Handicapped.

Some non-govt. training centers offer the opportunity to receive **'On the Job Training'** for work like making washers, spacers on the machines. This type of training is good for those who have a limited capacity to do intellectual work involving calculation, reading diagrams, comprehending designs for certain purpose, etc. but are capable of doing monotonous work quite well. By practice

many H.I. persons are seen to develop the required speed, accuracy, and quality in one type of operation.

**Availability of Qualified Vocational Instructors**

There are no Technical/Vocational Instructor Training Centres for Hearing Handicapped so far. Therefore shortage of Trained Technical/Vocational Instructors is a common phenomenon in all the existing organisation. Experience is the only qualification for vocational instructors at present.

**Available Courses**

Many of the courses conducted at the existing training centres are outdated. They are far from meeting the chaging demands of training and placement. In many cases, the media and the mode of communication through which the training is offered differs from the previous educational media and the method and the method of communication of the trainees.

## 4.3.5 Existing Attitudes

- For lack of proper guidance the Hearing Handicapped have unrealistic career expectations and aspirations.
- The more able Hearing Handicapped are prejudiced against work in production trade and industry.
- Most of the Hearing Handicapped have negative attitude to self – employment.
- Many employers still tend to underestimate the capabilities of the Hearing Handicapped and therefore most of the Hearing Handicapped are under-employed. The Hearing Handicapped are not given employment at highest skills suitable to their physical capacities and other occupational qualification.
- Many tend to generalize all Hearing Handicapped as one, forgetting that they are individuals.

### 4.3.6 Employment

**The tremendous increase in the population has left a wide and unmanageable gap between the available jobs and the number of job-speakers. The increasing inflow into the job market of fresheners turned out by the educational and training institutions every year call out attention too. Therefore the problem of unemployment of the Hearing Handicapped has been in alarming proportions in our country over the years. It is seen that the reserved job positions are not utilized fully because deaf students lack the required entrance qualifications.**

The organized sector alone cannot provide salaried employment to such a large number of job seekers. Only a small fraction of the registrants can be placed in salaried jobs by the employment exchanges.

Hearing Handicapped persons have been employed as clerks, machinists, hairdressers, beauticians, compositors, printers, T.V. repairers, typists, laboratory assistants, teacher aid, tailors, fabricators etc.

Those Hearing Handicapped, who have studied in schools and colleges in integrated set up, are better employed than others. Here again the Hearing Handicapped who are educated through local language medium have poor opportunities compared to those who learn through English medium.

Those Hearing Handicapped who are employed in banks do not have to do at their highest skills suitable to their abilities.

**Education**

- The blame for what is seen as a failure to realise vocational potential of the Hearing Handicapped should be laid principally upon educational shortcomings.
- Our present educational system fails to provide the Hearing Handicapped person, a chance to develop his intelligence constructively to use it vocationally.
- The average Hearing Handicapped adult is grossly undereducated. Despite having the potential to learn, Hearing Handicapped youth are not being given adequate opportunity to do so.
- Many Hearing Handicapped pupils level school ill-equipped to take any job, because they lack skills in basic arithmetic and have poor command of language for either written or spoken communication.
- They have negative attitudes to work and to the discipline it entails.
- Education often overlooks specific training for a particular job.
- The options like cooperatives, sheltered workshop/employment available in certain institutions like NASEOH, Mumbai, Little Flower Convent, Chennai, provide on the job training and then employment.

## 4.4 VOCATIONAL GUIDANCE

Vocational Guidance is the process of assisting an individual in solving the problems of choice pf career options based on his aptitude, interest vis-à-vis employment opportunities. The process includes-

- Interview
- Examination of his records including scholastic, medical records.
- Ascertainment of the interest, abilities, characteristics through various tests.
- Family background.
- Analysis of his physical capacity and occupational requirement.

Systematic vocational guidance is not available today to assist the Hearing Handicapped individuals to understand their capabilities and interests, to choose suitable occupations, and to

prepare for it, enter into it in order to make successful progress in it.

## 4.5 VOCATIONAL TRAINING PROGRAMMES

Vocational training is one means of assisting the Hearing Handicapped to become employable, and is necessary for success in life. Work is not available to the Hearing Handicapped school leavers. For many hearing handicapped persons, it will be virtually very difficult to find placement and retain jobs without vocational training. Proper Vocational training programme should offer extensive assistance and supervision during the training period.

## 4.6 NEED TODAY

- To change the Education policy to fulfil its function of preparing the Hearing handicapped pupils for working life today.
- To provide systematic Vocational Guidance to tap the capabilities of the Hearing Handicapped and assist in placement.
- To provide opportunities to acquire key skills and knowledge in Information Technology.
- To design RCI approved training course to orient the existing instructors in integrated set up.
- To establish Technical / Vocational Instructors Training Centres for the Hearing Handicapped so that the instructors can be trained to communicate with the Hearing Handicapped effectively.
- To strengthen to existing Vocational Training Centres with finance, man power and latest assistive devices for training and re-training. Modify the general trend of training towards art & craft, block-making screen printing, making stationary items, photo copying to focus to industrial related training work.

## 4.7 SUGGESTED COURSES

The Hearing Handicapped can be employed in practically all types of work. It is better to assume in the first instance, that a Hearing Handicapped person can do any job (for which he is otherwise trained and qualified) where good hearing is not essential. However the trend is to encourage them to learn and take up the jobs available in their surroundings and communities (through CBR) where they can live with or near to

their families and work independently or learn and carry on the family occupation/trade; e.g. fishing in the coastal areas.

The Hearing Handicapped who acquire the necessary qualifications can take up the Engineering, Non-Engineering and Competency Based Vocational courses as listed below. The list of vocations suggested, are same as identified by Pandit Sunderlal Sharma, Central Institute for Vocational Education (PSSCIVE), Bhopal and DGE&T, New Delhi.

## 4.8 COMPETENCY BASED VOCATIONAL COURSES

The hearing impaired persons, depending on their education, and capacities can be trained in the trades listed below :

**1. AGRICULTURE**

2.1 Crop Production

2.1 Horticulture

2.1 Fisheries

2.1 Farm Mechanic

2.1 Poultry

2.1 Sericulture

2.1 Vegetable Seed Production

2.1 Sheep & Goat Husbandry

2.1 Fish Seed Production

2.1 Repair & Maintenance Machinery

2.1 Dairy

**2. ENGINEERING & TECHNOLOGY**

2.1 Air conditioning & Refrigeration

2.2 Auto engineering

2.3 Building Maintenance

2.4 Clock & Watch Repair Technology

2.5 Computer Techniques

2.6 Electronics Technology
2.7 Engineering Drawing & Drafting
2.8 Lineman
2.9 Wireman
2.10 Maintenance & Repair of Electrical Domestic Appliances
2.11 Printing & Book Binding Technology
2.12 Repair & Maintenance of Radio & T.V.
2.13 Repair, Maintenance & Reqinding of Electric Motors
2.14 Welder (Gas & Electric)
2.15 Mechanic (Diesel)
2.16 Mechanic (Tractor)
2.17 Mechanic (Pump)
2.18 Mechanic (Agricultural Machinery)
2.19 Mechanic (Motor Vehicle)
2.20 Mechanic (Electronics)
2.21 Plumber
2.22 Mason
2.23 Fitter
2.24 Turner
2.25 Mechanist
2.26 Electrician
2.27 Instrument Mechanic
2.28 Electroplating
2.29 Draughts man (Mechanical)
2.30 Draughts man (Civil)
2.31 Upholstery
2.32 Sheet Metal Worker
2.33 Carpenter
2.34 Photo type setter & DTP
2.35 Pattern Maker

## 3. NON ENGINEERING COURSES

3.1 Hospital House keeping

3.2 Medical Laboratory

3.3 Ophthalmic Technician

3.4 X-ray Technician

3.5 Bakery & Technician

3.6 Commercial Garment Designing & Making

3.7 Food Preservation & Processing

3.8 Interior Designing

3.9 Photography

3.10 Commercial Art

3.11 Painter (General)

3.12 Banking

3.13 Cutting & Tailoring

3.14 Embroidery & Needle work

3.15 Weaving of Silk & Woolen Fabrics

3.16 Manufacture of footwear

3.17 Leather Goods Maker

3.18 Dress Making

3.19 Knitting

3.20 Bleaching, Dying & Calico Printing

3.21 Hair & Skin Care

3.22 Beautician

## 4.9 VOCATIONAL TRAINING FOR THE DISABLED – General guidelines

Vocational training is one means of helping a disabled person to become settled in employment. It is not an end in itself but a means to an end – the end being suitable work.

**Basic Principles of Training**

i) If a disabled person can be placed in suitable employment without training, then vocational training is not necessary.

ii) The principles, measures and methods applied in training the able-bodied should be applied in training the disabled too so far as medical and educational conditions permit.

iii) Training should continue until the disabled person has the necessary skill to work normally on an equal basis with the non-disabled workers, if he or she is capable of doing so.

iv) Wherever possible, disabled persons should receive training with and under the same conditions as non-disabled persons.

v) Special training arrangements should be made for those disabled who, because of the nature of their disability, cannot be trained with non-disabled persons.

vi) Training is wasted unless it leads to placement in the training trade, or in a similar trade.

**Selection of occupations in which training is to be provided**

Training must lead on to work in the training trade, and therefore, in selecting trades the following trades are important.

i) Trades should only those which are economically suitable for the country and in which employment opportunities are known to exist, i.e. they should bear some relationship the countries needs in skilled occupations.

ii) Predominantly agricultural of rural countries should consider training in agricultural of rural occupations as the first possibility.

iii) There may be trades in which it might be desirable to limit training to the disabled.

iv) Training occupations must be kept under constant review.

v) Training may be for open employment, self-employment, employment in cooperatives, or sheltered employment.

## Types of employment

- **Open employment** is employment in the organized sectors in the open environment wherein the persons with disabilities have to compete with the able-bodied counterparts in getting employment.
- **Sheltered employment** is predominantly meant for the persons with service disabilities / multiple disabilities who cannot cope up with the open employment situation/environment. Sheltered employment involves a great deal of job modification in simplifying the job thereby making it possible to be carried out by persons with disabilities. The trades preferred in sheltered employment are simple and repetitive in nature.
- **Self employment :** In this competitive era, Self employment is the only viable way out to earn livelihood. It is more so with the persons with disabilities. Successful self-employment should involve identifying potential trades having marketability with minimum investment. The persons with disabilities should have; entrepreneurship skills in making the venture successful.

### Techniques and Methods of training

i) Training should be conducted in an efficient businesslike way under conditions so far as possible similar to those in industry of commerce. There must be proper discipline.

ii) Training hours should similar to the normal working day.

iii) The training programme for each trade should be worked out in detail with the employers' and workers' representatives, a systematic analysis of the operations, skills and knowledge and safety factors being necessary.

iv) The normal duration of each type of training course should be agreed in consultation with both sides of industry, having regard to :

a) The level of skill to be attained, and

b) The need to prepare the workers as quickly as possible for production work.

v) Whenever possible, training should be on production work in preference to practical exercises.

vi) Trainees could be admitted individually, in small groups, or as a block, as dictated by the circumstances of training and placement. This should be agreed with both sides of industry in respect of each type of training.

vii) Satisfactory arrangements should be made for any necessary theoretical or ancillary training, which cannot be given during the course itself.

viii) There must be adequate supervision of trainees.

ix) Special methods and techniques may be needed for certain disability groups, e.g. the blind, the mentally retarded, and the deaf.

x) There should arrangement for necessary medical supervision during training.

**Matching the worker with the job**

Here are some basic principles in placing the disabled :

i) The disabled person must be able to meet the physical requirements of the job with any modifications that may be necessary and practicable;

ii) His aim should be to place the disabled person in work where he or she can utilize residual abilities (i.e. intelligence, educational attainments, qualifications skills, etc.) to the fullest;

iii) The disabled person must not be a hazard to him/herself;

iv) The disabled person must not jeopardize the safety of others;

v) Placement should be the logical conclusion to any vocational rehabilitation programme;

vi) The situation of the job, working conditions and environment, are as important as the job itself;

vii) Segregation of the disabled in their work should be avoided if at all possible;

viii) Placing in employment should be on the grounds of suitability for the job, not sympathy;

ix) Medical practice usually requires that medical information should be regarded as confidential, the employer being told only in lay terms of any limitations or employment capacity and any risks to be avoided.

**Possible obstacles in the way of placing the disabled**

The extent to which a wide range of employment opportunities for the disabled is practicable will vary in different countries, but it is probably true to say that many countries have some or all of the following obstacles still to overcome :

i) Attitude of the community;

ii) Economic situation in the country;

iii) Resistance of the employers;

iv) Attitude of trade unions;

v) Attitude of the disabled themselves and their families.

### 4.9.6 Employers' apprehensions

**a) Reasons for exclusion :**

i) Capability and productivity :

- Disabled people would not be able to use standard equipment, or use it effectively;
- They would need special facilities, which would cost money;
- They would not be able to get to work by public transport;
- Disabled workers would not be productive enough;
- They would not be sufficiently adaptable of mobile.

ii) Health and safety

- The work environment is too dangerous for disabled people, and their disability might get worse;
- They would often be unreliable and often be sick to work; In case of fire, there would be problem.

iii) Company Image

- The company's customers would find it embarrassing to deal with disabled persons;
- Disabled persons ere too temperamental.

iv) Effects on the shop floor

- Disabled workers would not fit in the rest of the workforce, and there would be problems of communication.
- Management would not be able to cope with them;
- If their work record was poor, it would cause a management / employee problem

The important principle to establish here is that disabled people are people with personalities, temperaments, and strengths, and weakness as anyone else.

### 4.9.7 Overcoming the obstacles to employment for disabled people

In many countries, high unemployment means there is there is a high level of competition for the jobs available. Disabled people looking for jobs face the following additional problems :

i) Disabled people are often denied access to education and vocational skills training;

ii) Many employees do not see disabled people in terms of their abilities, but only in terms of their disabilities. Even workers injured at work are not protected and may lose their jobs;

iii) Disabled people face practical obstacles on their way to work and when they get there. This is because of bad town planning and building design;

iv) The legal framework does not protect the right of disabled workers to work or their rights as members of the community. Self employment is an option, however, it is limited not only by the factors mentioned above, but also because many disabled workers do not have access to the finance needed to create their own jobs.

These obstacles and the ways in which employers' organizations can assist in overcoming these are explored in the following section.

### 4.9.8 Role of Employer's Organization

i) Employer's Organizations should adopt a policy for the promotion of training and suitable employment of disabled persons on equal footing with other workers;

ii) Employer's Organizations, together with disabled persons and their organizations, should be able to contribute to the formulation of policies concerning the organization and development of vocational rehabilitation services, as well as to carry out research and propose legislation in this field;

iii) Wherever possible and appropriate, representatives of employers' organizations, together with representatives of workers' and disabled persons' organizations, should be included in the membership of the boards and committees of vocational rehabilitation and training centers used by disabled persons, which make decisions on policy and technical matters, with a view to ensuring that the vocational rehabilitation programmes correspond to the requirements of the various economic sectors.

iv) Wherever possible and appropriate, employers should cooperate with appropriate specialists in considering the possibilities for vocational rehabilitation and job reallocation of disabled persons employed by that undertaking and for giving employment to other disabled persons;

v) Wherever possible and appropriate, employers' organizations should take steps to :-

- Advise their members on vocational rehabilitation services which could be made available to disabled workers,
- Cooperate with bodies and institutions which promote the reintegration of disabled persons into active working life by providing, for instance, information on working conditions and job requirements which disabled persons have to meet,
- Advise their members on adjustments which could be made for disabled workers to essential duties or requirements of suitable jobs,
- Advise their members to consider the impact that reorganizing production methods might have, so that disabled persons are not inadvertently displaced.

## 4.10 UNIT SUMMARY

Unemployment is widespread even with the non-handicapped qualified persons, hence there is a due necessity of training the hearing handicap's attitude towards self-employment and

motivate the otherwise capable youth which is essential pre-requisite for tackling the socio-economic problem of unemployment.

The Small Scale Industries offer almost unlimited opportunities for enterprising young Hearing Handicapped men and women. The Small Scale Sector today produces more than 50% of the total industrial output of the country. It turns out sophisticated and advanced items like T.V. sets, electronic items, sectors, mopeds and automobile parts and a wide variety of mechanical electrical, electronic, chemical products and consumer goods.

Therefore,

* Educational institutions should take up systematic vocational guidance.

* Pre-vocational training should provide wide range of experience and assist to acquire good work, habits and attitudes that are critical for job success.

* Every school should have a social worker to help the school levers to find satisfactory jobs and follow-up.

Higher education should assist to develop a core of specific knowledge & skills. The existing vocational training centers should and courses related to information Technology, in view of the changes in the present industrial scenery and in the structural changes in the world of employment.

## 4.11 CHECK YOUR PROGRESS

1. List the centers where vocational training is available for the H.I. State briefly the problems faced in training the H.I.

2. Keeping in mind the geographical and other conditions in your area and the availability of vocational training in your area or near by, select suitable courses from the list given in 1.7 for the H.I. residing there. Give reasons for your choice.

## 4.12 ASSIGNMENT

1. State the apprehensions felt and problems faced by the employees in giving jobs to the H.I. and say how you would try to dispel their fears and help the H.I. to adjust to the working conditions.

## 4.13 POINTS FOR DISCUSSION AND CLARIFICATION

After going through the unit, you may want to have further discussion or clarifications of some points.

**Points for discussion**

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**4.13.2 Points for clarification**

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## 4.14 REFERENCES

1. Perspectives in disability arehabilitation : R.S.Pandey, Lal Adavani,1995. - Vikas Publishing house Pvt. Ltd., New Delhi 110014.

2. Rehabilitation of the Physically Handicapped :Lakshman Prasad, 1994. -Konark Publishers Pvt. Ltd.Delhi 110092.

3. Vocationalizing Education : An International Perspective. Vol. 6. - Edited by Jon Lauglo & Kevin Lillis, 1988. : Pergamon Press, Oxford.

# UNIT 5: CONCEPT OF UNAIDED, AIDED AUDIOGRAMS, SPEECH SPECTRUM AND ITS APPLICATIONS

- **STRUCTURE**

**Introduction**
**Objectives**

- **Deaf Children With Some Secondary Disabilities**
- **Hearing Impairment With Mental Retardation**
  - Definition of Mental Retardation (MR)
  - Characteristics and Implications
  - Treatment and Teaching Strategies
  - Psychopharmacological Intervention
  - References
- **Hearing Impairment with Blindness/ Low Vision**
  - Definition and Description of Deafblindness
  - Causes of Deafblindness
  - Characteristics and implications
  - Teaching Strategies
  - Usher Syndrome
  - Possibilities of Rehabilitation
  - References
- **Hearing Impairment with Autism**
  - What is Autism ?
  - The Spectrum of Autism
  - Causes of Autism
  - Diagnosis of Autism

- *Features of Autism*
- Teaching Approaches for Autism
- Prognosis for Autism
- Hearing impairment with Autism
- References

- **Hearing Impairment with Cerebral Palsy**
  - 4.7.1 Definition
  - 4.7.2 Etiology
  - 4.7.3 Characteristics
  - 4.7.4 Implications
  - 4.7.5 Interventions/teaching strategies
  - 4.7.6 Psychological interventions
  - 4.7.7 Teaching strategies
  - 4.7.8 References
- **Hearing Impairment with Learning Disabilities**
  - 4.8.1 General definition / description of Learning Disability
  - 4.8.2 Characteristics
  - 4.8.3 Survey Of Learning Disabilities In H.I. Children
  - 4.8.4 Causes
  - 4.8.5 Inter-Modal Integration Problems
  - 4.8.6Treatment by switching on Compensatory Functions
  - 4.8.7Conclusion
  - 4.8.8 References
- **Assignment**
- **References**

*(Annexure 1, 2, and 3 which are given at the end of this unit are the methods of writing spellings/letters of alphabet for a deafblind child – part of 1.5 of this unit.)*

## INTRODUCTION

In India, in the present changing scenario, due to improved medical and scientific research and technology, there is increase in the incidence of children having more than one disability. With the (otherwise normal) deaf children, the main goal of education is to help them acquire verbal communication skills as a foundation to education in schools as early in life as possible. This in itself is quite a **complex and difficult task.** It requires intelligent sustained efforts and dedication on part of the teacher and constant parental support. As such one can imagine the enormity of the task if the hearing-impaired child has one or more additional disabilities.

It is said that one out every 4/5 deaf children has some associated disability. Deaf children who exhibit additional handicaps are brain–injured children with language disorders, motor disorders (C.P. children), mental deficiency, visual disorders, emotional problems, etc., Therefore, training and teaching deaf children with associated disabilities present much greater challenges to the parents / teachers. This group of children with associated disabilities has complex needs, which require the teacher, first to acquire knowledge about the particular disability and the problems associated with it, and then to develop skills in dealing with such children so that s/he can provide appropriate education and placement. She should also plan her course of action with sufficient room for flexibility.

This Unit gives concise yet comprehensive information about the additional disabilities that are generally seen in deaf children.

## OBJECTIVES

After studying this Unit the teacher trainee will be able to :

- Define and describe the main characteristics of each disability,
- Explain the implications of 'deafness combined with one or more secondary disabilities' which involve inability to communicate verbally,
- State briefly the techniques used for training and teaching used in different cases.

## DEAF CHILDREN WITH SOME SECONDARY DISABILITIES

There has been some increase in the etiologies of deafness that are accompanied by multiple disabilities. Intellectual deficiencies, central brain damage, and psychogenetic disorders are the secondary disabilities that are sometimes found in children who are deaf.

These children often need practical life skills more than academic knowledge. All forms of communication including manual alphabet, signs, communication boards, and speech may need to be used with them according to their individual needs.

The additional handicaps that may coexist with hearing impairment are :

- Hearing impairment with blindness/ low vision, (deaf-blind child),
- Hearing impairment with mental retardation,
- Hearing impairment with learning disabilities,
- Hearing impairment with autism,
- Hearing impairment with cerebral palsy,

In this Unit we shall focus on these five categories somewhat in detail. The problem of educating any of such children would involve **deciding whether the hearing loss or the other handicap is more severe, and in which school such children should be placed.** However it is seen that there is very little choice in such

matters and 'children are usually enrolled in a separate group in special schools for the deaf, or for the mentally retarded, or for the blind. It is however heartening to note that in the past decade, at least in big cities, some institutions such as Center for Autism, Center for the learning disabled, school for deaf blind children, which cater to the specific needs of such children, have been and are being established.

## HEARING IMPAIRMENT WITH MENTAL RETARDATION

Hearing loss has far-reaching, critical effects on childhood development of cognitive (thinking) and linguistic (language) skills. The occurrence of other disabilities in combination with diminished hearing creates "additional learning problems" which significantly add to the complexity of educating the student who is deaf or hard of hearing. The prevalence of other disabilities in addition to hearing loss is approximately three times as large (32.2%) in the deaf or hard of hearing population as in the general school population.

The three additional disabilities, most often reported in children who are deaf or hard of hearing are learning disabilities, intellectual disabilities (M.R.), and emotional/behavioral disabilities. **Students with hearing loss and intellectual disabilities are characterized by a generalized delay in development across all areas of learning with limited problem-solving abilities and lowered adaptive of functional skills.**

The difficulties of the child with Hearing Impairment and Mental Retardation (HIMR) are definitely compounded by the combination of both handicaps. Whether it is the sum of the two becomes questionable when one observes this group of children. Each of these children is unique, as each one might differ in the severity of the hearing and the intellectual impairment. In an effort to recognize this subgroup's uniqueness, the field appears to be moving away from using the label "learning disabled hearing impaired" and, instead, is beginning to label these students "deaf or hard of hearing with additional mild disabilities," "atypical learners with hearing loss," and "deaf or hard of hearing learners with additional learning problems."

We shall thus look at the disability of Mental Retardation and how it affects learning in an individual and to what extent. Then we take a look

at how we as special educators can expedite the process of learning of the HIMR child, by using the appropriate teaching strategies.

The main objectives would be :

- To present an overview of Mental Retardation as a developmental disability,
- To acquaint the reader with the characteristics of children with mental retardation,
- To present different techniques or strategies that can be used to teach the HIMR child, and
- To state the educational implications for children with HIMR.

**Definition of Mental Retardation (MR)**

The most commonly used definition of Mental Retardation (MR) is that of the American Association on Mental Retardation) AAMR). **"Mental Retardation refers to significantly sub average intellectual functioning resulting in or associated with impairments in adaptive behaviour and manifested during the developmental period".**

Significantly sub average means an IQ score of less than 70. Adaptive behaviour refers to a person's adjustment to everyday life. These adaptive skill areas include communication, self care, home living, social skills, community use, self direction, health, safety, academic competence, work and leisure and the use of basic reading, writing and arithmetic in everyday living.

MR is categorized as mild, moderate, severe and profound. The levels are as follows :

1) Mild (IQ 55 to 70)
2) Moderate (IQ 40-55)
3) Severe (IQ 25-40)
4) Profound (below 25)

Some individuals may have a degree of MR that may greatly affect their learning, language, memory, awareness and decision making capabilities. Other individuals with MR may have additional disabilities such as vision impairment, hearing impairment (HI), or mobility impairment.

**Characteristics and Implications**

Persons with MR have the capacity to grow, to learn and to develop. The great majority of these citizens can become productive and full participants in society. They only need the appropriate services to help them grow to **their** fullest potential. Some of the educational implications and characteristics of children with MR are:

- Delayed language development
- Inability to formulate strategies
- Smaller memory capacity; short attention span
- Difficulty in generalizing (problem with transfer of knowledge)
- Focus on only one aspect of a learning situation
- Low tolerance for frustration, low self esteem
- Often having problems with perception, problem solving and logical thought
- With more seriously affected children, they will experience delays in such areas of motor skill development, body image and control of body action.

The characteristics will however vary according to the level of MR. These characteristics for the different levels of MR in the different age groups are represented below:

**Developmental Characteristics**

| **Degree** | **Preschool**<br>**0 – 5 years** | **School age**<br>**6 – 20 years** | **Adult**<br>**21 and over** |
|---|---|---|---|
| Mild<br>I.Q. 55 – 70<br>89% of all people who are retarded | Often not diagnosed until later age | Learns academic and prevocational skills with some special training | Lives and works in the community. May not be easily identified as retarded. |
| Moderate<br>I.Q. 40 – 55<br>60% of all people who are retarded | Fair motor development. Can learn to talk and care for basic needs | Learns functional academic skills and can be independent in familiar surroundings. | Performs semi skilled work under sheltered conditions. May achieve competitive employment. |

| | | | |
|---|---|---|---|
| Severe<br>I.!. 25 – 40<br>3 ½ % of all people who are retarded | Slow motor development and some communications skills. May have physical disabilities. | Can talk or learn to communicate. Cares for personal needs | Can contribute to self-maintenance with supervision in work and living situations. |
| Profound<br>I.Q. 25 or less<br>1½ % of all people who are retarded | Overall responsiveness is minimal. Often have secondary physical disabilities. | Motor development is slow. Can be taught basic self-care skills. | Some communication skills. Cares for basic needs and performs highly structured work activities. |

**Treatment and Teaching Strategies**

The following are some of the strategies or techniques that could be considered when working with a child with Hearing Impairment and Mental Retardation.

- The problem of communication is fundamental, as there is a basic need for self-expression and reception of thought. Whatever mode of communication is used, the training for the prelingiustic behavior is very important for HIMR child. It can begin with play because that is the most natural form of motor imitation and then play imitation related to meaningful situations; e.g. the teacher uses action words such as throw, push, etc. Then he asks what the child did. As soon as the child can imitate, the teacher can use the action and word in social interaction .As soon as verbal production is developed from imitation the child can understand the importance of communication.

The teacher should try to -

- **Accompany gestures with verbal utterances** all the time since they are known as words in context of the situation.
- **Encourage lip reading**, which provides visual reinforcement and may prove to be a clue for understanding the message.
- Present information and instruction in **small, sequential steps** and **review** each step frequently.
- **Provide prompt and consistent feedback.**
- **Build on student's existing skills** by teaching easier tasks before more complex tasks.

- **Include a variety of group, social and recreational activities** in the child's educational program. These activities should include non-disabled peers and may include participation at birthday parties, attending recreational activities such as ball games and movies, participating in youth sports activities, and visiting community sites such as the zoo. The goal of these activities should be to teach appropriate social skills relevant to group participation and building self-esteem.
- **Help them generalize** using multiple examples and settings.
- Have **shorter and distributed learning sessions** in the instructional process.
- Use **concrete materials** that are interesting, age-appropriate and relevant to the students.
- Try **other supportive techniques** such as, for younger children and persons with more extensive limitations in their adaptive skills, teachers may find that hands on materials are more meaningful than pictures; and demonstrations more instructive than verbal directions.
- **Stress on repetition** of the information for learning since there would be problems in memory.
- Teach the child to **use contextual clues** to decipher the meaning of words and environment.
- Include **therapeutic interventions** with the children. Families may include family therapy, individual child behavior therapy, parent training, and group therapy with mildly mentally disabled children and adolescents focusing on developing appropriate social skills.
- Try **behavioural techniques** for disruptive behaviours such as throwing tantrums, self-injury, noncompliance, and aggression towards others.

**Psychopharmacological Intervention**

Treatment specifying the use of medication should only be considered when a particular psychiatric condition known to benefit from a particular drug coexists with the mental retardation or developmental disability. This may take the form of a severe depression, obsessive-compulsive disorder, attention deficit-hyperactivity disorder, or a variety

of other psychiatric disorders. There are few well-controlled studies of drug treatments with children who have mental retardation. It should also be noted that the use of medication as a form of chemical restraint should be avoided. In addition, when drug treatment is used, it should only be one component of an overall treatment approach (Batshaw & Petter, 1992).

**References**


i. Exceptional Children and Youth : Edward L. Meyer, Pub. : Love Publication Company, Denver, London.

ii. Multiply Handicapped Children: Rosalind Wyman, Pub. :Condon Book Souvenir Press.

iii. Manual on Developing Communication Skills in Mentally Retarded Persons : T.A. Subba Rao, Pub : NIMH.

iv. Moving Forward : Rita Peshwaria, Pub. : Dr. D.K. Menon and Others.

v. Handbook For The Trainers Of M.R. Persons, (Pre Primary Level) : Dr. Jayanthi Narayan, Pub. : NIMH.


## HEARING IMPAIRMENT WITH BLINDNESS/ LOW VISION

(Deaf-Blind Child)

### Definition and Description of Deafblindness

A deafblind child has both a hearing loss and a vision loss, the combination of which causes such severe communication and other developmental and educational problems that the child cannot benefit from a program for hearing impaired or visually impaired children.

Deafblindness may occur before birth, during birth or after birth. It may or may not be accompanied by other physical and mental impairments like cerebral palsy, mental retardation, learning disabilities, etc.

### Causes of Deafblindness

**I Prenatal causes**

- Syndromes and genetic disorder.

- Maternal infections and conditions during pregnancy like Rubella (German measles); Syphilis, Herpes; Cytomegalovirus; intake of certain drugs; overdose of alcohol; etc.
- Prematurely of birth
- RH incompatibility between the mother and the child.
- Central Nervous system impairment e.g. Hydrocephalus

II Perinatal causes

- **(During the process of birth) lack of oxygen or overdose of oxygen can cause deafblindness.**

**III Postnatal Causes**

- Infections during infancy - meningitis, encephalitis etc.,
- Childhood diseases like mumps, chicken pox, measles, etc.,
- Trauma caused by accidents or injuries.

Characteristics and implications

A deaf-blind child is not a deaf child who cannot see or a blind child who cannot hear. Deafblindness is unique and complex disability with very wide implications. The dual sensory loss of vision and hearing severely affects all areas of growth and learning in a child. Early and appropriate intervention is critical for the development of a deaf-blind child.

Teaching Strategies

An **Individual Educational Plan** (IEP) needs to be made for each deafblind child based on his needs and abilities. This IEP is made by a team comprising of Principal, Coordinator, Special Educator, Mobility Teacher, Audiologist, Vision specialist, Physiotherapist. Parent/ hostel staff and Doctor if there are any medical problems.

i. A **multi-sensory approach** is followed in teaching young deafblind children. This involves teaching in such a way that the child learns to make maximum use of all his senses including residual vision and hearing.

ii. The **teacher-student ratio** should be 1:1 especially in the case of young children – as the teacher and the child communicate mainly through touch. This also enables the teacher to provide maximum individual attention and develop individual goals.

iii. The teacher must **establish an emotional bond** with the child in order to provide a sense of trust and security. This can be done by maintaining close physical contact and a frequent and consistent interaction and also by going through pleasurable experiences together like body games, tickle games, playing together etc.

iv. A **Functional or Academic Curriculum** may be made **depending on the needs of the child**. In both cases, however, it is important to encourage the development in all areas of learning and development including Language and Communication, Cognition, Motor Skills, Self-care, and Emotional and Social skills. Communication (at the child's level) is stressed through out the day as communication facilitates development in all other areas of growth and learning.

v. **Learning** for these children needs to be **experience based**. The child should be given the actual experience of objects and situations involved in the concept being taught. As far as possible real objects in meaningful and natural situations should be used for these learning experiences.

vi. There must be enough **emphasis on teaching functional and meaningful skills**- skills which have some meaning for a deafblind child and helps him function better in his day to day life.

vii. The child's physical **environment** as well as his/her **daily routine** needs to be **structured and consistent.** This gives him a sense of security and reduces confusion. Tasks need to be broken into small achievable steps and one step should be taught at a time.

viii. Deafblind children need **repeated opportunities to practice any skill**. Moreover they may take some time to react to any kind of stimulation. The teacher therefore, must provide extra time and be patient.

ix. A **safe, organized and responsive environment** will motivate a deafblind child to move around and interact more freely with the people and objects in his environment. The ultimate goals for a teacher should be to encourage a deafblind child to become as

independent as possible can. Initially the child may require a much greater amount of assistance but with encouragement and proper opportunities he/she will show varying degrees of self-reliance and can become a contributing member of society.

**x. Modes Of Communication**

- **Gestures** - Using a natural action like 'the act of throwing for a 'ball' or drinking for 'water'.
- **Signals** - Using body language – e.g. A specific motion to indicate stop or start.
- **Facial Expression** – e.g. grimacing to show disapproval (for children with some vision).
- **Touch Cues** – e.g. a gentle tap on the lip means 'food is coming'.
- **Object Cues** – Showing objects to indicate an incoming action e.g. shoes for going out of a towel for bathing time.
- **Sign Language** – (tactile from for a child with several visual impairment) – A manual method of communication in which a certain hand configuration stands for a word/expression.
- **Adapted Signs** – Formal signs modified according to the needs of a deafblind child.
- **Finger Spelling** – wherein alphabets are expressed manually. This can be done using both hands or one hand only.
- **Speech And Intonation Pattern** – Children with good residual hearing are sometimes able to make some use of speech or at least intonation pattern. This however, mostly needs to be backed by signs.
- **Braille/Large Prints** – Depending on the individual's needs.
- **Print On Palm** – Writing on individual's palm with the fingertips.

- **Communication Cards/Books** with pictures or written materials in them. These cards/books can also be used to communicate with people in community while shopping, traveling etc.

The **Total Communication Approach** has been found to be a very suitable mode of communication for deafblind children. Total communication involves the use of all/any modes of communication e.g. signing, writing, gesturing, speaking, finger spelling, drawing etc., to encourage good and effective communication.

### Usher Syndrome

Usher syndrome is a genetically transmitted disorder, which results in congenital deafness and progressive blindness due to Retinitis Pigmentosa (RP) – a condition in which clumps of pigment appear of Retina. The blindness starts setting in normally during the early teens – but the extent and speed of vision deterioration varies from person to person. Three types of Usher Syndrome have been identified - Type I, Type II, and Type III.

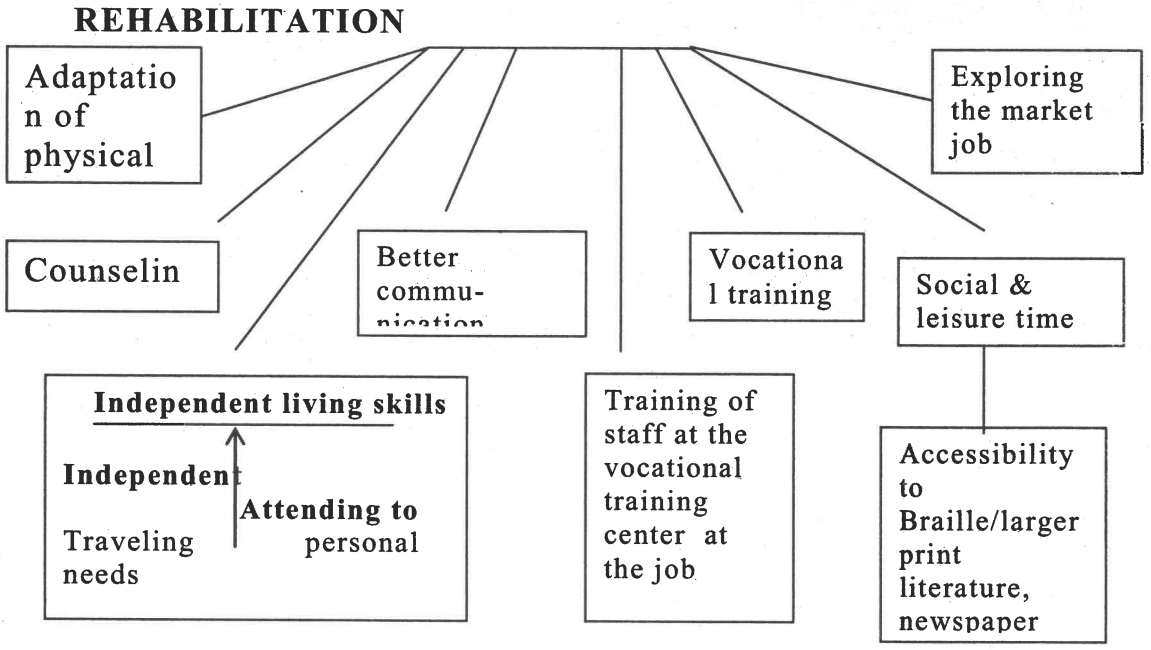
Adolescents and young adults with this disorder have high potentials and need to be taught with much high goals in mind. They will, however, first need to learn a tactile mode of communication and an adapted mobility technique (e.g. using cane). The teacher too needs to know more about low vision aids, lighting condition and a adaptation of teaching material.

Curriculum for students with Usher Syndrome should involve more of academic work. School subjects like geography, history, physiology, environmental science, basic arithmetic etc., can be taught with the help of proper equipment and techniques. They can also be helped to acquire a high level of language, mobility and independent living skills like traveling independently, money management, handling correspondence and attending to day to day needs. The teacher should also try to keep such students in touch with the world through

newspaper, periodicals etc., - presented in a way suitable to their visual needs.

### Possibilities of Rehabilitation

Rehabilitation of deafblind people involves multitude of factors.




The rehabilitation process of a deafblind individual may or may not include all these factors. Moreover the extent to which one will be successfully rehabilitated will also vary. While a deafblind child with additional disabilities may continue to live and work under a highly supervised condition, a young adult with Usher Syndrome may even think in terms of self-employment or a job in a semi sheltered situation.

Due to problems of transport and communication finding jobs in open market presently for which deafblind people have been successfully trained here :-

- Making envelopes end files
- Making liquid soaps

- Making simple food items
- Making decorative candles
- Making semi-precious jewelleries of varying complexities
- Cane work
- Working as a staff assistant in a residential unit for deafblind people.
- Plant nursery
- Packaging of food or electronic items.

It is possible for some of the older deafblind individuals to settle down with one of the occupation mentioned above. They will have to be assisted through during the purchase of raw material and marketing of finished product. The need, however, is to develop more job opportunities and tap the full potential of deafblind youths.

*[The different ways in which letters/alphabet are shown/written/spelt for deafblind children are given at the end of this unit as Annexure 1, 2, 3, and 4.]*

**References**

i. Curriculum Adaptation for the Deafblind Child – Sensori-Motor Period, : Judy Goodrich, Pub. : University of Kentucky.

ii. The Deafblind Baby, Peggy Freeman, Pub. : William Heinemann Medical Books.

iii. Beginning Language Development for the Deafblind Child, Pub. : New England Regional Center.

iv. Hand In Hand – Vol. ll : Kathleen Mary and Jean Prickett, Pub. : AFB Press.

## HEARING IMPAIRMENT WITH AUTISM

### The Autistic Spectrum Disorders

Autism is a severe form of child psychopathology that was first identified by Leo Kanner in 1943. Although the disorder is relatively rare, the severity and nature of the children's

behaviour has a profound effect on the family, the school, and the community.

Autism has been defined as a complex Developmental disability that typically appears during the first few years of life. It is the result of a neurological disorder that affects the **functioning of the brain.** It has been estimated to occur in about 2-4 per 10000 Children.

Autism affects the development of the brain in areas of **Social behaviours** and **Communications skills.** At times, **aggressive and/or self-injurious behaviour** may also exist. Besides this, such children may indulge in respected body movement e.g. hand flapping, rocking, or show unusual responses to people or objects, resist changes in routine. They may display extreme sensitivity to the inputs from sight, hearing, touch smell and taste.

The prevalence rate mentioned above would make autism one of the most common developmental disabilities in India. Yet most of the public, including many professional in the field of medicine and education have little or no idea about what is autism, what causes autism and what should be done to help children with autism.

**What is Autism ?**

It is generally accepted that :

- Autism is a spectrum disorder. It ranges from those who are severally affected to those who are so mildly affected that they may appear close to normal.
- Autism is a developmental disability. The syndrome varies with age and the developmental level of the child. This means that like other children, a child with autism will change, as he/she grows older.
- Autism cannot be diagnosed without taking a careful development history from parents and others who are involved in caring for the child.
- Autism can exist simultaneously with other conditions the most common of these condition is mental retardation.

## The Spectrum of Autism

Many related disorders have been included under the umbrella of Autistic Spectrum Disorders (also known as Pervasive Developmental disorders). Children who came under this category share common features such as deficits in communication and social skills, but differ in terms of severity. These children can be diagnosed as having any of the following:

- **Autistic Disorder**: impairments in social interactions, communications, and imaginative play prior to age 3 years. Stereotype interests and activities.
- **Asperger's Syndrome**: Impairments in social interactions and the presence of restricted interests and activities, with no clinically significant delay in language, and testing in the range of average to above average intelligence.
- **Pervasive Development Disorder –Not Otherwise Specified**: A child may not meet the criteria for a specific diagnosis, but there is a severe and pervasive impairment in specified behaviors.
- **Rett's Syndrome**: A progressive disorder which till now has been seen in girls only. This is a period of normal development and then a loss of previously acquired skills, loss of purposeful use of hands replaced with repetitive hand movements beginning at the age 1-4 years.
- **Childhood Disintegrative Disorder:** A child has normal development for at least 2 years and there is a significant loss of previously acquired skills.

### Causes of Autism

Medical science has not been able to find an answer, which can accurately explain the reason for autism to occur. Various researches have been conducted to explain the different forms of autistic disorders. Finding from these studies suggest a relationship between autism and biological or neurological differences in the brain. Research also points to a genetic basis for autism as in many families there appears to be a pattern of autism or related disabilities.

### Diagnosis of Autism

Autism cannot be diagnosed medically. The most dependable method to diagnose autism is to observe the child 's communication, behavior and developmental levels. However, since autism often occurs with

associated disabilities, medical test are also used to identify these as possible causes for symptoms on display.

A multidisciplinary team that includes a neurologist, pediatrician, and psychologist, speech and language therapist, special educator, or any other professional with sound knowledge about autism should do the diagnosis. It is possible for autism to be misdiagnosed if the team members do not have sufficient exposures to autistic conditions.

While observation is a recommended diagnostic method, a single session of observation would not provide the real picture. The child should not be observed in different situations. The observational report should be seen in light of the input from parents and carers, and the developmental history of the child. On one hand, some children with autism may appear to have low cognitive abilities, hearing deficits, or bizarre behaviors, on the other these conditions can co-exist with autism in some children with autism may appear to have low cognitive abilities, hearing deficits, bizarre behaviour, on the other these conditions can co-exist with autism in some children. In order to develop and appropriate and accurate diagnosis, it is important to distinguish autism from these conditions.

***Features of Autism***

Frequently, children within the autistic spectrum disorders appear relatively normal until the age of 2-3 years. It is around this period that parents notice discrepancies in the development of language, play and social behavior. The affected areas in autism are given below. However, a delay in any one of them would not warrant a diagnosis of autistic spectrum disorder. Autism is the outcome of several developmental deficits.

- **Communication**: language develops either slowly or not at all; use of words without attaching meaning to them; communication with gestures; short attention span.
- **Social Interaction:** spends time alone; little or no interest in making friends; may not respond to social cues such as eye contact or smile.
- **Sensory Impairment:** may have higher or lower sensitivities for sight, hearing, touch, smell, and taste.
- **Play:** may lack spontaneous or imaginative play; may not imitate others' actions; lack ability to initiate pretend-games.

- **Behaviors:** overactive or very passive; may have tantrums for no apparent reason; may have obsessive interest in a single object, idea, or person; appear to lack common sense, may be aggressive to self or others; may resist changes in routines.

Every autistic child is different from the other. Each child is unique and has a combination of characteristics. A mildly affected child may show a slight delay in language and more deficits in social interactions. The child may have difficulty in initiating or maintaining a conversation. He/she may communicate at people (monologue on a favorite topic despite attempts by others to interject comments) instead of communicating with them. Children with autism process and respond to information in different ways. **Parents and teachers must understand these unique patterns of learning in order to develop effective intervention programmes.** The child's abilities to learn may change from day to day due to problems in attention, processing, and anxiety. Changes in external environment may cause anxiety. This can affect learning. As a result the child may be very responsive one day and quite withdrawn the next. Some children may have average or above average intellectual, verbal, memory, spatial or manual skills but are unable to use them in creative activities or social interactions. Children with severe deficits require systematic support to manage needs of daily living.

Many autistic children are able to form some kind of social relationship. They are able to make eye contact, laugh and show affection and a range of other emotions. Autism may affect their responses and make it difficult for them to control themselves. Some children may use peripheral vision rather than looking at things directly. Sometimes touch or closeness may be so painful that a child may resist mother's hugs and kisses. The World may appear very strange and difficult for an autistic child who is unable to process the information coming through the senses. Fear, confusion and anxiety may be the outcome of these inability to " make sense" of the World. Many of the odd bizarre behaviours are often the manifestation of the child's effort to 'to cope' with the anxiety.

### Teaching Approaches for Autism

Educational intervention of autism should start as early as possible. Early intervention brings about a remarkable change in young autistic children.

The focus is on providing a behaviorally based programme, which enhances the child's motivation and uses a multimodal approach is highly structured teaching sessions. A variety of programmes and therapies are available. These include behaviour modification, discrete trial teaching, dietary interventions, music therapy, auditory integration training, sensory integration, speech and language therapy and TEACCH among others.

Of the approaches mentioned above, **Applied Behaviour Analysis** (ABA) is a programme of intensive 'one to one' teaching based of research first published by B.F. Skinner. ABA is the only widely accepted treatment for autism. The basis of an ABA programme is the premise that responses that are reinforced are likely to occur again than responses that are ignored so learning can be shaped by reinforcement. The skills are broken down to their simplest components and then taught to the child through a system of reinforcement.

The other programme is **TEACCH Treatment and education of Autistic and communication handicapped children.** TEACCH is a comprehensive treatment programme that believes in **'Structured Teaching'** to suit the needs of autistic children. The concept of 'structure' is derived from the principles of ABA. The program is structured with regard to :

i. Physical environment,

ii. Scheduling,

iii. Teaching method.

Research show that children with autism respond well to highly structured special educational programmes that cater to their individual needs. An appropriate teaching approach may have a combination of communication therapy, development of social skills, sensory integration therapy and applied behaviour analysis. The programme must be carried out by professionals in a consistent and cooperative manner. Children with severe problems must be educated in a structured setting through systematic use of behaviour modification techniques. Parents and carers of autistic children need to be trained on the therapeutic methods being used in order to maintain consistency in management.

**In addition to social skill and language development, children with autism should receive training in independent living skills.** Learning to

perform activities of daily living, to make simple purchase, to ask for help when needs are essential behaviours that may be difficult, even for those who have higher intellectual functioning.

To be effective, teacher of an autistic child should be flexible in his/her teaching approach, be ready to use reinforcements, evaluate the progress regularly and provide opportunities for generalization of learned skills.

Caring for a child with autism is not easy task. Families of these children often experience stress. Due to challenging behaviours of their children, providing therapies, seeking adequate educational placements and other financial constraints, the parent find it difficult to participate in social or community supports. The parents should be introduced to other parents of autistic children. This would build a support group and encourage sharing of resources among the parent groups.

**Prognosis for Autism**

Although there is no cure for the brain based disorders that result in autism, understanding about this condition has grown significantly since it was first described by Leo Kanner nearly 60 years ago. This has precipitated in development of better coping mechanism and strategies for the various aspects of the disability. Some of the symptoms of autism lesson or disappear completely as the child grows older.

If appropriate training is given, individuals with autism can lead a fairly independent life in the community. Adults with autistic disorders have been able to obtained employment and perform their duties adequately. They benefit from vocational training is that it teaches them work skills, work related skills, and provide social and recreational programmes.

Though much is desired as far as awareness about autism is concerned in a country, a number of support groups for parent of autistic children have emerged in the metro cities. Some cities have seen growth in special units of full-fledged centers providing educational programmes for children with autism. However, there is a need for duplicating these services, sharing of information on causative factors, diagnostic procedures, and effective training strategies for parents and families of children with autism. There is also a need to have professionals who have adequate

understanding of autistic spectrum disorders. We look towards the future with a hope that soon these needs would be met. Their disability makes the world a difficult place for children with autism; let us not contribute to it.

### Hearing impairment with Autism

The difficulties in training autistic children have already been described above. When hearing impairment is coupled with autism, it will normally be quite some time before it is diagnosed and appropriate training is begun.

However, it must be noted that a deaf child (above 1½ to 2 years of age) with normal brain-function, and with good and appropriate teaching, should give indications of language development within a month or two. He/she may respond to some names to which he is exposed consistently, may read words and match them to pictures or objects, may try to imitate some words or vocalize to draw attention. If the child under treatment does not respond as per he teacher's/ parent's expectations, then he maybe referred to for further observation and examination for the possibility of the child having some other learning disability. It would be of great help if the teacher and parents maintain a proper record of the treatment and the child's responses.

### References

i. Autism : Professional Perspectives and Practice, K.L. Ells, 1990, Pub. : Chapman And Hall, London.

ii. Language of Autistic Children, : D.W. Churchill, 1978. Pub. : John Wiley & Sons, N.Y.

iii. The Handbook of Autism : A Guide for Parents and Professionals, : Aronn & Gittens, 1992. Pub. : Rouledge, London.

## HEARING IMPAIRMENT WITH CEREBRAL PALSY

### Definition

Cerebral palsy is movement and posture disorder, which is non-progressive. It occurs due to brain damage at the time of birth.

Cerebral Palsy is non-contagious and primarily is caused by damage to those parts of the brain, which are responsible for communication, movement, and control of muscles. The extent of brain damage in pre-natal, peri-natal or post-natal period determines the severity of the disorder.

Cerebral Palsy is a complicated disorder. No two spastics are alike and the degree of spasticity varies in two individuals, it also has associated handicaps like hearing impairment or mental retardation.

**Etiology**

- **Pre-natal**
  - Mothers health during pregnancy (measles to the mother or even lack of vitamin B can result in spina bifida which is a type movement disorder)
  - Poor Gynecological care
- **Peri-natal**
  - Lack of oxygen (birth Asphyxia) to the brain resulting in damage to particular parts of the brain responsible for movement, control over muscles, speech
- **Post-natal**
  - Lack of vaccination to the baby
  - Infantile jaundice
  - Any accident to the child in the first few days after birth.

**Characteristics**

CP usually affects the body in a typical pattern :

- **Quadriplegia** - All four limbs
- **Diplegia** - Both legs
- **Hemiplegia** - Arm + leg on same side.

In cerebral Palsy there may be other signs of brain damage.

**Spastics Athetoid** is a type of spasticity, which usually has **associated hearing impairment**. Spastic Athetoids have very jerky and involuntary movements and they have no control over muscles. They need regular speech and occupational therapy.

Other areas of deficit are as follows :

- Developmental delay
- Abnormal reflexes
- Abnormal tone
- Abnormal movements
- Associated handicaps
  - Hearing loss
  - Mild mental retardation
  - Visual perceptual deficits.

**Muscular Dystrophy**, which is very rare, is a paralysis. Carriers of defective genes cause deterioration of muscles, which ultimately results in death.

**Spina bifids** is associated to C.P. in some cases where

- Damage to the brain is present from birth
- No sensations
- Affected bladder and bowel control.

**Implications**

**Cerebral Palsy** is a complex disorder and it has many associated problems and difficulties. It results in the following :

- Abnormal gait patterns and posture
- Lack of control over movement and muscle
- Jerky movements

- Imbalance in walking
- Severe speech and communication deficits (sometimes speech is present but the it is non understandable)
- Physical immobility
- Dependence on others for all the self-help and self-care skills such as (toilet needs, dressing, feeding)

The common **classroom difficulties** faced by C.P. children are as follows :

- Writing
- Communicating
- Feeding one self
- Sucking Drinking
- Self-help, Self-care
- Physical barriers
- Lack of specific furniture facilities in school.

**Interventions/teaching strategies**

The Interventions to improve the mobility and facilitate independence are mainly therapeutic.

- **Physiotherapy** – Facilitates independence in walking with effective use of calipers & crutches.
- **Occupational therapy** – Independence in A.D.L. (activities of daily living), self-helping skills, and hygiene needs.
- **Speech therapy** - Speech and language stimulation programmes facilitate speech development. They are trained in how to effectively communicate with the help of -
  (1) Communication chart
  (2) Bliss symbols
  (3) Picture boards

Communication is possible with the help of

(1) Typewriter – Portable/Electric
(2) Computer
(3) Cannon communicator

(4) Rubber stamps

**It must be remembered though that a complete language programme will have to be designed for a deaf child with C.P.; and language will have to be taught to him/her with great efforts of good quality for a sufficiently long period of time. Only then the child will be able to make use of the various types of communication devices mentioned above independently. (It goes without saying though that these assistive communication devices (AAC) will have to be tried out and used for teaching language too.) If the child has no control over movement and muscle, then even sign language may not be very helpful for expressing himself. The teacher will have to experiment a lot before a suitable device is found to be useful for a particular child both for development and use of language.**

**Speech therapy** is very helpful to people who have C.P. and drooling problems.

## Psychological interventions

A **psychologist** can effectively deal with the behavioural problems of children with C.P. Use of behaviour modification and therapy can reduce some of the psychosocial problems arising due to the disability.

A **social worker** can provide support and counsel the parents as well as children who have cerebral palsy.

## Teaching strategies

Special Education has contributed significantly in case of children who are intelligent having C.P. and now inclusion of these children in normal schools has been initiated.

**I.E.P.: Individualized Educational Programmes** are designed and the syllabus is taught in a modified manner. It is totally child-centered approach. This is also useful for children who have learning disabilities.

In deciding a specific programme for a C. P. child, his needs are taken into considering and a suitable educational

programme is chalked out by a special educator who takes into a account all the practical difficulties of C.P. child.

An example of a good Institute, which has successfully introduced a totally child-centered approach towards children, who have physical, mental, sensory and learning disabilities, is the V.M.S. Learning center. This was started in 1999 by S.N.D.T. University in Mumbai, and has been successful in helping children who have multiple disabilities.

**References**

i. Cerebral Palsy (Take Time), : Mary Wortham and Jean Hunt, Pub. : The Robinson Press.

ii. Communication for the Child with C.P., : Brinda Crisna, Pub.: Oversea Development Administration, U,K.

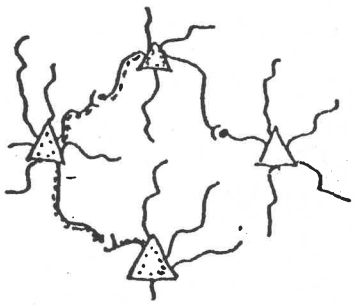
iii. Learning to Cope with Your Child with C.P., :Hasyslatha Mehta, Pub. : IICP

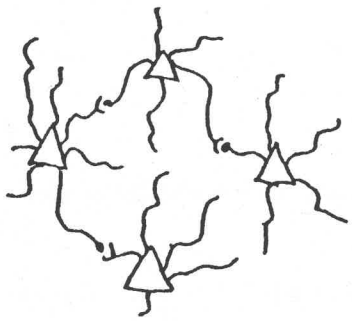
## HEARING IMPAIRMENT WITH LEARNING DISABILITIES

Learning disability is an invisible handicap until behaviour or learning problems begin to surface especially in a classroom / academic situation. Learning is intimately tied to developmental levels as described by Piaget's theory of hierarchical cognitive development. Consequently, in a classroom situation learning is an age related function; children who **do not fit the norm** are quickly detected by an earnest teacher.

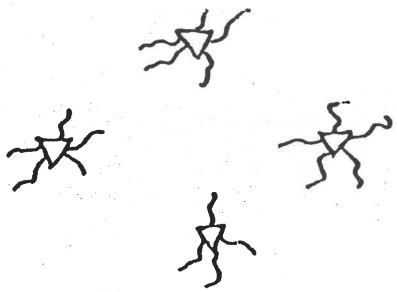
Physiologically 'learning' means 'organizing brain programmes'. When the brain cells are programmed, they are interconnected, ***integrated.*** Together they become a programme, in much the same way as we build a programme in a computer for adding or subtracting, multiplying, dividing, extracting roots, calculating averages etc, etc.

**Biochemically programmed brain cells** **Automatically programmed brain cells**





Certain parts of the brain are programmed for a specific behavior patterns. The unprogrammed brain cells lie together more or less detached.



When the programming is disturbed, we speak of dispraxia, or even apraxia i.e. absence of 'proxia'. When the 'senses integration programme' does not run smoothly, we speak of inter-model integration disturbances.

Aphasia, alexia, agraphia, acalculia, asymbolia, etc. are used by neurologists almost exclusively as a loss of the functions meant by these words. The most common learning disabilities

described **in H.I. children** are aphasia, dysarthria, perceptual disturbances, dysgraphia, dyslexia (reversal writing) and dyscalculia.

Dysphasia and aphasia may originate from a motor dyspraxia (lack of form consistency leading to spellings errors e.g. went & want, bad & dab, nut & not, etc.) and aphasia, and/or from an inter-model integration disturbance. **Dysarthria** and **anarthria** are regarded as **speech disturbances**, originating from difficulties with the tactual sense in the mouth and/or malfunctions in the sub-cortical centers. Sometimes these disturbances may be so much that only very accurate and intensive observations may discover them.

General definition / description of Learning Disability

Learning disability is a label, which refers to children sharing the same general symptoms. As a descriptive category children with L.D. exhibit a disorder in one or more of the basic psychological processes involved in understanding or using spoken or written languages. These may be manifested in disorders in **listening, thinking, talking, reading, writing, spelling or arithmetic**. They include conditions, which have been referred to as perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia, developmental aphasia, etc. Recent educational developments have also considered visual, hearing, or motor handicaps to mental retardation to emotional disturbance, environmental disadvantage as important factors contributing to learning disabilities.

**Characteristics**

Johnson and Morasky have listed related areas where problem behaviors occur.

They are as follows :

1. **Attention** – problems related to focus of attention, distractibility, hyperactivity. This takes into account Visual Perceptual Disability.
2. **Curiosity** – problems of undeveloped, reduced, restricted, or limited exploratory and investigative behavior.
3. **Motivation** - problems of disinterest, lack of persistence, low enthusiasm.

4. **Memory** - problems of retention, recall and learning of memory strategies.

5. **Imitation** - problems of poor mimicking, identifying relationships, basic imitation of behaviors.

6. **Transfer** - problems of generalization and extension of learning.

7. **Incidental learning** - problems of failure to profit from nonstructured or unplanned experience.

8. **Learning facilitation** - problems resulting from behaviors, which compete with or disrupt the learning task, through avoidance behavior or competing responses.

9. **Affective behavior** - Intolerance, frustration, and uncontrollable hyper activity or apathy, and limited emotional reactions.

10. **Language, communication and rate of learning** - The child will exhibit poor performance in all the activities related to linguistic skills , such as, speaking meaningfully, responding appropriately to verbal instructions, and reading, writing and arithmetic.

**Survey Of Learning Disabilities In H.I. Children**

**1.** A weak memory

Motor –[primary dysgraphia]

**2.** Dyspraxia a kind of dysphasia

dyscalculia

**3.** Disturbance in the inter – motor integration

dyssymbolia [ a kind of dysphasia]

integration – [primary] dyslexia

integration – [secondary] dysgraphia

4. Exceptional :

a. Disturbance in the visual Perception – figure-background perception, a kind of visual dysgnosia [primary] dyslexia

Perception –

[primary] dysgraphia

5. Disturbance in the auditory figure – background perception a kind of auditory dysgnosia.

**Causes**

- **Post-natal :** Accident, meningitis, mumps and so on
- **Peri-natal:** lack of oxygen

When a child is born, it must breathe. This it has not done mother's womb. This first breathing is a cry (a birth-cry). If this cry holds off, for perhaps a quarter or half an hour, even this can be dangerous, because the brain is starved of enough oxygen. This lack of oxygen is called anoxia, and causes many of the brain cells to die. This may have serious consequences like deafness, blindness, spasm, athetosis, integrative disorders, emotional irregularities etc. The same happens with immaturity at birth.

- **Pre-natal:**

These are dangerous causes, for example: rubella in the mother during her pregnancy. The rubella virus can penetrate in the child in mother's womb and nestle itself to grow within the brain of the baby, causing much damage there. Other causes are Rhesus antagonism (having almost the same effects of anoxia), the mother using drugs etc.

- **Heredity:**

Heredity is a possible cause too. Then we speak of congenital brain defect.

- **Learning Difficulties in Rubella Children**

Rubella children are victims of a serious pre-natal infection where virtually all organs including the central nervous system can be affected. The Rubella infant is often encountered as a child with many management problems.

Studies have proved valuable in predicting possible learning problems in H.I. children. Special problems encountered by rubella children, retaining rhythmically presented patterns and in " inter model" learning tasks. The delay in the development of these skills indicates subsequent problems in grammatically correct speech and symbolization.

In order to overcome these problems, the sequential memory of the child should be supported by means of visual mode i.e., language should not only be presented to the child orally, but it should be supported by writing as well. It seems that "graphic conservation " is a very appropriate method to employ in the language teaching of rubella children. In order to prevent inter-modal learning problems, especially problems in symbolization, children should be encouraged to experience object and situation in their spectrum through all sensory modalities. The broader the scope of sensory information, the stronger the connection between the symbol and the experience. This will, in turn, facilitate word retrieval, word recognition and word retention (Van Dijk and Isseldijk 1981). These children will have speech performance. The child's articulation should be supported by writings and/or finger spelling. There are clearly two distinct groups of rubella children .One group have bi-lateral cataracts; the other is 'only' hearing impaired. The first group of children is often referred to as 'deafblind'

## Inter-Modal Integration Problems

### i. Dysgraphia and Agraphia

At least 20% of the H.I. children experience difficulty in integrating the written and the spoken image. It may happen that the H.I. child repeats a

word correctly, especially when there are nice hearing remnants and also copies a word correctly, but does not read it or white it down correctly.

- A child may write a word completely different from what he had spoken e.g. He repeats ' Mary' when you say ' Mary' but when asked to write down, he writes 'John'. The reason may be a very strong inter-modal integration problem, a kind of graphic word finding disturbance. The child may repeat 'ball' nicely, but when asked to write it down, he cannot manage it and he writes 'bil', or 'aa' or something else. The transfer from mouth image to written image is not correct. This is a kind of dysgraphia as a result of inters modal integration disability.
- It may happen that a young deaf child does not start to write. He does not imitate by drawing and the function of writing does not develop.
- A child may produce many writing errors. For e.g. the child may speak 'ball' correctly but write 'bad' or 'dab' – again the child may speak 'warm' but write 'marv' or 'mraw'.
- A child may have difficulty in discriminating. E.g. d and b (originating from disturbed control of the body scheme). The child can conquer the difficulty by a very strong visual perception and memory.
- Another case, fortunately not a common one , is a weak figure – background discrimination by which confusions arise as ,

  n = m = w

  b = l = k

One of the typical difficulties of the integration of senses /intermodal integration is that they do speak but this has insufficient context. In such case we speak of ***echolia***, another kind of 'aphasia'. The child only repeats like a parrot. Such a child does not attain spoken language.

**ii. Integration dyslexia (defective reading)**

Another aspect of intermodal integration disability is the lack of the graphic and auditory – articulatory aspects of words. These children make reading mistake. e.g. reading 'when' for 'where', 'raining' for 'ramming', 'roll' for 'ball' and so on ,causing a lot of misunderstandings .We call this 'integrative dyslexia', sometimes even 'alexia'

They experience the same difficulty in writing down what they speak. e.g. the child says correctly 'raining' but cannot write it, or even after much treatment still writes 'earning' or 'rianing' and so on.

One should pay attention to this from an early age, otherwise these children will never get as far as reading .The L(isten) ,R(ead) , S(peak) method of the Ewings will be very fertile ,especially for these children .

If this disturbance is not treated in time, it result in the long run into a language disorder, i.e. a lack of memory for words and linguistic structures, lack of linguistic control, poor vocabulary and so on. It may happen in some exceptionally severe cases, that the eye-hand coordination is disturbed, i.e. resulting into another type of dyspraxia and dysgraphia..

## iii. Dyscalculia and Acalculia

Usually dyscalculia – acalculia is caused by a combination of dyspraxia – apraxia and sensory – motot integration disturbance (usually including dyslexia – alexia). The child does not se spatial relations, constellations and quantities in the right way, does not understand or find the symbols with their meanings.

The deepest form of the disturbance is that the child does not see quantities quickly enough. – a lack of control of the quantitative structure of experience, thus a lack of seeing the correct number of objects and relating them to each other, a lack of detecting the right mathematical coding and of working up of a quantitative problem. e.g. this problem 'if a soap costs 7 rupees how much will cost 3 soaps?' is solved as 'ten rupees', the child has added instead of multiplying, not finding the right quantitative working up. Another, less deep, but more frequent difficulty, concerns quantitative relations and proportions, e.g. in lines, contours, perspectives and in digits.

One sees the difficulty arising even in the nursery school. Observe some children when they are counting on their fingers: two fingers over each other, repeating the same finger etc., with the effect that the resulting figure is wrong, One sees that this child simply cannot find his fingers, neither motorily, nor visually, nor tactually.

### iv. A very Bad Memory

There are cases of H.I. children who have bad memories, that verbal language (speech, lip-reading, sound perception, writing, reading, fingers, finger spelling) is not possible. The only possibility which remains is the teaching of signs, hoping that at least that will be successful.

### v. Too low an intelligence

Some H.I. children possess so little intelligence that they hardly understand the meaning of the word 'cupboard'. They confuse it with the knob or with the room in with the room in which the cupboard is standing, or with the door, etc. This defect may be so serious that they cannot really learn a verbal language, because their intelligence is sub-normal.- these children may learn to speak a few words, which however, do not give them the possibility to converse with others. These children have to learn signs.

## Treatment by switching on Compensatory Functions

The main aim of rehabilitation should seen in terms of a diagnosis of the strong abilities of the child, of developing them and of integrating them into the child" whole behaviour pattern, thus of using compensatory functions.

There are several exercises for remedial teaching. The general principles to bear in mind are :

i. Work area should be comfortable with no easy distractions such as sitting next to the bulletin board, sitting near a window where he can easily gaze outside.

ii. Give only one instruction at a time,

iii. Provide reinforcement through positive strokes,

iv. Avoid multiple choice questions,

v. Keep worksheets clear and uncluttered,

vi. Remember that routine is very important,

vii. Stress on eye contact when talking; it is important,

viii. Give simple and minimum instructions,

ix. Provide ample tactile clues and experiential activities,

x. Involve the child in games where body coordination is necessary,

xi. Pay individual attention and then gradually introduce the child to group activity,

xii. Keep in mind each child's attention span and avoid boredom.

xiii. Aim at making all learning meaningful.

An L.D. Deaf child should be given an option of preferred input channel, and preferred response channel. Very often a deaf child is not given and taught in the **appropriate Communication mode**. This lack can add to the incomplete information and set back in learning, more especially when his home language is different from the classroom language.

## Conclusion

- In children who suffer from learning difficulties, one often finds retardation in the development of intersensory learning.
- In the case of semantic learning difficulties such as word finding, attaching meaning to words, one often finds difficulties in the simultaneous synthesis of sensory stimuli.

A lot depends on the expertise and the dedication of the teaching staff. If they lack the necessary expertise and also the necessary perseverance, the percentage of H.I. children with learning disabilities will become higher.

## ASSIGNMENT

- Write briefly the characteristics and implications of each of the 5 disabilities described in this unit. State how the problems of educating the deaf children in each case are multiplied when hearing impairment is associated with one of these disabilities.

## REFERENCES

1. A World of Language for Deaf Children. Part I- Basic Principles [Maternal Reflective Method] - Dr. A. Van Uden
2. Diagnostic Testing of Deaf Children Dr. A. Van Uden
3. Rubella Handicapped Children Dr. Jan Van Dijk

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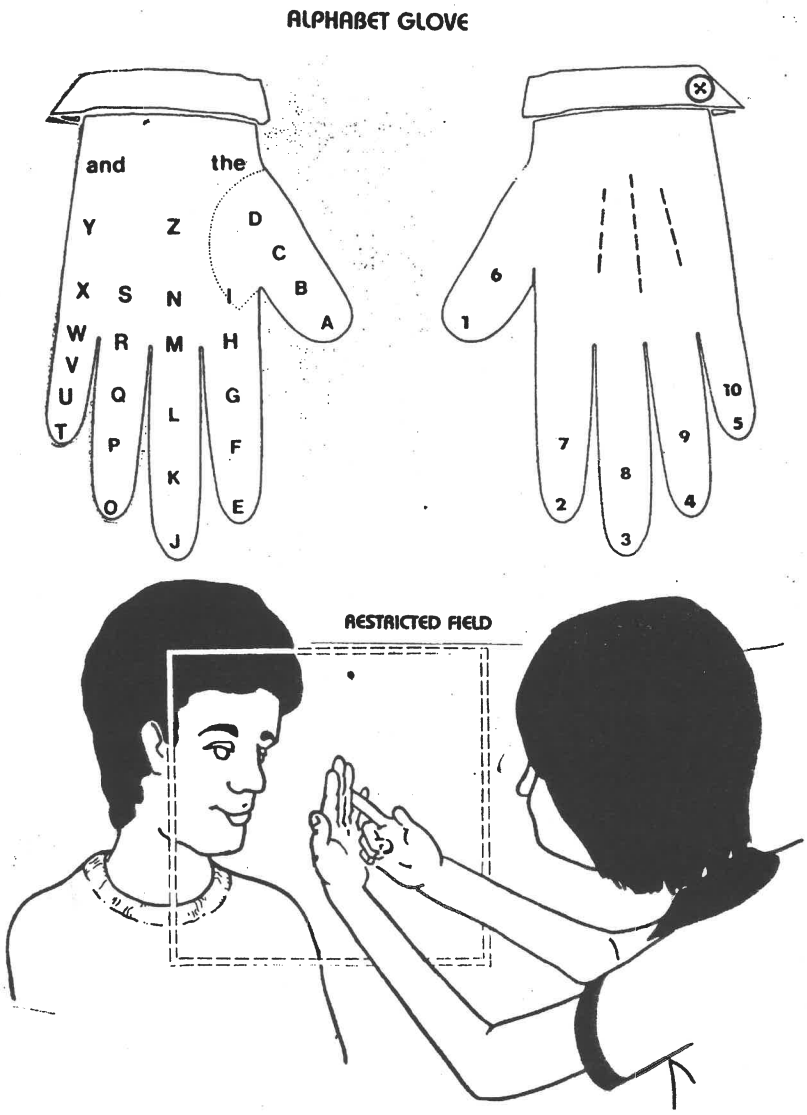
*Given on the next three pages as Annexure 1, 2, and 3 are the methods of writing spellings/letters of alphabet for a deafblind child – part of* ***1.5*** *of this unit.*

Annexure - 1


ALPHABET GLOVE
and
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7
9
8
2
4
3
RESTRICTED FIELD

Annexure - 2

BLOCK PRINTING

A B C D E F

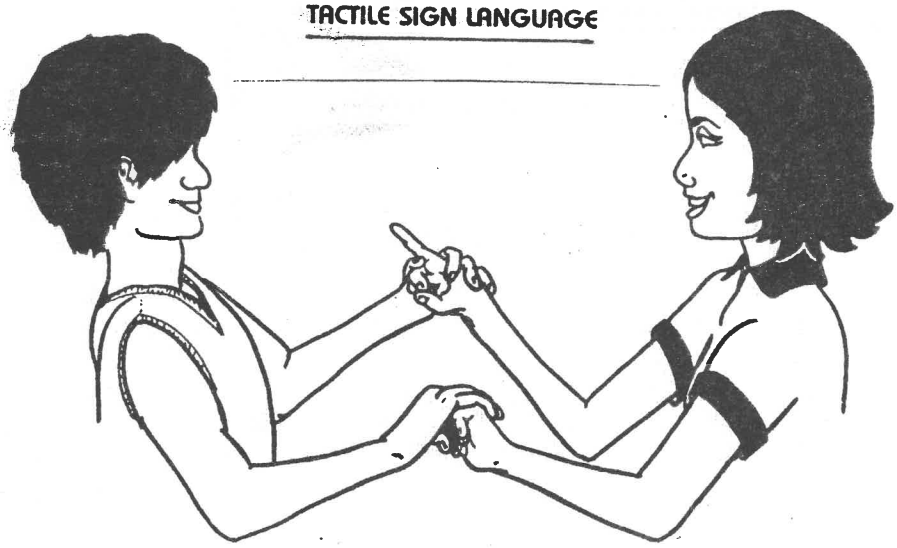
G H I J K L

M N O P Q R

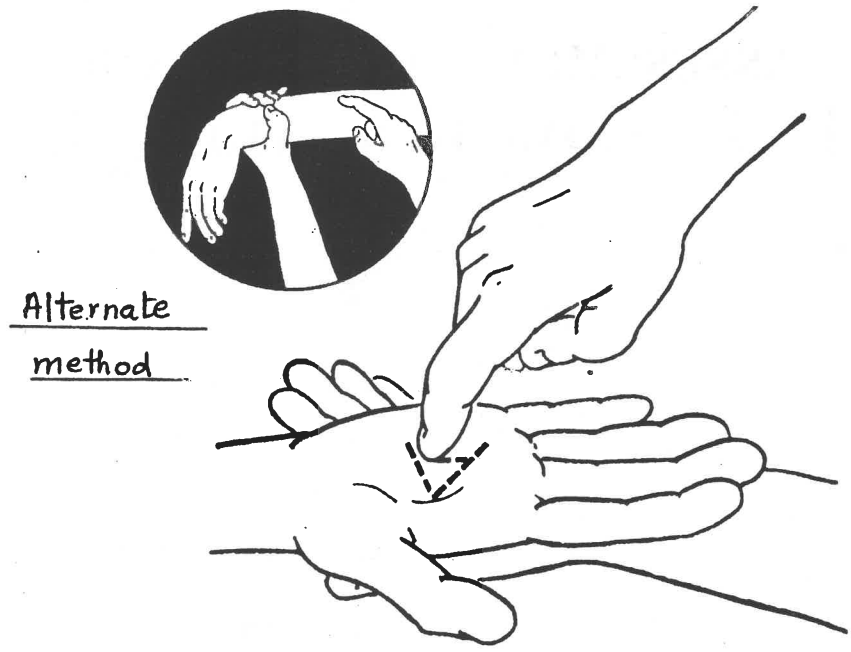
S T U V W X

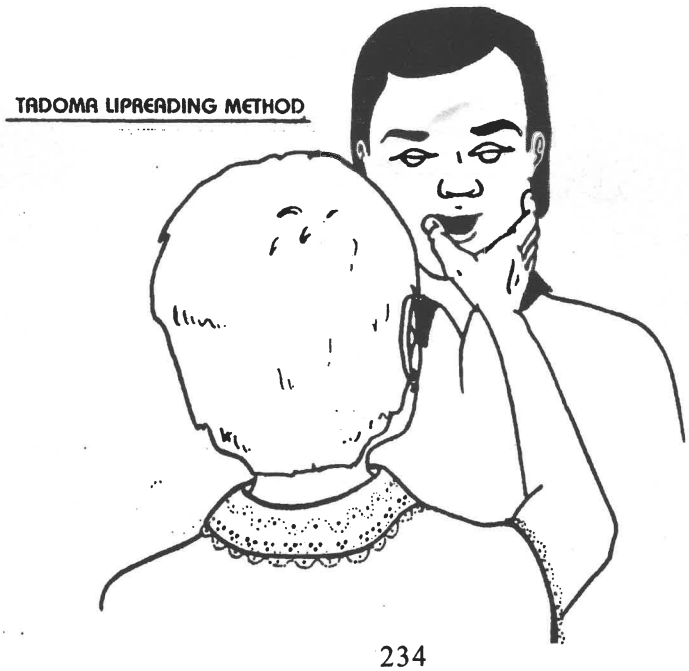
Y Z

TACTILE SIGN LANGUAGE



Annexure - 3



# BLOCK 3:
# ASSESSMENT OF LANGUAGE & COMMUNICATION

# UNIT 1: COMMUNICATION: CONCEPTS AND TYPES (LINGUISTIC VERSUS NON LINGUISTIC)

## STRUCTURE



## 1.1 INTRODUCTION

Sound is a form of energy. This energy is very crucial for us to carry out our day-to-day activities as the predominant mode of our human communication (which is verbal) uses the sound energy. Basic knowledge about the physics of sound is essential for any student dealing with hearing persons or persons with hearing disorders. The word "Physics" comes from a Greek word, the meaning of which is "Nature". Physics is the branch of science, which deals with the study of matter and ENERGY. Sound is a form of energy. Under this unit, one studies the properties of this form of energy. Further, physics is a quantitative science. Hence, this unit also deals with the way the different properties of sound are measured and quantified.

Knowledge regarding the organ of hearing and about how we hear sounds is essential for students dealing with hearing impaired population. This information on ANATOMY ( i.e. study of the structure of the body / organ ) and PHYSIOLOGY( i.e. study of the functions of the different parts / organs of the body) will help us to understand the different conditions causing hearing loss, about the types of hearing loss and also about the different degrees and nature of hearing loss. In addition to this, it helps us in knowing the reason (i.e. the underlying pathology) for different shapes of " Hearing Curves" ( i.e. CONTOUR OF AUDIOGRAM) in various conditions of hearing loss.

## 1.2 OBJECTIVES

After going through this unit you will be able to :

- Define sound
- State the different physical parameters of sound
- State the different psychological attributes of the different parameters
- Know the units of measurement of the different parameters of sound
- Have a basic idea about the Decibel concept
- Know about different types of sounds around us.
- Name the different parts of the ear.
- Identify the different parts of the ear in a diagram.
- State the functions of external ear, middle ear, inner ear and the auditory pathway.
- State how the sound is conducted from one part of the ear to another.

## 1.3 WHAT IS SOUND? – DEFINITION

Sound is that form of energy that is produced due to the vibration of the surrounding air or other medium.

It is actually patterns of successive pressure disturbances occurring in some molecular medium, which may be gaseous, liquid or solid.

Sound is that which is or which may be HEARD.

The general properties of sound are:

a) It is generated by vibratory motion. We hear sound when we ring a bell, when we clap, when we strike on the drums, when we vibrate our vocal cords in our voice box during speaking etc.

b) It can be transmitted through a medium, which delays it and attenuates its intensity. Sound can be transmitted through air very well. It can be transmitted through water or other liquids also. It can also be transmitted through solids such as walls, rocks etc. However, it cannot be transmitted in the absence of a medium i.e. in vacuum. Sound takes time to move from one point to another and therefore when it is being transmitted from one point, there will be delay in reaching the subsequent points. If the source of sound is near to a RECIPIENT, the sound will be heard sooner than if it were far from it.

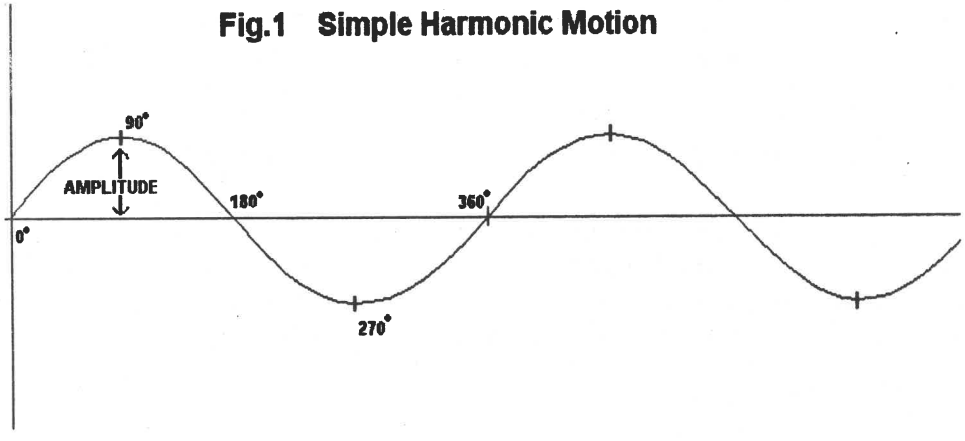
c) When the Sound is transmitted from a source, it also looses some POWER as it moves further and further away from it.

d) It can be received at a point distant from its origin. This is the reason why we can hear the horn of a bus from a long distance, even when the bus is not in sight.

## 1.4 PHYSICAL PARAMETERES OF SOUND

PARAMETER refers to any measurable or quantifiable characteristic or feature. The three physical parameters of sound are: Frequency, Intensity and phase. These parameters can be easily understood if we consider a SIMPLE HARMONIC MOTION (SHM). SHM is descriptively named. Oscillatory motion of a particle when it is repetitive or cyclic and is unaffected due to any friction etc, it is referred to as simple harmonic motion. Fig.1 shows such a waveform.

**Fig.1 Simple Harmonic Motion**



### 1.4.1. Frequency

The number of oscillations performed by a particle in one second is called its FREQUENCY. It is measured in terms of cycles or oscillations or vibrations per second. It is also referred to as HERTZ (HZ), in honour of a scientist named Hertz. If a particle completes 1000 cycles in one second, its frequency is 1000 Hz. i.e.1KHz

The human ear can hear frequencies from 20Hz to 20,000 Hz (i.e.20KHz). The frequencies, which are less than the human audible frequency, are called as SUBSONIC or INFRASONIC FREQUENCIES and those, which are above the human audible range, are called as ULTRA SONIC FREQUENCIES.

### 1.4.2. Intensity

In physical terms, intensity is referred to as AMPLITUDE. Amplitude is the extent of displacement of the vibratory particles in either direction from the position of rest. (see fig. 1). Intensity of sound is measured on a decibel (dB) scale with a specified reference sound of Sound Pressure Level (SPL) or Hearing Threshold Level (HTL/ HL). Human ear can hear sounds which are as soft as 0dBSPL ( i.e. the sounds which are of sound pressure level of 0.0002dynes /sec$^2$). Sound causes discomfort when it is 120 dB SPL and becomes painful at 140 dB SPL. (See 1.8. for decibel scale)

### 1.4.3 Phase

Phase is the part of the cycle the sound has reached at a given point in time. It is expressed in DEGREE. A complete cycle extends 360°. In fig.1, the beginning of the wave is $0^0$,the 1$^{st}$ peak (compression / Positive peak) is $90^0$ , the rest following is $180^0$ , the 2$^{nd}$ peak ( rarefaction / Negative peak) following is $270^0$ , the rest point following again is $360^0$. This parameter is not of much importance to this paper.

## 1.5 PSYCHOLOGICAL ATTRIBUTES OF SOUND

When we hear a sound, we perceive it as having certain characteristics or qualities. The physical parameters discussed above contribute to the perception of certain specified characteristics. Thus, each of the physical parameters has certain psychological attributes. They are:

**a) PITCH:** This is the psychological attribute of frequency. Higher the frequency, higher is the perceived pitch. Thus, we have very high-

pitched sounds, which can be described as shrill, low-pitched sounds, which are bass etc. Examples of high-pitched sounds are: sound of a metallic bell, whistle, voice of children etc. Examples of low-pitched sounds are : sound of a drum, buffalo sound, a normal adult male's voice etc.

**b) LOUDNESS:** This is the psychological attribute of intensity. Higher the intensity louder will be the sound. Thus, we have loud sounds of aeroplanes, orchestra, people shouting etc and soft sounds of whispers, breeze etc.

**c) TIMBRE:** this is the psychological dimension corresponding to the complexity of the sound. This is also referred to as the quality of the sound.

## 1.6 DECIBEL SCALE

Since sound is a form of energy, it can be measured using the derived units like power (such as in WATT) or pressure (such as in NEWTON / METER$^2$ i.e. N/m$^2$ ). It can also be measured using smaller units of the same scale such as dynes/cm$^2$ . However, the energy of the sounds we hear (from softest to the painful sound) is so little that these measures are very impractical and cumbersome to handle. The sound pressure level of the softest sound we hear is 0.0002 dynes / cm $^2$, where as that of the sound which will be painful has a sound pressure level of 2000 dynes /cm$^2$ · which is 10,000,000 (10 million ) times greater. Therefore, a ratio scale comparing the sound in question to a REFERENCE sound level is more convenient. The REFERENCE sound level chosen is the sound pressure level of the softest sound a normal adult human ear can detect, i.e. 0.0002 dynes / cm$^2$ · In humans, the ratio of the highest tolerable sound pressure to the sound pressure that can just be heard exceeds 10,000,000 : 1 Therefore, to make the ratio scale further easy to handle, a LOGARITHMIC RATIO SCALE ( to base 10 ) called as the **DECIBEL SCALE** (dB scale) has been adopted. Thus, for every TEN FOLD increase in the sound pressure level, there is an increase of 1dB only. The logarithmic dB scale also makes the multiplication and division of the sound pressure levels easier. (Please study about logarithmic scale separately for a better understanding of the concept)

**The decibel (Sound Pressure Level – SPL)** is defined as :

**dB (SPL)** = 20 $\log_{10}$ P1/P2 , where in P1 is the sound in question for measurement and P2 is the reference sound ( i.e. with a SPL of 0.0002 dynes / $cm^2$).

Table 1 gives the ratios which are relevant for the human audible range of intensity along with the respective levels in dB SPL .It may be noted that even though the ratios range from 1 to 10,000,000 ( i.e. one to ten million), the dBSPL level ranges only from 0 to 140.

## 1.7 SOME TYPES OF SOUNDS

We hear various types of sounds in our environment. Different types of sounds are used for Audiological evaluation. We also use various types of sounds in training the hearing impaired such as in AUDITORY TRAINING and SPECH AND LANGUAGE TRAINING. Therefore, it is important to know a little about the various types of sound, and their definition so that we can identify them and use them appropriately.

### 1.7.1. Pure Tones

These are the sounds that contain only one frequency .Its waveform repeats itself every 't' seconds. Pure tones are not very frequently heard in our day-to-day activities. However, they are the ideal stimuli for audiological evaluations as information about each pure tone may be obtained.

Examples of pure tones are : the sound produced by TUNING FORKS, PITCH PIPES used by musicians, factory SIRENS etc. Pure tones of 250 Hz, 500 Hz, 1000Hz, 2000Hz, 4000Hz, and 8000Hz are used in PURE TONE AUDIOMETRY.

The waveform of pure tones is as shown in fig. 1.

### 1.7.2 Complex Tones /Sounds

Complex tones are sounds that contain more than one pure tone in a SYSTEMATIC manner. The waveform will be periodic. There will be a pattern in the way the various pure tones are combined and hence the resultant sound is pleasant to hear.

Examples of complex tones are : sounds of the musical instruments, door bell, our speech etc.

The waveform of complex tones is as shown in Fig 2.

### 1.7.3 Noise

Noise is said to be an aperiodic signal because it fails to repeat itself at regular intervals. These sounds contain more than one pure tone / complex sound BUT in a haphazard manner and hence the waveform will not be periodic. Because of the irregularity in the combination of the different sounds, noise is unpleasant to hear.
Examples of noise are : Traffic noise, noise in a market, sound made by electrical appliances such as fans, mixer –grinder etc.

### 1.7.4 Different Types Of Noises

a. **Broad Band / White Noise**: These are signals have equal energy on an average at a wide range of frequencies.
Figure 3 shows the waveform of white noise.

b. **Narrow Band Noise :** Narrow Band Noise has energy in a narrow band of frequencies with maximum energy at a CENTRE FEQUENCY, and systematically reduced energy at the adjacent frequencies of the centre frequency.

## 1.8 ANATOMY OF THE EAR

The ear is described as **A Master Piece of Biological Engineering !!**

We have two ears placed on either side of the head in a symmetrical way. The important parts of the ear are hidden inside the head. What we see outside is only a very small and not so important part of the ear. However, the other parts are much more complex and important. The whole of auditory system covers a length of not more than 4 – 5 inches with in the head. However, this sense organ is considered to be the most complex sense organ. This is the only sense organ which is active even when a person is asleep and is far away from the source of sound.

The Auditory system, generally called as the EAR is divided into 4 parts / portions, namely :

- External Ear,
- Middle Ear,
- Inner Ear, and
- The Auditory Pathway.

### 1.8.1 External Ear

The External ear or the OUTER EAR consists of the PINNA or the AURICAL and the EAR CANAL or the EXTERNAL AUDITORY CANAL (MEATUS).

**a. Aurical :**

Aurical is the part we can see from out side. This is somewhat cone shaped and is attached to the head, on either side, at about an angle of $30^0$ to $40^0$. The deep portion in the center is called as CONCHA. The soft lower portion where one puts on the ear ring is called as LOBULE. The Aurical is made up of ELASTIC CARTILAGE. There is no bone in the auricles. It has blood and nerve supply.

**b. External Auditory Canal:**

This is an `S' shaped tube open at the pinna and closed in side by the eardrum. It measures about 25 – 40 mm in length and has a volume of about 4 cc. The outer two thirds of the canal has cartilaginous base whereas the inner one third has bony base. The canal is lined with skin (EPITHELIAL CELLS). The outer portion of the canal has hairs on the skin. It also has wax-secreting glands called as CERUMENOUS and SEBACEOUS GLANDS. Like any other part of the body, ear canal also has blood and nerve supply.

### 1.8.2 Middle Ear

Middle ear is a small air filled cavity of about 2 cc. Volume. The eardrum (TYMPANIC MEMEBRANE) separates the external ear from the middle ear. The important parts of the middle ear are :

**a. Ear Drum (Tympanic Memebrane):**

This forms the outer wall of the middle ear cavity. It is a very thin membrane of about $1/10^{th}$ mm thickness. It is roundish oval in shape. It is also concave. It has an area of about 85 to 90 $mm^2$. The deepest (center) point of the membrane attaches itself to a little bone (Malleus) inside the middle ear cavity. A small portion of the TM is very thin and is called as PARS FLACCIDA. The rest of the TM is relatively thick and is known as PARS TENSOR.

**b. Ossicles :**

There are three little bones in the middle ear known as the OSSICLES. These three bones are joined to one another and form a CHAIN. This chain of ossicles is suspended in the air filled middle ear cavity. It connects the TM to the inner ear. The three ossicles are :

i) MALLEUS : This is a hammer shaped bone measuring 8mm in length and 25mg in weight. It has a long handle, which gets attached to the TM at a point called as UMBO and a short handle, which is free.

ii) INCUS : This is an anvil shaped little bone with the same length and weight as the malleus. The head of the incus is attached to the head of the malleus. This ossicle also has two handle-like structures. The long one gets attached to the third ossicle STAPES. The short one is free.

iii) STAPES : This is a stirrup shaped bone. This is the smallest bone not only in the middle ear but also in the whole body. This has a small head and an oval shaped FOOT PLATE. Two curved handles giving it the shape of a stirrup connect these two parts. This bone measures only 2.5mg in weight and less than half the length of malleus and incus.

**c. Middle Ear Muscles:**

There are two little muscles in the middle ear. TENSOR TYMPANI MUSCLE is attached to the long handle of the malleus. This muscle is supplied by the $V^{th}$ CRANIAL NERVE (i.e. Trigeminal Nerve). The other muscle is the STAPEDIUS MUSCLE. This muscle is supplied by the $VII^{th}$ cranial nerve (i.e. Facial nerve). This muscle is attached below the head of the stapes.

**d. Eustachian Tube**

This is a tube, which runs from the wall of the middle ear cavity that is towards the center of the head (i.e. ANTERIOR WALL). This tube, which is about 30 to 40 mm in length, connects the middle ear to the NASOPHARYNX (i.e. Upper portion of the inside of the mouth).

**e. Windows Of The Middle Ear**

There are two windows on the inner wall ( i.e. MEDIAL WALL) of the middle ear. This is the wall which separates middle ear from the inner ear.

One is called as the OVAL WINDOW, as it is oval in shape. The footplate of the stapes rests on this window and thus the ossicular chain makes contact with the inner ear. The other window is called as the ROUND WINDOW. This window is covered with a very thin (thinner than the TM) membrane. There is a bony prominence (round in shape) in between the two windows. This part is called as the PROMONTARY. The inner ear is placed behind these structures.

**1.8.3 Inner Ear**

Inner ear is referred to as BONY LABYRINTH as it consists of a set of complicated tubes in it. The inner ear houses both, the organ of hearing called as COCHLEA, as well as the organ of balance called as VESTIBULE. In this unit, our concern is only with the cochlea.

**Cochlea** is a snail shaped bony structure. The snail shape is obtained as the cochlear tube wounds around a central bony pillar like structure called the MODIOLUS two and two third times. The basal end of the cochlea (which is towards the middle ear) is broader and the apex is pointed. Inside, all along this bony coil, there is a membranous tube. The bony cochlea is filled with a fluid called PERILYMPH. The membranous tube is suspended inside this fluid. The membranous tube is also filled with another fluid known as ENDOLYMPH.

This arrangement of the membranous tube lying inside the bony tube results in the formation of three compartments inside the cochlea. Two compartments have bony wall as their outer wall and these two compartments are connected with each other at the apex of the cochlea. This point of connection is known as the HELECOTROMA. The compartment in contact with the oval window is called as SCALA VESTIBULI. The other compartment, which is in contact with the round window, is the SCALA TYMPANI. It is these two compartments, which contain perilymph. The membranous compartment, which is situated in between these two compartments, is known as the SCALA MEDIA. This division contains endolymph. It is this compartment, which houses the end organ of hearing that is called as **THE ORGAN OF CORTI.**

## The Organ of Corti

The Organ of Corti is a cluster of cells situated on the BASILAR MEMBRANE. Basilar membrane is the membrane that separates the Scala Media from the Scala Tympani.

There are, basically, two types of cells in the Organ of Corti. They are, the SUPPORTIVE CELLS and the HAIR CELLS. The hair cells are the most important sensory structures. They have CILIA on top of their cell body and hence get the name HAIR CELL. There are two groups of hair cells separated by some supportive cells called as ROD CELLS. These rod cells make a tunnel like formation and have hair cells on both their sides. The INNER HAIR CELLS are placed in a single row and are few in number, while the OUTER HAIR CELLS are more in number. They are placed in 3 to 4 rows.

There are some important membranes in the Organ of Corti. The membrane which houses the Organ of Corti , as explained earlier , is the Basilar Membrane. There is a leaf like membrane, which hangs over the hair cells and is almost in contact with the cilia of the hair cells. This membrane is attached only on one side and the other end hangs loosely over the organ of corti. This membrane is known as the Tectorial Membrane. There is a very thin membrane that is present at the top of the cell bodies of the hair cells. This membrane is so thin that the cilia penetrate through this and get immersed in the endolymph of the Scala Media. This is the Reticular Membrane. Apart from these 3 membranes, the Scala Media has another membrane which divides it from the Scala Vestibule called as the Reissner's Membrane.

The hair cells are supplied by a complicated network of nerve fibres of the VIII cranial nerve i.e. the AUDITORY or the COCHLEAR nerve. All these nerve fibres join their cell bodies in the SPIRAL GANGLION and

join to form the auditory nerve. This nerve traverses out through the modiolus.

### 1.8.4 Auditory Pathway

The Auditory nerve joins the VESTIBULAR NERVE, coming from the vestibule and leaves the inner ear through a small bony canal called as the INTERNAL AUDITORY MEATUS. It is then referred to as the ACOUSTIC NERVE. This acoustic nerve, along with a couple of other cranial nerves, moves to the BRAIN STEM and ascend up towards the cortex. While moving up in the brain stem, they synapse at various levels of brain stem. In this process, the majority of the nerve fibers from one ear CROSSES OVER to the other side and vice- versa. Then they terminate in the AUDITORY CORTEX in the TEMPORAL LOBE. Thus, the nerve fibers from the left ear terminate in the right temporal lobe of the right auditory cortex and vice- versa.

## 1.9 PHYSIOLOGY OF THE EAR

### 1.9.1 Functions of the External Ear

The functions of the external ear are the following:

- The pinna "collects" the sound and directs it into the ear canal. It also makes the higher frequency sounds (i.e.5000Hz to 7000Hz) a little louder by "RESONATING" it.
- The ear canal transmittes the sound to the ear drum. It also makes certain frequencies (around 2KHz) louder because of its natural resonance.
- The ear canal, because of its "S" shape protects the eardrum from direct injuries from sharp objects.
- The hair and the wax present in the ear canal protects the eardrum by preventing the entry of any foreign body such as insects, worms etc. If they enter, they get stuck to the wax and hence cannot easily reach the eardrum.

### 1.9.2 Functions of the Middle Ear

The sound falling on the eardrum (Tympanic Membrane – TM) sets it to vibration. This vibration in turn vibrates the ossicular chain. When the sound is conducted through the ossicular chain, the footplate of the stapes starts ROCKING. This rocking motion of the footplate of the stapes passes on the vibration to the inner ear. In this process of transmission of sound from the outer ear to the inner ear the middle ear serves the following functions:

- It conducts the sound from outer ear to the inner ear,
- It acts as a TRANSFORMER by conserving and enhancing the sound so that not much energy is lost due to impedance mismatch while transmitting the sound from air media to fluid media ( i.e. to the perilymph in Scala Vestibuli). The transformer action of the middle ear enhances the sound energy up to 27 dB.
- It protects the inner ear in two ways: i) It gives the cushioning effect to the inner ear; ii) the ACOUSTIC REFLEX elicited due to the contraction of the two muscles in the middle ear (i.e. Stapedius and the Tensor tympany ) protects the inner ear from damage due to very loud sounds.
- The Eustachian tube helps to maintain the air pressure in the middle ear. It is maintained at par with that of the atmospheric pressure. This helps in the effective conduction of sound from the outer ear to the middle ear. Eustachian tube also helps to drain out any secretion produced in the middle ear into the NASOPHARYNX.

### 1.9.3 Functions of the Inner Ear

The rocking of the footplate of the stapes due to the vibrations conducted by the TM disturbes the fluid in the Scala Vestibuli. Thus, the mechanical vibrations of the sound is passed on to the inner ear. The fluid (i.e. perilymph ) in the scala vestibuli in turn displaces the Reissener's membrane which separates the scala vestibuli from scala media. This displacement of the thin membrane sets the endolymph to vibrate. When the endolymph is set in to motion, it ends up activating the hair cells in the Organ of Corti. Hair cell activation triggers the nerve impulse in the VIII nerve. This impulse will be electrical in nature and will be conducted along the auditory pathway.

Sound may also reach the inner ear by other routes. Sound can directly travel across the middle ear and stimulate the round window; it can also be transmitted through the bony structures of the skull. Irrespective of the mode of conduction of sound to the inner ear, the inner ear has the following functions :

- It acts as a transformer by converting the mechanical energy (sound vibrations) into electrical impulses by the functions of the hair cells. This process is called as the TRANSDUCTION PROCESS.

- Cochlea has FREQUENCY TUNING function. Thus, at the cochlear level itself the analysis of the frequency of the sound takes place.
- Similarly, the intensity analysis also starts at the cochlear level.

### 1.9.4 Functions of The Auditory Pathway :

Sound converted as electrical impulse is referred to as ACTION POTENTIALS. This is transmitted through the auditory nerve to the brainstem. As mentioned before, the majority of the impulses from the right side cross over to the left side and vice–versa. These impulses carry all the information regarding the frequency, intensity and time of the sound very systematically till they reach the Auditory cortex. Once the impulses reach the various parts of the auditory cortex, the sound will be PERCEIVED AND HEARD. Thus the auditory pathway functions as a RELAY and CONTROL center.

## 1.10 SUMMARY

- Sound is a form of energy . This is a very important form of energy for us as we use this energy to talk and communicate effectively.
- There are three physical parameters of sound namely : **frequency**, **intensity** and **phase.** Frequency is expressed in Hertz ( Hz), Intensity is expressed in db scale and Phase is expressed in degree.
- Decibel scale is a logarithmic ratio scale , constituted to make the measurement of sounds easy.
- We hear sounds from 20 Hz to 20,000 Hz. The softest sound a normal person hears is 0dBSPL , which has a sound pressure level of 0.0002 dynes / $cm^2$ and the sound which causes pain is 140 dBSPL (with a sound pressure level of 2000 dynes / $cm^2$).
- The psychological correlate of frequency is PITCH, that of the intensity is LOUDNESS.
- There are different types of sounds around us namely, pure tones (with single frequency sounds), Complex tones (with more than one pure tones but are periodic and hence pleasant to hear), noise which are combination of sounds in an aperiodic manner and hence unpleasant to hear.

**Anatomy and Physiology of the Ear :**

- The ear is divided into three parts namely, **external ear, middle ear and the inner ear,**
- Pinna and the external auditory canal make up the external ear,
- Middle ear is an air-filled cavity. It has the ear drum and the ossicles,
- The inner ear has both the end organ of hearing as well as the organ of balance,
- The end organ of hearing is called a cochlea,
- The end organ of balance is called a vestibule,
- The auditory nerve starts from the inner ear and carries auditory messages to the brain through the auditory pathway,
- External ear collects the sound and directs it to the ear drum via the external auditory meatus,
- The ear drum and the ossicles vibrate and pass on the sound to the inner ear,
- Both the external ear and the middle ear make certain frequency sounds louder due to resonation,
- The inner ear converts the sound into electrical energy and activates the nerve impulse,
- The nerve impulse is passed on to the brain through the auditory pathway.

## 1.11 SELF STUDY

1. Listen to the sounds in your environment and list them. State whether they are

   a) pure tones, b) complex tones, or c) noise.

2. State the pitch and loudness of each sound you have listed.
3. Study the Logarithmic table to understand the dB concept.
4. list out the types of noise you hear in your environment.
5. Observe the pinna of some persons to remember its shape and parts.

## 1.12 ASSIGNMENTS

1. Find out the intensity level of sounds in the environment in dBSPL from the books listed at the end of this unit.

2. Prepare a diagram of different parts of an ear on a chart paper and label it .

3. "Look into" the ear canal of a subject by pulling the pinna upwards and backwards and try to see the ear drum. Flash a torch to have a better view. Explain why you had to pull the pinna upwards and backwards.

## 1.13 POINTS FOR DISCUSSION

After going through the unit you may like to have further discussion on some points and clarification on other. Note down those points below :

### 1.13.1 Points for Discussion

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### 1.13.2 Points for Clarification

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## 1.14 REFERENCES

1. Bess, F.H., and Humes, L.E. Audiology – The fundamentals. 2nd edition. Williams and Wilkins, Baltimore .1995.

2. Rose, D.E. (Ed) Audiological assessment. Prentice Hall, 1972

3. Yost, W.A. Fundamentals of Hearing : An Introduction, ed 3. NewYork, Academic press, 1994.

# UNIT 2: RECEPTIVE AND EXPRESSIVE LANGUAGE: CONCEPT, TYPES (VERBAL AND MANUAL) AND STRUCTURE

STRUCTURE

## 2.1 INTRODUCTION

You have studied the structure and function of an ear in the previous module. In Audiology by '**normal ear**' we mean the ear of a young adult (from18 to 22 years) which has had **no known pathology or no known history of infection** nor any other kind of **disorder.** In terms of hearing levels -10dB to 20dB is considered as a **normal hearing level. A disorder of hearing** is defined as any **significant deviation** from the behavior of the average normal ear. In this module we shall be concerned with the **medical aspect** of hearing impairment, the causes of various hearing impairments and their treatment. We will also find out the information about incidence of hearing loss in India and the preventive measures that can be taken to reduce this incidence.

## 2.2 OBJECTIVES

At the end of the unit students will be able:

- To differentiate between organic and non-organic hearing loss.
- To explain the types of hearing loss.
- To enumerate the causes of conductive loss.
- To describe the treatment of conductive loss.
- To differentiate between conductive and sensory neural loss.
- To understand the causes of sensori-neural loss.
- To explain prevention of hearing loss.
- To understand the incidence of hearing loss in India

## 2.3 DEFINITIONS OF VARIOUS TERMINOLOGIES

Hearing losses are classified taking into account age of onset, site of lesion, genetic factors, degree of loss etc. The specific terminologies are used to describe the different classes and types. Let us get familiar with these terminologies.

**Organic hearing loss:** The term organic hearing loss implies to a **definite defect in auditory system** (that may be in external, middle, or inner ear or in the auditory nerve ) resulting into hearing loss. Majority of hearing defects fall into this category.

**Non organic hearing loss:** The hearing loss that **is not due to physical impairment** in auditory system is called as non- organic loss. The cause of this loss is rather **psychological** than **anatomical.** This loss is also referred to as **psychogenic or functional hearing loss.** The functional loss may be **combined with organic loss** or in some cases arises from organic loss. Example: Sometimes the patient may have a mild to moderate degree of actual organic loss but behave as if his hearing were profoundly impaired. This patient would be described as having a ' **functional overlay** ' on a true hearing loss.

**Malingerer:** An entirely different sort of assumed hearing loss occurs in the case of the malingerer, who **adapts the role of deafness** or hearing impairment **consciously** and **deliberately** for purposes of his own. Sometimes these purposes are concerned with financial reimbursement for ' injury ' incurred on the job.
The person is well aware of the true state of his hearing.

**Hereditary hearing loss:** Hereditary hearing loss may be defined as the loss caused by **factors present in the genetic make up** of the fertilized ovum. Hereditary hearing loss may be transmitted as a **dominant** or **recessive** characteristic.

**Congenital hearing loss:** Congenital hearing loss means the condition of hearing loss **existing since birth**. Congenital hearing loss may be hereditary or may develop during prenatal or natal period.

**Acquired hearing loss:** The term indicates that the hearing mechanism was normal at one time and hearing loss developed at a **later stage due to some reasons** like severe illnesses, accidents etc. Acquired hearing loss is further grouped into pre-lingual and
post-lingual hearing loss.

**Pre-lingual hearing loss:** The term pre lingual indicates that hearing loss developed **prior to the language learning age**. The hearing loss developed during the first three years of life is considered as pre lingual loss.

**Post-lingual hearing loss:** The term post lingual loss suggests **that hearing loss developed after the language had developed significantly**. Post-lingual hearing loss can be sudden or progressive in nature.

**Sudden hearing loss:** Sudden hearing loss results due to **one time insult** to the auditory system. The damage to the auditory system remains as a permanent hearing loss. Example: Hearing loss developed due to trauma.

**Progressive hearing loss:** This term indicates that hearing loss is getting **worse with time** This may be due to any infection or hereditary disorder. Any significant deviation form the behaviour of the average normal ear can be considered as a **hearing disorder.** The disorders of hearing can result from defects or diseases in outer middle or inner ear or auditory nerve. They are classified into **three major types**, taking into account the part of the ear affected,

**a) Conductive impairment , b) Sensori-neural impairment, c) Mixed Impairment.**

This classification is used by otologists and audiologists for the purpose of diagnosis and treatment. These three types of hearing disorders, their causes and treatment are discussed below.

## 2.4 CONDUCTIVE IMPAIRMENT

Any **dysfunction of the outer or middle ear** in the **presence of a normal inner ear** is termed a **conductive impairment** of hearing. In other words, the difficulty is not with the perception of sound but with the conduction of sound to the analyzing system. **Acquired hearing losses** in children are more likely to be of the **conductive type**. The conductive hearing loss can be congenital or acquired. Some of the common causes of conductive loss are listed below:

### 2.4.1 Causes of Conductive loss

**Conditions of the outer ear:**

a.) **Atresia:** The atresia means absence of external ear. Occasionally **babies are born with missing or rudimentary and occluded canals.** This condition is referred to as **agenesis** of the pinna and **atresia** of the external auditory canal. More often congenital atresia is accompanied by the anomaly of the middle ear as well. Frequently **the drums and ossicles are missing entirely.** By and large children with **congenital atresia have conductive hearing loss** as their inner ear is well developed structurally. However in some cases middle ear anomaly is also associated with deformities in the inner ear.

b.) **Wax in external auditory canal:** The commonest cause of hearing due to the improper functioning of the outer ear is a **blocking or plugging of the ear canal by an excess accumulation of cerumen( wax ).** Ear wax formation and its outward movement towards the pinna is a self- **cleaning mechanism** of the external auditory system. Some people produce much more cerumen than they need for the ordinary protection of the ear drum, with the result that the cerumen builds up into a plug, which effectively prevents sound waves from reaching the ear drum. Sometimes wax gets hardened in the ear canal and becomes impacted.

c.) **Foreign body obstruction:** It is possible for **the canal to be blocked by other substances** besides wax. The obstruction of the external canal by a foreign body may give rise to conductive hearing loss especially in children. The **children may stuff objects** like beans, wads of papers, beads, pieces of crayons etc in the canal. Hearing loss is usually not a major concern in such cases unless the foreign body has ruptured the ear- drum.

d.) **External Otitis:** External Otitis is **an inflammation of the skin** of the external auditory canal, most frequently due to **bacterial or fungal infection**. Usually the canal skin is red and edematous and only a small amount of discharge is present. In some cases the condition may not result in hearing loss however if the **swelling of the canal** is so marked that it obstructs the canal conductive loss will result. Some varieties of **otitis externa** are associated only with dry, scaling canal skin with little discharge.

**Conditions of the middle ear:**

- **Otitis Media:** The **most common cause** of conductive impairment is an **inflammation or infection of the middle ear** known as Otitis Media. There are various types and forms of **Otitis Media** One form produces **retraction** (forcing inward) of the drum owing to lack of sufficient pressure in the ear. The other form of Otitis Media causes the drum to **be distended or forced outward from the pressure** within the ear. The distention of the drum is sometimes caused by the **presence of fluid** in the middle ear cavity, usually as a result of infection in the nasopharynx. The term **serious Otitis Media** refers to various **conditions of the fluid** in the middle ear cavity. **If the fluid is clear and not pus the condition is called as Non-suppurative Otitis Media** and **if the fluid is pus the**

**condition is referred as Suppurative Otitis Media.** The temporary condition of infection and inflammation of middle ear is named as **Acute Otitis Media.** The term **Chronic Otitis Media** is used for the **recurring and frequent infections** of the middle ear. If Acute Otitis Media remains untreated can result into Chronic Otitis Media which may lead to conditions such as **perforation** of the ear drum, **growth of granulation** tissue and **infection** of the temporal bone.

- **Cholesteatoma:** It is a condition associated with Chronic Otitis Media. A marginal perforation of the drum may result in an in-growth of skin forming a **pseudo-tumor** called **cholesteatoma** which invades the middle ear and mastoid space and **can also destroy ossicular chain.**

- **Otosclerosis:** Otosclerosis is a **hereditary disease** that is more **common in females** than in males. The disease begins at a young age. This is a disease process that affects the bony capsule of the inner ear, turning the normally hard bone into spongy bone. Typically the **oval window is covered with bony deposit** and the **footplate of the stapes becomes fixed** in the oval window in such a way that normal movements do not occur. The **fixation of the stapes** occurs **gradually** over a period of years and produces a progressive hearing loss. Usually **otosclerosis** produces a **conductive** type of loss because **of failure of transmission of vibrations** to the fluid of the inner ear. At later stages the disease invades the inner ear and causes destruction of some nerve fibers.

## 2.4.2 Treatment of Conductive Loss

The patients with conductive hearing loss may avail **medical and surgical line of treatment,** which usually can improve the hearing. If inner ear is normal, the cases of **congenital atresia** can be treated surgically. A bone conduction type of hearing aid can also be used temporarily till the time of surgery. Impacted wax or foreign bodies can be carefully removed by otologists.

The treatment for **otitis media** is usually the **administration** of the **antibiotic drugs** in order to control the infection in the ear. If there is any danger that the drum might spontaneously rupture due to the fluid collection, the operation is performed to allow the middle ear cavity to drain. This operation is called **myringotomy**. Sometimes the surgical

procedure called **tympanoplasty** is done in order to **improve hearing** through **repair or reconstruction of damaged parts of middle ear**. In chronic Otitis Media with drainage through a perforation and possibly with the presence of cholesteatoma, there is always the danger that the infection or the growth will reach the covering of the brain and cause meningitis or other complications. It may be necessary for otologists to perform an operation called **mastoidectomy** as a **preventive measure**. The surgical procedure used for Otosclerosis to restore hearing is called as **Stapedectomy**.

## 2.5 SENSORI-NEURAL IMPAIRMENT

When the loss of hearing function is due to **pathology in the inner ear** or along the nerve pathway from the inner ear to the brain stem, the loss is referred as **sensori-neural impairment** (also written as sensorineural or sensory-neural). A pure sensori-neural impairment exists when the sound conducting mechanism, i.e. the outer and the middle ear is normal in every respect. In other words, sound is conducted properly to the fluid of the inner ear but it cannot by analyzed or perceived normally. **Sensori-neural impairment** can be **present at birth** or can be **developed in the later stage of life.**

### 2.5.1 Causes of Sensorineural Loss

Some of the causes of sensori-neural impairment are listed below:

- **Heredity:** Some cases of congenital sensori-neural loss may be attributed to heredity, **A defect in the genes.** Genes are found in chromosomes in the nuclei of all the cells that compose our body. Hereditary **hearing loss** may be **transmitted** as a **dominant** or **recessive** characteristic.

  Heredity appears to be responsible for a fairly consistent percentage of hearing loss cases. Such hereditary factors involve epithelial cells that are destined to form the inner ear. This may take the form of a **failure to develop specialized cells** that form the nerve element of the Organ of Corti, or there may be a tendency toward **early degeneration** of the fundamental cells. The mechanism by which this defect is transmitted in the blood- line is the same as that for such things as hair colour, facial features etc.

  Hereditary **hearing loss may be associated** with other stigmata such as renal involvement, degenerative diseases

of nervous system, mental retardation and metabolic abnormalities etc.

- **Damage to the Embryo in Utero( pre-natal causes ):**

Many times, **congenital deafness** can be explained in the terms of **damage to the Embryo in Utero.** It is known, for example that when the mother incurs certain diseases early in pregnancy, usually during the **first three months of pregnancy**, the **embryo** is subject to **injury** of various sorts, including impairment of the hearing. **German Measles** (rubella) is one of the most **insidious diseases** in its effects on the embryo. It may produce such anomalies, singly or in combination, as deafness, blindness, cleft palate, cerebral palsy and mental deficiency. The other diseases incurred by the mother during pregnancy and having harmful effect on the embryo are influenza, toxoplasmosis, bacterial meningitis.

Maternal alcoholism and drug addiction is also known etiological factors of hearing loss. Maternal irradiation, toxemia, diabetes and severe systemic maternal illnesses have been documented as causes of hearing loss. Maternal **use of certain drugs** such as quinine and salicylic acid (derivatives of which may be used to relieve pain) may **affect the fetus** and lead to hearing loss.

- **Natal Causes (causes occurring during the process of birth):**

  - **Hemorrhage** occurring **during the process of birth** and **shortly after birth may be responsible** for hearing losses. There are numerous causes for hemorrhage including trauma from prolonged or rapid delivery, caesarian section, breech presentation, other abnormal birth conditions and inept obstetric practice. Another common cause of injury is **oxygen deprivation** (anoxia) **and failure to breathe** (apnea) during the process of birth. The **blood abnormalities** (high level of bilirubin and jaundice) caused by **Rh incompatibility**, which may be present when certain differences in blood type exist between the parents can lead to hearing loss.
  - **Infectious diseases:** It has been found that **bacterial and viral infections** can **destroy cochlear hair** cells leading to permanent hearing loss. The diseases that may cause sensori-neural impairment include measles, mumps, scarlet fever, diphtheria, whooping cough, and any of the unnamed viral infections.

- **Drug Induced Hearing loss:** There is a group of **ototoxic drugs** which has a predilection for causing **cochlear and in some cases vestibular damage**. Drugs that are particularly toxic to the ear are certain antibiotics, salicylates and quinine. Streptomycin, which is prescribed for cases of tuberculosis, is a vestibulo toxic and ototoxic drug. The drugs such as kanamycin, neomycin, gentamicin and viomycin are ototoxics and should be used in treatment when no non- toxic drug is available.

- **Noise induced hearing loss:** As the civilization has progressed, the noise in the human environment has increased. The **adverse effects of noise are widespread** with respect to human physiology and produce changes in many bio-systems including ear. **Traumatic noise levels** invariably affect the hearing threshold at **4000 Hz** first and as the **exposure continues the damage extends to other frequencies.** There are many occupations in which the workers are subjected to extremely noisy environment and are susceptible to noise induced hearing loss that is caused due to damage to the hair cells in cochlea. The use of **ear- muffs and ear-protectors is recommended for such persons**. Exposure to **intense noise** for even **brief periods** can also **cause permanent damage** to the nerve fibers in the cochlea.

- **Presbycusis:** Presbycusis is a sensori-neural loss caused due to degenerative changes of aging. It is the most common cause of sensori-neural loss in the adult population. Recent statistics show that hearing impairment can occur in as many as 25 % of those in the age group of 65 to 70 years. This percentage can increase up to 40% in the age group over 75 years. The **degenerative effects** of aging **can involve variety of locations and cell types in cochlea.** It is for this reason that presbycusis in some individuals may be mild to moderate whereas may be profound for some other individuals.

- **Meniere's disease:** This is a condition confined to the middle ear and a cause of sensori-neural impairment. The symptoms of Meniere's disease are tinnitus, vertigo (dizziness) and hearing loss. The immediate cause of these symptoms is apparently an **increased fluid pressure** within the

  **Membranous labyrinth** hence the disease is also referred to as **endolymphatic hydrops.**

### 2.5.2 Treatment of Sensori-neural Loss

**The inner ear structure** has been considered as the most **complex structure** in the body. Any effect in the inner ear is permanent in nature. **The inner ear defect cannot be cured, controlled or rectified by any medical or surgical intervention.** The term sensori-neural is self-explanatory and means that sensori system is affected. The persons with sensori-neural hearing impairment are advised to use amplification device i.e. **Hearing aid.** The congenital hearing loss or pre-lingual hearing loss had adverse effects on speech and language development of a child. Early identification of such hearing loss is essential so that the **rehabilitation process** can be started as early as possible. The rehabilitation program includes fitting of hearing aid, auditory training, language stimulation, speech correction, parental counseling etc.

Some children with no recordable hearing and not benefiting from hearing aid may be tried with **cochlear implant**, if otherwise found suitable.

## 2.6 MIXED HEARING IMPAIRMENT

There are many instances of persons exhibiting symptoms of both conductive and sensori-neural types of loss. An elderly patient with presbycusis may also have some conductive loss because of otitis-media or an otosclerotic may have some secondary nerve involvement. Such cases demonstrating some degree of both types of hearing loss are referred to as mixed impairment. The term **mixed hearing loss refers to hearing loss due to involvement of inner ear as well as outer or middle ear.** A patient with mixed hearing impairment shows some **loss by bone conduction but a greater loss by air conduction**. The treatment of mixed impairment can vary from patient to patient and decided by an otologist. The treatment could be medical, surgical or use of hearing aid.

## 2.7 INCIDENCE OF HEARING LOSS IN INDIA

The incidence of hearing impairment in India is **quite alarming**. Even though the exact figures are not available, several studies have documented the incidence of hearing impairment to be between 6.8% (ICMR Study, 1983) to 37% (Jain, 1967). Stated below are the various studies conducted and the incidence of hearing loss found (ref. status of disability in India 2000, page 106)

**Reported Incidence of Hearing Impairment in India**

India is a vast country. To reach out to masses has been one of the challenging tasks. We have yet to know the exact number of hearing impaired persons.

A comprehensive country wise sample survey of persons with disabilities was undertaken by National Sample Survey Organization. (NSSO), in its 36th round in 1981. Another survey was conducted by NSSO in 1991 to estimate the magnitude of disabilities of the people in India. Estimated hearing and speech disabled number is shown in table given below.

**Estimated number of disabled persons in India: 1991**

The survey has also estimated the causes of various disabilities, the findings are **summarized in the following table showing per thousand distribution of persons with** hearing impairment separately for rural and urban areas.

## 2.8 PREVENTION OF HEARING LOSS

**Prevention** of hearing loss is **not yet an organized activity in India**. However certain important measures are bound to alter the incidence of hearing loss in India. **The actions need to include:**

1. **Immunise** all adolescent girls and women in child- bearing age against Rubella.
2. **Avoid** consanguineous marriage in families.
3. **Increase facilities** for early detection of pregnancy and to know the Rh- factor.
4. **Encourage** hospital delivery.
5. **Educating** the medical doctors on the need for judicious use of ototoxic drugs while treating patients especially pregnant woman and infants.
6. To carry out **immunization programs** against diseases like mumps, measles, tuberculosis etc.

7. **Creating awareness** regarding noise induced hearing loss among the masses especially among those who are working in noisy surroundings. **Encouraging** the use of ear-protectors and ear-muffs among people working in environment where the noise levels are injurious to hearing mechanism.

A **World Health Organisation (WHO)** 1980 report summarizes the **main causes** of hearing impairment as **infection, neglect and ignorance.** Low socioeconomic conditions, inadequate health care and malnutrition are the factors responsible for the above mentioned causes. According to WHO document of 1980, three levels of prevention are defined as follows:

- **Primary prevention** that includes the action aimed at preventing the impairment from occurring.
- **Secondary Prevention** that includes the action to be taken once impairment is present either to cure the disease or to control it. Example: Treatment of Otitis Media.
- **Tertiary prevention** includes habilitation and rehabilitation aimed at compensating for the hearing impairment by the use of amplification. It also includes special education, vocational training, and counseling to the parents of the hearing impaired.

The national and collaborative efforts for prevention of hearing impaired are a part of general measures undertaken for the prevention of all disabilities. Some of the measures which are carried out are mentioned below:

- **National measure of immunization:** Expanded program of immunization was launched by the WHO in 1974 and was implemented in India in 1978 with the collaboration with WHO. This is also one of the programs incorporated in National Health Policy of 1983. The universal immunization program is aimed at control of vaccine preventable diseases namely diptheria, pertussis, tetanus, tuberculosis, poliomyelitis and measles. **Hearing impairment is a sequel** of some of these infectious diseases or hearing impairment may result due to ototoxic drugs administered to manage the disease. **Implementation of this program is resulting in reduction in the incidence of hearing impairment** to some extent by controlling the infectious diseases.
- **National Iodine deficiency disorder control program:** Iodine deficiency is reported to result in several disorders like goiter, mental retardation and hearing impairment.

The population of Sikkim was screened for hearing loss (Roy Etal, 1991). It was found that 42.47% of the Iodine deficient population studied had hearing loss, especially for higher frequencies (3000Hz, 4000 HZ and 6000 Hz). **National Iodine Deficiency Disorder Control Program helps in prevention of hearing impairment by controlling the cause of deafness.**

- **Child survival and safe motherhood program:** This program was launched in 1992-93 as a seven year project with the financial assistance of World Bank and the UNICEF. The aims and objectives of the project were:-
  - **Sustaining and strengthening universal immunization program**, oral re-hydration therapy to control diarrhoea.
  - **Improving the maternal care** at community level by providing training to the traditional birth attendants and providing disposable delivery kits.
  - **Control of acute upper respiratory track** infection for children below five years of age.
  - **Setting up sub district level first referral units to attend emergency cases**. These projects aim at hygienic deliveries and immunization of the newborns that helps in early detection and control of infections. Indirectly this program is useful in controlling the causes of hearing loss.

## 2.9 EFFECTS OF HEARING LOSS

The **overall impact** that a hearing impairment will have on a life is greatly influenced by the age **of onset,** the **age at which** the hearing loss was **diagnosed, degree of impairment,** the **etiology.** The child who loses his hearing at the age of 4 or 5 years after he has acquired speech and language, obviously will not be as handicapped as the child who has hearing loss from birth. Since hearing loss may range quantitatively from mild to profound, it is axiomatic that the **greater the loss the greater the handicap.**

**The effects of hearing loss are discussed below:**

- **Hearing is a prerequisite for the development of normal speech and language.** A child with normal hearing learns to speak by **listening to** the speech and language stimulation provided in his environment and **modeling** his own utterances in an orderly sequence as he grows. The average child will have achieved **basic competency** in his or her primary language by the age of **about**

**3½ years.** By about seven years of age the speech and language development is almost complete but the process of hearing continues to help the child in overall learning and act as the **primary feedback mode for monitoring speech throughout the life.**

The children with hearing loss run the **risk of failing to learn** language at the normal time or rate because the learning of language is a **primarily auditory event.** The hearing impaired children have deficit in **vocabulary depending upon he degree of hearing loss** while general vocabulary knowledge increases with age the **gap** between children with normal hearing and the children with hearing loss in word usage **widens** as the children grow older. Children with hearing loss do not learn as much incidental vocabulary as do children with normal hearing. **Hearing impairment affects the acquisition of grammatical rules** for use in comprehension and expression of spoken language.

- The process of hearing is useful as a primary feedback mode for monitoring speech throughout the life. The children who have mild to moderate hearing loss exhibit **misarticulations**, similar to those of children with normal hearing, who have developmental disorders of articulation. Children with severe to profound hearing loss produce fewer consonants and develop them later than children with normal hearing. Abnormal patterns of speech rhythm may constitute the most deviant aspect of speech for these children.

- **Deficits in communication functions, interferes** seriously with **educational process** during the early years and in all school years to follow. Any degree of hearing impairment can put a child at a risk for **reduced academic achievements.** The underlying cause of poor academic achievement is the language deficit incurred as a result of hearing loss. The children with hearing loss may **demonstrate reduced performance** in those academic subjects that are language based and / dependent on the ability to learn new information through reading. Even mathematic performance is affected although to a lesser extent than are other subjects.

- A barrier to the child's progress that is second in importance only to oral language is **a failure to learn to read.** Practically all of the information not presented to the child in the form of oral language will reach in printed form as a general rule. The children with severe hearing loss do not exhibit sufficient knowledge of

language to ensure a basis for the normal development of reading skills. For children with hearing loss, the task of learning to read is a duel one. They are expected to learn language and reading simultaneously.

- The children with hearing loss do not follow conversation and occasionally not aware that they are being spoken to without facility with spoken language, these children depend upon the goodwill of adults, both teachers and parents, to interpret, rephrase and verbally mediate when necessary. The inability to hear and react appropriately makes them unpopular and their friends may avoid them. The end result is one of social isolation and the reduced self-esteem that occurs due to which they feel rejected by those children with whom daily interactions are necessary. It is the reaction of the family, peers other adults and poor communication that contribute to **social adjustment difficulties.**

- **Effects of hearing loss on parent child interaction:** The parents are impacted emotionally by confirmation of hearing loss. The common reactions of parents include grief, denial, anger, depression, guilt etc. Some parents tend to **overprotect** their child and exempt him from discipline. Some parents make **constant apology** for the child, cover up his hearing defect or keep him from the public eye. Acceptance of the hearing impaired child is of cardinal importance. Parents should **accept the hearing handicap unreservedly** as they have to play an important role in rehabilitation program of their child.

- The goal for all children with hearing loss must be **early detection** followed immediately by **appropriate intervention.** The development of language is the foundation for all other aspects of human behavior, growth and development. **Without language subsequent effects** are seen in the academic achievements and social developments. Through **early detection** and **appropriate intervention** we must work with children and their families to enable them to **achieve optimum personal development.**

## 2.10 LET US SUM UP

- Different terminologies are used to describe hearing losses.

- Hearing impairments are divided into three types: conductive, sensori-neural and mixed.
- Conductive loss is due to defect in the outer and/or middle ear.
- Conductive loss may be amenable for medicine or surgery.
- Sensori-neural hearing loss is due to the defect in the inner ear or in the auditory nerve.
- There is no known medical or surgical cure for sensori-neural loss.
- Usually the persons having sensori-neural loss are advised to use hearing aid.
- Mixed hearing loss refers to hearing loss due to involvement of inner ear as well as outer or middle ear.
- The incidence of hearing impairment in India is quite alarming.
- The incidence of hearing loss can be controlled by taking preventive measures.

## 2.11 SELF STUDY

1. Differentiate between the following terms:
   a. Pre-lingual and post-lingual loss.
   b. Organic and non-organic loss
   c. Congenital and acquired loss
   d. Sudden and progressive loss
2. Enumerate the causes of conductive loss
3. Describe the nature of treatment used for conductive hearing impairment.
4. Differentiate between Conductive and sensori-neural loss.
5. Discuss the etiology of sensori-neural hearing impairment
6. Why a hearing aid is recommended for a case of sensori-neural hearing loss?
7. Write a short note on mixed loss
8. What preventive measures can be taken to reduce the incidence of hearing impairment in India. ?
9. Discuss the effects of hearing loss.

## 2.12 ASSIGNMENT

a) Describe causes and treatment of conductive hearing loss.

b) Define sensori-neural loss and innumerate its causes.

c) Describe how hearing loss can be prevented.

## 2.13 POINTS FOR DISCUSSION AND CLARIFICATION

After going through the unit you may like to have further discussion on some points and clarification on other. Note down those points below :

### 2.13.1 Points for Discussion

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### 2.13.2 Points for Clarification

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## 2.14 REFERENCES

1. Audiology by Hayes A. Newby
2. Handbook of clinical Audiology by Jack Katz.
3. Status of Disability in India 2000

# UNIT 3:
# DEVELOPMENTAL MILESTONES IN TYPICALLY GROWING CHILDREN; IMPACT OF DEAFNESS ON COMMUNICATION AND LANGUAGE WITH REFERENCE TO CLINICAL (TYPE, DEGREE, ONSET) AND ENVIRONMENTAL (PARENTAL PARTICIPATION, ACCESS TO LANGUAGE EARLY INTERVENTION SERVICES) FACTORS

## STRUCTURE

**3.13 References**

## 3.1 INTRODUCTION

Hearing loss can develop due to various pathological conditions. At the **outer ear** level there could be excessive formation of wax or an obstruction due to a foreign body. At the **middle ear** level, there could be infection, discharge or ossicular chain discontinuity. At the **cochlear** level, the hearing loss can occur at birth or may occur due to certain infections.

**The degree of loss may vary in individuals.** Some individuals may display mild hearing loss, others may exhibit severe hearing loss. The effects of hearing loss could also vary. One person may develop poor language skills, another may have difficult in localising the source of sound. One child may display poor academic progress, while another may develop poor self concept and may lack self confidence.

**The objective is to learn more about hearing evaluation techniques.** There are various types of hearing tests. Some tests are aimed at identifying the hearing impaired individuals. Other tests help to study the type and degree of hearing loss in details. The interpretation of some tests depends upon the subjects responses. In other tests, the test interpretation does not depend upon the subject's responses.

In this unit, we shall be discussing different tests, their merits and de-merits and how these tests can be used for early identification of hearing impairment.

## 3.2 OBJECTIVES

At the end of the unit students will be able

- to understand need for hearing evaluation
- to describe objectives of various tests
- to enumerate difference between informal and formal test
- to understand high risk criteria
- to list various symptoms of partial hearing loss
- to elaborate formal subjective test
- to explain need for objective tests
- to select appropriate test for various age groups.

## 3.3 OBJECTIVES OF HEARING TESTS

Why do we test one's hearing ? Isn't it sufficient for an E.N.T. doctor to examine the ears to draw his conclusions ? The fact is that the doctors can only examine the **physical structure** or the condition of the ear. This is also limited to these areas which are **visible**. But this examination does not give any information about the **functioning** of the system. An EN.T. doctor can not examine the inner ear with simple instruments in his clinic. It is the **physiological function** ,which tells us more about the function and the capacity of the inner ear. There is a need to perform certain tests, to interpret the results and to give more definite answer, regarding whether the hearing is normal or abnormal. If the hearing mechanism is abnormal, then it is essential to know the degree and the type of hearing loss. The objectives of hearing tests can be stated as follows :

- **Early identification of hearing loss** : A child needs to have **normal** hearing sensitivity to achieve normal and age-appropriate language development. Various medical conditions may lead to hearing loss, which will ultimately affect language development of a child. It is important **to identify** this condition at a **very early stage** so that rehabilitation can begin at an early stage. It can be done in the hospital or in the primary health centre. Such tests are called **screening tests**. Screening is the process of applying a test to a large number of individuals. The procedure should be simple, fast and should be capable of identifying probable hearing disorders.

- **Medical diagnosis** : Another important purpose of a hearing test is **to assist in medical diagnosis**. The audiologist performs and interprets the test results to find out whether the auditory system is normal or not. If the system is not normal, what type of problem does one have ? Does it involve the outer/middle/inner ear ? Is it the degree of loss mild/moderate or severe type ? The test results give information about the hearing mechanism **qualitatively and quantitatively**. This diagnosis helps the doctors to **understand the problem and to plan treatment**.

- **Monitoring of hearing status** : The purpose is to understand the **changes in hearing capacity over a period of time**. People who have a long - standing history of exposure to loud noise, or who have been working in a noise - hazardous environment. These are usually people working in a military or factory environment and are likely to develop hearing loss over time. It is essential to **monitor** their hearing sensitivity on a **regular basis**. Similarly, cases with progressive hearing loss, or those who have fluctuating hearing loss, need to be monitored for their hearing status.

- **Auditory fitness** : Hearing assessment and a proper diagnosis are essential to understand a person's **auditory fitness**, i.e. his hearing capacity, certain jobs such as telephone operators, pilots and armed forces personnel require good auditory skills. Only if the hearing tests display normal hearing, the person would be accepted for such jobs.

- **Planning of rehabilitation program** : The hearing tests give information about the degree of loss. This helps to plan the rehabilitation programme; selection of hearing aid and fitting of the hearing-aid. A complete assessment of a hearing impaired child would help to plan whether he requires special or integrated schooling. The programme will also help the child's speech and language development.

## 3.4 TYPES OF HEARING TESTS

There are various types of hearing tests. These can be classified into different groups. Each classification uses a different criterion. There are various instruments used to perform the tests. These instrumentation vary from very simple tools to the most sophisticated; computerized tools. All these tests have a **common aim, - to find out the hearing capacity**. Each test has its own merits and demerits. We need to study these tests and to understand their utility.

## 3.5 INFORMAL HEARING TESTS

An informal test is based on **behaviour observations** of a subject in response to various auditory stimuli . This test has a single objective - **'early identification of hearing loss'**. This test can be performed on **new-born** babies in the hospital. It can also be performed at primary health centres, and on **school-going** children in the school environment. Informal hearing tests can be performed by a semi-skilled person, **who has a basic knowledge about child development and auditory behaviour of various age group**. An informal hearing test assesses whether a child has normal hearing or has a probable hearing loss. In other words, this procedure **only identifies** potential hearing loss cases, but this test procedure **does not measure** the degree of hearing. Screening for hearing sensitivity has been an acceptable practice since 1927. At that time, screening tests were carried out on children at the age of two to five years; Now, sophisticated hearing tests have made it possible to assess hearing sensitivity of new born babies as well. Informal tests are commonly carried out on infants and children under two years of age; but the tests can be performed on school-going children as well. To perform hearing tests on all children will be very time-consuming and may not be cost-effective. A question arises, who should be chosen for a hearing test ? The next point will answer this question.

### 3.5.1 High Risk Criteria

Children who are likely to have hearing disorders are the ones who have a **strong family - history** of hearing problems or who have a **significant history of certain illnesses**. There are some children who have had a problem at the time of birth, or have had a problem immediately after birth. These conditions are grouped in a category known as '**High Risk Criteria**'. Following are the few conditions associated with the high risk group.

1. **Hereditary Hearing Loss** : There is one or more hearing-impaired persons in the family.
2. **Consanguinity** : Marriage of parents is between close relatives. e.g. first cousins.
3. **Rh Incompatibility** : Two different blood groups, of mother and baby (foetus) which are not acceptable because of basic differences.

4. **Prematurity** : Birth of a child before completion of normal pregnancy period.

5. **Low birth weight** : Weight of a baby at birth is considered as low if it is less than 1500 gm.

6. **Asphyxia** : The child does not breathe, or has difficulty in breathing, immediately after birth.

7. **Hyperbilirubinemia** : The child develops severe jaundice immediately after birth.

8. **Birth defects of ear, nose, throat** : The child may have congenital atresia (absence of external ear), cleft palate and or lip.

9. **Severe Infections:** Infections in the early weeks after birth : e.g. meningitis, measles.

10. **Birth defects of head ,face ,and neck** The child may have small head, or abnormally large head

The above stated conditions are likely to be associated with hearing loss - hence a hearing check for those cases is essential. However, hearing loss is only one of the disabilities associated with the above group. **These children may also be likely to display mental retardation, visual impairment, or cerebral palsy**. The tester must be aware of this fact, so that early detection and rehabilitation is possible. This early detection of hearing loss is possible by way of informal hearing tests.

**Informal hearing tests for various age groups** : Children respond to various auditory stimuli differently. Their **response** pattern **varies** with age. The Auditory system of human beings starts **functioning** when the **baby is in womb**, and it **matures** with age. **Generally, by eighteen months of age, the auditory system reaches maturity and starts functioning as an adult auditory system.** Naturally, auditory response varies from birth to two years of age. It is important to define the auditory response patterns of various age groups.

### 3.5.2 Arousal test

A simple arousal test, using a high intensity signal **to awaken** the infant, has been accepted as a test for hearing screening. A baby who is in a light sleep normally gets **disturbed, or gets startled**, when loud sounds are presented. The stimulus can be a clap or a bang.

The loud sound should be presented at a distance of one foot, and the response should be observed. If the baby gets disturbed or gets startled; the child's hearing sensitivity is likely to be normal. Other body reactions may be opening of the eyes; a stirring movement of the whole body, indicating arousal from sleep; or a strong and immediate eye-blink followed by one of the above responses. These responses should be elicited two or three times during the procedure. If the child repeatedly fails to respond to sound, formal hearing test is recommended.

### 3.5.3 Orienting Test

Sir Alexander and Lady Ewing (1944) were the first to describe orienting responses in infants. They had recommended the use of various noise-makers. (such as a toy-xylophone, a cup and a spoon, a rattle, tissue paper) and voice and unvoiced consonants. The responses they described are time tested. These are eye-shifts, or head-turns towards the sound. **These response patterns get well defined with age.**

### 3.5.4 Informal Test for Various Age

The expected responses of a normally hearing child to various sound stimuli at different age levels are :

- **Birth to four months of age** :- A simple arousal test using a loud sound to awaken the child has been accepted as an informal hearing test. In addition, to this, widening of the eyes, eye blink, frowning etc. are other common body responses. If the child fails

to respond to three successive sound presentations, refer the child for a formal hearing test.

- **Four to seven months of age** :-. This stimulus should be presented out of the child's field of vision and at a distance of one foot.. **An immature head turn in a horizontal plane, or a wobble of the head,** is observed as a response to sound. This response pattern **gradually matures,** and around six months of age the **head turn is definite.**

Normally by this age, the child responds **to familiar voices** of parents and of siblings. He smiles, stops crying and interrupts his play when he hears these familiar voices. The mother should be asked whether her child is responding in this way. If the child fails to respond, a formal hearing test is required.

- **Seven to twelve months of age** :- The sound is presented in various planes, such as at the side, below the child and indirectly above, at a distance of one foot from the child. The sound should not be presented within the child's field of vision. The response expected from a child with normal hearing would be a turning of the head towards the source of the sound.

By this age, the child can understand the meaning of the word 'no'. **His babbling** (i.e. vocalizations like ba-ba-ba, da-da-da) **increases.** By the age of ten months, he will look towards the object named. If you ask, "Where is the ball ? ", he will look around for it. The parents have to be asked whether the child is **capable of making such responses.**

- **Thirteen to twenty-four months of age** :- The child of one year of age or above demonstrates **orientation to the sound source by locating a sound, presented at any angle. The full maturation** of the auditory behaviour of the child occurs at about **eighteen months,** and does not change significantly after that. **Spontaneous expressive language** i.e. speech development, is another strong indicator for normal hearing sensitivity. But specific information from the informant can help to give a better idea of the child's ability. The informant is asked the following questions

1. Does your child respond to simple instructions?
2. Does he identify and does he name body parts?
3. Does he try to communicate simple sentences?
4. What is his vocabulary size ? (10 words, 20 words)

5. Does he try to imitate simple nursery rhymes?

6. Does he use too many gestures?

7. Do the parents need to use many gestures for the child to understand them ?

If the answers are negative to the above first five questions, and positive to the last two questions it is advisable to refer the case for complete diagnostic audiological evaluation.

**Remember : If the informal method results point to a possible hearing problem, formal tests of hearing have to be performed.**

- **Behavioural symptoms of hearing impairment in older age group children** (Two years and above age ) :-

A **severe to profound** hearing loss can be **detected** very easily, as the symptoms are obvious. However, a **mild or a moderate** loss may go **undetected**. These children may be labelled as 'dull', 'stubborn', 'inattentive'.

If a child presents any of the following symptoms he may be having a possible hearing loss. If any of these are detected, he should be referred for formal hearing tests. The teacher and parents can use the following **check - list** to identify hearing impaired children.

The Symptoms are :

1. The child has problems paying attention in the school.

2. The child finds it difficult to understand speech if presented behind him.

3. He may answer questions irrelevantly.

4. Repetitions of speech may be required before he can follow an instruction.

5. The child puts the TV / Radio too loud.

6. The child does not respond if called from another room.

7. He hears only when he wants to, 'is a very common comment by parents and teachers.'

8. The child may display poor vocabulary and grammar.

9. He may exhibit voice problems and mispronunciation.

10. The child may speak too loudly or too softly.

11. The child may not mix easily with other children of his age.
12. The child may favour to use one of the ears for listening purposes. e.g. He always turns his right ear towards the source of sound or speech.
13. He performs better in school if placed in the front row.
14. The child uses too many gestures.

**If the answer is yes to 50 % of the above symptoms**, the child may have a hearing problem, and he should be sent for formal hearing tests.

### 3.5.5 Merits of informal hearing tests

1. No special instruments are required.
2. The test can be performed in a short time.
3. Do not require trained professionals to carry out the test.
4. These are cost-effective techniques.
5. These are useful in early identification of hearing loss.

**Demerits of informal hearing tests**

1. These tests do not provide a definite conclusion about the hearing status.
2. These tests do not give any definite diagnosis about the type or degree of hearing loss.
3. False results may be frequently seen.
4. Test - retest reliability varies significantly.

An informal hearing test has the **single objective** of **early identification** of hearing loss. In a country like ours, where people have difficulty in getting access to necessary services, an informal test carries significant importance. If the subject fails in an informal test, he should be referred for formal hearing test. Before we start on formal hearing tests, we need to take a complete case history of the subject. This may give an indication of the cause of hearing loss. Similarly, a physical examination of the ear by an ENT doctor is essential.

**Fig II**

## 3.6 PRE-REQUISITES OF A FORMAL HEARING TEST

Before a hearing test is actually performed, certain basic procedures need to be followed.

(a) **Examination by an ear specialist** :- It is necessary for a doctor to **examine** the ears to detect any **anatomical or pathological** anomalies which may be present. When the ENT specialist examines the ear, he uses an instrument called an '**otoscope**'. This instrument has a magnifying glass with an attached light; when it is inserted in the external ear canal, the doctor can see the magnified structures clearly. It is essential to remove any obstructions (e.g. wax, foreign body) which may be present in the ear canal, before the hearing test is performed. The doctor can examine the **tympanic - membrane**, and can draw some conclusions about the middle-ear status.

**Case History** : The case-history helps to obtain certain **relevant information**, about the patient's problem. An adult patient is questioned regarding the **medical aspects** of the problem, such as duration of the problem; pain in the ear, a discharge from the ear, and other signs of hearing loss. And medical problems such as **diabetes and hyper - tension**. All this information is useful in the hearing test results. This helps to reach a diagnosis of the hearing disorder. In case of a child, family members can be asked a few questions about the child's general health, his birth history, any other major family history for hearing loss etc. **This information is valuable to understand the cause of deafness, and to plan remedial measures to the extent possible.**

## 3.7 FORMAL HEARING TESTS

These tests are carried out using simple or elaborate equipment. The tests are performed by professionals. There are two subgroups under formal hearing tests. They are **subjective** hearing tests and **objective** hearing tests.

### Subjective Hearing Tests

**Hearing is a very personal experience**; The subject needs to actively indicate that he has heard the sound. The individual has to **actively participate** in the test, along with the tester. Naturally the subject himself should meet certain basic requirements, to participate in these tests. **Basic requirements** for participation in the formal hearing test are , the subject should **understand all the instructions** given to him prior to the test. He should have the **desired attention - span**, and should have **focussing skills** to listen and to respond to various auditory stimuli.

An individual needs to wear headphones to listen to various stimuli and he needs to keep those headphones on for a certain length of time, at least a minimum of ten minutes. **The hearing tests, which involve subject's active participation, are called ' subjective tests'.**

**Types of Formal Subjective Hearing Tests** : These are the **diagnostic tests**. The instrumentation, procedures and interpretations of the test results are **standardized**. These tests have **universal acceptance** in the medical, audiological and educational field. There is a well-developed test battery, which includes tuning fork test, pure tone audiometry and speech audiometry among others. These tests have **strong reliability** and **validity**. These are the important tests used in the clinical and rehabilitation fields.

### 3.7.1 Tuning Fork Tests

Tuning forks are very **simple instruments**, used even today by E.N.T. doctors. They have been used for over two centuries. The forks are of **different sizes and frequencies**. These frequencies are 256 Hz, 512 Hz, 1024 Hz, 2048 Hz and 4096 Hz. Tuning fork tests are effective tests for **qualitative** evaluation. A doctor can diagnose conductive loss or sensorineural loss in his office, and can plan a line of treatment immediately after the test.

**There are two basic tests with tuning forks. These are Rinne' test and Weber test.**

#### Rinne' Test

Compares the hearing sensitivity of a subject **via air conduction and bone conduction**. The qualitative comparison of these two modes of hearing, gives information about conductive hearing loss and sensori-neural loss.

#### Weber Test

Compares the hearing sensitivity **via bone conduction in the two ears**. Weber test is generally performed to support Rinne' test findings.

#### Merits of Tuning Fork Test

1. The test helps in qualitative evaluation of the hearing loss.
2. It uses very simple tools.
3. The test requires no special test room.

4. There is no recurring cost involved.

5. The test can be performed in a short time.

**Demerits of the Tuning Fork Test**

1. The test findings can not give quantitative evaluation.

2. False responses are common.

3. This test can not be performed on small children.

4. The test is difficult to perform on severe to profound hearing loss cases.

5. The test requires active participation of the subject.

### 3.7.2 Pure Tone Audiometry

Pure tone audiometry is the **well accepted diagnostic** test. The pure tone audiometry has an electronic oscillator-circuit which generates pure tone frequencies, with controlled output levels. The audiometer can generate frequencies from 125 Hz to 8000 Hz. Its intensity or output is regulated from 10dB to 120dB, in steps of 5dB. **The purpose of the test is to find out the faintest tone a subject can hear at various desired frequencies**. This faintest intensity level is called **threshold of hearing**. These thresholds are determined for two main purpose 1) to assist in the diagnosis of ear pathologies (2) to acquire information which may be used in obtaining appropriate habilitation or rehabilitation programmes for hearing impaired individuals.( The details of test procedure are given in unit 4.)

**Merits of Pure Tone Audiometry**

1. It is a very reliable diagnostic tool.

2. The test results help to understand the qualitative conductive / sensorineural / mixed hearing loss) and quantitative (mild/moderate/severe) nature of the hearing loss.

3. The test assists an ENT doctor in planning the medical treatment for the patient.

4. The test results help audiologists and speech therapists and teachers of the hearing - impaired to plan habiltation and rehabilitation measures.

5. The test findings provide guide- lines to select a hearing aid.

6. The results would be accepted by Government agencies to ascertain auditory fitness.

**Demerits of Pure Tone Audiometry**

1. It requires a very special sound treated room. It can not be performed in any ordinary room.
2. Regular calibration and servicing of the audiometer is a must.
3. Only trained professionals can perform the test.
4. It requires active participation of the patient.
5. The initial expenses are high.

### 3.7.3 Speech Audiometry

Speech audiometry is a supplementary tool to the pure tone audiometry procedure. This test is more than a hearing acuity measurement test. **It is a test of the overall performance of a subject in hearing, understanding and responding to speech.** Speech audiometry is particularly suitable for the general assessment of hearing and the estimation of the degree of practical handicap related to a hearing problem.

The procedure of speech audiometry is very simple. The test material is speech. Words or sentences are spoken into a microphone, which is a built-in part of the audiometer. This signal is passed through a calibrated attenuator , and is heard by the listener through the headphones, or through the loudspeakers. The listener is asked to identify the words. He may repeat the test words or he may check them on a multiple choice list, or he may write them down on a paper. There are two main types of tests (1) Speech Recognition Threshold test (S.R.T.) (2) Word Recognition Score Test (W.R.S.Test).

Speech recognition threshold (SRT) is defined as the **lowest level of intensity**, which **elicits 50% of correct responses.** SRT has proved to be a **reliable test**, and can be used to test the **validity** of pure tone thresholds (PTA). It has been very well documented that SRT value is in good agreement with PTA values. If the test threshold levels for pure tones and for speech do not agree, it strongly suggests that the defect is either neurological or it's an error of technique.

The second type of speech test is called word recognition score test, (W.R.S.Test), **which aims to measure how well the listener hears and discriminates words in general.** It measures the maximum percentage of words that are intelligible at the most comfortable listening level. **A normal** hearing person and a person with **conductive loss** can achieve **nearly 100% score** at the comfortable listening level. But in **sensorineural loss**, the maximum discrimination scores **fall markedly**.

Speech audiometry is considered as one of the sensitive tools in diagnosis. However, in a country like ours, with a multicultural and multilingual environment, to develop standardized speech test material in all languages has been a difficult task. In spite of this, speech test materials have been developed in nearly 12-15 languages.

**Merits of Speech Audiometry**

1) It gives an assessment of the subject's practical hearing capacity.
2) It is a good validity test for pure tone audiometry .

**Demerits of Speech Audiometry**

1) It requires a special sound treated room with a two-room situation.
2) Only trained professionals can perform the test.
3) The subject should have a minimum vocabulary of fifty to sixty words.
4) The test material has cultural biases.
5) The tester and speaker should be speaking the same language.
6) The initial expenses are high.

## 3.8 OBJECTIVE HEARING TESTS

**These tests do not require active participation of the subject**. Using modern and sophisticated instruments, the hearing capacity of the subject is detected. The tester has to be a well-trained audiologist. As the subject does not participate in the test, the test results do not depend on his level of intelligence, co-operation or attention span. The

objective tests are **standardized universally**. The various tests are as follows

1) Impedance audiometry
2) Brainstem evoked response audiometry (BERA)
3) Otoacoustic Emission Tests.(OAE)

**All the tests are reliable tests and help in a detailed diagnosis of the hearing problem.**

### 3.8.1 Impedance Audiometry

Impedance audiometry is an **objective means of assessing the function of the auditory system**. A small probe is inserted into the ear canal. With the help of a pressure release pump, air pressure is exerted on the eardrum. **The drum responds to the change of air pressure** in the outer ear canal. This results in some degree of displacement of the eardrum. This **movement of the eardrum is measured**. The instrument shows this movement in a graphical form, which is called as 'tympanogram'. There are various types of tympanograms, which give significant information to the doctor.(Fig.4). The modern instrumentation is fast and reliable. The entire test can be completed in three to four minutes duration.

## 3.9 LET US SUM UP

This unit has given us an understanding of various hearing tests. Normal speech and language development is dependent upon normal hearing function. For various reasons, if the auditory system fails to respond, a child's speech and language development and consequently his educational and social development will be affected. It is essential to measure the hearing sensitivity at an early age. The informal hearing tests are quick and effective tools to identify probable hearing impairment. Those individuals who fail in the screening test, or those who have a significant family or medical history, are subjected to various formal hearing tests. Formal test battery consists of subjective and objective hearing tests. Subjective hearing tests are the ones where individual participation in the test procedure is expected; while objective hearing tests do not require the subject's active participation.

Once the qualitative and quantitative evaluation is done, the line of action to be taken can be decided. They can be grouped

into two categories. Those cases that can be treated medically are referred to the medical doctors. Cases, who have permanent hearing disability, need to be considered for a rehabilitation programme.

## 3.10 SELF STUDY

1) Why is it important to detect hearing loss at an early age?

2) What is an informal hearing test ? Where can it be carried out ?

3) Why is it important for you to be aware of the "High Risk Criteria?" List all conditions included in the high risk criteria.

4) State True/False

   a) Children falling in the high- risk criteria may develop only a hearing loss.

   b) A baby whose birth weight is 1100 gm. would be considered as low birth weight.

   c) A child's auditory maturation is completed by 18months age.

   d) a child labelled by his teacher as "dull", "stubborn", "inattentive" may actually be having a hearing impairment.

   e) Pure tone audiometry results are not accepted by government agencies to prove fitness of hearing.

5) What are the arousal responses an infant less than 4 months would show, when presented a loud sound?

6) A child of 19 months is brought to you. The parents mention he does not respond to sounds and he has not yet developed speech.

   a) What are the basic questions you would ask the parents ?

   b) What informal test would you carry out in the room ? What response would you expect at 19 months age?

   c) In case the child fails the informal tests, where would you refer the child?

7) A teacher of the first standard class feels one child has a probable hearing loss. Name six 'symptoms' she may have observed in the child.

8) Which formal hearing test/tests can be recommended for a three months old child who had jaundice at birth?

## 3.11 ASSIGNMENT

1) Write various types of formal subjective hearing test.

2) Discuss behaviour response patterns of an infant to various sound stimuli.

3) Describe behavioural symptoms of four year old hearing impaired child.

## 3.12 POINTS FOR DISCUSSION AND CLARIFICATION

After going through the unit you may like to have further discussion on some points and clarification on other. Note down those points below :

### 3.12.1 Points for Discussion

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### 3.12.2 Points for Clarification

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## 3.13 REFERENCES

1. Handbook of Clinical Audiology : Ed. Jack Katz
2. Hearing in Children : Northen and Downs
3. Hearing and Deafness : Davis and Silverman

# UNIT 4: ASSESSING COMMUNICATION AND LANGUAGE: DEVELOPMENTAL CHECKLISTS, SCALES, STANDARDIZED TOOLS AND ASSESSING LANGUAGE SAMPLES USING PARAMETERS OF MEASUREMENT (PRODUCTIVITY, COMPLEXITY, CORRECTNESS AND COMMUNICATIVENESS)

***STRUCTURE***

## 4.1 INTRODUCTION

If you are observant enough, you will realize that a **sizable number of individuals suffer from some degree of hearing loss.** You are already familiar with the various types of hearing impairments, their causes and treatment. In the earlier module, you have studied the various types of hearing tests available for the diagnosis of hearing loss. Pure-tone audiometry is a simple and a basic test which is conducted first in most of the hospitals and clinics when a person complaints of a hearing loss. This module will cover the process of hearing assessment using pure-tone audiometry in details and the interpretation of the results.

**The earlier the loss is detected the better is the rehabilitation.** Keeping this purpose in mind the pure-tone audiometry is modified to suit various age groups. The test procedures used for various age groups are also discussed briefly in this module.

## 4.2 OBJECTIVES

**At the end of this unit students will be able:**

- To describe the parts of pure-tone audiometer.
- To understand pure-tone audiometry and its importance.
- To explain the step by step, procedure of pure-tone audiometry.
- To plot an audiogram using proper symbols.
- To interpret an audiogram for type and degree of loss
- To calculate average hearing loss
- To describe free field test.
- To differentiate between close field and sound field- test
- To describe the test procedures used for infants and children.

## 4.3 INTRODUCTION TO PURE-TONE AUDIOMETRY

We have seen that hearing impairment can be caused due to various **structural and physiological changes** in the auditory mechanism. The effect of these changes is exhibited as hearing loss, which may be identified by observing the individual's behavior. It is necessary to find out **the qualitative** ( type of loss ) **and quantitative** ( degree of loss ) status of auditory system, for which pure tone audiometry is used.

**A Pure tone audiometry** is a subjective test carried out by controlling many physical and behavioural factors. It came into effect after Second

World War and is used as an established procedure worldwide. As the name indicates, the **pure tones** i.e. sounds of single frequency are used as stimuli in this test. The thresholds for air conduction and bone conduction are measured independently and separately for each ear. In psychological and physiological work in the field of sensation, **threshold** is defined as the **intensity of stimulus required just barely to elicit a sensation** in whatever sensory modality is being studied. A threshold of hearing may be defined as the **minimum intensity level of a tone at which sound is detected as a sensation from silence and elicits a response**.

A Pure-tone audiometry is carried out using an instrument called **audiometer**, which produces different pure tones of variable intensities. It is necessary to carry out this test in a **sound treated room** as the presence of ambient noise in the test room would affect the test results. A **sound treated room** has specially designed walls, floor, ceiling and doors. Minimum furniture and heavy carpeting are essential. These special features prevent external sounds from entering the room and also absorb any sounds generated within the room. Ideally ventilation is achieved by central air-conditioning.

The results of pure tone audiometry are shown in a form of a graph called **audiogram**, which is a representation of frequency intensity function

## 4.4 IMPORTANCE OF PURE-TONE AUDIOMETRY

Pure tone audiometry is a **simple test** that provides useful information **about hearing impairment**. Let us find out how the test results of pure tone audiometry are useful to otologists, audiologists and the teachers of the hearing impaired.

- The **qualitative information** regarding hearing impairment can be obtained. You are already familiar with different types of hearing impairment and their treatment. As the decision regarding treatment of hearing impairment depends upon the type, it is indeed very important for otologists to obtain this information from audiogram.

- The **quantitative information** such as mild, moderate, severe or profound loss can be obtained. This information regarding degree of hearing impairment is useful in planning appropriate habilitation or rehabilitation programs for hearing impaired persons.

- **Both the ears are tested separately** during the procedure and the independent information is obtained for each ear. The hearing sensitivities of the two ears can be

  thus compared.

- Some hearing losses are progressive in nature. If the pure tone audiometry tests are carried out at regular intervals the **changes in hearing sensitivity can be identified.**

- **The comparison of pre-treatment and post-treatment** documentation of hearing sensitivity is useful in assessing the benefits of treatment. In many clinics and hospitals, it is a common practice to record pre-surgery and post-surgery audiograms to obtain information regarding changes in hearing sensitivity.

- The results of pure tone audiometry are useful in **selecting a hearing instrument** of appropriate gain and **adjusting its tone control**. The decision regarding monaural or binaural amplification will also depend upon the findings. The information obtained from the test is useful for setting up amplification levels in speech trainers, group hearing aids etc.

- Pure Tone test is a basic test in Audiology which **gives guidelines for further management** and provides direction for further investigations.

## 4.5 DESIGN AND FUNCTIONS OF AUDIOMETER

Audiometer is an instrument **designed and calibrated** to **international standards**. It produces different pure tones of variable intensities. Audiometer has a basic electronic circuit called an **oscilloscope**, having a capacity to generate number of frequencies. There are several models of pure tone audiometers available commercially. They vary from simple portable models to research type audiometers. Various types of audiometers like portable models, table models, computerised models are available in the Indian Market. Regardless of the make and type of pure tone audiometers, certain necessary controls are common to all instruments. It is necessary to know about these controls in order to perform hearing tests. Let us get familiar with the various **controls of an audiometer.**

**The basic controls of an audiometer are:**

a) **Power Switch:** This is used to switch the audiometer off and on. Audiometer **needs power** which can be supplied by D.C or batteries.

b) **Output Selector Dial:** Using this switch, the tester can **select** left earphone, right earphone or bone vibrator for presenting tone.

c) **Headphones:** The air conduction test is carried out using headphones. The headphone with a **red mark** is to be placed on the **right ear** and the one with a **blue mark** is to be placed on the **left ear** during testing. This colour code is according to international standards. The headphones are attached to a headband which can be adjusted in such a way that headphones remain well fixed over the pinna.

d) **The Bone Vibrator:** The bone vibrator is used for **bone conduction** testing. It is placed on the mastoid process of temporal bone during testing. It is held in place over the skull with the help of a headband.

e) **Frequency Dial:** The various frequencies generated for testing procedure are indicated on this selector. The frequencies commonly available on the selector are 125 Hz, 250 Hz, 500Hz, 1000Hz, 1500Hz, 2000Hz, 3000Hz, 4000Hz, 6000Hz and 8000Hz. On the frequency selector dial of most audiometers a small number printed under the frequency designation indicates the maximum hearing level that is available for the specific frequency. For example if the figure of 90dB appears beneath the frequency 250Hz, it means that 90dB is the maximum intensity level that the audiometer will produce for the frequency of 250Hz.

f) **Intensity control Dial – Attenuator :** This control can vary intensity of any given frequency from 10dB to 100dB. The intensity can be varied in **steps of 5dB** for example 30dB, 35dB, 40dB, 45dB and 50dB. Some audiometers have the facility of extending the upper limit of intensity upto **120dB** using a special button.

g) **Interrupter Switch:** This switch is used by the tester to **present the tone** to the patient. The switch when depressed turns the tone on and when released turns the tone off. The interrupter switch is spring loaded and hence returns to its off position when tester

releases it. By using this switch, the tester can decide **when to present** the tone and what should be the **duration of presentation.**

h) **Masking Dial:** If there is a **significant difference** in **hearing levels** of the two ears, then it is necessary to introduce masking sound in the better ear. In such cases sound energy presented to the worse ear can get transferred via skull bone to the better ear. Thus the patient may give response as the better ear has heard the tone but not the worse ear. Unless we make the better ear nonfunctional, we cannot test the other ear independently. To make the better ear **nonfunctional,** masking is used. This prevents the tone from being heard by the better ear. The masking noise can be varied from 0dB to 100dB. The level of masking to be used is calculated by using various formulae.

i) **V-U Meter:** V-U Meter gives an indication whether or not **power is entering the audiometer**. This is present on most audiometers. When the interrupter switch is pressed, if the voltage is adequate, the needle will deflect to the right indicating that tone is generated.

j) **Patient Signal:** This facility is available in some audiometers. The person who is taking a hearing test is given a switch-button and is instructed to press it when he hears a sound. When the switch is pressed a light on the audiometer gives signal to the tester that the patient has heard the given signal. The tester can then increase or decrease the intensity level of the signal as per the need.

The circuit, external design and the arrangement of the audiometer's basic controls will differ from instrument to instrument, however every audiometer has the above mentioned controls.

## 4.6 PURE TONE AUDIOMETRY TEST PROCEDURE FOR ADULT POPULATION

The Pure-tone test for adults is carried out placing headphones over the ears therefore called as **closed field testing**. Here the tones reach the ears directly. This is in contrast to sound field testing to be discussed later. ( 4.12)

In order to obtain valid hearing testing results there must be some control over the conditions under which the Pure-tone test procedure is performed. Ideally, the **testing should be performed in a sound treated room** in which external noise level is minimum. The step by step procedure for pure tone audiometry is described below:

i. Plug in the audiometer and ensure the proper electric supply.

ii. Turn on audiometer's power switch making certain that the instrument actually does receive power by seeing that the dials light up or the tubes in the instrument begin to glow. Check the V-U meter needle deflection.

iii. If the headphones and bone vibrator are not plugged into the audiometer, plug them in, confirming that they go into the proper jacks. Check that the audiometer functions by placing headphones or bone vibrator on self and varying the frequency and intensity levels.

iv. Make sure that the patient sits in such a way that he will not see the audiometer or the movements of the tester. The ideal situation will be where the subject sits in one room while the tester and audiometer are in an outside room as shown in the diagram 2. This will enable the tester to see the subject's facial expressions and his responses to tones.

v. Take relevant information from the patient regarding his hearing problem and medical history.

vi. Ladies should be requested to remove ear-rings, hair-pins etc as they can cause discomfort when headphones are placed over the ears.

vii. Assure the patient that it is a very simple test and instruct him the following manner --------

' The objective of this test is to find out the **softest sound you can hear** in each ear. The headphones will be placed over your ears. You are going to hear certain beeps through the headphones. Please raise your hand every time you hear a beep. As soon as you stop hearing, please lower your hand. Gradually the sound will get softer and softer. You should concentrate on hearing the beeps. You should raise your hand for barely audible sounds also. Feel free to take a guess. You will hear the sound in one ear only. Once the test is completed with one ear, the other ear will be tested.' The above instructions should be given before placing the headphones. The tester should raise his voice while instructing if necessary and articulate clearly. Instructions should be repeated if

necessary. Gestures can also be used if needed. If the patient cannot understand oral instructions, written instructions can also be used. '

viii. Place headphones over patient's ears, making it sure that the **red headphone** is placed on the **right ear** and the **blue** on the **left ear**. The headband should be adjusted in such a way that the headphones cover the pinnae properly.

ix. Always begin with the testing of the **better ear**, so that if there is a difference between sensitivity of the two ears, appropriate masking levels can be used while testing the worse ear. The decision regarding the better ear will be based on the information given by the patient prior to testing. If the patient reports no such difference, any ear can be tested first.

x. **Always begin a test at the frequency of 1000 Hz** since the ear is most sensitive to intensity changes at this frequency. It has been demonstrated by research that 1000 Hz has highest **test – retest reliability** of any frequency in audiometric testing. This means that at 1000 Hz the most reliable responses are obtained. Generally the result does not change by more than 5 dB (Higher or Lower ) on retesting during the session.

xi. As you are already aware, in this test we try to find out hearing thresholds for pure-tones of various frequencies. For obtaining threshold at any frequency three different methods can be used.

a.) The **ascending method** in which the examiner starts from the lower intensity level and gradually increases the intensity level to find out the threshold.

b.) The **descending method** in which the examiner starts from higher intensity level and gradually lowers the level of intensity to find out the threshold.

c.) **Bracketing method** which is a combination of ascending and descending method and is commonly practiced.

Let us discuss the steps to be followed for **threshold determination** at each frequency- At what intensity level do we begin the test? If the patient understands conversational speech fairly well then begin the test at 60 dB. If he cannot understand conversational speech, begin at 100 dB. Present the tone by pressing the interrupter switch. If the patient hears the tone then the intensity of the signal should be reduced by 10 dB. Again press the interrupter and present the tone. If the patient's response indicate that the tone is not heard, the intensity should be increased by 5 dB and the tone should be

presented. By increasing and decreasing the intensity level, as per the requirement, the lowest intensity level at which sound is heard i.e. threshold is determined.

**Example:**

a) We have started the test at 60 dB level and presented the tone. If the patient responds at 1000 Hz we reduce the tone by 10 dB. Thus, we now present the tone of 50 dB.

b) If the patient again responds, we further reduce the tone by 10 dB and present the tone at 40 dB level by pressing the interrupter.

c) If the patient does not respond, we increase the intensity of the tone by 5 dB i.e. present the tone at 45 dB.

d) If he still does not respond, again we increase the intensity by 5 dB and present the tone at 50 dB.

e) If he responds at 50 dB level, this is likely to be his threshold level. However the process of increasing and decreasing intensity level is is continued till at least **three reliable responses** are seen at the same intensity level. This decibel level is recorded as the threshold. So if three consistent responses are obtained at 50 dB level, then the threshold for 1000 Hz is confirmed as 50 dB.

f) Note that at each step we either reduce by 10 dB every time the patient responds or increase by 5 dB every time he does not respond.

g) The same **example** is shown in a form of flow chart where R indicates response and NR indicates no response.

The interrupter should not be pressed for a long duration. At the same time the duration should not be too short. The interrupter should not be pressed at regular time intervals, as this may enable the patient to guess when the next tone is likely to be heard.

xii. After you have succeeded in getting the threshold at 1000 Hz, change the frequency dial to 2000 Hz and using the same method find out the threshold for 2000 Hz and record it.

xiii. Change the frequency dial to 4000 Hz and repeat the procedure to find out the threshold. Occasionally the thresholds for 6000Hz and 8000Hz are also obtained if required.

xiv. Again test at 1000 Hz. This is to confirm the reliability of the test. Pay no attention to the previous threshold obtained at this frequency until you have completed the steps necessary to obtain another threshold measurement. Compare the second threshold with the first. If they **match exactly** or **differ by no more than 5 dB** in either direction, then the test results can be considered reliable. If on the other hand, there is a **difference of more than 5dB between the first and the second threshold** measurement at 1000 Hz, the reliability of **the test is in doubt.** It is advisable to repeat the test from the beginning in such cases.

xv. After rechecking the threshold at 1000 Hz, find out the threshold for 500 Hz and then for 250 Hz.

xvi. After completing threshold testing of one ear change the output selector dial to the other ear. Proceed in the same way and obtain thresholds for the other ear. If essential, the **masking** should be introduced in the better ear while testing the worse ear.

xvii. Remove the headphones and place the bone vibrator on the **mastoid process** of the temporal bone. It is placed on the **mastoid of the better ear first.** The maximum intensity level available for bone conduction testing in most of the audiometers is **50 deciBel.** Find out bone conduction thresholds for 250 Hz, 500Hz, 1000 Hz, 2000 Hz and 4000 Hz. Begin with 1000 Hz as for air conduction and follow the **same method** and order of testing frequencies. Assume that you are testing the bone conduction of that ear, where you have placed the vibrator. In certain cases, masking is required in bone conduction too.

## 4.7 THE FACTORS INFLUENCING THE RESULTS OF PURE-TONE AUDIOMETRY.

It has been found that there are certain factors which influence the results of pure-tone audiometry. Some of them are listed below.

### i.) Instrumental Factors:

The accuracy of testing depends upon the proper functioning of audiometric equipment. audiometers must be **calibrated and serviced** regularly once a year to ensure that the

frequency and hearing level outputs are actually as indicated on the controls. The audiometer can go out of **calibration** due to changing characteristics of electronic components, excessive voltage fluctuations, rough handling and dropping of headphones, bone vibrator etc. The audiometer which is out of calibration can affect the results of pure-tone audiometry. The **zero reference level** of the audiometer, the upper and lower output capability of the audiometer and standards adapted for calibration are also some of the factors that can influence the test results.

ii.) **Subject Variability:**
The variability in threshold measurement is often related to the **motivation and physical conditions** of the person being tested. Some subjects are not interested in giving the test and do not give their full attention to the listening task. Some get tired easily or are in pain and have difficulty in attending to the listening task.Some people may not have the **intellectual capacity**
to maintain **sustained interest** in the test procedure.

**Patient comfort** is another **important factor**. Uncomfortable seating arrangements, poor room ventilation or lighting, improperly placed headphones can cause discomfort to the patient, **leading to the patient becoming inattentive**

iii.) **Tester Variability:**
The instructions given by the tester to the subject can also affect the results of audiometry. If different methods of threshold detection are used they may not give the same threshold values. You are already aware that ascending, descending and bracketing are methods used for the threshold detection.

iv.) **The level of ambient noise:**
**Excessive ambient noise** in the testing room would also **affect the test results**. It is therefore necessary to adopt the international standards of permissible noise levels for a sound-treated room to be used for testing.

## 4.8 PLOTTING AN AUDIOGRAM

The results of pure-tone audiometry are recorded in the form of a graph which is called as an audiogram. **Frequency** along the **abscissa ( X – Axis )** and **intensity** along the **ordinate ( Y-Axis )** are the two dimensions of an audiogram. The patients hearing threshold at each frequency tested is plotted on the audiogram. For **plotting audiograms, specific symbols, which are standardized at the international level are used.** The **separate symbols** for air conduction ( AC ) and bone conduction ( BC ) of each ear are used. **Separate colours** are used for right ear and left ear, **Red** denoting the **right** ear and **blue** the **left**. The following chart shows the symbols used in plotting the audiogram.

## 4.9 INTERPRETATION OF AUDIOGRAM FOR TYPE OF LOSS.

As you are aware the audiogram provides us with the **qualitative information** regarding the type of hearing loss. By interpreting an audiogram we can diagnose the type of hearing impairment. **The interpretation for each ear is done separately**. The **air conduction and bone conduction** threshold level also the **air-bone gap** ( i.e. difference between air and bone conduction thresholds ) is **taken into account while interpreting the audiogram for type of loss**. The features of various types of audiograms are listed below.

1. **Audiogram indicating normal hearting sensitivity:** In this type of audiogram, the thresholds of air conduction and bone conduction range from **–10 dB to 20 dB**. The bone conduction thresholds are equal to air conduction thresholds or less than that. The thresholds of AC and BC do not much differ from each other.

2. **Audiogram showing conductive hearing loss:** In this audiogram **air conduction threshold levels are abnormal** but **bone conduction threshold levels are normal**. Conductive loss results due to malfunctioning of the outer and / or middle ear hence the audiogram shows loses by air conduction only. However bone conduction is normal, as the inner ear mechanism is not affected.

3. **Audiogram of sensory neural loss:** The audiogram of sensory neural loss shows **loss by both air conduction and bone conduction.** The thresholds of AC and BC do not differ much from each other. The difference between AC and BC thresholds is upto 10 dB or less than that.

The different types of audiograms seen in hearing impaired children with congenital hearing loss are shown in **Diagram 7** below.

4. **Audiogram of mixed loss:** A mixed loss occurs when there is an involvement of the outer and / or middle ear and the inner ear.A mixed impairment will produce an audiogram which shows **some loss by bone conduction** but more **severe loss by air conduction.** In the audiogram of mixed loss air conduction and bone conduction differ each other by 15 dB or more.

Keeping in mind all the above features of different types of audiograms, you can use the following flowchart for interpretation.

a. Find out if AC and BC thresholds are upto 20 dB or less than that.. If so, then **hearing sensitivity is within normal limits.**

b. If not, then find out if bone conduction thresholds alone are within normal limits. If yes, then **hearing impairment is conductive in nature.**

c. If air and bone conduction thresholds both are abnormal then look for AC-BC gap ( i.e. the difference between AC and BC thresholds at each frequency ). If the gap is 10 dB or less then the **hearing impairment can be interpreted as sensori-neural.**

d. If air and bone conduction thresholds are both abnormal and AC-BC gap is 15 dB or more, the **hearing impairment is mixed in nature.**

To sum up

## 4.10 INTERPRETATION OF AUDIOGRAM FOR DEGREE OF LOSS

a.) **In terms of average hearing loss:** For purpose of calculating average hearing loss, the AC thresholds of 500 Hz, 1000 Hz, 2000

Hz are averaged to one single figure. This single figure is called pure-tone average. **For example**: In an audiogram AC thresholds for right ear are as follows –

500 Hz - 90 dB

1000 Hz - 50 dB

2000 Hz - 40 dB

**Average hearing loss** = 90 dB + 50 dB + 40 dB = 180 dB = **60 dB.**

3 3

b.) **The degree of hearing loss** on the basis of average hearing loss:

## 4.11 CONDITIONING TECHNIQUE

The procedure mentioned previously is difficult to administer on children below a certain age. In **order to suit the pure-tone audiometry test procedure to the pediatric population, conditioning techniques are used.** Instead of asking the child to raise the hand as a response the child is asked to respond to sound in a different manner. For example – holding a block near the ear and dropping it down whenever he hears the tone or picking up a toy displayed on the table whenever he hears a tone. The child is conditioned to perform a certain action only when he hears.

The **conditioning sequence** starts with a demonstration by the tester. For example – the tester holds a block near the patient's ear, presents a sound of gong and drops the block down. Thus the child sees the gong and hears the sound together **( visual + auditory clues )**. After a few demonstrations of this nature, the child should be offered the block and the tester should guide a few responses. The right responses should be rewarded with hand clap, gestures or vocal praise. When the child responds well, the tester then goes behind the child and presents the sound. Now the child has to respond only on hearing the sound, as he cannot see the gong **( only auditory clue )**. To begin with, the intensity of stimulus must be fairly high.

As the child responds independently, the intensity levels are gradually decreased. **The reliable conditioning can normally be established after four to five demonstration responses and a further four or five guided responses.**

At this stage it might be possible to introduce headphones and obtain thresholds for AC first, for both ears and later for BC using bone vibrator. If the child refuses to use headphones then sound field thresholds for different frequencies can be obtained (refer 4.12). The

hearing thresholds obtained in this case will represent binaural hearing sensitivity. During testing procedure, the tester should **vary the pause interval quite unpredictably to reduce the possibility of anticipatory responses from the child**. If the tone is given at regular intervals, the child may put a block down according to the time interval rather than on hearing the tone. To speed up the test, the tester should be economical with time. For which it is necessary to use larger increments and decrements instead of ' down 10dB, up 5 dB'. This is necessary as the child will pay attention for a limited span of time.

**Conditioning technique can be successfully used between age group 5 to 7 years**. It can also be used for age group 3 to 5 years, if the child can follow instructions. It may be necessary to have more than one testing session for this age group as they are likely to lose their interest within a short span of time.

## 4.12 SOUND FIELD AUDIOMETRY

This test is used for young children and babies who cannot be tested using headphones. This test is also known as **free field test or sound field test.** The clinical audiometer having provision for sound field audiometry is used for the test. For sound field audiometry, two room test facility is required, so that the tester and the child are in separate rooms. The tester can observe the child through a glass or one way mirror. **The sound or speech is presented** to the child **through speakers** installed in the test room. The frequency and the intensity of pure tones presented to the child can be varied using the audiometer. **The response of the child is likely to be turning the head towards the source of sound,** ceasing of an activity or smiling. If possible, the child can also be taught to drop a peg or pick up a toy displaced on the table whenever he hears the tone or speech. The tone of higher intensity may be used at first. As the child responds ,the intensity is gradually decreased. The responses of the child to sound can help the audiologists to judge the degree of hearing loss. This unit also has a **talk back system** which enables the tester in the control room to hear what the subject in the test room says.

Early identification of hearing impairment is necessary as it has several advantages. Considerable progress in testing the hearing of infants and children has been made in the past few years. Procedures used in the assessment of hearing of an individual child are determined by the responses he is capable of making. This will depend upon several factors like **mental age, neurological status** etc. There will be variations in test procedures and the responses to be expected at different age levels.

Let us study briefly the test procedures used for auditory evaluations at different age levels.

## 4.13 TEST PROCEDURE FOR AGE GROUP ZERO TO TWELVE MONTHS

Assessment of hearing sensitivity during the first 6 months is generally quantitative, not qualitative. In early months of this age range ( upto 4 months ), auditory assessment is limited to the **elicitation of reflexive responses to relatively intense auditory signals.** The useful responses are **auropalpebral reflex ( APR) and startle reflex.**

**Auropalpebral reflex** represents contracture of the orbicularis palpebrae muscles. It is seen as a **quick closing of the eyes ( an eye blink ),** or **tightening of the lids** if the eyes are already closed., as a response to an intense auditory signal. The startle reflex is seen as a **small jump** of the infant's body immediately following the auditory stimulus of high intensity. The arms go apart, the fingers spread, the legs extend, the eyes open and the head is thrown backwards as a response to loud sound.Both auropalpebral reflex and startle reflex tend to disappear quickly upon repeated presentation of sound stimulus. Thus the tester should be alert and quick in his/her observations. If auropalpebral reflex or startle reflex is not observed for intense auditory signal it is advisable to carry out Brainstem Auditory Evoked Response Test, to rule out the possibility of hearing loss.

The sound of known intensity and frequency can be presented in the sound field testing situation or a headphone can be held near the baby's ear, out of the baby's visual field. It is ideal to have two testers to perform this test. One can present the sound and the second tester can control baby's attention and also can observe the reactions of the baby. **After the age of 6 months,** it is expected that the child will **turn towards the source of sound, as a response.**

## 4.14 TEST PROCEDURES FOR AGE GROUP ONE TO THREE YEARS .

The common techniques used for hearing assessment of this age group are **'visual reinforcement audiometry'** and **'conditional orientational reflex.'** For this procedure a two room testing situation is needed as in sound field test . The child is made to sit in one room with the parent. The tester is in the other room. Two small loud speakers are placed on either side of the midline, behind the child. Above each loud speaker an attractive picture or a doll is placed. There is a **bulb inside the doll** or the picture which can get **illuminated** to make it **visible each time a**

**sound is presented**. A pure-tone of known intensity is presented from one of the loudspeakers and at the same time the doll or a picture is illuminated. Initially through a few trials, the child is made to understand that when the sound is heard a light will glow in the doll or the picture. The child soon understands the association between the sound and light, which is pleasurable and rewarding. Once this association has been made the sound can be presented alone. If the child turns when the sound is presented, **the response is rewarded** with **visual reinforcement** by allowing the doll or the picture to light up. The intensity level of the signal can be lowered to find out the lowest intensity level at which the child responds. The audiologists can assess the hearing sensitivity of the child using this technique.

In addition to this, the child can be presented with different ' speech games'. As the child sits with a parent in one room, the tester can speak to the child, controlling the intensity of speech through an audiometer. The child can be asked to pick up a specific toy or a picture which is placed in front of him, or can be asked to obey simple commands. The child's response will enable to assess his hearing sensitivity.

The objective test like BERA is also a useful tool for this age group, especially children who refuse to co-operate and for children with additional problems such as mental retardation, cerebral palsy etc.

## 4.15 TEST PROCEDURES FOR AGE GROUP THREE TO FIVE YEARS

The conditioning technique described earlier ( section 4.11 ) may be tried with this age group. **Using reinforcement the child may be encouraged to give correct responses**. It is possible that the child of this age group may soon lose interest in the test and may not respond. It is wise to complete audiometry within two to three sessions completing few frequencies at a time. The tester should be experienced and should be quick in completing the test by obtaining reliable responses. The tester should use reinforcement technique to hold the interest of the child throughout the testing procedure. If the child refuses to wear headphones, the test can be done in sound field using conditioning technique, however the threshold obtained in this case will represent binaural hearing status. By this age, some children may have good speech and language abilities. These children can be tested using speech as a stimulus as described earlier.

## 4.16 LET US SUM UP

- Pure-tone audiometry is a subjective test carried out to understand the qualitative and quantitative aspects of a persons hearing loss. It is performed in a sound treated room.
- An audiometer is the instrument used to carry out this test. Various models of audiometer are available. For audiometry pure-tones of different frequencies 250 Hz, 500 Hz, 1 KHz, 2 KHz, 4 KHz, 6 KHz, 8 KHz are used.
- The intensity level for each frequency can be varied.
- An audiogram is a graph plotted, representing frequency-intensity functions. The results are important for otologists, audiologists and teachers for the hearing impaired.
- Thresholds at different frequencies are plotted for air conduction and bone conduction.
- Test can be conducted in sound field or close field.
- Different audiometric procedures are used for different age groups.
- For infants aged 0 to 4 months reflexive responses are noted in sound field.
- For children, age group 6 to 12 months, turning of the head towards the source of sound may be a response.
- For children, age group 1 to 3 years, visual reinforcement and condition oriented reflex are used in sound field. Speech games are also used.
- For children, age group 3 to 5 years, conditioning techniques are used in sound field or close field.
- For children above five years conditioning is used in close field.
- From the audiogram, one can interpret the type of hearing loss ( Normal, Conductive, Sensori-Neural or Mixed ) and the degree of hearing loss.

## 4.17 SELF STUDY

i. Why is a sound treated room used for audiometry ? What are its special features ? ( 4.3 )

ii. What are pure-tones ? ( 4.3 )

iii. Define Threshold. ( 4.3 )

iv. What are the uses of pure-tone audiometry ? ( 4.4 )

v. Describe the various parts of an audiometer. ( 4.5 )

vi. Describe the procedure for finding out threshold at each frequency . ( 4.6 )

vii. When masking is used during audiometry ? ( 4.6 )

viii. What are the factors that affect audiometry results ? ( 4.7 )

ix. Using the correct symbols plot the audiogram for the following thresholds: ( 4.8 )

x. Find average hearing loss and degree of loss for the following levels of thresholds: ( 4.9 )

xi. Describe the features of an audiogram showing
a) Normal Hearing b) Conductive Loss c) Sensori-neural Loss d) Mixed Loss. ( 4.10 )

xii. When is the conditioning technique used ? ( 4. 11 )

xiii. Discuss how you would perform a pure-tone audiometry for a five year old child having difficulty in hearing . ( 4.11 )

xiv. What does sound field test mean ? When is it used ? What are the various responses of a child in sound field ? ( 4.12)

xv. Describe the test procedures used to assess the hearing of children in the age group one to three years . ( 4.14 )

xvi. Discuss the methods of assessing hearing of children in the age group three to five years.
( 4.15 )

## 4.18 ASSIGNMENT

a) With a neat labeled diagram of an audiometer describe the basic parts and their functions.

b) How will you conduct pure-tone audiometry test for an adult ?

c) Classify hearing disorders as per i.) Types, ii.) Degree.

## 4.19 POINTS FOR DISCUSSION AND CLARIFICATION

After going through the unit you may like to have further discussion on some points and clarification on other. Note down those points below :

### 4.19.1 Points for Discussion

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_____

_____

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### 4.19.2 Points for Clarification

## 4.19 REFERENCES

1 Audiology by Hayes Newby.

2 Handbook of clinical Audiology by Jack Katz.

3 Pediatric Audiology zero to five years by Barry McCormich.

4 Hearing care for Children by Frederick N. Martin & John Green Clark.

# UNIT 5: IDENTIFICATION OF NEEDS RELATED TO COMMUNICATION AND LANGUAGE

## STRUCTURE

## 1.1 INTRODUCTION TO HEARING AIDS

Early appropriate amplification is fundamental to the success of any auditory rehabilitation program.

**Hearing is prerequisite for the development of normal speech and language.** A child with normal hearing learns to speak by listening to the speech and language stimulation provided in his environment and modeling his own utterances in an orderly sequence as he grows. The normal process of auditory based speech and language development is disrupted to a greater or lesser extent depending upon the degree of the hearing loss. For congenitally hearing impaired children, particularly those with significant degrees of 'residual hearing', **acoustic amplification is the primary mechanism for the development of speech and language skills.**

An **individual hearing aid** could be considered as an **auditory prosthesis** to help the hearing impaired person to hear as much as possible, in a wide range of acoustic environments. The hearing instrument should be fitted immediately after hearing loss is detected. The audiologists selects a hearing aid that will make audible as great a portion of acoustic speech spectrum as is possible, keeping output of the instrument at safe and comfortable level.

There is a fundamental difference between the significance of hearing aids for hearing impaired adults and for congenitally hearing impaired children. Hearing aid selected and used by adults are coupled to existing auditory based speech and language skills. The task for adults is simply to recognize a linguistic code learned and mastered in their early years. When a hearing instrument is fitted to a congenitally hearing impaired child, the underlying assumption is that **amplified sound is the most effective therapeutic tool** for minimizing or averting the linguistic and educational ramifications of a hearing loss

In this unit we are going to study the most useful amplification systems for hearing impaired i.e. hearing aids.

## 1.2 OBJECTIVES

At the end of the unit students will be able:

- To understand the need of hearing aid
- To describe the history of hearing aid
- To explain hearing aid electronics and technical terms

- To describe types of individual hearing aids and hearing aid fittings
- To understand the need of ear mould and explain the ear mould making procedure
- To describe the different types of ear moulds and ear mould modification
- To explain hearing aid care and procedure for checking of hearing aid
- To discuss common faults of hearing aids and their solutions
- To elaborate the procedures used for hearing aid selection
- To maintain hearing aid records in the school

## 1.3 HISTORY OF HEARING AIDS

As mentioned earlier, the function of a hearing aid is to amplify sounds to a degree, and in a manner, that will enable a hearing-impaired person **to utilize** his or her **residual hearing in an effective way**. A hearing aid must be cosmetically acceptable, to be effective.

Perhaps, the **first "amplification system"** to be used was the **placing of a person's hand behind the ear.** This provided approximately 15 dB amplification. This amplification appeared to be just sufficient for a person with mild hearing loss to get the desired clarity of speech.

**Mechanical hearing aids** such as **horns and speaking tubes**, which were held at the ear-canal entrance of the affected person, were in use as early as the seventeenth century.

Mechanical hearing-aids were followed by **Carbon hearing-aids**, which came in use at the beginning of the last century. These were based on the principles of the telephone.

In 1938, **Vacuum-Tube Hearing-Aids** appeared and offered much greater amplification possibilities, a wider frequency response and lower harmonic distortion.

Today's hearing aids are based on the invention of the **transistor by Bell Telephone Laboratories**. Transistors were introduced into hearing aids in the 1950s. This development made possible much smaller

sized aids, requiring less battery consumption. It also permitted a flexibility of design, which had never been possible before.

**Miniaturization of hearing-aid circuits** became a reality due to the advanced development of amplifiers and integrated-circuits. The **integrated-circuit** consists of **transistors, resistors and wiring**, all on a tiny wafer of silicon or similar material. It is inherently low in power needs, and is relatively robust.

## 1.4 HEARING AID ELECTRONICS

**Hearing aids are available in different shapes and sizes.** However, the basic electronics of all the aids is the same. Hearing aids are made up of the following parts:

a) **Microphone:** This picks up the **sound energy** and **converts** it into **electrical energy.**

b) **Amplifier:** This **increases the strength of the electrical signal.** A battery provides power to the amplifier. The battery used in a hearing-aid will depend upon the type and size of the hearing-aid.

c) **Receiver (earphone):** This converts the **electrical energy back into sound energy**.

d) **Telecoil:** Telecoil is an **optional feature** in a hearing aid and when it is activated it **converts the magnetic vibrations** ( related to telephone signals ) **into electrical signals**, which are then fed to the amplifier.

**With these components, how does a hearing aid function?**

The microphone or telecoil of the hearing aid picks up the sound signals, and converts them into electrical signals. This low-energy electrical signal is fed to the amplifier, which converts it into a powerful electrical signal. This reaches the receiver, where the electrical signal is converted back into sound, and this now enters the ear of the hearing aid user. This, in a simple way, is how a hearing aid works.

### 1.4.1 Technical Terms Used For Hearing-Aids

Hearing aids are commonly described in terms of **gain, maximum output, frequency response and bandwidth.** Let us understand the meaning of each term.

a) **Gain:** The gain of any hearing aid is simply the **difference, in db, between the input and output of the system.** Thus, if a 60 dB sound is at the microphone [input], and 100 dB is measured at the receiver [output], the gain of that aid is 40 dB. However, hearing aids do not provide the same gain throughout the entire frequency range. Certain frequencies may have more gain than others, depending on internal components. **The gain expressed by the hearing-aid manufacturer** is usually the **average gain of a hearing aid**, covering all frequencies.

By studying the audiogram ( the degree of hearing loss ) an hearing aid of appropriate gain is selected for the hearing-impaired person.

b) **Maximum output:** All amplifying systems **can amplify sounds only to a certain maximum limit**. Till this limit, there is a linear relationship between input and output. Once this **maximum level of amplification is reached**, the **output cannot increase further**, no matter how much the input may increase. Thus, a **saturation point** is reached, beyond which no more amplification occurs.

Let us consider an aid with a gain of 40 dB. If the input signal is of 50 dB, the output is expected to be 90 dB. If the input is now increased to 100 dB, the output expected would be 140 dB. Usually, this much of an output is not desirable for the user, and can even be harmful in certain cases. All precautions must be taken so that the output does not exceed the threshold of discomfort [threshold of pain], which is around 140 dB. Therefore, the system will limit the output to a level below 140 dB.

Most often, the limiting is achieved by **Peak clipping**, where the amplitude of the amplified signals are flattened at their peaks, once the maximum output level of the aid is reached. However, this may lead to distortion of sounds, and poor quality of sound signals.

Hearing-aid manufacturers often provide curves of the hearing aid's maximum output, as shown below.

c) **Frequency response:** The gain of an aid is not same for all frequencies. Hence, **a chart** is made **to show the gain for the different frequencies** which are amplified. The resulting curve represents the particular aid's gain per frequency, and is called the frequency response of the aid as shown in diagram.

d) **Bandwidth:** The **frequency range** in which a **hearing aid effectively amplifies** the signal, is called **the bandwidth of the hearing aid**. To calculate the bandwidth, a line is drawn across the frequency response curve, 15 dB below the average gain of the aid. The lowest and highest frequencies where the line intersects the frequency responses, are the lower and upper limits of the bandwidth.

Thus, if the gain of an aid is 40 dB, a line is drawn 15 dB below this, which is at 25 dB. If this line intersects the frequency response curve at 230 Hz and 4800 Hz, then the bandwidth of this particular aid is 230 Hz to 4800 Hz.

These **technical details like gain, maximum output level, frequency response and bandwidth, are available with the hearing-aid manufacturers and with the dispensers.** These are all taken into account while choosing an appropriate hearing aid for a hearing-impaired individual.

## 1.5 TYPES OF HEARING-AID FITTINGS

The following are the various hearing-aid fittings available.

- **Monaural:** If the hearing aid is **used only in one ear,** the fitting is termed as monaural fitting.

- **Binaural or real binaural:** If **two hearing aids are used,** [i.e. a separate aid for each ear], the fitting is termed as binaural or real binaural. Such a fitting provides **several advantages,** such as **improved localization** of sound sources, **better discrimination** of speech in the presence of noise, and improved quality of sound. Binaural aids are recommended frequently for young children with severe or profound impairments. However, a binaural fitting

almost doubles the expenditure, and it may not be possible for some to afford.

- **Pseudo-binaural fitting:** This third type of fitting is possible only with pocket-model aids. Using **one pocket-model aid with a V or Y-shaped cord and two receivers**, sounds can be received in both ears simultaneously. Such fitting is called pseudo-binaural fitting.

## 1.6 TYPES OF INDIVIDUAL HEARING AIDS

A wide range of different types of hearing aids are available for the users. They are designed in a variety of shapes and sizes. Let us study the most common types of hearing aids.

- **Body worn hearing aid (pocket –model):** Until the mid 1960s the body style was the most common type of aid available. **Body worn instruments** are either **worn in a pocket** or **with special harness** or **clipped to the clothing**. This aid consists of a **box, a receiver and a cord**. The electronic circuit and components are inside the box. These include a microphone, a battery, and an amplifier. The microphone converts the sound signals into electrical signals. These are amplified by the amplifier. These amplified electrical signals are then carried, via an electric cord, to the receiver. The receiver converts the electrical signals back into sound signals, which are fed into the ear via the ear mould or ear tip. They are the most common aids used by hearing-impaired children in schools.

Now, to study each individual part

**Microphone:** The microphone inside the aid **picks up sound signals**, and **converts them into electrical signals.**

**Receiver (or earphone):** The receiver is attached to a cord, and **is responsible for converting electrical energy into sound energy**. A plastic ear-tip or ear-mould, which goes into the ear canal, is fitted on the earphone. Receivers have various values and this value should be compatible to the electronic circuit.

**Cord:** The **cord carries electric signal from the amplifier to the receiver** of the hearing aid. The cord fits in a socket, and attaches the body of the hearing aid to the receiver. For a monaural fitting, single

cord is used. **For pseudo-binaural fitting, a V or Y-shaped cord is chosen.**

**On-off switch:** This is used for **switching the aid on or off**. There are three settings available: O- which stands for off; M- which stands for on (i.e. microphone is in use) and T- which stands for telecoil, and is set during telephonic use or while using loop induction system in classroom.

**Volume control:** The volume control is used **to increase or to decrease the audibility of sound.**

This enables the wearer to adjust the output of the amplifier to suit his particular needs.

**Tone control:** It is used **to select the frequency emphasis for amplification**. Normally, there are three options available: L- used for low frequency emphasis; H- used for high frequency emphasis; and N- i.e. normal-no special emphasis for any particular frequencies.

**By studying the audiogram, the position of the tone control is selected** and recommended.

**Battery compartment:** A **pencil- sized battery**, with **voltage of 1.5volts**,is used in the aid. The positive and negative markings in the compartment indicate the way the battery should be placed.

**Clip:** The hearing aid can be fitted to a pocket or a harness, using a fixing clip.

**Seal washer:** A small plastic washer is placed between the receiver and the ear mould/ear-tip. This gives a **better sealing effect.**

Advantages of body worn hearing aids:

These aids are **robust, high power and relatively cheaper**, as compared to other aids. In our country, this is definitely a positive point while selecting an aid. It also has an advantage for profoundly deaf children, as it is a means for them to hear their own voices. The **use of pencil size battery** in this instrument makes it **cost effective**.

**Disadvantages of body worn hearing aids:**

The main disadvantage of this type of hearing aid is the **size and weight of the hearing aid**. As the hearing aid is seen

easily, it has **negative cosmetic value**. The placement of the hearing aid on the person's chest makes it susceptible to **'body-baffle'**, which leads to relative emphasis on low frequency sounds. This occurs due to the absorption of high frequency energy by clothing and body tissues, while low frequency energy is reflected. The placement of the microphone on the chest also makes it more vulnerable to damage from spilt food, dribble and vomit, in case of children. Body worn hearing aids **do not help is sound localization** or **identification of the source of sound.**

- **Post-aural hearing aids:** These are also referred to as **"Behind-The-Ear"** [BTE] aids. The body of this instrument is worn behind the ear. A thin acoustic tube or a plastic hook, which fits over the ear, connects the body of the aid to the receiver. The receiver is attached to the ear-mould or the ear-tip, which fits into the ear canal.

A BTE hearing instrument can be **worn comfortably by children as well as adults**. **Various sizes** are available, such as mini, midi and large, to fit all ears. Button-type batteries having size 13 or 675 are used for BTE hearing aids. **A wide variety of hearing losses can be compensated** by using BTE aids. These even help those with severe and profound degree of hearing loss.

With advances in hearing-aid technology, **a wide range of circuit choices** are now available for BTE hearing aids. These are **conventional, programmable and digital circuits.**

Like a pocket-aid, a BTE aid also has a microphone, receiver, volume control, on-off switch and battery compartment. It has **trimmers to adjust frequency emphasis.**

**Advantages of BTE hearing instruments:**

A BTE instrument offers benefits such as **compactness, convenience** and a **cosmetic appeal,** as it is not seen easily. As the microphone of BTE is positioned at the ear level, the placement **resembles natural hearing** to a greater extent. **Amplification can easily be controlled by the user while wearing the hearing aid**. If worn binaurally BTE aids are useful for **sound localization.**

Disadvantages of BTE hearing instruments:

BTE hearing aids are **costlier** than pocket-model aids. **The recurring expenditure of batteries, maintenance and repairs is also high**. Sweat is the main cause of failure of these instruments.

- **In-the-ear hearing instruments (ITE):**

  These aids consist of a **hard plastic shell**, which **contains all the electronic components**. These aids **sit in the ear canal and concha.** Often, this plastic shell is cast by taking the ear impression of the person's ear canal. Thus, the fitting can be very precise. In-the-ear hearing aids are available in **three different types:**

**Concha:** The hearing aid sits in the ear canal, and extends completely into the outer ear.

**In-the-canal hearing aid(ITC):** This is a smaller version of the in-the-ear hearing aid. It sits in the ear canal, and extends partly into the outer ear.

**Completely in the canal hearing aid (CIC):** These hearing aids sit completely and deeply in the ear canal, and can only be seen in side-view of the face. As they are smaller, **they do not have some of the features** available in the other aids like volume control, on & off switch, telecoil etc.

**Advantages of ITE hearing instruments:**

There are **several benefits** that wearers enjoy. Besides **cosmetic benefit**, the other advantages are **improved localization of sounds, very close to "natural" hearing** due to the placement in the ear, **reduced distortion, and increased wearing comfort**. The use of ITE aid facilitates pinna's function.

Disadvantages of ITE hearing instruments:

These are **expensive hearing instruments** and cannot be afforded by all. Further, this type is regarded as **unsuitable for children**, due to the need to remake the shell [casing of aid] as the pinna and ear canal grow in size with age. ITE hearing aids are available for mild to moderately severe hearing loss. **Severe and profound hearing loss cases cannot be considered** for the fitting of ITE hearing aids also the recurring expenditure of batteries, maintenance and repairs is high. .

- **Spectacle hearing aid:**

Here, the hearing aid is **incorporated into the frame of the spectacles**. They may be provided monaurally or binaurally. Usually, the **output of the aid is delivered to the ear in the same way as with the post-aural aid**, i.e. through an acoustic tube fitted into an ear mould. Alternatively, **a bone vibrator may be fitted into the tip of the spectacle frame**, which lies against the mastoid process, and this can be used as a bone-conduction aid.

Neither version is commonly used, as the use of spectacles becomes mandatory. In cases of young children, this type is not used due to the need to replace the frame as the child grows.

- **Bone-conduction type of hearing aid:**

  All the aids where the sound is transmitted via a ear mould into the ear canal, are called air- conduction aids. **The bone-conduction type of aid is fitted to transmit sound energy to the cochlea, via bone conduction.** The **prerequisite** for the fitting of bone conduction type hearing instrument is **normal hearing by bone conduction.** These instruments are fitted for those who are not able to use body-worn or post-aural aids. These would include those with **abnormalities of the external ear, absent or rudimentary pinna, a narrow or malformed ear canal**, or **persistent ear discharge**.

  The bone-conduction hearing aid has a **headband and vibrator**, which rests on the mastoid process, and transmits sound energy to the cochlea, by vibration of the mastoid bone.

  The **drawbacks** which make this type of aid unpopular are **lack of aesthetic appeal** of the bone vibrator, **physical discomfort, lack of a firm connection**, and the **difficulty of keeping the head-band in place.**

- **CROS system / aid:**

  CROS (Contralateral Routing Of Signals) system is **used in cases of unilateral** or asymmetrical hearing loss. The principle is to collect the sound signals received by the poorer ear, and to route them into the better ear.

  The hearing aid consists of **two units** similar in appearance to post-aural aids. **One unit contains a microphone and amplifier,**

and goes behind the poorer ear. The **other unit** contains only **a receiver**, and is fitted to the better ear, using an open mould.

## Technical variations in hearing aids:

Hearing instruments can be classified with their technical performances as follows:

- **Analog Hearing aids:** In analog hearing aids, signal processing is done using analog technology. Fitting is done by mechanically adjusting resistor values. For each adjustable parameter of the instrument a separate trimmer is required. The effect of trimmers is limited to simple controls such as N,L,H, peak clipping etc. **The frequency response of analog aid can be altered by using tone control or trimmers** to some extent however **has its limitations**.

- **Programmable hearing aids:**

Programmable hearing instruments are far more advanced then the conventional types. These type of hearing instrument incorporate integrated circuits with a memory chip that can store necessary information or data. Unlike conventional types, there hearing instruments can be modified in terms of their response characteristics by altering various parameters with the help of software fed into a computer. Thus the number of available parameters that can be altered are relatively more in a programmable hearing instrument. Programming is done with the help of a computer, software and **hipro box. Hipro box is a interface between hearing instrument and a computer**.

The frequency response of the aid becomes very precise for each wearer, as the programming is

done exactly as per the audiogram.

**Programmable instrument is a tailor made hearing aid** that can be fitted to all types of hearing losses.

- **Digital hearing aids:**

Digital hearing aids use state-of-the-art technology.

In essence, the digital hearing aid is a wearable computer. It eliminates the need for conventional components such as transistors, capacitors and resistors instead **it has a microchip.** This microchip identifies speech and noise. **Every signal entering** into the hearing aid is **analysed and enhanced only if it is speech and suppressed if it is noise.** This technique solves the problem

of background noise and feedback, and presents very clear speech. It provides a solution to the various problems faced by hearing aid users. All the functions of this aid are **programmed by a software**. Digital hearing aid can be fitted to all types of hearing losses.

## 1.7 EAR MOULDS

The discussion about hearing aids will be incomplete without including the topic of ear moulds. **The ear mould is a plastic or Silicon insert** designed to conduct the amplified sound from the hearing aid receiver into the ear canal. Although ready-made ear tips available can be used as a substitute for ear moulds, the hearing aid should ideally be used with **ear mould** as it has **several advantages**.

### History of Ear mould

Although **the first ear mould appeared about the turn of the century**, ear moulds as we know them today did not begin to appear until the 1920s. It was about that time that **Western Electric Laboratories patented a hearing aid ear mould**. It was not really a 'custom' ear mould but rather a series of stock ear moulds in various sizes. **A dentist in New York initiated the idea that ear mould should be custom-made** and subsequently began manufacturing custom ear moulds.

With the development of the post-auricular hearing aid in the 1950s, the styles of ear moulds began to appear. The various styles are described below separately. Initially Plaster of Paris was the most common material in making ear mould impressions. During the late 1940s and early 1950s a soft pliable material became available for use in making impressions. This material was a substantial breakthrough since there were many problems inherent in the use of Plaster of Paris the most common of which was the difficulty in removing from the ear ones as it hardened.

**In 1962 the National Association of Ear mould Laboratories ( NAEL) was formed**. Prior to that time there was no general agreement as to designation of ear mould styles, tubing sizes, or ear mould materials. In recent years, the NAEL has standardized tubing sizes, adopted standard nomenclature for

ear mould styles and assisted in the development of new ear mould materials.

**To have a properly fitting ear mould, it is necessary to have it custom-made.** An impression of the person's concha and external auditory canal is taken, and using certain procedures, the custom ear mould is made.

**Advantages of using custom-made ear moulds**

In the amplification process, the role of the ear mould is **to link the hearing aid to the hearing impaired person.** This facilitates efficient transfer of acoustic energy to the tympanic membrane. A mould that fits well helps in this **efficient transfer.** The ear mould is **comfortable to wear, easy to fit and remove, and has a good cosmetic appearance**. The ear mould serves as **an anchor for hearing aids** affording retention of the hearing aid to the ear. A properly fitted ear mould will prevent the hearing aid from falling, under most circumstances. For body aids the ear mould provides a retainer for the receiver in the ear. The ear-mould can be used to modify the frequency response of the hearing aid to some extent. This can be achieved by making slight modifications in the ear mould.

1.7.1 Procedure For Making Ear-Moulds

## Taking an ear-impression

An accurate ear-impression is fundamental to design an effective ear mould. If the impression is not taken properly, the resulting ear mould can be uncomfortable to wear and will have a poor fit in the ear. This would affect the efficiency of the aid negatively.

- **Ear impression equipment and materials:** Otoscope or ear light, cotton or foam block, nylon thread, mixing bowl, spatula, tweezers, impression powder, syringe and scissors.
- **Examination of Ear:** Prior to taking the ear- impression, it is **necessary to inspect the ear canal** with an **otoscope**. The **presence of wax, discharge** or **obstruction by a foreign body** are all **contra-indications** for taking a ear- impression.

- A suitable size of **cotton-wool ball tied properly to a thread** (temp), should be **inserted into the ear canal. The target spot** for placing the cotton ball is at the **junction of the cartilaginous and bony canal**. The attached thread should be in the middle of the back of the temp, and should run out of the ear and hang freely down the side of the cheek. ( See the diagram given below )

- The next job is to prepare the **impression material**, and then **invest the material into the ear**. The impression material must be invested into the ear by means of a syringe in such a way that no distortion of the aural tissues occurs. The important point to note is that the impression material should spread properly in the concha and the external ear canal. The material that can be used for taking ear impression is available in two varieties. Alginate material is mixed with water and the paste is invested into the ear using a syringe. The Silicon based material can be just mixed and invested providing better dimensional accuracy.

- When the material is cured, **impression should be carefully removed** avoiding undue stress or strain. The thread should be pulled out gently and slowly. To remove the impression first move the ear away from the impression and with the thumb and forefinger take hold of the impression at the center back and pull slightly forward. Then pull out the top ( helix ) and pull straight out with a bit of upward and clockwise motion. The impression should release and come out easily. Be sure to check the ear for any bits of material that might have remained. **Be sure also that the cotton block comes out with the impression.**

## Trimming and casting of the ear impression

- **The ear impression should be trimmed to the desired length** with a scalpel or scissors. It should be cleaned to remove the deposits of cerumen, if any. The silicon impression should be left to stand on a tile to allow the complete polymerisation. The impression is then **invested in plaster of Paris** or alternate model making material and left to dry.

- The **original impression is removed** from the plaster and the **cast is obtained** which is filled using the material of choice. ( The types of ear mould materials are described below )

## Fabrication and finishing

- The mould is taken out from the plaster and processed which includes **drilling a canal in the mould, cutting the undesired portion and buffing of the mould**. A small electric motor with an '0 to ¼ chunk' will suffice for this purpose. The ear mould laboratory need tools such as drills, burrs, stones, polish wheels and polish. The electric motor should be 1/6 HP ( horse power ) and not more than ¼ HP. It should have a double shaft i.e. a usable shaft on each side. It should be a two speed 1725/3450 rpm motor. One end of the shaft is for mounting the buff wheel and the other one is for the chunk in using the drills, stones etc.

- After polishing **a snap ring ( plastic or metal ) is fitted** in the mould if to be used for a pocket model aid. For a **post aural aid the mould** need to be **fitted with a plastic pre-bent tube**.

### Fixing the mould on the hearing aid

- The fitting of the ear mould is checked on the user. **The ear mould should be comfortable to wear, easy to insert and remove.** It should be possible to set the **desired volume control level without acoustic feedback**. Acoustic feedback is the characteristic high pitch sound emanating from hearing aid when worn. It is by definition, the return of some of the energy of the output signal from hearing aid receiver back to the microphone of the hearing aid. **Improper ear mould fitting can lead to feedback**. It results into ineffective amplification due to inadequate usable gain.

- **The user must be given careful guidance on how to use and clean the ear mould.** In case the user being a child the parents should be guided. The practice in insertion and removal of the ear mould should be part of the program of introduction to the hearing aid system. It will be necessary for parents to obtain new ear moulds for their children quite frequently in early years of life. It is not possible to put a time span on the life of an ear mould.

  The professionals and parents should be on the **lookout for allergy** to the ear mould material. **Dry flaking skin or itching of the concha and meatus** are clearly signs of this problem. The referral to a doctor and use of alternative material is the solution of this problem.

Ear Mould Material

The most commonly used material for making ear mould is lucite plastic, **a hard, durable clear material. The chemical name for this lucite material is methyl methacrylate. Besides being available in a clear material it can be manufactured in various shades. Any style of ear mould can be made out of lucite material.** Another soft material known as PVC ( Polyvinylchloride) is leading soft material **in use today as it has excellent acoustical properties. It is available in various degrees of softness. However it tends to crack and break.** Currently various Silicon materials are available **and are used in hard and soft form. This material needs ultra violet curing.**

**Some hearing aid users tend to have allergic reactions to some of the standard ear mould materials. These reactions often take the form of itching, irritation or swelling in the canal and / concha. Therefore, a nonallergenic polyethylene has been developed for use with ear moulds.**

### 1.7.2 Types of Ear Moulds

The ear mould for a pocket model **aid is a** full, solid mould with a metal or plastic snap ring **to hold a receiver directly to the ear mould. The ear moulds for behind the ear hearing instruments have different styles like shell mould, skeleton mould, half-shell mould, etc.**

Shell mould **is, by design, the best ear mould available in terms of acoustic seal. It** fills the concha completely, **yet has excellent cosmetic qualities and is used to great advantage in fitting more severe losses where higher levels of gain and output are needed.**

Skeleton mould **is the same basic style as the shell mould with the** center of the bowl portion removed, **leaving instead a 'ring' around the posterior perimeter of the concha for retention. It is used with mild and moderate gain instruments. The skeleton mould and its variations are the most widely used ear moulds today.**

Half shell mould **The name of this mould denotes its style.** The base of the mould covers only about half of the concha **bowl that portion of the lower concha covering the canal , filling the tragus and anti tragus areas. This is good mould for mild to moderate losses and is generally considered cosmetically acceptable.**

### 1.7.3 Ear Mould Modification

It is technically possible to manipulate the entire frequency response of a hearing aid by making modifications in the ear mould. **These modifications are changes in the length and diameter of the sound tube, the use of ear mould venting, use of damping elements etc.** Sometimes ear mould modifications are also used to increase the comfort of the subject not altering the frequency response appreciably.

- **Venting** the ear mould is done by **drilling a small hole from the outside of the ear mould** either into the sound bore or to the end of the canal. Venting reduces amplification of low frequencies, increases the overall acceptance and comfort of the hearing aid, reduces the occlusion effect.

The vent can cause feedback and caution must be taken when it is used. **Venting is not advised when the user is wearing a high gain instrument.**

**Vents** can be classified into three types **parallel, diagonal, external.**

A **Parallel vent** runs parallel to the sound bore to the end of the canal.

A **Diagonal vent** runs into the sound bore at an angle, not reaching the end of canal.

With a Diagonal vent, there is an increased chance of acoustic feedback.

An **External vent** is a groove cut into the surface of the ear mould from the outside to the mould to the tip of the canal. An External vent is used when space does not permit the use of either diagonal or parallel vent. An External vent is also used when the patient suffers from excessive moisture in or drainage from the ear.

- **The change in bore diameter** modifies hearing aid response by the way of high frequency reduction ( above 1 KHz ). The reduction occurs as the diameter of the bore is decreased.

- **Damping** is **facilitated by fused mesh elements or mechanical inserts** that fits snuggly into the ear hook or ear mould tubing. This is used to reduce the resonance effects in the sound transmission channel of post aural

aids, resulting in a smoothing of the frequency response, effective in the 1-3 KHz zone. Dampers are colour coded, for different frequency band. Specific dampers are designed for specific models of hearing aids and this information is available with hearing aid manufacturers.

## 1.8 HEARING AID CARE

Hearing aid is an electronic device. Dust, humidity, sweat, body heat, mishandling can have adverse effect on hearing aid. **Hearing aid care is very important**. It is very essential to explain the following points in detail to the parents and the hearing aid users. If the aid is looked after well, it can give good service.

- The hearing aid should be kept in a cool, dry place.
- The hearing aid should not be exposed to high temperatures.
- It should not be handled carelessly or roughly.
- The hearing aid should be protected from water.
- Care must be taken to see that the hearing aid is switched off before it is removed from the ear. If not, the battery will soon get drained out.
- The appropriate battery should be used. Care should be taken to place the positive and negative terminals correctly, while placing the battery in the battery compartment.
- If the hearing aid is going to remain unused for a long time, it is better to remove the battery from the hearing instrument. This prevents leakage of the battery.
- No cloth should directly cover the microphone, as the sound of the cloth movements causes great disturbance to the user.
- In case of children, a hearing aid should be used with a harness or with proper straps. It is also essential to have a protector on the pocket-model instrument, to protect the microphone and switches from spilt food, water, dribble and vomit. A BTE instrument can be used with a ring, called BTE lock.
- The hearing aid and mould should be kept in an open box when not in use, to let any moisture present evaporate. It is better to keep ITE and BTE instruments in a dehumidifier kit after usage.

- The ear mould should be cleaned daily, by wiping it with a tissue, a damp cloth or a prepared hearing aid solution.
- If the output hole of the ear mould gets blocked with wax, it will prevent the sound from entering the ear. This wax should be removed with a wax hook or a stick, regularly once a week.
- It is essential to get the hearing aid serviced regularly.

If these basic precautions are taken, the hearing aid can give long and valuable service to the user.

## 1.9 CHECKING OF HEARING-AIDS

It is essential for the teacher of the hearing-impaired to check the hearing-aid every morning , to find out whether it is working properly.

You can check the hearing aid in the following way:

- Place the hearing aid on the table, with the earpiece [receiver] at a distance of 12-18 inches from the microphone.
- Switch on the hearing aid to the maximum volume.
- There should be a strong whistling sound heard. This sound, called feedback, indicates that the hearing aid is working. The feedback should be continuous, and not intermittent.
- Then set the hearing aid to a comfortable volume setting, place the mould in your ear, and listen to the quality of sound. Clarity of sound indicates that the hearing aid is working well.

### 1.9.1 Common Faults of Hearing Aids, And Their Solutions

You may find the following faults with the hearing aids of your children. There are a few checks to be made by you, before you send it to a hearing-aid technician for repairs.

• When the aid is being checked, there is no feedback, or the aid is dead

The casting [body] and /or receiver may be cracked or broken. Check them.

The controls [switches] of the aid may not be in their correct positions. Check them.

The battery may be weak. Check and replace, if required.

The battery terminals may be dirty. Clean them.

The cord may be broken. To check, wiggle the cord between finger and thumb, especially near the plugs. If an intermittent sound occurs, it means the wire is broken. Change the cord, and check if the aid works well now.

The canal of the ear mould or ear-tip may be plugged with wax. Clean it.

The receiver may be damaged. Replace it with a new receiver, and check.

- The hearing-aid is too weak

The canal of the ear mould or ear-tip may be clogged with wax. Clean it.

The battery may be weak. Try a new battery.

The hearing thresholds of the person may have changed [worsened]. Conduct the audiogram again. A hearing aid of higher gain may be required.

- The hearing-aid works intermittently

The cord may be broken. Try a new cord.

The battery contact may be dirty. Clean battery contacts with sharp-edged object.

- The hearing-aid is giving feedback [whistling], while being worn

The ear mould or ear-tip may not be fitted properly in the ear. Fit it properly.

The ear mould or ear-tip may not be of the correct size. Make a new ear mould, or fit a new ear-tip of proper size.

For a pocket-aid, the distance between the microphone and the receiver may not be sufficient. Try to increase the distance, by changing the position of the hearing aid.

The seal washer between the receiver and ear mould may be missing or worn out. Replace the washer.

The hearing aid may be turned on too loud. Adjust the volume to the degree necessary to hear well.

On post-aural aids, check the microphone inlet and ear hook for blockage. Check the connecting tubing for cracks, moisture or debris.

When trying to determine the nature of a fault on a hearing aid, **follow a logical, step-by-step procedure**. Rule out each possible fault, one at a

time. In case you are still unable to get the hearing aid working, contact a hearing-aid technician.

## 1.10 HEARING-AID SELECTION

It is essential to choose a hearing aid that will suit a person's hearing loss. Recent advances in hearing-aid technology have made a wide range of hearing aids available, suitable for different degrees of hearing loss.

**A hearing aid should be selected after a careful process**, which includes the following procedures.

## 1.16 POINTS FOR DISCUSSION/CLARIFICATION

**After going through the unit you may like to have further discussion on some points and clarification on other. Note down those points below :**

### 1.16.1 Points for Discussion

_____

_____

_____

_____

_____

_____

_____

### 1.16.2 Points for Clarification

_____

_____

## 1.17 REFERENCES.

1 Amplification for the hearing impaired by Michael Pollock.

2 Audiology by Hayes Newby.

3 Handbook of Clinical Audiology by Jack Katz.

4 Paediatric Audiology zero to five years by Barry Mc Cormich.

5 Hearing Care for Children by Frederick N Martin and John Green Clark.

6 Bridge course in manual for the field of hearing impaired and associated disabilities – published by the rehabilitation council of India.

# BLOCK 4:
# ASSESSMENT OF SPEECH

# UNIT 1: RESPIRATION AND PHONATION: PRE-REQUISITES, PROCESS, TYPES AND NEED FOR ASSESSMENT

## STRUCTURE

Introduction

- **Objectives**
- **Various Class Room Amplification Devices**
  - Speech Trainer
  - Group Hearing Aids
  - Induction Loop System
- **Cordless Amplification Devices**
  - Infrared System
  - FM System
- **Television Enhancement Technology**
- **Telecommunication Technology**
- **Signal/ Alerting Technology**
- **Other Amplification Devices**
  - Cochlear Implant
  - Risk Factors Involved in Cochlear Implant
  - Tactile Aid
- **Classroom Acoustics**
  - Identification of Various Noise Sources
  - Reduction of Noise Levels
  - Reverberation
- **Let us Sum up**
- **Self Study**
- **Assignments**
- **Points for discussion and clarification**
- **References**

## INTRODUCTION

Hearing impaired person tries to find suitable amplification devices. These are called as individual hearing aids. These **hearing aids have some built in limitations**. It amplifies limited frequency range, and is unable to amplify complete speech frequency spectrum. (A spectrum is a graphic representation of the distribution of frequency components in a given acoustic signal.) It is ineffective at a long distance, and in presence of background noise. Hearing aid amplifies everything, even though not required by the hearing impaired person.

The person who is using a hearing aid **experiences instrument being very noisy**. So there is a need to explore other amplification devices, which may resolve above stated problems, and may offer better quality auditory inputs to hearing impaired person. **Teaching hearing- impaired children** essentially **depends upon good quality of auditory inputs**. Classroom amplification devices act as alternative devices, which provide flexibility to the teacher as well as to the students.

There are other assistive listening devices, which may work independently of, or in conjunction with the hearing aid. These devices are used for television, telecommunication etc. It has been observed that **profound hearing loss cases do not receive significant benefit from individual hearing aids**. Naturally they tend to rely more on speech reading and not on auditory cues. These individuals need different kind of stimulation mode. Cochlear implant and tactile aids are the other options to them.

Appropriate acoustical conditions in a classroom are crucial, as all these **devices do not have** selectivity **to amplify only speech and no other inputs**. Similarly acoustic environment is a constantly changing environment. **Thus background noise may adversely affect the listening skills** of hearing impaired children, resulting into poor academic performance in schools. It is essential to study acoustics, noise levels in and around the classroom and various measures to reduce this noise level.

## OBJECTIVES

**At the end of this unit students will be able**

- To understand various classroom amplification devices.
- To compare and to contrast classroom amplification devices.
- To describe cordless amplification.
- To list various assistive listening devices.

- To understand cochlear implant and tactile aids.
- To list various sources of noise, in and around the classroom.
- To elaborate measures to reduce classroom noise.
- To explain reverberation and how to reduce it.

## CLASSROOM AMPLIFICATION DEVICES

There are different types of amplification devices, which are used in the classroom. These instruments have **better, and wider frequency response curve**, than an individual hearing aid. They have **high level of amplification**. Most of the systems are coupled to set of headphones; hence problem of feedback is minimal. Also, background noise reduction becomes possible. This noise reduction is achieved by placing a microphone as near to the speaker's mouth as possible. This minimizes the adverse effects of distance between the speaker and the microphone and also minimizes background noise. **Improvement in signal-to-noise ratio is the primary goal**, which, can be achieved with these classroom devices. Signal-to-noise ratio expresses the ratio of speech intensity (S) to noise intensity (N). The difference in dB between a sound of interest and a competing sound is called the signal –to- noise ratio. The S/ N may therefore be interpreted as a relation between two acoustic signals. **Speech intensity has to be louder than background noise to understand speech**. But we have no control on variables of acoustic environment; hence this ratio keeps on changing. Every effort is made to control signal to noise ratio in all these classroom devices. Common classroom devices are as follows, speech trainer, hard wire system or group hearing aids and loop induction system. Let us study these units in details.

### Speech Trainer

A speech trainer can be considered as a **large size hearing aid.** It is a kind of master hearing aid, which can be used for different types of hearing losses. The speech trainer constitutes two microphones, amplifier and a set of headphones. The two microphones can be built-in in the speech trainer or can be attached externally. There are independent gain controls, tone control along with one on-off switch on the speech trainer (fig1). There are two types of speech trainers, **a) monotype, and b) stereotype**. Monotype speech trainer has single amplification circuit, and stereotype consists of two

independent amplification circuits. The output level of the speech trainer can be adjusted individually in stereotype speech trainer. In mono- type speech trainer, independent volume controls can adjust the output level of each ear.

The teacher can adjust the output level of the speech trainer, according to hearing-loss of an individual. **Generally amplification level is kept 30dB above the pure tone average**. The frequency response curve of any speech trainer is from **100Hz to 8000Hz**. This wide frequency response curve can facilitate better speech inputs. Some speech trainers have **tone control**. The function of the tone control is same as, that of any tone control of hearing aid. Speech trainers also have **VU meter or LCD lights**. The needle of a VU meter in a speech trainer deflects when an individual speaks; the deflection of the needle indicates output level or loudness of the input. If the deflection of a needle is very minimal, when a child speaks he can be explained a need to monitor his own voice. Similarly LCD lights are effective to give information on loudness of voice. **These visual cues are important to monitor intensity of individual's voice**. These are additional visual inputs to the hearing impaired child. Some speech trainers are batteries operated, in that case VU meter or the LCD lights gives **indication about the low voltage of the battery**. Speech trainer is being a portable unit; it gives flexibility to use it in various environments such as at home, in the classroom etc.

**Merits of Speech Trainer**

- It has a wide frequency response curve.
- It has maximum output level of 140dB.
- It can be used for all types of hearing losses.
- VU meter or LCD lights can give visual cues to the child.

- It has high-quality amplification.
- It is useful in auditory training activity.

**De-merits of Speech Trainer**

- The headphones are bulky for infants.
- It affects the mobility of a child.
- It can be worn for short period [20-30 minutes].
- A trained person is required to handle the instrument.

### 2.3.2 Group Hearing Aids

**High-fidelity sound input** is the need of hearing impaired children; and if this input is given to the whole class simultaneously, classroom teaching will be easier to the teacher. Group hearing aid or hardwired system provides such input to all the children in the class simultaneously. **The system consists of microphones, amplifier and few sets of headphones**. The system is installed in a classroom; generally it is fixed to the students' tables.

**The system is made available for a group of six/eight/ten children**. At teacher's desk one microphone is installed. Other microphones are installed in such a way that single microphone is shared with two children. **The inputs are fed into the microphone, which transmits electrical signals to the amplifier. Amplifier amplifies electric signals, which is fed to a series of student control boxes**. Each control box is equipped with an **independent gain control** for the left and the right headphone. In this way, amplification can be adjusted as per the audiogram of an individual. All children have set of headphones. Generally classroom furniture is designed in **a half circle shape,** but one can have different furniture styles. **Half circle arrangement appears to be more convenient for children to speech read their teacher**. The preferred seating arrangement may be as, children with minimal residual hearing

are seated at the center and others with relatively good residual hearing are seated sideways. This system facilitates desired, and high –fidelity quality auditory inputs to all the children simultaneously. (Fig.2)

**Merits of hard wired/ group hearing aid system**

- High fidelity inputs are provided to all the children, simultaneously.
- Distortion of amplified speech is at minimal level.
- Signal to noise ratio is improved and maintained.

**De-merits of group hearing aid system.**

- Mobility of children is affected.
- Heavy headphones cause discomfort to children.
- Wear and tear of the system is very common, as children misuse hard wires, control boxes etc.
- Requires constant maintenance.

### 2.3.3 Loop Induction Amplifying System

High quality amplification is a need of all hearing impaired children. But children should have mobility in the classroom, children should be able to participate in various activities in the classroom, then group hearing aid is not a solution. **Loop induction system has provided better alternative for classroom amplification**. The system differs from the conventional amplifying system, that the output from an amplifier is fed into a loop of wire instead of directly to the headphones. The sound waves are picked up by the microphone and transduced into electrical current in the normal way. **The signal is then strongly amplified and fed into a loop of wire that runs around the entire room. The flow of current within this wire causes a magnetic field to be set up within**

**the room**. Telecoil of an individual hearing aid will be able to pick up the signal from the magnetic field. This signal is amplified and transformed back into acoustical energy by the earphone. **This telephone pick up circuit is sensitive to variation in the magnetic field**; so the child will be able to pick up various auditory cues. The great advantage of this system is **the mobility of children**. Regardless of position of children in a classroom, children are able to **hear their teacher's voice clearly, and constantly. Signal-to-noise ratio remains unaltered** irrespective of the distance between the microphone and the receiver.

**Merits of Loop Induction System**

- Child gets similar kind of input constantly, irrespective of the distance in the classroom.
- Signal-to-noise ratio is improved and maintained.
- Child is free for any activity.

**Demerits of Loop Induction System**

- If the two systems from the adjacent classrooms are on, child may hear the activity that is going on in the next room. This is called as **Spillover.**
- The **performance and success** of the loop induction system depends on **quality** of individual's hearing aid.
- The child is **unable to hear his own voice**, as the microphone of his instrument gets disconnected, when hearing aid is set to T position.

Speech trainer, group hearing aid system, and induction loop system are the commonly used as amplification devices in the classroom. These devices have advantages over individual hearing aids with reference to performance but they **do not completely satisfy audiological requirements** of highly effective system of amplification. The next generation of

assistive amplification devices is **infrared system and FM system**. These are the cordless devices.

## 2.4 CORDLESS AMPLIFICATION DEVICES

We have seen how the loop induction system attempts to provide mobility by using a magnetic field to convey the signal from the amplifier to the receiver. The next generation system attempts to provide the advantage over the loop system without the disadvantages stated above. Currently there are two systems available to hearing impaired individuals.

### 2.4.1 Infrared System

Infrared system does not use a hardwire connection. The sound that is picked up by the microphone is **converted into infrared light waves through the use of diodes**. (Diode is an electronic device in which the electric current passes in one direction only.) These waves are **dispersed through out the room**. The receiver, worn by the hearing-impaired listener **transforms the infrared light waves back into an auditory signal**. The receiver looks like a stethoscope. This receiver serves as an amplifier and can be adjusted as per the need of an individual (fig3).

**Merits of the Infrared System**

- It can be used for any listening activity.
- It can be coupled in variety of ways to headphones, and hearing aids
- Signal-to-noise ratio is maintained.
- System can be fitted for individual use or for a group.

**Demerits of Infrared System**

- The system can be used **only in enclosed situations**.

- The room should be **free from any obstacle** such as furniture, as infrared light waves cannot pass through or bend around obstacles.
- Infrared system cannot be used outdoors.

### 2.4.2 FM Systems

FM system or the frequency modulated system works on a **principle of radio-frequency waves** to carry the information in the same way as a radio and television station broadcast the signals. This signal can be picked up by anyone with a radio receiver.
The classroom teacher is fitted with a cordless microphone and a **transmitting unit that transduces** the audio-speech signal into radio waves. These are then **transmitted into the environment**. The children wear a small radio receiver that **picks up** the radio signal being transmitted by the teacher's transmitting unit and **transduces it back into an audio** signal at a headphone or a hearing aid. FM system has been found, to be the **most effective device** among the existing assistive listening devices (fig.4).

**Merits of FM System**

- It can be used as **outdoors, as well as indoors**.
- It does not have a problem of Overspill from adjacent classrooms, since **multiple of frequency channels** are available for transmission, which can be used simultaneously.
- It **monitors** the signal-to- noise ratio more effectively.
- It has **high quality** sound reception.

**Demerits of FM System**

- FM system can function in a radius of 50 meters or 100 meters **depending upon the strength** of the transmitter.
- FM systems are **expensive.**

## TELEVISION ENHANCEMENT TECHNOLOGY

Television plays an important role in the lives of almost all individuals. It can be used as a source of information and education tool and as well as a source of entertainment. But for hearing impaired individuals and their families, it can be a source of great frustration. To solve this difficulty in listening a **special device is connected** to a hearing aid via hardwire or via infrared or FM system. A microphone is placed near the television's speaker or through the output jack. **Individual receives direct input**, which is **distortion free, and gives clarity in listening**. This device is good for mild to moderately severe hearing loss cases.

Many individuals with severe to profound hearing loss or poor speech recognition ability, the basic amplifying system **neither provide sufficient amplification nor speech recognition**. These individuals require **visual information to supplement or replace the audio signal**. The process by which this is accomplished is known as " **Closed Captioning**". Closed captions are hidden subtitles that are provided in one band of the televised signal .**To visualize these subtitles a decoder is required**. Currently such system is not available in India.

## TELECOMMUNICATION TECHNOLOGY

Telephone communication is a major component of the auditory activities of daily living. In the past the only **amplification option was through magnetic induction**. The hand -sets of the telephones was equipped with such telecoil. Present scenario is different. Telephone instruments are not compatible to a hearing aid. Hence the need for different amplification devices for telephone use became strong. (Fig 5 and 6) Show three types of telephone amplifiers. These devices increase the loudness of the incoming telephone signal. The devices have subtle difference; such as handset (fig 5) has a volume control. And the listener makes adjustments. In-line amplifiers are interfaced between the body of the telephone and the hand set (fig6).

Portable strap-on amplifiers (fig 6) are available for use on variety of phones. They are small, portable systems that can be used by individuals who use several different telephones. But these strap-on amplifiers can be used only on hearing aid compatible telephones.

Amplification devices may not always be able to provide the necessary amplification for individuals with severe to profound hearing loss or poor speech recognition. For these individuals **visual systems** are available to help make telephone communication accessible. **Text telephone (TT) also known as Telephone Devices for the Deaf (TDD) or Teletypewriters (TTY) are based on teletypewriter technology and transmit visual signals over the standard telephone line.**

It is necessary one person types his message, the signal is transmitted along the telephone line is decoded at the other end by the TT receiver. The message is seen on a line screen built into the TT (fig 7). TTY is also not available in India.

## SIGNAL / ALTERING TECHNOLOGY

Auditory activities of daily living, such as hearing a doorbell or a telephone ring, waking to an alarm clock or listening for a baby cry may not be heard by many hearing impaired individuals and may therefore be a source of great anxiety and frustration. This has led to the development of signal-alerting technology for the purpose of **alerting hearing –impaired persons to the presence of environmental signals.** Alerting can be done through the use of **auditory (amplified), visual, or tactile signals**. Alerting devices can be simple individual units for use with a single telephone or doorbell, or multi-line systems using FM transmission for signal detection throughout an entire living environment. By and large any **signal such as doorbell or telephone activates electrical system and a lamp lits up**. This system is the most effective system for hearing-impaired individuals and is very commonly used by many. FM transmission system generally gives auditory signal but individual has to wear the hearing aid all the time.

There is another new concept of **training to hearing ear dog**. These dogs are professionally trained to alert their hearing-impaired owner to a number of different sounds in a variety of listening situations. **The dog and an owner must train together at a specified training setting and for a period of time, within the owner's home environment. The hearing dog's responsibility is to attract the attention of the owner, when he hears the doorbell, telephone, fire alarm etc**. And lead the hearing- impaired individual towards the source of sound.

Assistive listening devices have been popular and commonly used in the western countries, but in India, picture is different. Hearing – impaired individuals and their family members are not aware of such facilities. But time has come that educators should advocate usefulness of assistive listening devices.

## OTHER AMPLIFICATION DEVICES

The majority of hearing impaired individuals with sensari-neural hearing loss receives significant benefit from the use of conventional hearing aids. But there are those, who appear to receive little or no benefit from hearing aids. These are profound hearing loss cases and for them alternative approaches need to be considered such as, cochlear implants and tactile aids.

### Cochlear Implant

Cochlear implants are designed to provide **direct stimulation** to the auditory nerve. In the normal auditory system, the sound energy entering the outer ear is converted to neural signals in the cochlea. The neural signals are transmitted along the auditory nerve, and further to the brain. It has been very well documented that cochlea is severely damaged in severe to profound hearing loss. **There is a breakdown in the conversion into neural signals**. So cochlear implant is designed to restore some hearing by way of **bypassing the defective sensory mechanisms, and directly stimulating the auditory nerve.** The **biocompatibility** (the ability of machines to be used together with living things.), and **surgical safety** of the implants have been studied in details. It has been approved by various scientific organizations, to provide implant to infants, as young as twelve months of age. There are some **pre-requisite tests** to decide the candidacy of an implant. The two important pre-operative investigations are radiological study of the ear structure by way of CT Scan, and MRI (Magnetic Resonance Imaging.) and audiological investigations to document that the child has severe to profound hearing loss and has no significant benefit with a high power hearing aid. The other medical tests are routinely done for the medical fitness for surgery. Post -operative hospitalization is for two to three days only.

The components of the implant are, a) A microphone, which picks up the acoustic signals and converts them into an electric signal. b) Externally worn speech coding unit, here the signal is manipulated into desired electrical pattern, c) A system for transmitting the signal from the processor to the internal components. d) Surgically implanted electrodes, which are capable of exciting the nerve fibers. (Fig 8)

Cochlear implant has been one of the options in auditory rehabilitation. It is safe for children. There are minimal risk factors, may be as minimal as that of any ear surgery. **A structured auditory program** is essential, which starts one-month post –operatively and may continue for two years. It has been documented that cochlear implantees perform well in language development, and their auditory responses are well within '**Speech Banana**.' It has been observed that children progress well in auditory training program. This technique is available in India, but is very expensive at this stage.

**Risk Factors Involved in Cochlear Implant**

Before one decides to go for the expensive procedure of cochlear implant (minimum Rs. 10 to 12 lacs as on today), it is important to be aware of the potential risks.

- The procedure of cochlear implant is not considered dangerous or particularly painful.
- Complications that have been seen include those associated with any surgical procedure – anesthetic risks, the possibility of inflammation, infection and bleeding, as well as those particular to this type of ear surgery – numbness or stiffness about the ear, taste disturbance, facial weakness, neck pain, dizziness or increased tinnitus (head noises).
- However these problems may usually be only temporary and in most cases would resolve with time and healing of incision.
- Other possible risks may occur after surgery, e.g. a perilymph leak from the cochlea which can be quickly repaired surgically, facial twitching can be caused by current escaping from the cochlea and stimulating the facial nerve; but this is usually alleviated by programming the speech processor.

- The presence of any foreign body under the skin can result in irritation, inflammation or breakdown of the skin in the area around the receiver / stimulator. Such complications may require additional medical treatment, surgery, and/or removal of the device.
- Failure of component parts could result in the perception of an uncomfortable loud sound sensation. If a failure occurs with the implanted electronics, they can be replaced.
- Potential hazards include new bone growth in the cochlea or deterioration of the nerve cells.
- However, it may be a relief to note that, now, if the implant is carried out by a well-known expert implant team, then the total number of complications and device failures could be very low.

## Tactile Aid

Systematic attempts to develop tactile communication aids for the deaf goes back to the pioneering work of Gault in the 1920's. (Terry Hnath-Chisolm). Initially researchers proposed **to use touch as a substitute for the impaired hearing mechanism**. Early devices were simple, the speech -signal transmitted directly to the skin through a single vibrator. Experimental results indicated that **single channel** devices provided only a **limited amount of information** about speech. They were useful in supplementing speech reading and in speech production training. Multiple vibrator system was the need for more speech information. Now multiple vibrator systems are commercially available.

All tactile aids consist of the basic components, a) microphone for picking up the sound signal and transducing it into an electrical signal. b) Processing unit to send the stimulation to tactile transducers. c) Tactile vibrators, which are wrapped in a wristband.

**The fingertips of the hands are the most sensitive areas, through which tactile stimulation can be given.** Children, who do not appear to receive adequate benefit through hearing aids, may be considered for tactile aid. Since it is a **noninvasive** gadget, there appears to be no limiting factor to

recommend tactile aid. Various studies have shown that tactile aids can be effectively incorporated into speech and language training programs for deaf children. (Terry Hnath- Chisolm) Tactile aids are currently not available in India.

Cochlear implants and tactile aids currently are being used effectively in the treatment of profound hearing loss cases. There are few comparative studies available to comment upon their performance. **Studies suggest higher performance level with implant than tactile aid. But longitudinal studies are required to compare both types of stimulation mode.** (TerryHnath-Chisolm).

We have discussed various amplification devices used for hearing impaired persons. But their **limited dynamic range** (Dynamic range is defined as difference between threshold of hearing and threshold of discomfort.) and **limited residual hearing** imposes lot of difficulty in processing auditory information. Background noise does interfere in this auditory information processing. **Few instruments have been successful to maintain signal- to-noise ratio but it is indeed a difficult task**. It is always advisable to monitor noise level in the classroom, and to make every effort to maintain the noise level at low level.

## CLASSROOM ACOUSTICS

Speech produced at one location in a classroom should be **clear and intelligible** everywhere in the room. But this may not be always possible. Speech intelligibility in rooms is influenced by a) the level of speech, b) room reverberation, c) background noise. These are the fluctuating factors. Normal hearing person can easily adjust in such a variable acoustic environment. But hearing impaired person has lot of **difficulty in listening in noise**. It is a difficult task for the defective auditory system. Children have to focus on listening task and this activity can be tiring. The educator's role is to understand

Reverberation, background noise and to understand various measures to reduce this noise level.

### Identification of Various Noise Sources

It is essential **to identify, to measure** the specific source of noise. Noise sources within a room include external noise, internal noise and noise within the room.

**External noise:** Noise that is generated from outside the building, such as traffic, playground, industrial or other noise generating activities in the neighborhood.

**Internal noise**: Noise that originates from within the building but outside the classroom, such as rooms adjacent to the classroom, gymnasiums, and busy hallways.

**Room noise:** Noise that is generated within the room noise includes individuals talking, sliding of chairs or tables and shuffling of hard-soled shoes.

### Reduction of Noise Levels:

**Rooms must be located away from high noise sources**, such as busy traffic. Thick concrete walls provide good attenuation than windows and doors. If windows are located externally, they must be properly installed, heavy weighted, or doubled paned.

**Certain landscaping strategies** can also diminish the effect of external noise sources. Placement of trees or shrubs around the school building is one such strategy. For reducing internal noise in a classroom, false ceiling, acoustic paneling, placement of absorptive materials etc. is recommended. The noise caused by the shuffling of hard-soled shoes, movement of the desks or chairs can be dampened by installation of thick carpeting with adequate padding.

**Jute mats may be a preferred option**. The placement of some form of rubber tips on the legs of desks and chairs can decrease room noise. This is particularly important if the room is not

carpeted. The hanging of thick curtains or venetian blinds over window areas can dampen room noise levels effectively.

### Reverberation

**Reverberation is defined as a noise that continues for some time after it has been produced, because of repeated reflection of the sound**. These reflections affect the quality of the sound. Eventually the sound can no longer be detected in the room. This process of sound energy decay can be long or short depending on the room surfaces. **This reverberation time should be less than 0.4 seconds**, however in reality it can be more than one second. There is a strong need to monitor this reverberation. **Reverberation can be reduced, by covering the hard reflective surfaces in a room with absorptive materials**. The material can be used, such as, acoustic paneling, cork bulletin boards, carpeting and wooden shelves, cupboards can also be strategically placed on the walls. Curtains can be placed to cover the hard reflective surfaces of windows. Thick carpeting on the floors can also significantly reduce reverberation. Positioning of mobile boards, black boards at angles rather than parallel to opposite walls will also reduce reflection of sound. Teachers may use some creative artwork to help absorb noise and, to reduce reverberation. Small classrooms, low ceiling heights are also recommended.

**Appropriate acoustical conditions in a classroom are vital to the academic achievement of children**. Studies have shown that excessive classroom noise and / or reverberation can be detrimental to all academic areas, such as speech perception, language development, reading ability, behavior, attention, psychosocial function and concentration. Poor classroom acoustics have also been shown to affect the vocal hygiene, and overall effectiveness of teachers.

**The American speech and hearing (ASHA) guidelines recommend limiting background noise levels to 30dB –35dB (A). Signal to noise ratio at the child's ear level must be +15dB or better and reverberation time of the classroom**

**setting should not exceed 0.4sec. (Classroom Acoustics: Carl C. Crandell et.al.)**

## LET US SUM UP

We have studied various amplification devices used in the classroom. Speech trainer is the ideal unit for one-on-one training program. It certainly gives high quality input to a child; it becomes easy to elicit responses on auditory training activities. Speech trainer can be a good facilitator for speech corrections. Hard wired group hearing aids can give high fidelity auditory inputs simultaneously to all children in a classroom, however, it has a limitation of mobility and children often complain off profuse sweating. Induction loop system is ideal for toddler group. We have also studied advanced technology of infrared and FM systems. Assistive listening devices are necessary to meet individual's specific auditory needs. There are large number of hearing impaired individuals who do not benefit from hearing aids. Cochlear implant and tactile aids are good alternatives for them. When children are equipped with the state -of –the art technology, classroom acoustics is equally important issue. It is important to study, various sources of noise, how to reduce this noise level, and how to provide optimum listening environment to hearing impaired children to enrich their language skills.

## SELF STUDY

1) Discuss limitations of individual hearing aids.
2) Explain signal –to- noise ratio, and its adverse effects on classroom teaching.
3) What the different types of classroom amplification devices?
4) Compare and contrast performance of a speech trainer and performance of an individual hearing aid.
5) Describe cordless amplification devices.

6) Describe various gadgets used for television and telecommunication enhancement.

7) Discuss need for other amplification devices, and describe their function.

8) What is reverberation?

9) What are the measures to reduce noise levels in and around the class room

## ASSIGNMENTS

1) Describe need for other amplification devices.

2) Why do we need to study room acoustics? How to reduce the reverberation in the classroom?

3) Describe personal assistive listening devices used in various listening activities.

## POINTS FOR DISCUSSION/CLARIFICATION

**After going through the unit you may like to have further discussion on some points and clarification on other. Note down those points below :**

**Points for Discussion**

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**Points for Clarification**

## REFERENCES

1) Dereck A. Sanders, **Aural Rehabilitation**, Prentice –Hall Inc. (1971)

2) Carl C.Crandell, Joseph J. Smaldino, Karen Anderson, **Classroom Acoustics**, http:/ /www.agbell.org / publications/ acoustics.html

3) Joseph Mantano, **Rehabilitation Technology for the Hearing Impaired**, in Handbook of Clinical Audiology 4th Ed, Editor: Jack Katz, Pub. Williams and Wilkins (1994)

4) Terry Hnath-Chisolm: **Cochlear Implants and Tactile aids,** in Handbook of Clinical Audiology, 4th Ed. Editor: Jack Katz, Publisher: Williams and Wilkins (1994)

5) Anna K. Nabelek and Igor V.Nabaelek, **Room Acoustics and Speech perception,** in Handbook of Clinical Audiology, 4th Ed. Editor: Jack Katz, Publisher: Williams and Wilkins (1994)

6) American –Speech – Language – Hearing Association (1995) **Guidelines for Acoustics in Educational Environments**, ASHA 37, Suppl 14, 15-19

# UNIT 2: BASICS OF ARTICULATION AND PHONOLOGY (ACTIVE AND PASSIVE ARTICULATORS; CLASSIFICATION OF VOWELS AND CONSONANTS; ASSESSMENT OF ARTICULATION)

STRUCTURE

- **Introduction**
- **Objectives**
- **What is Auditory Training**

Auditory Training and its Importance in Young Children

- **Different Approaches to Auditory Training**
- **Tools used for Assessing Auditory Training**
  - The Audiogram
  - Auditory Speech Perception – its Importance
- **Factors Important for Auditory Training**
  - Selection of Hearing Aids
  - Parent's Involvement
  - Commitment of Professionals
  - General steps to be followed while undertaking the Auditory Training Sessions
- **Some Activities for Auditory Training**
  - Detection
  - Discrimination
  - Identification
  - Comprehension
- **Summary**
- **Self Study**
- **Assignments**
- **Points for discussion and clarification**

- **References and Books for further Reading**

## 2.1 INTRODUCTION

Language is a tool for communication. It is the code through which one expresses his/her thoughts, feelings and ideas. Spoken language / oral communication i.e. speech is one form of language and is predominantly an auditory code. Unless one hears the sound, develops recognition of sounds and their inter and intra relation with source, oral language does not conceptualize. Thus hearing or sense of audition is a pre-requisite for normal speech development.
According to Calvert and Silverman, "Learning to speak is so universal and apparently so effortless that we take it for granted that speech comes naturally. However, when development of language and speech are delayed or deviant or impeded, our attention gets drawn to the process of development. Only then one realizes as to how complex this process is."

Hearing loss is a major impediment of speech development and this is because 1) It severely restricts reception of speech and 2) reduces the ability of the speaker to monitor his own speech. For children who are pre-lingually deaf, hearing loss creates a greater problem, because a child's awareness and acquisition of spoken language depends upon the ability to hear the messages of others as well as perceive his or her own attempts to imitate. A hearing loss in a young child restricts these processes and may delay or inhibit both his speech and language development.

## 2.2 OBJECTIVES

The study of the unit on Auditory Training will help the trainees -

- To realize the importance of maximum use and utilization of residual hearing for betterment of language and speech development
- To know the various approaches of Auditory Training.
- To understand the importance of early intervention and a team approach for the success of aural rehabilitation.
- To get guidelines for planning activities to Auditory training.
- To acquaint with the various stages of Auditory training.

## 2.3 WHAT IS AUDITORY TRAINING?

The majority of the hearing impaired is not totally deaf. Very often they have remnants of hearing i.e. residual hearing as if the gates were slightly open. Making use of it and training the child to use this residual hearing is auditory training. Auditory training is the process by which children learn to recognize and understand auditory signals available to them (Jill L.Bader).

Sanders(1971) defines auditory training as a systematic procedure designed to increase the amount of information that a person's hearing contributes to his total perception. Auditory training assumes that there are specific exercises or experiences that will help a hearing impaired person use his/her hearing better than he would with constant amplification alone without such training.

According to Calvert and Silverman (1975), the training is presumed to improve the person's ability to use what he hears rather than improving the power of hearing itself.

Alpiner (1978) defined auditory training as consisting of three distinct factors (1) Discrimination of individual speech sounds, (2) Hearing aid orientation and (3) Improvement of tolerance levels.

Auditory training was defined as the creation of special communication conditions in which teachers and audiologists help hearing impaired children acquire many of the auditory speech perception abilities that normally hearing children acquire naturally without their intervention (Erber, Boothroyd, 1967)

### 2.3.1 Auditory Training and its importance in young children

Auditory training is the backbone of an oral aural educational set up. It is the very foundation on which the whole edifice of a child's oral communication skills depends. It opens up the entire world to the child as most human beings around the child transact and communicate with spoken language. Spoken language is normally received at the brain via the auditory channel. The brain is able, stage-by-stage to develop awareness of the acoustic cues underlying linguistic distribution and thus to separate the pattern which make up language. Similarly it is through audition that the child experiments with and monitors motor

speech production as development proceeds from babbling to conversation. In order to recognize and produce speech patterns the child must have adequate if not consistent exposure to oral language in a context which is meaningful to him.

The acquisition of language is further linked to auditory sense in human beings because it is a time locked function related to early maturational periods in the infant's life. The earlier and larger the auditory language stimulation, the better and efficient will be the language and speech skills. On the contrary, if the gap between onset of hearing impairment and age of detection and age of intervention becomes larger, then the language and speech of such hearing impaired will be poorer and less efficient.

The importance of early auditory stimulation is very high because the development of biological functions and language is time bound and known to occur at the fastest rate between 0 to 3 years (Lenneberg 1967, Chomsky,1966). This period is known as the critical age of development. A baby, who is deprived of appropriate language stimulation during these first 2 to 3 years of life, will not fully attain and develop to the same extent as those who have been stimulated and made use of hearing in critical period. Whether the deprivation is from lack of hearing or from lack of high quality language exposure or mental sub normality, such children are known to suffer from inadequate and delayed speech and language development.

It is for these reasons that it is necessary to tackle the hearing problems at the earliest possible age in childhood and develop use of all other skills, knowledge and insights in the hearing impaired child.

## 2.4 DIFFERENT APPROACHES TO AUDITORY TRAINING

**A) The different approaches as explained by Erber (1982) are**

1) Natural Conversational approach
2) Moderately structured approach
3) Practice on specific tasks

**1.** In Natural Conversational Approach, the teacher eliminates visible cues and speaks to the child in a natural way.

**2.** In the Moderately Structured Approach, the teacher applies a closed set of auditory identification task, but follows this activity

with some basic speech development procedures and a related comprehension task.

3. In Practice on specific tasks, the teacher preselects the set of acoustic speech stimuli and also the child's range of responses, prepares relevant materials and plans the development of the task.

**B) The Carhart Approach (1974)**

Carhart viewed the goals of auditory training as aiding in (a) Developing a command of language (b) Developing speech and language (c) Encouraging adjustment to the world of hearing people.

His approach to auditory training comprises of four major stages.

**1st stage** is development of awareness of sound. The goal of this stage is for the child to recognize when a sound is present and to attend to it.

**2nd stage** involves the development of gross sound discrimination . The child is trained to distinguish between highly dissimilar non-speech sounds, such as bells, drums, as well as other environmental sounds are often employed simple speech patterns. By now the child is practically aware that sounds differ and is ready to apply this knowledge to the understanding of speech.

**2rd stage** involves development of discriminations among simple speech patterns.

**4th stage** involves the development of fine description of speech. The child is taught to make all of the discriminations among speech sounds that are possible within the limits imposed by the hearing impairment.

**C) Acoupedic Approach ( Pollack, 1970)**

Pollack believed that the use of audition is hampered when attention is divided between two or more sensory inputs, so she proposed a unisensory approach towards education and rehabilitation of hearing impaired children. This is known as acoupedic method and excludes all visual cues such as speech reading during early training .

**D) Kretschmer's Approach –The auditory / language pattern programme**

The approach developed by Kretschemer (1974) was designed as a means of teaching language and speech skills to the hearing impaired children through extensive training in the use of auditory channel. In this method, exercises are directed towards having the child learn and apply linguistic rules through audition / auditory expansion and language rehearsal techniques. This is to eventually be able to put utterances together to form cohesive sentences. The inclusion of non-linguistic tasks such as the recognition of environmental sounds, occurs only when such sounds relate to the specific therapy experiences used to develop a particular linguistic principle or model.

**E) Cognitive Auditory Approach by Grammatico (1975)**

This approach is similar to Pollack's in which auditory training is not viewed as an activity to be set apart from other educational procedures. Her approach stresses 1) sound awareness, 2) discrimination, 3) localization, 4) imitation of intonational patterns, 5) memory.

**F) The traditional approach as given by Hirsh (1966) Erber and Ling (1976) .**

They have described four levels of audition that contribute to the perception of conversational speech. They are a) Detection, b) Discrimination, c) Identification, and d) Comprehension.

- Detection: This requires the child only to distinguish between the presence and absence of sound.
- Discrimination: This requires the child to differentiate speech sounds and indicate whether they are same or different.
- Identification: This requires the child to recognize the speech signal and to be able to identify it in some way, such as pointing to a picture, writing the word or syllable heard or repeating the stimuli.
- Comprehension: This finally involves understanding the message on a cognitive and linguistic basis. The child demonstrates comprehension by answering questions or performing appropriate tasks like answering questions like what is your name ? or following directions like shut the door. Erber and Hirsh (1976) suggested an auditory training programme in which increasingly complex speech stimuli are presented for processing through the 4

levels of audition, resulting in an auditory skills matrix as given below.

Many auditory training curricula or guidelines include the discrimination of environmental or non-verbal sounds. It is implied that greater skill at discriminating a bell from a whistle will somehow assist in the perception and discrimination of speech sounds.
( Lovell & Stoner 1960, Pollack 1971 )This idea cannot be supported.

The brain does have hemispheric specialization for the reception of speech and non-speech sound. (Liberman et. Al.1967), and thus it is likely that it uses different strategies to process each type of acoustic information. Further speech and environmental sounds have vastly differently temporal characteristics. Certainly learning to discriminate environmental sounds may have some importance in itself, but there is no evidence that it will promote improvement in speech discrimination.

Before an educator or the audiologist plans the auditory training session there are certain pre-requisites which would help them decide the path to be followed. They need to have some information about the child's residual hearing and more importantly the speech perceptual abilities.

## 2.5 TOOLS USED FOR ASSESSING AUDITORY RECEPTION

### 2.5.1 The audiogram:

The audiogram of a child is one important tool to know the hearing abilities or the residual hearing of the child. It is currently the most useful, single predictor of degree, type and nature of hearing loss. But predictions made simply on the basis of audiogram are not enough. It is crucial that teachers establish early whether a hearing impaired child can perceive sufficient spectral information to identify speech components or whether the child seems to perceive only intensity patterns. Sound has 3 aspects – intensity, frequency and duration. The audiogram provides no information on how well a child may be able to process the time relationship i.e. the durational aspect which is important to develop speech intelligibility. Therefore it is also essential to know the speech perceptual abilities of the children.

## 2.5.2 Auditory Speech Perception - Its importance

In order to learn how to speak, the hearing impaired must in some way, receive the speech patterns on which he can model his own production. For both normal and hearing-impaired listeners, speech perception and speech production are closely related events.
A child's ability to produce intelligible speech depends to a great extent on his or her ability to perceive its spectral and prosodic qualities. Auditory perception thus plays a vital role in speech communication during both reception and production.

Speech perception category for profoundly hearing impaired children as given in early speech perception test designed by Ann Geers and Jean Moog is as follows.

**a) Category 1 – No pattern perception**

At the lower end of the category are those who cannot detect even amplified speech. This category also includes children who can detect speech but cannot discriminate auditorily
among speech patterns like words or phrases that differ in gross duration patterns( e.g. cup vs.. Lunch box).

**b) Category 2 – Pattern perception:**

Children of this category have developed minimal skills in perceiving speech. At the lower end of this category are children who are just beginning to discriminate between words or phrases that differ in durational pattern in a closed set. At the upper end are those children who can differentiate between words that differ in stress ( e.g. apple vs. tooth brush).

**c) Category 3 – Some word identification:**

This category includes children who demonstrate minimal ability to make use of spectral or intonational information. These children are able to discriminate among words or phrases of similar stress and durational pattern presented in a closed set with highly different vowels (e.g. tooth brush vs. raincoat).

**d) Category 4 – Consistent word identification**

This category includes children who demonstrate greater facility in using spectral information for discrimination. They can discriminate among

single syllable words containing different vowel sounds presented in a large closed set ( e.g. bag, bus, boot etc.)

## 2.6 FACTORS IMPORTANT FOR AUDITORY TRAINING

### 2.6.1 Selection of hearing aids

After obtaining the audiogram and the speech perception ability category of the child, another important task for educator is the proper fitment of hearing aids. Without sufficient and proper amplification of speech the perception will not improve. It is also an established fact that production depends upon perception. Hearing aid selection for very young hearing impaired children is difficult because of the difficulties in conditioning and also they often have very little vocabulary or language with which to describe their auditory sensation. Therefore several trials and behavior response observations must be conducted for the selection of aids.

### 2.6.2 Parent's involvement

Parent's commitment is also equally important. They should be committed to believe that their child's auditory capacity can be developed.

**Commitment of professionals**

The teachers and audiologists should also be equally committed and should remember that it is the child's use of, not the amount of, residual hearing that is valuable to functional communication.

They should then decide together the plan and activities for the children. It should be remembered that the activities should be age appropriate and the achievements in the auditory training should be incorporated in speech therapy sessions.

**General steps to be followed while undertaking the Auditory Training Sessions**

1) Ensure that the hearing aids are working in optimum conditions.

2) Give the child an auditory verbal stimulus and show him the expected response (whether to raise a finger, pull a bead, jump, move a toy train etc.)

3) Next give the child only auditory stimulus by covering lips and show him the expected response (while covering lips care should be taken not to reduce the intensity of stimulus i.e. sound and also ensure that the child does not get clues from teacher's movement of eyebrows , shoulders etc.)

4) Then give the auditory stimulus only and note the child's response.

5) Give a lot of reinforcement to the child and make the auditory training session enjoyable.

6) Incorporate the child's achievements in Auditory Training in speech production and also use the same in classroom teaching and at home.

## 2.7 SOME ACTIVITIES FOR AUDITORY TRAINING

### 2.7.1 Detection

a) Detection of 6 sounds | a | | u | |i| |sh| |s | |m |. The teacher will give the stimulus and the child may be asked to pull beads, raise finger or put stickers of stars etc. on chart. Care should be taken not to give the 6 sounds daily in a sequence in a set order but to give them randomly.

b) Detection of onset and termination of sound. The teacher can give any continuous sound e.g. – o ---- The child is expected to move a toy train or a car after hearing the sound and stop when the sound terminates.

c) Detection of repetitive syllable:- Teacher may give an auditory stimulus of any repetitive syllable e.g. hop --- hop--- hop ---- and the child is expected to make the rabbit hop.

d) Detect sound in a natural situation:-The teacher may note the child's response to his name or to environmental sounds in a natural situation.

### 3.7.2 Discrimination

a) Continuous sound vs. discrete sound.

Ex . mooooo vs. ball.
(child manipulates the cow vs. points to the ball).

b) Continuous sound vs. intermittent
Ex. Kooooo vs. ba.. ba.. ba..
(child moves an engine vs. makes the sheep walk).

c) Long sentence vs. short sentence.
Ex. Blow the balloon vs. she likes to eat vanilla ice-cream.
The car zoomed vs. the little girl sleeps in her bed.
The teacher could use sentence cards with lines drawn under the sentence to indicate a short or a long sentence.

d) Speech patterns of differing intensity.
Loudly spoken syllables or words vs. quietly spoken syllable or words
Stop vs. Stop.

e) Speech pattern of differing pitch.
High pitched speech sound vs. low pitch sound.
The child may put a monkey toy on the tree or at the bottom of the tree for high or low pitch.
Continuous ascending pitch pattern vs. continuous descending pitch pattern. The child may manipulate toy airplane flying high or low for ascending and descending pitch.

f) Speech stimuli differing in rhythm and duration

(i) A word vs. a phrase vs. a sentence.
Ex. 'Moo' vs. 'A purple hat' vs. 'The boy kicked the ball'.
The child can point out to the sentence cards.

(ii) Sentence differing in rhythm.
Ex. Oh no ! Daddy is angry.
The cat jumped.
The baby has a red ball.

### 3.7.3 Identification

The activities mentioned for discrimination could also be taken for identification. The child could be instructed to identify the given stimulus.

a) Identify speech stimuli identical in number of syllables but differing in rhythm.

Ex. Oooh ! The water is cold.
The girl plucked the flower.
The bubbles went pop, pop !
Quack, Quack, says Daddy Duck.

b) Identify sentences according to stress or phrase boundaries.

Ex. John ran to the store.
John ran to the store.
John ran to the store.

### 3.7.4 Comprehension

Activities for comprehension could be –

1. Picture description
2. Story with comprehension questions
3. Guessing games
4. Following directions "Simon says"
5. Conversation

## 2.8 SUMMARY

Hearing or sense of audition is a pre-requisite for normal speech development and its sustainment. Prelingually deaf children generally exhibit delay in language and speech acquisition. However, majority of the Hearing Impaired children are not totally deaf and have some amount of residual hearing. Auditory Training is aimed at using this residual hearing to improve a person's ability to use and understand what he hears with the help of suitable amplification devices.

It is crucial to note that the first 3 years are the critical years and the importance of early auditory stimulation is very high because the development of biological functions and language is time bound and known to occur at a fastest rate between 0-3 years. It is therefore necessary to give adequate auditory stimulation and training to a congenitally hearing impaired child during the critical period.

There are many approaches of Auditory Training. They generally proceed from Detection or Awareness then Discrimination followed by

Identification and finally training the children to auditorily comprehend and respond to what he 'hears'.

Proper selection and consistent usage of Hearing Aids, Parents involvement and commitment of the professional team of Educator, Audiologist and Speech Therapist would assist the child in using his residual hearing. They should remember that the achievements in Auditory Training should be incorporated into the speech and language therapy and should also be emphasized at home. It is very important for professionals and parents to note that 'it is the child's use of , not the amount of residual hearing that is valuable to functional communication.

## 2.9 SELF-STUDY

1. Do you think hearing is important for language and speech acquisition ? Justify your answer.

2. 'Auditory Training is not just clapping hands or beating drum'. Elaborate the statement.

## 2.10 ASSIGNMENTS

1. State the different approaches to Auditory Training.

2. Plan out activities for Auditory Training for each stage of Detection, Discrimination,

   Identification and Comprehension in your language.

3. Which are the factors important for Auditory Training ? List out the general steps to be followed while undertaking Auditory Training in your class.

## 2.11 POINTS FOR DISCUSSION/CLARIFICATION

After going through the unit you may like to have further discussion on some points and clarification on other. Note down those points below :

### 2.11..1 Points for Discussion

_____

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### 2.11.2 Points for Clarification

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_____

## 2.12 REFERENCES AND BOOKS FOR FURTHER READING


1. Erber, N. (1982) Auditory Training, Washington D.C.:.A.G.Bell Association for Deaf.

2. Gathoo Varsha, (1997) A systematized approach to improve speech intelligibility in Hearing Impaired, N.C.E.R.T.,New Delhi.

3. Ling, D., Ling, A.(1980) Aural Rehabilitation, Washington D.C.:A.G.Bell Association for Deaf.

4. Moog Jean & Geers Ann, Early speech perception test for profoundly hearing impaired children. Central Institute for Deaf, St. Louis, U.S.A.

5. Pollack D. (1979) Educational Audiology for the Limited Hearing Infant, U.S.A.:Thoms Publisher.

6. Sanders D. (1982) Aural Rehabilitation Management Model, New Jersey:Prentice Hall.

7. Sawant Poonam, (1997) Assessing the impact of Auditory Training on Speech & Perception and Intelligibility. Unpublished M.Ed(H.I.) dissertation submitted to University of Mumbai.

8. Sums,Watter & Whitehead. ( 1982) Deafness & Communication, Assessment and Training.

# UNIT 3: SUPRASEGMENTAL ASPECTS OF SPEECH AND ITS ASSESSMENT

- ***STRUCTURE***
  - **Introduction**
  - **Objectives**
  - **Communication, Language and Speech**
  - **Functions of Speech**
  - **Parameters of speech**
    - Voice
    - Articulation
    - Fluency
    - Prosody
    - Speech Intelligibility
    - Segmental, Supra-segmental and Non-segmental aspects
  - **Characteristics of good speech**
  - **Summary - Things to remember**
  - **Assignment**
  - **Check your progress**
  - **Points for discussion / clarification**
  - **References / Further reading**

## 3.1 INTRODUCTION:

All living creatures are connected to each other by a constant **flow of messages**. The process that makes this connection possible is the process of **COMMUNICATION**. Communication is the essence of life. It is the binding force, so essential for society and the human culture. Men, women, children and infants are basically **social beings** and depend on human interaction and companionship for survival.

Human beings communicate with one another principally through **SPEECH**. Speech is unique and fundamental to human beings. It is the **most frequent and important** way of sharing our minds and relating to each other. Human beings **speak as easily** as they breathe. However, later through this course you will realize that the act of speaking is a **complex and highly coordinated** process involving many systems of the human body. Also, you will realize that a problem with any of these systems or in co-ordination of these systems may lead to **impairment** in the final product i.e. SPEECH.

## 3.2 OBJECTIVES:

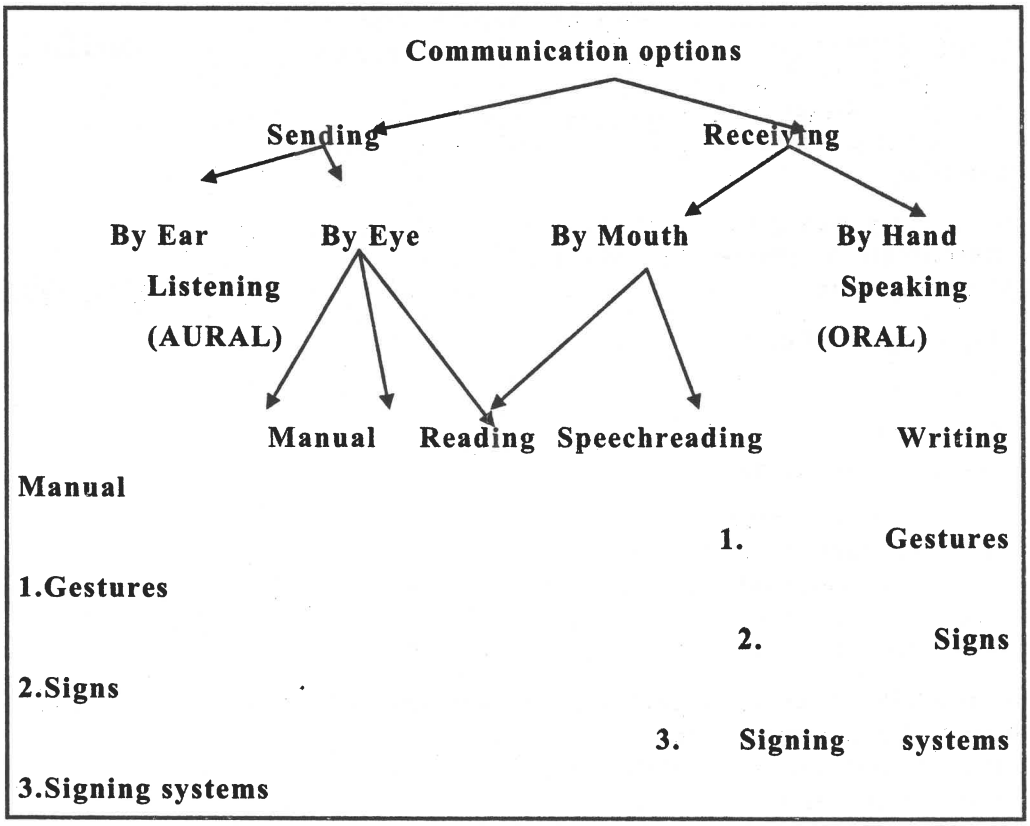
At the end of this unit you will be able to:

- Explain the **importance of communication** in the lives of human beings
- State the different **communication options** available to an individual
- Explain the **relationship** between communication, language and speech
- List the **functions** of speech
- Describe the **processes involved in communication** using speech
- Explain the various **parameters of speech**
- Explain the concept of **intelligibility of speech**
- Explain the characteristics of **good speech**

## 3.3 COMMUNICATION, LANGUAGE AND SPEECH:

**COMMUNICATION** is the process of exchanging and/or sharing information, thoughts, ideas and opinions. Most often this exchange is via language. **LANGUAGE** is a code consisting of symbols ordered in particular sequences for the purpose of conveying information. The **symbols of language** mainly consist of oral symbols, written symbols, etc. Depending on the symbols used, communication can be carried out in different ways. These communication options are shown in the figure below. For example, when communication involves use of written

symbols, it is achieved through **reading and writing**. Use of hand gestures or signs for the purpose of communication is involved in the non-verbal or **manual** mode of communication. **Typical ways** of communication include speaking and listening and also reading and writing.




The term communication is often used to include **only the spoken word**, that is SPEECH and HEARING. However, speaking and listening comprise but one of the many aspects of communication and are the foundation and the **primary medium** of most human communication.

**In-text activity:**

Try communicating the following sentences to a friend using each of these options viz. **GESTURES, SPEECH and WRITING.**

**Sentence 1**: What is the time?

**Sentence 2**: I do not go swimming because I am scared of water.

**Sentence 3**: The day after tomorrow my friend is coming from Hyderabad for her cousin's wedding.

What does **your experience** tell you as regards the most efficient communication option? You will surely agree that sentence 1 can be easily communicated using gestures as well as speech. Sentence 2 cannot be clearly communicated only through gestures. Especially the feeling of being "scared" cannot be **unambiguously** communicated

through gestures. The gesture for "being scared" could be misinterpreted for "feeling cold". Sentence 3 is definitely communicable most effectively through speech alone. All three sentences can of course be communicated effectively by writing. However, this will be **time-consuming**.

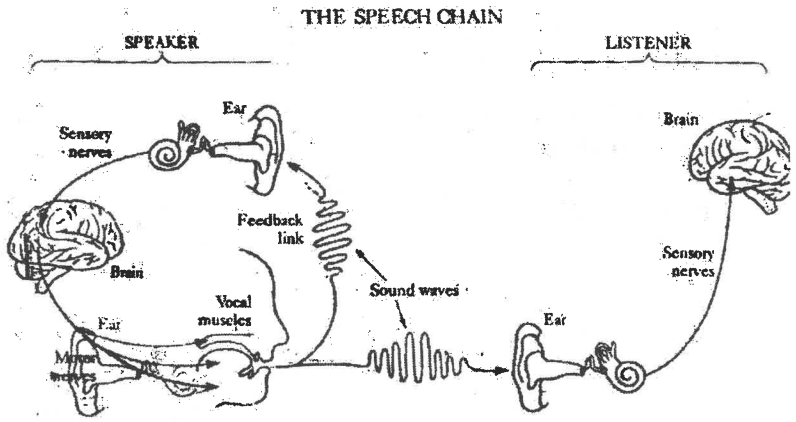
This activity was given to you to emphasize the fact that an **effective communication system** is one that permits the user to exchange information with

- high degree of ease,
- flexibility
- speed and
- accuracy in a wide variety of circumstances.

You will surely agree that speech appears to meet these conditions. **Nonverbal cues** such as our facial expression and bodily gestures **support and facilitate** communication; however, they cannot replace SPEECH. Therefore most educators lay tremendous emphasis on choosing speech as the communication option for the **hearing impaired**.

The process of communication is a **two-way process** that involves **sending** of a message by one individual and receiving of that message by another individual. The **sender encodes** a message using the code that he wants to use and sends this message to the receiver who is capable of understanding that code. The **receiver** receives this message and **decodes** it in order to understand the information in it. The process of sending a message is called as **expression** and that of receiving the message is called as **reception or comprehension**. For communication to occur, the receiver and the sender must share a common code. For example, if an individual chooses to send a message using hand gestures or sign language, his communication partner should be one who understands this code of non-verbal symbols. If both the partners do not share a common code, communication will **fail to occur**.

## FIGURE 1: THE SPEECH CHAIN




Many things must happen in order for a speaker **to speak efficiently:**

**(Refer Figure 1-Speech Chain)**

a. The brain must **create an idea** it wants to communicate to someone else.
b. The brain must then send this idea **to the mouth**.
c. The brain must tell the mouth which **words** to say and which **sounds** make up those words.
d. The brain must also send the proper signals to the **vocal muscles**, those that control the tongue, lips and the jaw through the **motor nerves**.
e. These muscles have the **strength and co-ordination** to carry out the brain's commands.
f. The lungs must have sufficient **air** and the muscles in the chest must be strong enough to force the **vocal folds to vibrate**.
g. The vocal folds must be in a good working condition for speech to sound **clear and be loud** enough to be heard.
h. The words produced must be **monitored by our hearing** sense (feedback link). This helps us review what is said and hear new words to imitate in other situations.

If the communication process has to be complete, the second part of the "speech chain" is equally important. The **listeners** should have a normal **hearing** mechanism. The **sound waves** of the message should reach the ears of the listener. The **sensory nerves** should carry the message to the **brain**, which should interpret it.

## 3.4 FUNCTIONS OF SPEECH:

Speech is one of the **most fundamental** qualities of human beings. It is the most **frequent** and **efficient** way of communication used by humans. Speech can serve a number of **functions**. Some of these are:

- **Gaining attention:** The most primary function of speech can be that of helping an individual in gaining attention of another person. **Calling out** someone's name or using some predetermined words to **signal** someone are examples of this.
- **Exchange of information:** Individuals can give and get information about a lot of things by speaking. Information about happenings, incidents, news, etc. can be shared by speaking. As it is very commonly seen, information spreads very fast by **"word of mouth"**. Exchange of information can occur not only between two individuals, but also between members of two groups, two cities, two countries and two generations. Important information about legacies, traditions, religious rituals, etc. is passed on from **one generation to another** through speech.
- **Sharing of emotions:** Speech is an important medium through which an individual expresses his or her emotions and feelings. By doing this, individuals can **relate better** with each other, build sound **interpersonal** relations with each other and promote **intimacy**. Speech also serves as a medium for **ventilating** one's pent-up emotions.
- **Speech as a controlling medium:** Through speech an individual can influence and control the behavior of another individual. Speech can be used for intents such as requesting, asking, reprimanding, convincing, warning and many more which help in changing, monitoring or **controlling behaviors of others**. Speech can also be used effectively for gaining **co-operation** of other persons in a co-operative endeavor. It is through speech that great leaders could gain the respect and co-operation of their countrymen.
- **Speech reflects individuality:** An individual can express his or her individuality by speaking his or her mind or by expressing his or her opinion. It is through speech that an individual can achieve his or her **identity and entity**. Actors and other public figures are often remembered by their unique styles of speaking.

- **Speech as recreation:** Some of the best forms of recreation and **entertainment** use speech as the medium. Theatre, cinema, drama, mimicry and singing all make use of the oral mode of communication. Though silent movies, mime acts and other forms of non-speech entertainment are available, they are not as popular.

The functions of speech thus can be **summarized** as follows:

1. To gain attention
2. To give information
3. To get information
4. To bind one generation to another
5. To express emotions
6. To promote intimacy
7. To influence others' behavior
8. To facilitate co-operative activities
9. To express individuality
10. To create new worlds

**In-text activity:**

- Try getting the attention of a friend of yours while walking on a **crowded road** by **clapping** or making a **whistling** sound. You will be surprised to see that a number of people will turn back to find out whether they are being called. Instead, if you call out the name of the friend, you can surely get his/her attention.
- At your workplace or college, try doing your **work without speaking** much to your colleagues/ peers. You will definitely find it difficult to get your colleagues to co-operate with you when you have a task to deal with together. They may think of you as being aloof, asocial or "snobbish". Also, at the end of a few days you will find your feelings to be **bottled up** within yourself due to lack of an opportunity to express your feelings openly.

**Interesting observations:**

- Many individuals attribute their **likes or dislikes of people** to the way these people speak. We often think of individuals with "good" speaking skills as **interesting** people and those with "not-so-good" speaking skills as **dull** people.

## 3.5 PARAMETERS OF SPEECH:

Speech is produced by a **complex** interaction between the processes of **respiration, phonation, articulation and resonation**. Speech has a number of **parameters** that are considered to be a result of the various **processes** involved in the production of speech. The main parameters of speech can be enumerated as **voice, articulation, fluency and prosody**. Let us look at each of these in some detail.

### 3.5.1 Voice:

Voice is the **sound** (tone) generated by the **vocal folds in the larynx** (voice box). It is the result of the **processes** of respiration, phonation and resonation. The various parameters of the **vibration** of the vocal folds determine the parameters of voice. Different aspects of the **respiratory** and **resonatory** processes also affect the parameters of voice. Voice can be described in terms of its **pitch** - which depends on the fundamental frequency of vibration of the vocal folds, **loudness** - which depends on the amplitude of the vibration of the vocal folds, and **quality** - which depends mainly on the resonatory effects.

### 3.5.2 Articulation:

Articulation is the process of **speech sound production**. It consists of a series of overlapping movements of the articulators, placing varying degrees of **obstruction** to the outgoing air stream and simultaneously **modifying** the size, shape and coupling of the resonating cavities. Correct articulation of all the phonemes in a language is necessary for speech to be understood clearly. Correct articulation requires **accuracy** in the **placement** of articulators, **timing, direction** of movement, **strength** of movement, **speed** of movement and the **co-ordination** of all events. The products of the process of articulation are the speech sounds or phonemes. Speech sounds are classified mainly as **vowels and consonants**. Consonants are further classified depending on the **place** of articulation, **manner** of articulation and presence of **voicing** during articulation. You will study the description of speech sounds in one of the other units in detail.

### Fluency:

Fluency is the **smoothness** with which sounds, syllables, words and phrases are **joined** together during speaking. Speech that flows **uninterrupted**, at an optimal **rate** and **easily** without unusual hesitations, pauses or breaks is considered as fluent. In other words, appropriate and timely **sequencing** of these units of speech is necessary to maintain the fluency of speech. **Fluent speech,** then, is that which is

- relatively effortless,
- relatively free of abnormal pauses or discontinuities,
- moves forward quite rhythmically and easily, and
- spoken at an optimal rate, that is, which is neither too fast nor too slow.

### 3.5.4 Rhythm Or Prosody:

Prosodic features of speech are those which give speech its **melody** and **rhythm**. Speech rhythm **carries meaning, aids understanding, conveys emotional state** and **expresses esthetic qualities**. Rhythm features are produced by changes in **voice** and **articulation**, and usually by a combination of the two.

Features such as **intonation, emphasis, phrasing and rate** of speech contribute to the prosody of speech. Because prosodic features such as stress, intonation and emphasis are often spread over more than a single consonant or vowel, they are often referred to as the **"suprasegmental"** aspects of speech.

Rhythm features that are relevant to teaching speech include:

- **Emphasis:** Increased **stress** to a word in a phrase. Emphasis is produced primarily by an increase in **intensity** and **duration** of syllables within the stressed word. An accompanying change in **frequency** also occurs.
- **Intonation:** Change in **pitch** from syllable to syllable, rather than from word to word. Important linguistic **information** can be conveyed through intonation without using additional words.
- **Phrasing:** Organization of words into **groups** related to units of meaning. It has **two components** -the words **linked** in speech and the **pauses** between phrases. Pauses help the speaker to **inhale** air, to mark **grammatical boundaries** and to provide time for **planning** of new material while speaking.
- **Rate: Number** of syllables uttered in per unit of time. Individuals **vary** in the rate at which they talk. Rate is usually measured as the **number of words** per minute or the number of syllables per second. Most adults **read** orally from **160 to 180 words per minute**. In connected conversational **speech**, we average 5 to 5.5 syllables per second or about **270 words per minute**.

### 3.5.5 Speech Intelligibility:

Intelligibility refers to the **degree** to which a message can be **understood**. It is the **clarity** with which an average listener can understand one's utterances. In other words, it is that aspect of oral speech-language output that allows a listener to understand what a speaker is saying. We therefore **describe** a person's speech in terms of its intelligibility. For example, Mr.X's speech intelligibility is good. Mr. Y's speech intelligibility is poor. In one of the later units, you will realize that this description is useful when we have to describe the speech of a **hearing impaired** child who is being trained to communicate verbally. You will need to work on **improving** his speech intelligibility if it is poor.

Intelligibility of speech **depends on** various factors such as

- Appropriate use of the speech **parameters** discussed above,
- Listener's ability to **predict** parts of the message,
- Location of **pauses,**
- **Speed** with which the utterances are produced, and
- Grammatical **complexity** of the sentences.

**In-text activity:**

- Observe a person speaking while **chewing pan**, smoking a **cigarette** or with a **limited** mouth opening. Depending on the degree of mouth opening you will find it **difficult** to understand their speech.
- While listening to others speaking, try to **make judgements** about how intelligible their speech is. You will realize that the speech of some persons is clearer and easier to understand than that of others. Try to **analyze the reasons** for poor intelligibility of some speakers.

### 3.5.6 Non-Segmental, Segmental And Suprasegmental Aspects:

Very often, the parameters of speech discussed above are referred to in a different way that categorizes them into the segmental, non-segmental and the supra-segmental aspects of speech. This system of reference to the parameters of speech is very commonly used for **teaching** of speech to the **hearing impaired** children. Therefore, let us discuss these terms.

A **segment** refers to any discrete unit that can be **identified** in the stream of speech. Segmentation can take place using either physical or auditory criteria. A **segment** can be any unit in a sequence, which may be **isolated** from the rest of the sequence. Because the **phonemes** or speech sounds are discrete and definitely identifiable units of speech,

these are referred to as the **segmental** aspects. The **vowels, consonants, diphthongs, semivowels** are all included in the segmental aspects of speech.

On the other hand, segments that are not easily identifiable units are classified as non-segmental or supra-segmental aspects. **Ling (1976)** provides an extensive discussion about these aspects for the purpose of **teaching** of speech to the hearing impaired. According to Ling, **non-segmental** features of speech are

- pitch and its control,
- loudness and its control,
- duration and its control and
- quality.

The **supra-segmental** aspects are the **prosodic** features such as

- intonation,
- phrasing,
- rate,
- emphasis and
- rhythm.

## 3.6 CHARACTERISTICS OF GOOD SPEECH:

In order for speech to be **effective** and contribute to appropriate **social interactions**, it must have certain characteristics. We will now discuss these.

(a) **Purposiveness:** For speech to be effective, it should be purposeful. It should serve the purpose with which the speech was initiated to begin with. If speech is meant to seek **information** about something, it should do so. If it intends to express an **emotion**, it should do so correctly. Speech that does not serve its purpose is not effective.

(b) **Communicativeness:** Speech should be purposive and should carry a sense of personal **contact** and **rapport** with the listeners. Communicativeness is possible only when there is a full realization of the **meanings** that are being conveyed. Also, for speech to be communicative, it should be **direct** and **logical.**

(c) **Agreeable voice quality:** To be most effective as an instrument of communication, the speaker's voice should be of good quality. It should not be **breathy, harsh, shrill,** excessively **nasal** or

**unpleasant**. It should be **age- and gender-appropriate, of optimum pitch** and adequately **loud**.

(d) **Flexibility**: Flexibility of speech refers to flexibility of features such as pitch, loudness, rate, quality and stress. Without flexibility, speech will become **monotonous and boring**. Flexibility refers to variations that a speaker creates while speaking. This can be achieved by varying the **quantity** of speech i.e. varying the length of the sentences, varying the **rate** of speech and varying the number and length of **pauses**.

(e) **Adequate projection**: Projection refers to speech and voice that is **sufficiently strong**. Good projection arises from a good voice **mechanism**, proper **use** of the voice mechanism, **interest, enthusiasm** and **animation** on the part of the speaker. Failure to open mouth adequately, failure to provide adequate breath stream and indistinct articulation lead to **inadequate projection**.

(f) **Adequate articulation**: **Distinctness** of speech requires flexibility and agility of the speech organs. For correct and adequate articulation, the **sounds** in the language should be formed at the right **place** of articulation and in the correct **manner** of articulation.

(g) **Correct pronunciation**: The pronunciation of a good speaker should be **acceptable** by the listeners. This is especially relevant to the variations in the pronunciation of a particular word in different **dialects** and **regions**.

(h) **Animation**: For speech to be effective, it should contain **liveliness, alertness** and **interest**. A speaker who is dull, lifeless and uninterested is not considered a good speaker by many.

(i) **Ease of bearing**: The posture and the body language of the speaker convey a lot about the speaker. Awkwardness, stiffness and an immovable and inflexible posture may not convey **ease and comfort** on the part of the speaker. An erect posture, but not and arrogant or rigidly tense one, may be more effective.

(j) **Absence of excessive fear and timidity**: A **wholesome attitude** towards speaking, one that is free of fear, anxiety and timidity will definitely be more effective to the listener. If the speaker reflects these feelings, it may give an impression that the speaker is **not well versed** with the topic of discussion.

(k) **Semantic/Linguistic Soundness**: A good and effective speaker is one who makes good and apt choice of the **right words** in the right context. A **powerful vocabulary** with good knowledge of linguistic rules contributes immensely to effective speech.

## 3.7 SUMMARY - THINGS TO REMEMBER

- **The process of communication** is a two-way process that involves sending of a message by one individual and receiving of that message by another individual. For communication to occur, the receiver and the sender must share a **common code.**
- **Typical ways** of communication include speaking and listening and also reading and writing.
- An **effective communication system** is one that permits the user to exchange information with high degree of ease, flexibility, speed and accuracy in a wide variety of circumstances.
- **LANGUAGE** is a code consisting of symbols ordered in particular sequences for the purpose of conveying information.
- Speech can serve a number of **functions** such as gaining attention, exchanging information, sharing emotions, controlling others, establishing individuality and as a source of recreation.
- **The main parameters** of speech can be enumerated as voice, articulation, fluency and prosody.
- **Speech intelligibility** refers to the degree to which a message can be understood. It is the clarity with which an average listener can understand one's utterances.
- Features such as intonation, emphasis, phrasing and rate of speech contribute to the **prosody of speech.**
- A **segment** refers to any discrete unit that can be identified in the stream of speech. Because speech sounds (vowels, consonants, diphthongs, semivowels) are discrete and definitely identifiable units of speech, these are referred to as the segmental aspects.
- **Characteristics of good speech** include purposiveness, communicativeness, flexibility, agreeable voice quality, adequate projection, adequate articulation, correct pronunciation, animation, ease of bearing, absence of excessive fear and timidity and semantic/linguistic soundness.

## 3.8 ASSIGNMENT

Explain the parameters that influence speech intelligibility.

## 3.9 CHECK YOUR PROGRESS:

❖ FILL IN THE BLANKS WITH APPROPRIATE WORDS

1. The process of _____ is a two-way process.
2. _____ is the most common mode of human communication.
3. The process of sending a message is called as _____.
4. The main parameters of speech include _____, _____, _____ and _____ .
5. The process of speech sound production is called as _____.
6. Voice is generated by the _____ in the larynx.
7. _____ is the smoothness with which sounds, syllables, words and phrases are joined together during speaking.
8. Prosodic features such as stress, intonation and emphasis are often spread over more than a single consonant or vowel, they are often referred to as the _____ aspects of speech.
9. Rhythm features are produced by changes in _____ and _____, and usually a combination of the two.
10. _____ is produced primarily by an increase in intensity and duration of syllables within the stressed word.
11. Control of pitch, loudness, duration are referred to as _____ features.

❖ **QUESTIONS**

1. Explain the difference between Communication, Speech and Language.
2. List the various communication options you know of after reading this study material.
3. Explain the speech chain.
4. List the functions of speech.
5. Enumerate the parameters of speech.
6. What are the different aspects of rhythm?
7. What do you understand by the term ` Intelligible'?
8.

## 3.9 POINTS FOR DISCUSSION/CLARIFICATION:

After going through the unit you may like to have further discussion on some points and clarification. Note down those points:-

### 3.9.1 Points for Discussion

### 3.9.2 Points for Clarification

## 3.9 REFERENCES / FURTHER READING:

1. Crannell, K.C. (1987). Voice and Articulation. California: Wordsworth Publishing Co.
2. Denes, P.B. and Pinson, E. N. (1993). The Speech Chain – The Physics and Biology of Spoken Language. Baltimore: Williams and Wilkins.

3. Gray and Wise. The Bases of Speech.

4. Ling, D. (1976). Speech and the Hearing-impaired Child: Theory and Practice. Washington DC: Alexander Graham Bell Association for the deaf.

5. VanRiper, C. and vonEmerick. (1984). Speech Correction – An Introduction to Speech Pathology and Audiology. (7th Ed.). Englewood Cliffs – Prentice Hall Inc.

# UNIT 4: MILESTONES OF SPEECH DEVELOPMENT IN TYPICALLY DEVELOPING CHILDREN

- **STRUCTURE**

  - ***Introduction***
  - ***Objectives***
  - ***Structures involved in speech production***
  - ***Speech as an overlaid function***
  - ***Respiration***
  - ***Phonation***
  - ***Articulation***
  - ***Resonation***
  - ***Regulation***
  - ***Summary - Things to remember***
  - ***Check your progress***
  - ***Points for discussion / clarification***
  - ***References / Further reading***

## *4.1 INTRODUCTION:*

*The process of speech production comes very **naturally** to human beings. Human beings speak as naturally as they **breathe**. However, the process of speech production is a very **complex** and highly **coordinated** act involving a number of processes in the human body. The major **components** of the process of speech production include:*

1. ***Respiration** or breathing, which provides the power source for speaking i.e. the air stream from the lungs,*
2. ***Phonation** or voice production, which provides the sound source i.e. the vibration of the vocal folds in the larynx,*
3. ***Articulation** or speech-sound production, which forms the different phonemes or speech sounds by the movements of the tongue, lips, teeth and palate,*
4. ***Resonation** or modulation of the sound produced by the larynx. which is carried out by the cavities of the mouth, nose and throat,*
5. ***Regulation** or control of the process of speech production, which occurs in the centers in the brain.*

*In this unit, we will look at the different processes involved in the act of speech production.*

## *4.2 OBJECTIVES:*

*At the end of this unit you will be able to*

- *Describe the **main processes involved in the production** of speech*
- *Describe the **structures involved** in speech production*
- *Differentiate **breathing** for life from breathing for **speech***
- *Describe the process of production of **voice***
- *Describe the process of **speech sound** production*
- *Discuss the **resonatory** effects on speech*
- *Enumerate the centers in the central nervous system that **control** speech production*

## *4.3 STRUCTURES INVOLVED IN SPEECH PRODUCTION:*

*The structures involved in speech production are the **organs** and structures that are a part of the **systems** in the human body that participate in the speech production act.*

*These structures include:*

*(a) Structures in the **respiratory** system: **lungs**, trachea, bronchi, the rib cage, diaphragm and other muscles of respiration.*
*(b) Structures in the **phonatory** system: **larynx**, the vocal folds in the larynx and the muscles of the larynx.*
*(c) Structures in the **articulatory** system: lips, **tongue**, teeth, jaw and palate.*
*(d) Structures in the **resonatory** system: **oral cavity** (mouth), **nasal cavity** (nose) and **pharyngeal cavities** (throat).*
*(e) Structures in the **nervous system** which act as controlling or regulating centers during speech production.*

## *4.4 SPEECH AS AN OVERLAID FUNCTION:*

*All the above structures and the muscles involved in speech production are used for other **bodily activities** that are important for **sustaining life**. **Breathing** which provides the airstream for speaking is very necessary for life. The lungs transfer oxygen to the blood and then to the muscles and remove impurities. The **larynx** or the voice box has the basic function of **preventing foreign objects** and **food** from entering the lungs. The vocal folds also help to cough up anything, such as food and phlegm, which the lungs reject. The larynx also helps in **fixation of the chest cavity** (making the chest cavity rigid) during activities such as **pushing, pulling, lifting heavy objects** and **childbirth**. The structures in the **articulatory** system are basically used for **chewing** and **swallowing** which are also functions necessary for life. The **tongue** directs food to the back of the oral cavity, the **lips** help in keeping the food from escaping out of the mouth, the **teeth** cut, grind and chew the food, the **palate** provides a hard upper surface for swallowing and the **velum or soft palate** keeps food from entering the nasal cavity. The **resonating** structures are the cavities through which necessary **food or air passes**. But these same organs are also used to produce very delicately and very accurately modulated **chains of sound** through which we communicate. Because the speech process utilizes the same structures that are used in important biological (bodily) functions, speech is called an **overlaid function**. This means that speech is a **secondary function** of the organs which basically work towards sustaining life.*

***In-text activity:***

- Try **speaking** few words while you are **swallowing** something. You will observe that it will not be possible for you to do this because when you are swallowing, the **movement of airstream through the**

**larynx is stopped**. This is because the vocal folds shut tightly to prevent food from entering into the lungs which are below the larynx.

- *Try **lifting** a heavy object and **speaking** at the same time. You will find that voice is produced very **effortfully** as the vocal folds are tightly closed to allow for fixation of the chest cavity during the strenuous activity.*

## *5 RESPIRATION:*

*Respiration is the process of **breathing air in and out**. It is accomplished by a complex interaction of the muscles of the **thoracic** (chest) and **abdominal** (stomach) cavities. Respiration consists of two **phases**:*

1. ***Inspiration** or inhalation is the process by which air is **taken in** through the nose or mouth and travels through the pharynx and trachea to the lungs.*
2. ***Expiration** or exhalation is the process by which the air from the lungs is **given out** through the nose or mouth.*

*During quiet and normal breathing, the relative **duration** of inhalation and exhalation is about the same. One inhalation and one exhalation together form one **respiratory cycle**. In **adults**, there are about **twelve** respiratory cycles per minute in quiet breathing. It is during the exhalation phase of the respiratory cycle that **voice production** and speech occurs. The air stream being exhaled from the lungs passes through the **larynx**, during which voice is produced.*

### *RESPIRATORY SYSTEM:*

*The respiratory system **starts** at the openings of the mouth and the nose and **ends** at the lungs. The oral and the nasal cavities connect to the **pharynx** (foodpipe), **larynx** (voice-box) and the **trachea** (windpipe) below. The trachea divides into the **left** and the **right** branches called as **bronchi**. Each branch enters the lung on the respective side and further **subdivides** into branches called as **bronchioles**. Each **lung** is a cone-shaped, sponge-like structure and is made up of millions of **air sacs** called the **alveoli**. The **oxygen** from the air that is breathed in is **exchanged** for carbon-dioxide in these air sacs. The **carbon-dioxide** is then given out by the lungs during exhalation. The contraction and expansion of the lungs and the chest during breathing is brought about by the **muscles of respiration**. The important muscles of respiration include the dome-shaped **diaphragm** and the **abdominal** muscles.*

***TYPES OF BREATHING / BREATHING PATTERNS:***

Depending on the muscles that are **used predominantly** during breathing, there can be different breathing patterns in different individuals. Most normals use rib-cage movements predominantly, although at times **rib-cage** and **abdominal** movements both occur simultaneously and regularly. The different **types** of breathing patterns can be described as follows:

- **Diaphragmatic breathing:** In this type, a downward movement of the **diaphragm** is accomplished by an expansion of the lower ribs. This technique provides **easier**, more **flexible** control over exhalation.
- **Clavicular breathing:** In this type, the speaker raises the **shoulders** (clavicles) and collar bone while inhaling. This type of breathing can be very **exhausting** and also adds to the **tension** in the laryngeal area.
- **Thoracic breathing:** In this type, the **sternum** (breastbone) is elevated during inhalation and often pulls in the lower rib cage.
- **Abdominal breathing:** In this type, there is very little costal movement, but the movement of the **abdominal wall** is evident as the diaphragm moves up and down.

**BREATHING FOR SPEECH:**

The normal breathing of human beings is a regular, **reflexive** and **involuntary** activity. Also, inhalation and exhalation take **equal time** when we breathe regularly. For the purpose of **speech**, however, this breathing pattern is modified. When we speak, breathing goes from involuntary to **voluntary control**. We may take in **more air** during inhalation in order to speak loudly or to speak a longer sentence. Also, **inhalation** for speech is **quicker** and **exhalation** is **slower**. While speaking, inhalation may also take place through the **mouth**. The **length** of the exhalation is modified according to the length of what we have to say.

**In-text activity:**

- Sit in a **relaxed** position. Take a deep **breath** without applying too much force or effort while inhaling air in. Place one **hand** on the chest and one on the abdomen (stomach). **Feel** how these two parts move as you breathe air in and out. Depending on the type of breathing you are using, you will observe significant **movement** of the chest or the abdomen.
- Stand in front of the **mirror** and **observe** the movements of your shoulders, chest and stomach. Try to decide which type of breathing **pattern** you use. You will be able to **confirm** the observation that you have made in the above activity.
- Using the second or minute hand of your watch try to count the number of **respiratory cycles** per minute in your breathing.
- Ask a friend or a family member to say these **two sentences**. "How are you?" and "When I went to the exhibition yesterday, I saw a very attractive and bright red vase." Observe the differences in the **length** of his inhalations and exhalations while he says the short sentence and the long sentence. Give attention to the places where he **pauses** during a long sentence to take air into the lungs.

## 4.6 PHONATION:

The process of the larynx acting on the exhaled air stream is called **phonation**. The larynx is a structure made of **cartilages** and **muscles** and is situated in the neck, above the trachea and below the pharyngeal cavity. At the anterior (front) of the larynx the **thyroid cartilage** forms the **"Adam's apple"** on the neck. This can be very prominently seen on the neck in **males**. The small **cricoid cartilage** rings the bottom of the larynx. A pair of **arytenoid cartilages** rest on the thyroid cartilage. On this pair of arytenoid cartilages are attached the **vocal folds** or vocal cords. The vocal folds are two **muscle**

**bands** which serve to open and close the trachea by **vibrating** to and fro. When the vocal folds are **open**, free flow of air from the trachea to the oral and nasal cavities is possible. The opening between the two vocal folds is called the **glottis**. During normal **breathing**, the vocal folds are separated from each other (glottis is open), allowing air to flow easily. When the vocal folds **vibrate** to and fro, the air stream coming from the lungs is released into the cavities above the larynx in small **air puffs**. This results in the production of a complex sound called the **laryngeal tone**.

The laryngeal **muscles** play an important part in opening and closing the glottis. The glottis can be **completely open** when the vocal folds are parted from each other and it can be completely closed when the vocal folds are **tightly closed** against each other. The laryngeal muscles can also close the glottis only **lightly** so that the vocal folds can be parted by **air pressure** from the lungs, causing **rhythmic** opening and closing of the glottis for phonation. During phonation, the vocal folds follow a rhythmic **cycle**:

- closing of the glottis
- increasing air pressure below the glottis
- opening up of the vocal folds due to the pressure
- emission of a puff of air
- closing of vocal folds again due to the decrease in air pressure and constant muscle tension.

When the vocal folds close, air pressure below the glottis again increases and the pattern is **repeated**. The resulting periodic puffs of breath (air) give the sound of **voice**.

The frequency of **vibration** of the vocal folds (number of vibrations per second) determines the **fundamental frequency** of the voice. The fundamental frequency of the voice depends on an interaction between the **height** of the larynx in the neck and the **length**, **thickness** and

**tension** of the vocal folds. The vocal folds of **males** vibrate at a lower frequency while that of **females** vibrate at a higher fundamental frequency. The frequency of vibration is the highest in **children**. The fundamental frequency of vibration decides the individual's **vocal pitch**. When the increase in air pressure below the glottis is considerable, the vocal folds are forced **farther apart** during the close-open-close cycle. This leads to an increase in the **loudness** of the voice. The pitch and loudness of the voice can be **voluntarily changed** by an individual to some extent.

**In-text activity:**

- **Listen** carefully to the differences in the voices of **males, females** and **children**. You will realize that most of the males have **low-pitched** voices while females have **high-pitched** voices. High-pitched voices sound **thin** while low-pitched voices sound **thick**. The voices of children sound the **thinnest**, that is, they are the highest in pitch.
- When you get an opportunity, listen to the seven tones (swaras) on the musical scale on the **harmonium.** The first /sa/ is the lowest in pitch. The pitch goes on increasing from /re/ to /ni/. The last /sa/ is the highest in pitch.
- Ask **five persons** to say a prolonged /a/ along the musical scale i.e. change the pitch from the lowest to the highest. Observe what happens in the laryngeal area. You will find that in most people, the larynx **moves upward** while increasing the pitch.
- You will realize during your practicum work that most **hearing impaired** children speak in a higher pitch.
- Notice the amount of air you breathe in before saying something in a **loud voice**. You will realize that you need to take in **more air** in order to create more pressure below the glottis. Compare **soft voice** with a loud voice.

## 4.7 ARTICULATION:

The air stream coming out of the larynx is molded into speech sounds by the **vocal tract**. This process is called as **articulation**. The vocal tract extends from the glottis to the oral and nasal cavities. The vocal tract consists of three main **cavities** (air-filled passages) - the **pharyngeal** cavity, the **nasal cavity** and the **oral** cavity. The **configuration** (shape) of the cavities in the vocal tract at a particular moment determines what **speech sound** (phoneme) will be produced. The oral cavity is the one which significantly affects the production of most of the phonemes in languages such as English, Hindi and Marathi. The nasal cavity affects production of **nasal sounds** such as /m/ in **mum**my, /n/ in **n**ose and /n/ in goi**ng**.

*The **structures** in the oral cavity which are responsible for articulation of the phonemes are called the **articulators**. These include the tongue, lips, teeth, lower jaw (mandible), the hard palate and the soft palate (velum). The articulators can be classified into two **types**:*

- ***Active articulators** are the organs in the oral cavity which take an active part in articulation. These include the parts which **move** to change the shape of the vocal tract. Active articulators in the vocal tract are lips, tongue, mandible and soft palate.*
- ***Passive articulators** are the organs in the oral cavity which do not move but take part articulation by providing a **surface** for contact by the active articulators. The alveolar ridge (gums just behind the upper front teeth), hard palate and teeth are passive articulators.*

*Let us look at each of the articulators in detail.*

1. ***Tongue:** The tongue is a **highly mobile** muscular organ arising from the floor of the mouth. It occupies most of the space in the oral cavity. **Muscles** within the tongue enable it to change its **shape** easily. Other muscles coming from **various sites** allow important movements such as tongue **elevation** or upward movement, **protrusion** or outward movement, **retraction** or backward movement and **lateralization** or side to side movement. The tongue can be divided into its **tip**, **middle portion** and **back**. The tongue can **narrow** and **point** as it does for the sound /l/ as in **l**etter, or it can present a **broad front** surface as it does in the production of the sound /**sh**/ as*

*in **sh**irt. The **back** of the tongue can be elevated independently of the front portion as in the production of the sound **/k/** as in **k**ite. The **vowels** and **diphthongs** of our speech are produced primarily by the movement of the tongue. The tongue is the most important structure for articulate speech.*

2. ***Lips:** The lips are made up mainly of **facial muscles** which make it possible for them to **spread**, **round**, **come together** or **pucker**. They are the most visible structures of the mouth and are also used in various **facial expressions**. The lips can close to stop the air stream as in the production of sounds such as **/p/** in **p**arrot, **/b/** in **b**ag and **/m/** in **mum**my. The lower lip can touch the upper front teeth for production of sounds such as **/f/** in **f**ather and **/v/** in **v**an. Rounding the lips and changing the degree of lip opening contributes to the production of vowel sounds such as **/u/** in p**u**ll and **/o/** in **o**ur.*
3. ***Teeth:** The teeth that are most important for production of speech sounds are the **four front** teeth in each jaw - lower and upper. They are used in the production of sounds such as **/f/** in **f**ather, **/v/** in **v**an, **/s/** in **s**ix and **/z/** in **z**ebra.*
4. ***Alveolar ridge:** This is the **gum ridge** just behind the upper front teeth. This is an important **point of contact** by the tongue for sounds such as **/t/** in **t**en, **/d/** in **d**og, **/n/** in **n**ose, **/l/** in **l**etter, **/s/** in **s**ix and **/z/** in **z**ebra.*
5. ***Mandible:** The **lower jaw** or the mandible helps in opening or closing of the mouth (oral cavity). It also changes the **size** and **shape** of the oral cavity required for different vowels. Mandibular movement is also important in maintaining optimal vocal **resonance**.*
6. ***Palate:** This is the structure **separating** the oral and the nasal cavities. It extends from the alveolar ridge to the back of the mouth. The part of the palate just behind the alveolar ridge is **bony** and **hard**. This is called as the **hard palate**. The part toward the back of the oral cavity is **soft, muscular** and **mobile**. This is called as the **soft palate** or the **velum**. The hard palate helps to **direct** the air stream toward the front of the mouth during consonant articulation. It also contributes to vowel **resonance**. It provides various **points of contact** by the tongue for articulation of different speech sounds. The soft palate is a mobile structure and can be **raised up** or **lowered down**. When elevated, it is in contact with the wall of the throat **(posterior pharyngeal wall)**, thus separating the oral cavity from the nasal cavity. When it is not elevated, air can flow from the oral and pharyngeal cavities to the nasal cavity. This is required in production of **nasal sounds** like **/m/** in **m**at and **/n/** in **n**ose. The velum also serves as a **point of contact** for the back of the tongue during production of sounds such as **/k/** in **k**ite and **/g/** in **g**o.*

***In-text activity:***

- *Stand in front of the **mirror**, open your mouth **wide** enough and try to **identify** the active and the passive articulators such as the soft palate, hard palate, alveolar ridge, tongue, lips, teeth and the mandible.*
- *Observe movements of the **lips** when you say sounds such as **/u/, /o/, /p/ and /m/** repeatedly. Also observe movements of other articulators while you are saying these sounds.*
- *Bring your tongue out of the mouth (**protrusion**), turn it up towards the nose as high as you can (**elevation**), move it from side to side as far as you can (**lateral movement**), take it in and try to turn it back and up towards the back of the mouth (**retroflexion**). Observe the movement of the **back portion** of the tongue while repeating the sound **/k/**. Observe how **easily** the tongue can make these movements and also note the **range** of movement.*
- *Try to **feel** the upper portion of your mouth with your tongue and **identify** the hard palate and the soft palate.*

## *4.8 RESONATION:*

*The laryngeal tone is selectively **amplified** and **modulated** by the pharyngeal, oral and nasal cavities. This process is called as **resonation**. Since these cavities are **flexible** and differ in **size** and **wall thickness** from person to person, each individual has a distinct resonance or **vocal quality**. The **velum** or soft palate is an important structure in determining resonance of speech sounds. When the velum is lowered, the nasal cavity and the oral cavity are coupled together, thus giving the sound a predominantly **nasal resonance** or nasal quality. On the other hand, when the velum is elevated, the nasal cavity is separated from the oral cavity, giving the sound a predominantly **oral resonance**.*

***In-text activity:***

- *Standing in front of the **mirror**, open your mouth **wide** enough for you to see the velum clearly. Use a **torch** and observe the position of the velum when it is **at rest** i.e. when no speech is being produced. Then start saying an **/a/** as in **f**a**ther** and observe the upward movement of the **soft palate** at the beginning of the vowel. If you **prolong** the vowel /a/ you will observe that the velum continues to be raised upward and is **lowered** only when you stop the /a/.*
- *Experiment with this and try to bring about **voluntary** raising and lowering of the velum.*

## *2.9 REGULATION:*

*The highly co-ordinated act of speech production involving the above systems in the human body is regulated by centers in the **nervous system**. The human central nervous system consists of two major parts – the **left** and **right** hemispheres (besides the brainstem, medulla, pons and cerebellum). Each hemisphere is divided into **four lobes***

1. *Frontal lobe*
2. *Temporal lobe*
3. *Parietal lobe*
4. *Occipital lobe*

*Unlike the other components of the speech production process which are borrowed from their basic biologic functions, the central nervous system has **specialized areas** which fulfill the purpose of **receiving**, **organizing** and **formulating** messages. Besides, the impulses (orders from the brain) are relayed (carried) to the brain by special nerves known as the cranial nerves.*

1. *The **centers** in the brain responsible for the various speech and language functions include:*

- ***The Broca's area :** In most individuals, an area located on the side of the **frontal lobe** of the **left cerebral hemisphere** is responsible for motor speech. This is called as Broca's area and is the command center for originating, **planning** and carrying out the **transmission** of messages. Damage to this area leads to a problem in the **production** of speech. Comprehension of spoken language may also be affected but to a lesser degree.*
- ***The Wernicke's area:** In most individuals, an area located in the **temporal lobe** of the **left cerebral hemisphere** is responsible for **comprehension** or understanding of speech. This is called as Wernicke's area and damage to this area results in a problem in **understanding** spoken language. The production of speech may also be affected, but in a way **different** from that of a damage to the Broca's area.*
- ***Cerebellum:** The cerebellum plays an important role in the **co-ordination** of the movements required for production of speech.*

2. ***Cranial nerves:** The command centers in the cerebral hemispheres **relay** orders to the specific muscle groups of speech production and **receive** information from the sense organ of hearing through the **peripheral** nervous system. This is done through the cranial nerves.*

*There are **twelve pairs** of cranial nerves emerging from the base of the brain and are named primarily according to the **function** they serve. The cranial nerves important for the control of the **speech mechanism** are the **fifth** (trigeminal), **seventh** (facial), **ninth** (glossopharyngeal), **tenth** (vagus) and **twelfth** (hypoglossal) nerves. The **eighth** cranial nerve is the auditory nerve which is responsible for **hearing and balance**.*

## *2.10 SUMMARY –THINGS TO REMEMBER:*

- **During phonation**, the vocal folds follow a rhythmic cycle that involves closing of the glottis, increasing air pressure below the glottis, opening up of the vocal folds due to the pressure, emission of a puff of air and closing of vocal folds again due to the decrease in air pressure and constant muscle tension.
- The **velum** or soft palate is an important structure in determining resonance of speech sounds.
- **The central nervous system** has specialized areas which fulfill the purpose of receiving, organizing and formulating messages.

### *2.11 CHECK YOUR PROGRESS:*

❖ ***FILL IN THE BLANKS WITH APPROPRIATE WORDS***

1. *The main processes involved in speech production include _____, _____, _____, _____ and _____.*
2. *Speech is called as an _____ function.*
3. *The _____ _____ can touch the upper front teeth for the production of sounds such as /f/ and /v/.*
4. *The lips can close to stop the air stream in the production of sounds such as _____ , _____, and _____.*
5. *Teeth are used in the production of sounds such as _____ _____ _____ and _____.*
6. *The gum ridge just behind the upper front teeth is known as _____. It is important for production of sounds such as _____.*
7. *The laryngeal tone is selectively _____ and _____ by the resonating cavities.*

8. *When the velum is lowered, the oral cavity and nasal cavity are _____, thus giving the sound a predominantly _____ quality.*
9. *When the velum is elevated, the oral cavity and nasal cavity are _____, thus giving the sound a predominantly_____ quality.*
10. *_____ of the voice depends on the fundamental frequency of vibration of the vocal folds.*
11. *Loudness of voice depends on the _____ of the vibration of the vocal folds.*
12. *Speech sounds are classified mainly as _____ and _____.*
13. *Consonants are classified depending on the _____ of articulation, _____ of articulation and presence of _____ during articulation.*

❖ ***QUESTIONS***

1. *List the processes involved in speech production.*
2. *List the structures in the respiratory system.*
3. *List the structures in the phonatory system.*
4. *List the structures in the articulatory system.*
5. *List the structures in the resonatory system.*
6. *Explain why speech is called an `overlaid function.'*
7. *Explain the two phases of respiration.*
8. *Briefly explain the different types of breathing patterns.*
9. *How is breathing for speech different from breathing for life?*
10. *Describe the rhythmic cycle of the vocal folds during phonation.*
11. *What is articulation? Briefly explain active articulators and passive articulators.*
12. *Briefly describe the structure and functions of the tongue.*
13. *Briefly describe the structure and functions of the hard and soft palate.*
14. *List the areas in the brain that are important for speech and language functions.*
15. *What are cranial nerves? How many pairs of cranial nerves exist in a human brain?*

## *4.12 POINTS FOR DISCUSSION/CLARIFICATION:*

After going through the unit you may like to have further discussion on some points and clarification. Note down those points:-

### 4.12.1 Points for Discussion

### 4.12.2 Points for Clarification

## *4.13 REFERENCES / FURTHER READING:*

1. *Boone, D. R. and Plante, E. (1993). Human Communication and its Disorders. (2nd Ed.). Englewood Cliffs – Prentice Hall Inc.*

2. *Calvert, D. R. and Silverman, S. R. (1983). Speech and Deafness. (2nd Ed.). Washington DC: Alexander Graham Bell Association for the Deaf.*
3. *Greene, M. C. L. (1972). The Voice and its Disorders. Philadelphia:J.B. Lippincott.*
4. *Lane, V. W. and Molyneaux, D. (1992). The Dynamics of Communicative Development. Englewood Cliffs: Prentice Hall Inc.*
5. *Ling, D. (1976). Speech and the Hearing-impaired Child: Theory and Practice. Washington DC: Alexander Graham Bell Association for the Deaf.*
6. *VanRiper, C. and vonEmerick. (1984). Speech Correction – An Introduction to Speech Pathology and Audiology. (7th Ed.). Englewood Cliffs: Prentice Hall Inc.*

# UNIT 5: SPEECH INTELLIGIBILITY: CONCEPT, FACTORS & ASSESSMENT

Introduction

- **Objectives**
- **Defining Phonetics, Phonology and Phoneme**
- **Review of the processes of speech production**
- **Classification of speech sounds**
- **Description of Vowels**
- **International Phonetic Alphabet (IPA)**
- **Summary - Points to remember**
- **Check your progress**
- **Points for discussion / clarification**
- **References /Further reading**

## 5.1 INTRODUCTION:

Try to **produce** the sound **'p'** as in /pəl/ ( ) and observe in front of the mirror as to how you produced it. You must have observed that you put both your lips together for a moment and then released the contact.

Next, produce the sound **'b'** as in / bəl/ ( ) and you will observe that you have produced this sound also in the **same way**. What then is the difference?

This unit is devoted to the understanding of all these details, that is,

1) How are sounds **produced**?
2) What is the basis for the **classification** of sounds?
3) How each of the sounds can be **described**?

Note that all examples throughout the unit are also written using **IPA** as in the examples above. This is with the idea of familiarizing you with this system. Kindly refer to the section **1.8** of this unit for a detailed explanation.

## 5.2 OBJECTIVES:

At the end of this unit, you will be able to

- Describe how speech sounds are **produced**
- **Classify** speech sounds of any language
- Describe **vowels** and **consonants**
- Use phonetic symbols from the **IPA** system
- Describe the phonemes of **Hindi** and **English** language

## 5.3 PHONETICS AND PHONOLOGY:

Human beings are capable of producing a **large** number of different speech sounds. The **branch** which deals with the study of all these speech **sounds** themselves, how they are **made**, how they are **perceived** and the **physics** involved is known as **'Phonetics'.** In other words, Phonetics is the systematic study of **all** human **speech sounds**. It provides a means of describing and classifying virtually all the sounds that can be produced by human vocal tracts. However, each language uses only a **limited** number of these sounds. In a language, each sound which is capable of bringing about a **meaning** difference when it substitutes another sound in a word is known as a **'phoneme'** (Refer to the same example of /pəl/ and /bəl/. By substituting the sound /b/ by /p/ the meaning of the word changes). Every language has a definite number of such meaning differentiating units, that is phonemes.

**'Phonology'** is the study of how sounds are **organised** and **combined** into systems to be used for a particular language. The phonology of each language, therefore, is different from that of every other language, as each language will have its **specified** number of phonemes and its own **set of rules** for combining into words. Both these disciplines i.e. Phonetics and Phonology are heavily **dependent** on each other. In other words, the study of speech sounds in general is Phonetics while the function of speech sounds within a language is termed 'Phonology'. Example, the sound /k'/ is a speech sound and has a function in Hindi language (e.g k'ɑnɑ-_____) but has no function in the Tamil language.

We have already seen that modifying the **volume** and **direction** of a moving column of **air** using the specific **systems** of the human speech production mechanism creates speech sounds. We need to consider the **state** of the various parts of these systems to facilitate the **description** and **classification** of the sounds of human language. Therefore, before we start describing the speech sounds, we will **only review** the major aspects of the speech production process which we have already discussed **in detail in unit 2.**

## 5.4 THE MECHANISM OF SPEECH PRODUCTION:

The organs involved in the production of speech can be divided into three groups —

1. the respiratory system,
2. the phonatory system,
3. the articulatory system.

We need a **source of energy** for setting up sound waves in the air. Usually it is the air-stream coming out of **the lungs** that is used for this purpose. The apparatus that sets up the air-stream is called **the initiator**. If the lungs are the initiator, the air-stream mechanism is called **pulmonic**. Normally we use an **egressive** pulmonic air-stream for the production of speech. The sounds of **English** and almost all the sounds of the **Indian** languages are produced in this way.

The **Phonatory** system consists of the **larynx**, which contains the **vocal folds**. The vocal folds play an important role in the production of **voice**. They open and close regularly many times a second and the air-stream passes through in a series of small **puffs**. Thus the vocal folds act as **a vibrator** and produce a buzzing sound technically known as **voice**. This

process is called **phonation**. When the vocal folds vibrate, the resultant sounds are known as **voiced**. If they do not vibrate, the resultant sounds produced are known as **voiceless**. For example all vowels and consonants like [m,n,l,v,z,] as in the Hindi words /mɑɭɑ/ ( ) /nəhi / ( ) / ɭɑtʰi/ ( ) /vəhə/ ( ), /zəɤuɤət/, are said to be voiced. This **vibration** can be felt by touching the neck at the larynx and saying [z]. The buzzing noise can also be heard by putting the fingers in the ears. The **difference** between a voiceless and a voiced sound can be realized by saying [p] and /b/ as in the **Hindi** words /kəp/ ( ) and /kəb/ ( ), one after the other.

The air-stream coming through the larynx is **modified** by the shapes of the cavities of the **pharynx,** the **mouth** and the **nose.** These cavities also act as the **resonators** of the note produced in the larynx. The **velum or soft palate**, as we have discussed in unit 2, can be raised or lowered. When it is raised, the air can flow only into the oral tract, that is, the mouth; sounds produced in this way are known as **oral sounds**. When the velum is lowered, air flows into both mouth and nose, resulting in **nasal sounds** such as the sound 'm' in the **Hindi** word _____ /mɑtɑ./ and sound 'n' in the Hindi word _____ /nəɭ/. All sounds in the Hindi language, except the nasal consonants [m,n, ŋ ] are oral.

**The tongue** is the most flexible of the organs of speech in the **articulatory** system and it can assume a large number of different **positions**. Any part of the tongue can be raised to any **height** within the oral cavity and may even be brought into **contact** with the roof of the mouth to produce various sounds. The **lips** can also assume various shapes and thus affect the shape of the **cavity** in the mouth. They can be held tightly shut or held apart but sufficiently close together so that the air escapes with **friction**. The articulation of the various vowel and consonant sounds thus depends on the various positions of the movable organs of speech – the soft palate, the tongue and the lips. The description of each of the sounds is discussed a little later in this section. You will realize how important these aspects are for the classification and description of speech sounds.

To summarize, the **major aspects of speech production** are

- ✓ The **air stream** mechanism – determines where the air used in speech starts from and which direction it is travelling.
- ✓ The state of the **vocal folds** – whether or not the vocal folds are vibrating, which determines voicing.

✓ The state of the **velum** – whether it is raised or lowered, which determines whether a sound is oral or nasal.

## 5.5 CLASSIFICATION OF SPEECH SOUNDS:

Speech sounds can be grouped into two major categories **Consonants and Vowels**.

### 5.5.1 CONSONANTS:

Consonants are produced by a **closure** or **narrowing** of the air passage so that the air stream is blocked completely in the mouth or comes out with an **audible noise** (friction). They can be described using a **three-fold classification system.** The classification parameters include **place** of articulation, **manner** of articulation and **voicing.**

### 5.5.2. PLACE OF ARTICULATION

This refers to the **articulators** involved in the production and the **place** where the moving column of air is **obstructed**. There are **eight** such places along the vocal tract. These include bilabial, labio-dental, dental, alveolar, retroflex, palatal, velar and glottal. The description of phonemes in **Hindi** and **English** according to place of articulation is given in Table 1.

### 5.5.3 MANNER OF ARTICULATION:

This refers to the description of **how** the sounds are made, that is, the **way** in which the air stream is **obstructed**, and **how** the air is released from the vocal tract. Consonants can be grouped into six categories on the basis of **how** they are formed. Each of these **six categories** has been described in the following TABLE 2. Please note that only sounds in each category will be listed and for **examples** you can refer to the table 1.

## VOICING:

This is the last dimension commonly used for classifying consonant sounds. This is a binary dimension and refers to whether or not a consonant is accompanied by laryngeal tone. Consonants that have vocal fold activity are termed ***voiced; voiceless*** is the term applied to consonants that are not accompanied by vocal fold vibration. Note (see Tables 3 and 4) that many consonants, for example, /s/ and /z/, occur in pairs that differ solely by the variable of voicing.

The classification system may seem confusing and a bit cumbersome to you at first, but assigning sounds to the categories of place, manner and voicing provided a convenient way in which to understand how consonants are produced. Using this system, you can describe sounds in a detailed way as the following examples will make it clear. You can similarly describe any of the sounds in the language using the tables given above.

The sound /p/ is a bilabial voiceless unaspirated plosive.

The sound /g / is a velar voiced unaspirated plosive.
The sound /gh/ is a velar voiced aspirated plosive.
The sound /t/ is a dental voiceless unaspirated plosive.
The sound /s/ is an alveolar voiceless fricative.

A speech clinician, by comparing the errors made by the child with respect to any of the categories shown in the table, will be able to understand the nature of errors that make the child's speech unintelligible. This facilitates the correction or teaching process.

## DESCRIPTION OF VOWELS:

Vowels are produced in a relatively open vocal tract, that is, without any closure, or narrowing that will produce audible friction. All vowels require laryngeal tone (voicing), and they provide the carrying power of voice. The quality of a vowel depends on the shapes of the cavities of the pharynx, the mouth and nose, which in turn depend on the positions of the soft palate, the tongue and the lips.

The contours (shape) of our tongues vary with each vowel, for there are

- ✓ Front vowels.
- ✓ Middle Vowels
- ✓ Back vowels.

Each vowel family has several members distinguished by

- ✓ The height of the tongue bulge
- ✓ The amount of the mouth opening.
- ✓ The amount of lip rounding.

To produce vowel sounds, some part of the main body of the tongue is generally raised, so that the upper surface of the tongue is convex. To describe the tongue position for a vowel, therefore, it is enough to indicate the position of the highest point of the tongue along the horizontal axis and the vertical axis. We have to say which part of the tongue is raised and how high it is raised. For the vowel / i:/ as in the Hindi word ( ) /ɡi:t/, for example, the front of the tongue is raised, but for [ɑ] as in the word /ɑ:m/, there is only a slight raising of the back of the tongue.

For purposes of description, we refer to three points on the horizontal axis to indicate the position of the highest point of the tongue – **front, central and back**. / i:/ as in ( ) / ʃi:t/ is an example of a front vowel, [ə ] as in ( ) /pər/ is an example of a central vowel, and [ɑ] as in ( ) /ɑ:p/ is an example of a back vowel. Along the vertical axis we use a four-point scale- **close, half-close, half-open** and **open.** For a close vowel the tongue is brought close to the roof of the mouth, but the passage for the air-stream is not so narrow as to cause audible friction. [ i: ] as in ( ) / ʃi:t/ is an example of a close vowel, while [ɑ] as in ( ) /ɑ:p/ is an example of an open vowel.

The lips can assume various positions for vowel sounds. They can be **spread,** that is, the corners are drawn back, or they can be **rounded,** that is pushed forward. [i:] as in ( ) / ʃi:t/ is produced with spread lips, while [u:] as in ( ) /ru:p/ is produced with rounded lips. The term **unrounded** can also be used instead of **spread.**

A three term label is used to describe vowels and indicate the tongue and lip positions. For example [I:] as in 'sheet' / ʃI:t/] can be described as 'front close unrounded' and [u:] as in 'shoot' /ʃu:t/ as ' back close rounded'.

Vowels can have different **durations.** The sign [ :] is used to indicate a comparatively long vowel. For example the vowel /i/ in /ti:n/ ( ) is long and therefore we use the marker : after the vowel.

Some of the vowels are produced with the column of air directed through the nasal passage, particularly when the vowel is preceded by a nasal consonant. For example, in the word /nɑ:m/

( ), the vowel /ɑ/ is nasalized because of the preceding nasal consonant. To indicate this, the marker /~ / is used to indicate the nasalization.

## 5.7 THE INTERNATIONAL PHONETIC ALPHABET

**As a special teacher you need to listen to the speech of a hearing impaired child and** analyze **the errors, if his speech is not intelligible enough. To be able to do this, you will have to systematically write down which sounds the child substitutes for which sound and which sounds he is not able to produce at all (omissions). You can do this easily using the** Devanagiri **script because Hindi is a phonetic language, that is we write exactly as we speak. But how can an individual who does not know this language but wants to study and analyze the errors in Hindi Language do this? He can do this by using a kind of notation which is** universal. **This universal alphabet is known as** International Phonetic Alphabet (IPA). **You are well aware that the spelling system in English is inconsistent. Different letters may represent a single sound, for example 'to', and 'two', 'through' and 'threw'. A single letter may represent different sounds, for example 'cell' and 'call'. A combination of letters may represent a single sound, for example 'shoot', 'character', 'physics'. All these discrepancies between spelling and sounds gave rise to the concept of** IPA, **that is having universal alphabet. The recording (writing) of the speech production of any individual in any language using the IPA is known as** Phonetic Transcription.

**Therefore the need for the IPA is three-fold:-**

1. **To enable an individual to record the speech of an individual in any language, even when one is not familiar with that particular language.**
2. **To analyze the errors in speech production. For example, errors in the speech of a hearing impaired child can be analyzed irrespective of the language.**
3. **To enable an individual to learn the correct speech production of a new / foreign language, he or she is learning.**

**Therefore as a special teacher you will find the IPA useful, sometime or the other due to the reasons explained above.**

## 5.8 SUMMARY - POINTS TO REMEMBER:

- The study of speech sounds in general is **Phonetics** while the function of speech sounds within a language is termed '**Phonology**'.
- In a language, each sound which is capable of bringing about a meaning difference when it substitutes another sound in a word is known as a **'phoneme'.**
- The Major aspects of speech Production are:-

**The Air Stream Mechanism** - where the air used in speech starts from and which direction it is travelling.
**The state of the vocal cords** – whether or not the vocal cords are vibrating, which determines voicing.
**The state of the velum**– whether it is raised or lowered, which determines whether a sound is oral or nasal

- **Speech sounds can be grouped into two major categories** Consonants and Vowels.
- **Consonants** can be described using a **three**-fold classification system, namely - the **place of articulation, the manner of articulation** and **voicing.**
- **Vowels** can be described using **three** parameters namely - **the height of the tongue, the place of the tongue** in the oral cavity along the horizontal axis and the **rounding or unrounding of the lips.**
- Every sound in any language can be written/recorded using a universal set of alphabets known as **International Phonetic Alphabet**.

## 5.9 CHECK YOUR PROGRESS - EXERCISES:

Studying a new subject often involves learning a large number of technical terms. Phonetics is particularly difficult in this respect. Read over the definitions of the terms in this unit, and then try the exercises below. Listen to the sounds of words, and be careful not to be confused by spellings. Using a mirror may be helpful.

1. **Circle the words that begin with a bilabial consonant:**

   Hindi :-

   English :- call, mug, boat, table, purse.

2. **Circle the words begin with a velar consonant.**

   Hindi :-

   English :- kill, might, call, top, goat.

3. **Circle the words that begin with a labiodental consonant.**

   Hindi:-

   English:- wheat, father, big, van, soap.

4. **Circle the words that begin with an alveolar consonant.**

   Hindi:-

   English :- Sunday, matter, zebra, letter, same.

5. **Circle the words that begin with a dental consonant.**

   Hindi :-

   English :- tub, road, dog, teacher, give.

6. **Circle the words that end with a palato-alveolar consonant.**

   Hindi :-

   English :- brush, measure, rice, lash, pleasure.

7. **Write five words using IPA, beginning with:-**

- Fricative.

- Affricate.

- Plosive.
- Nasal.
- Lateral.

**8. Write five words each, in any language, using each of the following vowels,**

**using IPA:-**

- 1.Front close unrounded vowel
- 2.Back half open rounded vowel
- Front open unrounded vowel
- Central half open unrounded vowel
- Back close rounded vowel

## 3.10 POINTS FOR DISCUSSION / CLARIFICATION:

## 5.11 REFERENCES / FURTHER READING:

**1. Bansal, R.K.; (1971): An outline of General Phonetics. Indian Branch, Oxford University Press.**
**2. Chaturvedi, M.G. (1973); A contrastive study of Hindi English Phonology. National Publishing House ,23, Darya Ganj.**
3. VanRiper,C & Emerick L. ( 1990); Speech correction ,5th ed. Prentice –Hall ,Inc.

# BLOCK 5:
# EDUCATIONAL ASSESSMENT AND IDENTIFICATION OF NEEDS

# UNIT 1: EDUCATIONAL ASSESSMENT: CONCEPT AND SCOPE

- **STRUCTURE**

Introduction
Objectives

- **Prerequisites for normal speech development**
- 1.3.1 Normal neuromotor maturation
- 1.3.2 Normal auditory system
  - Adequate physical and emotional health
  - Normal intelligence and cognitive development
  - Stimulating environment full of love and care
- **Stages in normal speech development**
- 1.4.1 Reflexive utterances
  - Babbling
  - Socialized babbling
  - Inflected vocal play
  - First words
- **Effects of hearing impairment on normal speech development**
  - Pre-lingual hearing loss
  - Effects of different degrees of hearing loss on speech
  - Post-lingual hearing loss
  - Speech Insurance
- **Summary - Points to remember**
- **Check your progress**
- **Assignment**
- **Points for discussion / clarification**
- **References / Further reading**

## 1.1 INTRODUCTION

**By now you have realized the** importance of verbal communication **i.e. spoken language because of its efficiency in transferring one's message. Most children develop this skill of speaking in a meaningful way** effortlessly **in the first few years of life. Little does one realize how** complicated **this whole process is. You have already read about the** various systems **in our body, which work in co-ordination to produce speech. We will now discuss the development of speech in a** normal hearing **child. Though speech and language cannot be separated from one another, in this unit we will be restricting our discussion to development of verbal language (speech) only. Once you know how normal development takes place, you will be able to appreciate the** problems **faced by hearing impaired child in a better manner.**

## 1.2 OBJECTIVES

At the end of this unit you will be able to

- Discuss the **prerequisites** for normal speech development
- Describe the various **stages** in normal speech development
- Discuss the effects of **pre-lingual** hearing impairment on speech development
- Describe how **different degrees** of hearing impairment can affect speech development
- Describe effects of **post-lingual** hearing impairment on speech

## 1.3 PREREQUISITES FOR NORMAL SPEECH DEVELOPMENT

Before going through the stages in speech and language development, we will highlight the **pre-requisites** for speech and language development. They are:

1. Normal **neuro-motor** maturation
2. Normal **auditory** system
3. Adequate **physical** and **emotional** health
4. Normal **intelligence** and cognitive development
5. Stimulating **environment** full of love and care

### 1.3.1. Normal Neuro-Motor Maturation

You are already aware of the role played by the **nervous system** in controlling ongoing speech production. (Refer to Unit 2.5.7). Hence maturation of central nervous system is a pre-requisite for learning of any **rapid and fine motor skill** during the developmental years. Let us take the **example** of the motor skill such as **walking**. A **newborn** baby is not able to perform this finely coordinated motor act. But as the child grows and his nervous system undergoes maturation, he is able to balance himself and perform the act of walking, further followed by running, jumping etc.

Maturation of the nervous system is important not only in learning of such motor skills but also in learning to **understand and produce speech**. e.g. A child who is 3 months old is not able to locate the direction of the sound source. However the same child by the age of **6 months** is able to **localize** the sound source. This is possible because of **maturation** of auditory processes of central nervous system. In other words, child's response to sound and speech develops as a function of central nervous system (CNS) maturation. Similarly during the period of **3-6 months** the infant produces **pleasurable** (cooing) and **distress** (crying) sounds **involuntarily**. Later as CNS matures he goes through series of speech development stages and reaches a stage of producing first meaningful word **voluntarily**.

### 1.3.2. Normal Auditory System

Speech is acquired and monitored **primarily** through hearing. Hence children who have hearing loss prior to acquisition of speech and language are most likely to show **delay/absence** in the development of speech. The effects of hearing loss on development and conservation of speech are discussed in detail later on in this unit.

### 1.3.3. Adequate Physical and Emotional Health

A child who **frequently** falls ill and requires frequent hospitalizations, will have restricted activities. His parents might lose lot of time catering to his health needs. In this process child is likely to be **deprived** of an enriched language environment and communicative interaction. Similarly emotional health of the child and support from the family members are also an extremely important factor. **Negative family environment** such

as frequent quarrels, divorce, disturbed family relationship is likely to have an adverse effect on a sensitive child, thereby disturbing the child's emotional health. Poor physical health and lack of emotional support from the family members will **restrict his/her communicative interactions,** thereby **affecting the development of speech and language.**

### 1.3.4. Normal Intelligence And Cognitive Development

To acquire oral language, a child must have the **mental capacity** (normal intelligence) for using **symbols**. To use symbols appropriately, he must be able to **attend, recognize, associate, generalize and store** items in memory. As the child's ability to reason expands, his language skills improve. Mental development is the necessary **base** to handle symbols.

**Language development is** closely linked **with cognitive development. In other words the child should have the facility to** grasp concepts, **and this facility of grasping concepts should develop at an appropriate age. You will learn more about normal cognitive development in Psychology. Let us look at an** example **of how cognition and language develop hand in hand. Around the age of** 9-12 months, **a child acquires the concept of** object permanence. **This means that he becomes aware that an object exists even when he cannot see it. Only after a child develops this concept does he learn to use** words to label **objects and events.**

### 1.3.5. Stimulating Environment Full Of Love And Care

**Three** environmental factors are essential in speech development.

- A relationship of **love and care** between the child and the person from the environment. This person should consistently be **encouraging** the child's attempts to speak.
- At least one person from the environment should be speaking in **simple but well formed language patterns**.
- A child should have enough **opportunities to explore** and have a number of day-to-day **experiences,** which encourage him to communicate.

It is generally observed that children brought up in **orphanage** have delayed development of speech and language in spite of prerequisite 1,2,3,4, being present. This is because nurturing and stimulating environment is not adequate.

## 1.4 STAGES IN NORMAL SPEECH DEVELOPMENT

As child **matures**, he/she gains **control** over speech mechanism. Before the child starts speaking meaningfully he goes through a stage known as **prelanguage**. During this stage he builds the **foundation** for the true speech which is still to come. In the very early **reflexive** sounds of crying and comfort cooing, we certainly find him **practicing** respiration and phonation. In his babbling we see him **exploring** articulation, and gradually child comes to **meaningful** first word stage. Let us now look at that a child undergoes from birth through the early years of life.

### 1.4.1 Reflexive Utterances

Much of the behavior of the **newborn** is **reflexive** (involuntary) and beyond his/her immediate volitional control. In the first 3 months the child has a very **limited repertoire** of vocal behavior. The most common sounds made by the newborn are **cries and comfort sounds.** These sounds generally reflect the child's **physiological** state.

a} **Crying sounds**: By the end of the **first month** cries become **differentiated** and mothers can usually tell the **type of cry** by its pattern. Non-crying sounds of the newborn include normal **phonation**, which are predominantly **nasalized**. When baby is **2 months old**, parents can identify several **distinct types** of crying patterns, e.g. anger, pleasure, pain, and hunger. During crying child **practices** the essential motor co-ordinations, besides establishing the necessary **feedback loop** between the larynx, the mouth and the ear. In addition, crying, particularly when differentiated, establishes a primitive **communication link** between child and parents.

b) **Comfort sounds**: Reflexive utterances like **gurgles, sighs and grunts** are called cooing or **comfort** sounds. They generally appear during or after relief from distress. E.g. feeding, diaper changing. By now the infant has developed **muscle control** to stop and start oral movement definitively. **Back consonants** and **mid and back vowels** predominate but they are not nasalized. At this stage the child will show the signs of **social awareness** i.e. tracking or following an adult movements with his eyes and smiling. He responds **selectively** to the speech of an adult. He co-ordinates his bodily movements with **melody** of speech, also **discriminates** speech from non-speech sounds. Evidently babies

are born with a special capacity for recognizing and processing speech.

### 1.4.2 Babbling (4-6 Months)

Babbling is a **universal** phenomenon found in all human infants. It is characterized by the **chaining and linking of sounds together on one exhalation.** The child begins to **experiment** with sounds and to gain increasingly independent **control** of the parts of vocal mechanism. The baby seems to be **playing** with his tongue, lips and larynx in much the same fashion he plays with his fingers and toes. We hear **syllables** of **CV** (consonant vowel) combination as in /**bɑ**/ or **VC** (vowel consonant) combination as in /**ɑb**/ or **CVC** (consonant vowel consonant) combination as in /**ɑbɑ**/. **Neuromuscular control** moves from the back of the oral cavity to the front. These strings of syllables have **no semantic meaning** and some of the sounds may not be present in his native language. This activity is also known as "**vocal play**" and is carried out when the child is alone. It is very important for a child to feel and hear sounds repeatedly. **Babbling is self-imitation of purest variety.** If babbling is interrupted or delayed due to illness, true speech will also be delayed. A **hearing-impaired child** begins to babble at normal time, but since they cannot hear the sounds they produce; they lose interest and hence have much less true vocal play than the hearing child. However it is possible to compensate. The adult or caregiver can be particular about giving the **visual feedback** of their imitation of child's utterances. This has a rewarding value for the child.

### 1.4.3 Socialized Babbling

By six months of age babbling appears to have an **instrumental function**. Child uses it to get **attention**, to support **rejection** and to express **demand**. He starts using his primitive speech both to express himself and to modify the behavior of others. This stage is characterized by syllable repetition or **doubling of sound** in his vocal play e.g. /**dɑdɑ**/. Now child seems to take more pleasure in public practice. He is talking to himself but also sometimes to parents/caregiver. This is "**socialized vocalization**".

**Inflected Vocal Play**

In this stage vocal play takes on the **tonal characteristics** of adult speech. Baby uses **inflections** that sound like questions, commands etc. **Private** vocal play and **social** vocal play continues. Marked gain in **back vowels** and **front consonants** are seen. He begins to sound as though he is talking. Child, through his vocal gymnastics, masters **co-ordination** necessary to meaningful speech. He **responds** to parent's speech. His **imitation** is more hesitant but more purposive. It begins to resemble parent's utterances. During this period, simple musical tones, songs are especially good **stimulation**. Social **reinforcers** like parental smile or gesture or touch or spoken word will increase the frequency of his vocal play.

### 1.4.5 The First Words

Words are **comprehended** before they are used. Before first words are uttered, the child has shown by his behavior that he understands the gestures, intonations and meanings of some of the parent's speech. Babies' first meaningful utterances are **single words**; these words are often **duplicative,** (e.g. /bɑbɑ/ for daddy, /mmɑ/ for mummy) perhaps showing the influence of his previous babbling. The **labial and dental sounds** are the most prominent in the first words.
The first sounds are the **sentence words**. E.g. Same words can be spoken at one time with the intonation and stress of a declarative statement and at another time as a command or even as a question. Often an appropriate gesture will accompany the utterance. Even though only one morpheme is used, the **tone of voice** and gesture show the other parts of the implicit sentence. Thus the child has made a beginning in his efforts to **communicate** in verbal world.

## 1.5 EFFECT OF HEARING IMPAIRMENT ON NORMAL SPEECH DEVELOPMENT

**The effect that hearing-impairment has on speech and its development can vary according to the** onset of the hearing impairment. **Here, we are going to look at the effect of pre-lingual and post-lingual hearing-impairment on speech.**

### 1.5.1 Prelingual Hearing Loss

The ear is a **natural channel** through which we learn to speak. A serious impairment in hearing before acquisition of speech and language is known as **prelingual hearing loss**. Such a loss **hinders child's normal development of speech and language**. E.g. a child who is born deaf, never learns to talk unless special training is undertaken early in life. His deafness denies him a chance through which he would acquire both knowledge of speech and **control** of speech organs normally. Consequently the mechanical difficulty in speech production encountered by the prelingually hearing-impaired child is compounded by the deficiency of his knowledge of the phonologic, semantic and structural features of language. He must know the right word, place it in the right order, and avoid syntactic error. Therefore the task of the prelingual hearing-impaired child is essentially one of **development of spoken language** rather than its conservation. Any substantial loss of hearing at birth or occurring soon thereafter will hinder both language development and establishment of adequate speech habits.

**In-text activity:**

Switch on your T.V. and select a channel, which telecasts programs in a **language you are not at all familiar with**. View it for 5 minutes and try to understand content of a play / movie / news that was probably going on when you switched on. **Did you understand even a word?** Your obvious answer is 'NO'. Why? Obviously you will say you have never had an exposure to that language and therefore had **no opportunity** to learn it and hence you could not understand.

Similarly a **young hearing-impaired child** cannot learn to understand a language he / she has never heard / or is probably never going to hear.

The two factors responsible for this are:

- Hearing loss reduces sharply the **number of listening experiences** that the child has and thus slows down the process of learning to talk.
- Losses of certain types make it impossible for the child to **distinguish some of the elements** of speech. Hence he will not be able to pronounce sounds he does not hear, unless he has special training. For example, a child with high frequency loss may misarticulate high frequency sounds such as /s/ or /f/, particularly because he is not able to hear them.

**The effects of auditory impairment on speech can be discussed with respect to the three main aspects of speech.**

**A) Phonetic elements or segmentals:**

Phonemes are the **shortest units** in human speech that can be recognized as having stable identity. Speech problems characterized by imperfect production of phonetic elements and the transitions between them are called **"articulatory defects".** Here the hearing loss prohibits the **initial mastery** of phonemes and/or removes the auditory control needed to **maintain** precise pronunciation. In such instances, an effective program of speech training should be implemented early in life.

**B) Non-phonetic elements or suprasegmentals:**

**Human speech possesses four aspects that are relatively unstandardized but which nevertheless contribute to naturalness and acceptability of oral communication. These features are** melody, quality, time and stress**. If properly blended during connected speech, non-phonetic elements help in** clarifying the meaning **and** adding interest **to spoken language.** Severe auditory impairment **makes it impossible for a person to hear these non-phonetic elements in his own speech, thus may cause** unnatural **use of these elements. This disturbs the** effectiveness **of his oral communication. The characteristic speech errors made by person/child with hearing loss will be discussed in detail in** next unit.

**C) Loudness of voice:**

The speaker ordinarily **adjusts the loudness of his voice to the situation** in which he is talking. The speaker has consciously learned to raise his voice when background noise is strong or when the listener is at a little distance. Generally we unconsciously soften our voice in quite surroundings. In short we tend to maintain a favorable margin between the loudness of our speech and the background noise so that our listeners will not find our speech unpleasantly loud.
**A hearing loss disturbs the ability to adjust the levels of one's voice to the situation**. This happens due to the fact that person with hearing loss does not hear much of the background noise and does not judge the requirements of situation. **Secondly he may receive false impression of the loudness of his own voice.** e.g. person with **sensorineural** loss hears his own voice softly hence has a tendency to talk loudly, regardless of

surroundings, whereas a person with **conductive** loss hears his own voice loudly through bone conduction hence he speaks softly.

The speech produced by hearing impaired children is directly related to the severity of the hearing loss and the degree to which an auditory-verbal feedback loop can be established.
As the effects of hearing loss depend primarily on **its degree, configuration and age of onset**, it does not cause one specific kind of communication problem.

### 1.5.2 Effects of Different Degrees of Hearing Loss on Speech

**1) Effects of mild hearing loss: (26-40 dBHL)**

- Language learning may not be affected.
- Vowel sounds are heard clearly but voiceless consonants may be missed.
- The short unstressed words and less intense speech sounds are inaudible.
- They may exhibit mild misarticulations.
- Voice quality is normal.

**2) Effects of moderate hearing loss: (41-70 dBHL)**

- Miss all sounds at conversational level.
- Show inattention, language retardation, speech and learning problems.
- Vowels are heard better than consonants.
- Articulation errors include omitted and distorted consonants.
- Strangers may have difficulty in understanding speech of a child with this loss.
- Hearing aid, speech reading, auditory training, speech training are necessary.

**3) Effects of severe hearing loss: (71-90 dBHL)**

- Language and speech will not develop spontaneously.
- They cannot hear sounds or normal conversation without amplification.

- They may hear their own vocalizations, loud environmental sounds or speech sounds spoken loudly at close range.
- With amplification, they can differentiate vowel sounds and difference in manner of consonant articulation.
- Generally they have severe language, speech, learning problems.
- They can be integrated into regular school with supportive help given by the special school.

**4) Effects of profound hearing loss: (91 dBHL and above)**

- They hear speech only with intensive special education.
- Without amplification, they are unable to hear any sounds.
- With amplification they may hear the rhythm patterns of speech, loud environmental sounds.
- Generally they have severe language, speech, learning problems.

### 1.5.3 Post-Lingual Hearing Loss

As the ear serves as a guide to **accurate control** of speech mechanism, degeneration of speech is often seen in individuals who suffer from hearing loss **later in life**. The hearing loss that occurs after acquisition of speech and language is known as **post-lingual hearing loss**. Because of this, the sharpness and precision of **articulation** disintegrates and **intonation, emphasis, phrasing, rate and loudness of voice** suffer. To get an insight into this, **experience** the following: ask one of your family members to listen to a walkman through headphones at a normal volume. Now ask him a question. You will observe that he responds with normal loudness of voice. Now ask him to increase the volume of his walkman considerably and ask him a question. You will notice that he responds with a very loud voice.

As auditory feedback controls our speech production, **deterioration** of speech occurs after severe hearing impairment. But this deterioration is neither **instantaneous nor complete**. When **sudden bilateral hearing loss** occurs either due to meningitis or mumps, speech is usually maintained intact for a short time and then begins to deteriorate rapidly. With **gradual hearing loss** as in presbycusis or otosclerosis, speech deteriorates slowly as hearing loss progresses.

Following **defects** are generally noted in the speech of post lingual hearing impaired person:

- Defects of **articulation** usually appear first and are characterized by **distortion or omission** errors of high frequency sounds such as /s/, /f/. Final consonants are affected first.
- Voice **quality** is affected.
- Control of **loudness** is lost.
- Irregularities of **rhythm** are noted.

### 1.5.4 Speech Insurance

Special type of training based on the concept of **"Speech Insurance"** is necessary for **conservation** of speech in individuals with post-lingual hearing-impairment. Here the patient is hearing-impaired but has normal habits of speech. Hence **main educational task** is to teach him to retain these habits in order to conserve the skill he already has. If training starts early, no deterioration in speech may occur. The technique is to give the person **substitute channels** for controlling his speech efforts, since his ear no longer serves as a fully effective monitor when he talks.

When the hearing loss is profound or severe speech insurance must depend mainly on learning effective use of **kinesthetic cues**. Here the patient should first become acquainted with the nature of speech process. He must understand the activity that he wishes to control.

1) He must learn to **preserve the articulation** of speech by becoming fully aware of the kinesthetic cues of each element.

2) He must develop awareness of bodily **sensations associated with proper control of melody, quality, rhythm and emphasis.**

3) He must maintain physical **alertness**, facial expressiveness, and spontaneous gestures.

It is very important for a person to learn to maintain **effective control of the loudness** of his voice. We have already seen earlier in this unit, how and why hearing loss affects the person's ability to adjust the loudness of his voice to the situation in which he is talking. Now let us see how he can learn to control the loudness of his voice.

1) The person must master the ability to talk at each of four or five general **levels of loudness**. He must then learn to shift at will from one level to another. These levels which are under kinesthetic control must range from **soft speech to very loud speech**.

2) The person must **study and classify typical sound environments**. He should learn what level of background noise he is most likely to

encounter in each type of situation. He can then meet the requirement of loudness with reasonable success by speaking at the level that is ordinarily demanded by the situation at hand.

## 1.6 UNIT SUMMARY : POINTS TO REMEMBER

- **Prerequisites for normal speech and language development include**

1. Normal neuro-motor maturation
2. Normal auditory system
3. Adequate physical and emotional health
4. Normal intelligence and cognitive development
5. Stimulating environment full of love and care

- Before the child starts speaking meaningfully, he goes through a stage known as **prelanguage.** During the period of prelanguage child builds the foundation for true speech.

- The main **stages** in speech development include:

1. Reflexive utterances
2. Babbling
3. Socialized babbling
4. Inflected vocal play
5. The first word

- **The effects of hearing loss** depend primarily on it's **degree, configuration, and age of onset.**
- A hearing loss that occurs before acquisition of speech and language i.e. at birth or soon thereafter is known as **pre-lingual hearing loss.**
- Hearing loss that occurs after acquisition of speech and language is known as **post-lingual hearing loss.**
- Hearing loss affects main aspects of speech: **segmentals and suprasegmentals.**
- A young hearing impaired child **cannot learn to understand** a language he / she has never heard / or is probably never going to hear because of

1. a sharp reduction in the number of listening experiences and
2. a difficulty in distinguishing some of the elements of speech.

- A special type of training known as **"Speech Insurance"** is necessary for individuals with post-lingual hearing loss.

## 1.7 CHECK YOUR PROGRESS

**Fill in the blanks:**

1. _____ is the primary channel through which we learn to talk.
2. _____ _____ denies him a chance to acquire normally both knowledge of speech and control of speech.
3. The ear serves as a guide to accurate control of _____ _____.
4. Generally a speaker consciously learns to raise his own voice when the background noise is _____ or when the listener is at a _____.
5. A person with sensorineural hearing loss speaks _____ whereas a person with conductive loss speaks _____.
6. Effects of hearing loss depend primarily on _____, _____, and _____ of hearing loss.
7. Poor physical health and lack of emotional support _____ his /her communication interaction.
8. Language development is closely linked with _____ development.
9. Much of the behavior of the newborn is _____.
10. _____ sounds generally appear during or after relief from distress.

**Answer the following questions:**

1) Give the two main reasons that hinder both language development and establishment of adequate speech habits.
2) List the three main aspects of speech.
3) Define pre-lingual and post-lingual hearing loss.
4) What are "articulatory defects"?
5) List the aspects of speech that attribute to naturalness of oral communication.

6) Why is a person with hearing loss not able to adjust the level of his own voice with the situation?

7) List the effects of mild hearing loss, moderate hearing loss and severe hearing loss.

8) List the factors affecting speech and language development.

9) Explain the three environmental factors essential for development of speech.

10) What is prelanguage?

11) Discuss normal development of speech in the first year of a child's life.

12) What is object permanence?

13) What is babbling?

14) Why do hearing- impaired children stop babbling? What can be done to rectify it?

15) Discuss the effects of profound pre-lingual hearing loss on speech.

## 1,8 ASSIGNMENT

a) Discuss the various stages in normal speech development.

b) Discuss the effects of prelingual hearing impairment on speech development.

## 1.9 POINTS FOR DISCUSSION / CLARIFICATION

**After going through the unit you may like to have further discussion on some points and clarification. Note down those points:-**

### 1.9.1 Points for Discussion

### 1.9.2 Points for Clarification

## 1.10 REFERENCES / FURTHER READING:

1 Shames, G. H. and Wiig, E. H. (1986). " Human Communication Disorders." 2nd edition. Charles. E. Merill. Publishing Company.

2 Davis, H and Silverman, S. R. (1978). " Hearing And Deafness." 4th edition. Holt, Rinehart and Winston.

3 Van Riper, C. and Emerick, L. (1984). " Speech Correction." 7th edition. Prentice Hall Inc.

4 Davis, J. M. and Hardick, E. J. (1981). " Rehabilitative Audiology for children and adults." John Wiley and Sons, Inc.

# UNIT 2: FACTORS AFFECTING EDUCATIONAL PERFORMANCE: INDIVIDUAL, FAMILY AND ENVIRONMENT

***STRUCTURE***

- ***Introduction***
- ***Objectives***
- ***Classification of speech errors***
- ***Deviations in respiration***
- ***Errors in phonation***
- ***Errors in articulation***
  - *Vowel articulation*
  - *Consonant articulation*
  - *Diphthong articulation*
  - *Analysis of articulation errors*
- ***Errors in supra-segmentals***
- ***Speech intelligibility***
- ***Speech characteristics associated with mild to moderate hearing loss***
- ***Assessment / Evaluation of speech of the hearing-impaired***
  - *Oral peripheral examination*
  - *Assessment of phonetic level skills*
  - *Assessment of phonological level skills*
- ***Summary - Points to remember***
- ***Check your progress***
- ***Points for discussion/clarification***
- ***References/Further reading***
- ***Annexure***

## 2.1 INTRODUCTION

*The **role of hearing** in **acquiring** normal speech and in **monitoring** speech production is well established. By now you have studied in detail the **effect** of prelingual and postlingual hearing impairment **on speech**, its development and its monitoring. The development of speech in children with severe to profound prelingual hearing impairment is usually **delayed** if intervention does not start early. Also, the characteristics of the speech that they develop are **different** from that of normal hearing children in a number of ways. Different studies carried out to describe in detail the speech of the hearing-impaired report differences in the following aspects of speech:*

- ***Respiration and its control***
- ***Phonation and its control***
- ***Articulation***
- ***Suprasegmentals***

*In general, speech production of the hearing impaired consists of **poor co-ordination** between respiratory, phonatory and articulatory systems. Also, due to errors in the aforementioned aspects of speech, the **intelligibility** of the speech of the hearing impaired may be poor.*

*In this unit, we will discuss the various speech errors of the hearing impaired. To begin with, we will stress on speech errors predominantly associated with **severe to profound prelingual** hearing impairment.*

## 2.2 OBJECTIVES

*At the end of this unit, you will be able to*

- *List the parameters of speech that may be **affected** in the hearing impaired*
- *Describe the various **articulatory** errors in the speech of the hearing impaired*
- *Describe the **voice** problems in the speech of the hearing impaired*
- *Describe the errors in **suprasegmentals** in the speech of the hearing impaired*
- *Discuss the factors affecting **intelligibility** of speech of the hearing impaired*

- *Discuss how **breathing** for speech may be affected in the hearing impaired*
- ***Assess** the speech of the hearing impaired*
- ***Profile** the speech of the hearing impaired child in your classroom*

## 2.3 CLASSIFICATION OF SPEECH ERRORS

*Errors in the speech of individuals with severe to profound sensorineural hearing impairment are mainly classified as*

***1. Deviations in respiration and its control:***

*Predominant features of respiration in the hearing impaired include*

- *inappropriate breathing **patterns**,*
- *inadequate breath **support**,*
- *inadequate breath **control** and*
- ***forced expiration** while speaking.*

***2. Problems in voice and control of its parameters:***

Voice problems reported in the literature include

- *disorders of **pitch and pitch control**,*
- *disorders of **loudness and loudness control** and*
- *disorders of voice **quality**.*

***3. Errors in articulation:***

*Articulatory errors in speech of the hearing impaired may be in*

- ***vowel** production,*
- ***consonant** production and*
- *production of **diphthongs and semivowels**.*

***4. Errors in suprasegmentals:***

Prosodic or suprasegmental errors in the speech of the hearing impaired include

- *irregularities in **rate** of speech,*
- *inappropriate **phrasing** patterns,*
- *inappropriate **intonation** patterns and*

- *inappropriate **stress** patterns.*

We will now look at each of the category of errors in detail.

## *2.4 DEVIATIONS IN RESPIRATION*

*In Unit 2, we have looked at the **importance** of breathing for speech. You are also aware of the **differences** between breathing for **life** and breathing for **speech**. It is also established that a **fine co-ordination** between the systems of respiration, phonation and articulation is extremely important for production of good speech.*

*A number of authors/researchers have studied speech breathing in hearing- impaired children and adults. Findings from these studies indicate that*

*a) Children with severe to profound prelingual hearing impairment have a particular problem in learning to **co-ordinate** control of their breathing in producing speech.*

*b) They may attempt to **speak on inspiration** as well as expiration.*

*c) They tend to produce **short bursts** of speech and then run out of breath because they do not take **sufficient** amount of breath before beginning to speak. This results in a lot of **pauses** while speaking, interfering with speech flow.*

*d) Poor co-ordination of breathing and phonation leads to an **increase** in their articulatory and suprasegmental errors.*

## *2.5 ERRORS IN PHONATION*

*Voice of the hearing-impaired has been studied with respect to **all its aspects** viz. Pitch, loudness and quality. Let us look at errors in each of these.*

***a) Pitch:** Deviations in the pitch of the hearing-impaired include*

- *Use of a **higher pitch** / fundamental frequency*
- ***Reduced range** of pitch (i.e. reduced ability to vary pitch from low to high)*
- ***Poor** ability to **control** pitch according to linguistic requirement or intent of communication*

***b) Loudness:*** *Normal speakers regulate loudness of voice according to* ***distance*** *from listener and the* ***noise*** *present in the surrounding. Hearing-impaired speakers may be* ***unable*** *to realize these conditions. Problems reported in hearing-impaired speakers include*

- ***reduced*** *loudness,*
- ***excessive*** *loudness and*
- *reduced loudness* ***variations*** *across utterances*

***c) Quality:*** *The voice quality of the hearing-impaired speakers has been described using* ***terms*** *such as hollow, dull, tense, piercing, flat, breathy, throaty, etc. Voice quality of the hearing-impaired may be characterized by*

- ***Breathiness:*** *Feeling of* ***excessive*** *amount of* ***air*** *during phonation. May be attributed to* ***inadequate closure*** *of vocal folds.*
- ***Harshness:*** *Feeling of excessively* ***"noisy"*** *speech. May be due to applying extra* ***effort/pressure*** *while phonating.*
- ***Nasality:*** *Hypernasality, resulting due to opening of the* ***velopharyngeal port*** *when not necessary for an utterance, is very commonly found in hearing-impaired speakers.*

## *2.6 ERRORS IN ARTICULATION*

*Hearing-impaired speakers can have* ***variable*** *degrees of errors in their speech. This is especially true of* ***articulation***. *However, despite the variability, certain difficulties / errors may be found very* ***commonly*** *in most hearing-impaired. Two* ***main features*** *common to the articulation skills of the hearing-impaired are:*

- *Errors in the production of* ***vowels***, ***consonants*** *as well as* ***diphthongs***
- *Among these, consonant errors* ***more common*** *than vowel or diphthong errors*
- *Also, some* ***typical*** *and* ***systematic*** *error patterns are encountered in the articulation skills of the hearing-impaired.*

### *2.6.1 Vowel Articulation*

*Vowel production is* ***important*** *in most spoken languages because vowels form the important parts (nuclei) of words.* ***Accuracy*** *of vowel production is important for good speech* ***intelligibility***. *As already discussed in unit 3,* ***production*** *of vowels is dependent on mouth opening, lip rounding and place and height of the tongue within the oral*

*cavity. Vowels are* ***particularly difficult*** *for the prelingually profoundly hearing-impaired. This is because the articulators rarely come into contact during vowel production, thus providing* ***little or no*** *tactile and kinesthetic* ***feedback.***

*Various studies have shown that hearing-impaired speakers tend to use a more* ***centralized*** *tongue position during production of different vowels, i.e. the tongue is placed in the* ***middle*** *of the oral cavity irrespective of the vowel being produced. This results in the production of the* ***neutral / central*** *vowel /ə/ ( ) for many other vowels. This means that* ***"neutralization"*** *or the tendency for all vowels to resemble the neutral vowel /ə/ is the most common error in vowel production. An example of neutralization error is producing /pɑnə/ for /pɑni/, where the vowel /i/ is substituted by the vowel /ə/. Neutralization error is also considered as an error of* ***substitution*** *where the vowel is substituted by the neutral vowel.*

*The other errors found in vowel production of hearing-impaired include*

a) ***Substitution:*** *Substitution error means* ***replacing*** *the target sound by some other sound. In the context of vowels, an* ***example*** *is /piɬɑ/ produced as /peɬɑ/. In this example, the vowel /i/ is substituted by the vowel /e/.*

b) ***Nasalization:*** *Nasalization of vowels means production of a* ***nasal*** *vowel in place of a* ***non-nasal*** *one. This happens when the* ***velum is lowered*** *to allow sufficient air stream to pass through the nasal cavity. For* ***example,*** *in the word /hɑthi/ the vowels /ɑ/ and /i/ are both non-nasal vowels. However, a hearing-impaired person may produce both these vowels as nasal. This is an error of* ***nasalization.***

c) ***Diphthongization:*** *Diphthongization error means production of a* ***diphthong*** *instead of a vowel. This error is* ***not*** *very commonly encountered in the speech of the hearing-impaired. An* ***example*** *of this kind of error is production of the diphthong /əI/ instead of the vowel /i/ in the word /piɬɑ/, thus making the word sound /pəIɬɑ/.*

d) ***Prolongation or vowel lengthening:*** *The duration of vowels in connected speech should* ***vary*** *according to* ***context.*** *However, it has been found that hearing-impaired speakers tend to produce vowels with* ***minimal*** *durational differences. They tend to produce vowels*

*with **excessive duration** i.e. the vowels are **prolonged**. For **example**, the short vowel /I/ in the word /**pɪtɑʤi**/ may be produced as long /i/. In addition to this, the **other vowels** i.e. /**ɑ**/ and /i/ may also be lengthened, giving a perception of the speech being **prolonged**.*

e) ***Aspiration:*** *All vowels are voiced. However, hearing-impaired speakers may **forcefully exhale** air before production of vowels. This forceful release of air (**aspiration**) is perceived by the listener as **/h/** sound. For **example**, the vowel /**ɑ**/ in the word /**ɑ:m**/ may be released forcefully, resulting in the word being perceived as /**hɑ:m**/.*

f) ***Distortion:*** *As we recall, vowels are produced by **fine variations** in mouth opening, place and height of tongue, and lip rounding. Hearing-impaired speakers may be slightly **off-target** with respect to one or more of these required variations, particularly in those vowels with very **low kinesthetic** feedback. This applies especially to vowels **/i/, /e/ and /ɑ/** where lip rounding is not available as a cue for monitoring the vowel production. This results in the hearing-impaired speaker producing a vowel that is not similar to the target vowel. Not only this, the produced vowel may be one that is **not present** in the speaker's **language**. This is an error of **distortion**.*

### *2.6.2 Consonant Articulation*

*As already discussed in unit 3, consonants **differ** from vowels in several different ways. Consonants require **faster** and **precise** adjustments of the articulators. Also, while vowels can be produced in **isolation**, many consonants cannot. However, consonants provide relatively **strong** tactile and kinesthetic **feedback** during production.*

***Errors** in consonant production are **more common** than vowel errors in the speech of the hearing-impaired. Consonant errors are generally **classified** as errors of **omission**, **substitution**, **addition** and **distortion**. Let us look at each of these.*

A. ***Errors of Omission:*** *An error of **omission** means omitting, **deleting**, or **dropping** of a consonant in an utterance. Studies have shown that omission or deletion of a consonant can occur for consonants in the **initial** position or **final** position in a word.*

- *Omission of a **final consonant** by young hearing-impaired children is sometimes caused by **forgetting** to articulate the consonant. In older children, final consonant deletion may be due to **reduced force** while producing the consonant or an **abnormal lengthening** of the vowel before that consonant. For **example**, the final consonant /ɬ/ may be omitted in the word /**phuɬ**/ i.e. the word may be produced as /**phu**/.*

- *Omission of a consonant in the **initial position** of a word may occur if it is produced with **reduced force**. This is especially relevant to **plosive** consonants, which are often produced with insufficient force. For **example**, the initial consonant /p/ may be omitted in the word /**pɑni**/ i.e. the word is produced as /**ɑni**/.*

- *One **characteristic** error of omission reported by many authors is the omission of consonant **/s/ in all contexts**. This error is **frequently** found in the speech of the hearing-impaired. For **example**, the **initial** /s/ in the word /**sɑp**/ may be omitted, i.e. the word is produced as /**ɑp**/. The **final** /s/ in the word /**gIɬɑs**/ may be omitted, i.e. the word is produced as /**gIɬɑ**/.*

***B. Errors of Substitution:** Substitution error means **replacing** one consonant by some other consonant. Substitution errors in the speech of the hearing-impaired can be **categorized** as following:*

- ***Voiced-voiceless substitution:** This is the most **commonly** encountered error in the speech of the hearing-impaired. This error consists of substitution of a **voiced** consonant by the **voiceless** consonant having the **same place** of articulation or vice versa. For **example**, the voiceless stop consonant /p/ may be substituted by its voiced counterpart /b/ as in /**bɑni**/ for /**pɑni**/ or the **reverse** may happen wherein the voiced consonant /b/ may be substituted by the voiceless /p/ as in /**pɑɬ**/ for /**bɑɬ**/. Voiced-voiceless substitution may be caused **due to** continuation of **voicing** of the preceding vowel into the consonant. Also, **reduced force** during the production of a voiceless stop may lead to the consonant being perceived as its voiced counterpart.*

- ***Nasal-oral substitution:** A **nasal** consonant may be substituted for its **oral** counterpart. For **example**, a hearing-impaired speaker may produce **/m/ for /b/** as in /**mɑɬ**/ for /**bɑɬ**/, or /n/ for /d/ as in /**nɑnɑ**/*

*for /**dɑdɑ**/. Also, hearing-impaired speakers may substitute an oral consonant for its nasal counterpart i.e. **/b/ for /m/** as in /**bəʃəɤ**/ for /**məʃəɤ**/ or /d/ for /n/ as in /**dɑm**/ for /**nɑm**/. This type of substitution is primarily due to improper closure of the **velum** or soft palate.*

- ***Low-feedback substitution:** Production of some sounds is likely to provide little **sensory feedback**. These sounds may be substituted by sounds that provide more feedback, especially **tactile**. For **example**, consonants **/t/** or **/th/** may be substituted for the low feedback consonant **/s/** as in /**tɑp**/ for /**sɑp**/. The speaker seeks increased **tactile** feedback by touching the tongue and alveolar ridge for /t/ or seeks increased perception of **friction** by producing /th/.*

*Other **types** of substitution errors include:*

- *Using **stops** in place of corresponding **fricatives** (as in /t/ for /s/)*
- *Using **fricatives** in place of corresponding **stops** (as in /s/ for /t/)*
- *Using **glides** in place of **liquids** (as in /j/ for /**ɭ**/)*
- *Substitutions between **aspirated** and **unaspirated** consonants (as in /p/ for /ph/ or /bh/ for /b/)*
- ***Fronting** of consonants (as in the back consonant /k/ produced as /t/ in which the tongue placement is in the front of the oral cavity)*

***C. Errors of Addition:** This means adding or **inserting** an extra sound where it is not required. Errors of addition may include:*

- ***Insertion of a vowel between consonants:** This occurs more often when two consonants occur next to each other. For **example**, the word /**bɭu**/ is often produced as /**bəɭu**/ or the word "**fUʧbɔɭ**" may be produced as "**fUʧəbɔɭ**". In both these instances, a vowel is inserted between **two consonants**.*

- ***Unnecessary release of final stop consonants:** The hearing-impaired speakers may produce a stop consonant in the **final** position by **forcefully** releasing it. This leads to **perception** of an added vowel at the end. For **example**, the final stop /d/ in the word /**bæɖ**/ may be forcefully released leading to the word being heard as /**bæɖə**/. Another example is the word /ek/ produced as /**ekə**/.*

***D. Errors of Distortion:*** *Distortion occurs when a consonant is substituted by a sound* ***not occurring in the language****. Errors of distortion may occur when consonants are produced with either too much or too little* ***force****. For example, stops /p/ and /t/ are often distorted due to too much bilabial or lingua-alveolar pressure combined with excessive* ***jaw movements****. Distorted articulation in the speech of the hearing-impaired may also be due to* ***prolonged*** *articulatory contacts or* ***slow*** *articulatory movements.*

### *2.6.3 Diphthong Articulation*

*Diphthongs are a combination of two continuously phonated vowels with the first portion longer than the second. Errors in the production of diphthongs in the speech of the hearing-impaired include:*

- ***Simplification*** *of the diphthong by* ***splitting*** *it into two separate vowels or* ***omitting*** *one component. For example, the word /ɬaɪ/ may be produced as /ɬa:ɪ:t / where the two components of the diphthong are separated or as /ɬat/ where the component /i / is omitted.*

- ***Errors in timing*** *include producing the second portion of the diphthong longer than it needs to be.*

### *2.6.4 Analysis Of Articulation Errors*

*Many studies have looked at the* ***articulation errors*** *in the speech of the hearing-impaired with respect to the* ***type*** *of error, the* ***position*** *of the error in the word,* ***degree*** *of hearing loss, etc. Results of these studies suggest that*

- *In* ***severely*** *hearing-impaired,* ***omission*** *is the most frequent type of error followed by substitution and distortion. In* ***partially*** *hearing-impaired,* ***substitution*** *errors are more common followed by omission and distortion.*
- *For* ***both*** *severely and partially hearing-impaired subjects, errors involving* ***final*** *consonants are more common than errors involving the* ***initial*** *consonants.*
- *In terms of* ***place of articulation****, the visibility of phonemes is an important factor in determining correct production. In general,* ***bilabials*** *and labiodentals are more correctly produced consonants, while alveolars, palatals and* ***velars*** *are more prone to be produced incorrectly.*

- *In terms of **manner of articulation**, studies suggest that **laterals**, glides and stops head the list of correct production followed by fricatives, nasals and **affricates**.*
- ***Consonant cluster** reduction process may include*
  - *reduction of a fricative-stop cluster to a stop consonant*
  - *reduction of a nasal-stop cluster to a stop consonant*
  - *reducing a liquid consonant in a cluster to a glide*

*It is important to **remember** that errors of articulation are not only confined to production of individual phonemes, but are also **influenced** by the preceding and following sounds. For **example**, a hearing-impaired child may be able to produce the consonant /s/ correctly in isolation but may omit or distort it in connected speech.*

## *2.7 ERRORS IN SUPRA-SEGMENTALS*

*In Unit 1 we have discussed the aspects of speech that contribute to its **rhythm** or prosody. The various supra-segmental features such as emphasis, intonation, phrasing and rate are achieved by controlled variations of loudness, pitch and duration. Studies indicate that supra-segmental characteristics of speech of the hearing-impaired show problems with **all the aspects**.*

*Supra-segmental errors in the speech of the hearing-impaired appear to be due to speaker's **difficulty** in varying loudness, pitch and duration. Even if a hearing-impaired speaker achieves these skills, he may not know when to apply them in the context of the **linguistic requirement**.*

- ***Intonation:** Intonation is characteristically **absent** in the speech of the hearing-impaired. The most **common** errors include:*
  - *a) **monotonous** rate*
  - *b) **insufficient** variability of intonation*
  - *c) **excessive** variability of intonation*
  - *d) use of **durational** cues in place of intonation*

- ***Stress:** In general, stressed syllables have higher fundamental frequency, greater intensity and longer duration than the unstressed syllables. Studies reveal that hearing-impaired **fail to produce durational difference** between stressed and unstressed syllables. They produce unstressed syllables with longer duration.*

- ***Rate:*** *Hearing-impaired individuals speak at a rate* ***slower*** *than that of speakers with normal hearing. Slow speaking rate has been related to the* ***prolongation*** *of individual phonemes and the presence of* ***lengthy pauses*** *within utterances. Some investigators report that slow rate may be used by hearing-impaired speakers as a* ***compensatory strategy*** *to improve intelligibility. Speakers with hearing-impairment have been found to use frequent and lengthy inter- and intra-word pauses.*

## *2.8 SPEECH INTELLIGIBILITY*

The concept of speech intelligibility was introduced in **Unit 1.** The perceived intelligibility of speech depends on both **suprasegmental and segmental** features. In other words, speech intelligibility is influenced by **stress, intonation, voicing, oral-nasal distinction and positioning of the articulators.** Segmental features tend to be more **influential** in determining speech intelligibility.

*Studies have shown that individuals with* ***mild to moderate*** *hearing loss have* ***better speech intelligibility*** *as compared to those with severe to profound hearing loss. Because of problems in* ***producing and harmonizing*** *the several aspects of speech, the speech of children with severe to profound prelingual hearing loss is generally hard to understand. The general outcome of* ***various studies*** *of speech intelligibility of individuals with severe to profound hearing loss indicates that the mean intelligibility figure is between* ***18 to 25 %.*** *In other words* ***listeners not used to speech of the hearing impaired*** *can understand only about 25% of their speech.*

Various studies have looked into the **factors associated** with speech intelligibility.

- ***Degree of hearing loss*** *is negatively correlated with speech intelligibility i.e. the greater the hearing loss poorer is the speech intelligibility.*
- *Speech intelligibility also appears to be correlated with* ***linguistic ability*** *perhaps because hearing-impaired children will be able to speak more fluently if they have a fair knowledge of the language.*

- *The effectiveness of **speech training procedures** also seems to have an impact on speech intelligibility. There is evidence that hearing-impaired children can improve their speech intelligibility to some extent with speech training.*
- *Children who make **good use** of their **hearing aids** show significantly superior speech intelligibility to children who do not use their aids to such advantage.*
- *In some children, a deficit in **tactile and kinesthetic feedback** m contribute to errors in articulation leading to poor speec intelligibility.*
- Difficulties with **consonants** cause more intelligibility problems than difficulties with vowels.

## 2.9 SPEECH CHARACTERISTICS ASSOCIATED WITH MILD TO MODERATE HEARING LOSS

*You have already looked at the effects of **different degrees** of hearing loss on speech production in unit 4. The **greater the hearing loss**, the **more effect** it has on different aspects of speech production.*

*Studies taken up on speech of individuals with mild to moderate hearing loss are relatively **limited.** Generally, this group of individuals appears to have **fairly intelligible** speech. **Vowel** production errors are rare and voice **quality** and **suprasegmental** features are generally either normal or mildly deviant. However, primary speech errors of this population are related to misarticulations of **single consonants** and **consonant clusters** (consonant-consonant combinations). Sounds most commonly in error are the **affricates and fricatives**. Stop plosives, nasals and glides are not commonly misarticulated. Common types of errors reported are **substitutions,** followed by distortions and omissions.*

## *2.10 ASSESSMENT / EVALUATION OF THE SPEECH OF THE HEARING-IMPAIRED*

In order to **develop** age-appropriate speech skills and **correct** speech errors in the hearing-impaired children, one must know what spoken language skills, if any, the child has already acquired. This information can only be obtained through **systematic evaluation,** which involves **observation** and

**assessment** as training proceeds. The main components of a systematic evaluation procedure include

- **Oral peripheral examination** of the child's speech organs (structure and function)
- Assessment of his **phonetic level** skills i.e. assessment of control over pitch, duration and loudness in **vocalizations** and assessment of segmental skills (speech sound production) at **isolation** level
- Analysis of his **phonological level** speech i.e. assessment of segmental and supra-segmental skills in a **meaningful linguistic context**.

To understand the concept of **phonetic and phonological** level, let us consider this **example**. When the child is at the stage of babbling and produces the syllable /baba/, it is non-meaningful and thus can be considered to be at the phonetic level. But as the same child starts saying /baba/ consistently to indicate his father, it is associated with a meaning and hence becomes a phonological level production.

As a teacher, you may have to carry out speech assessment for children with varying degrees of **proficiency in spoken language**. Some children may have very limited spoken language skills while you assess them. For such children, assessment should be carried out keeping in view the level at which the child is functioning. For example, if a child has no meaningful verbal output, phonological level assessment cannot be carried out. For another child who is speaking in sentences and has good vocabulary, assessment at phonetic as well as phonological levels can be carried out. It should also be remembered that speech assessment of one child may take more than one session. Especially for children who are verbal and the complete phonetic and phonological assessment needs to be carried out, assessment may not be a one-time process but may take more number of sessions.

Let us now look at each of the components of assessment in brief. Details of the phonetic and phonological level sub-skills and teaching of these will be done in detail in the next unit.

### *2.10.1 Oral Peripheral Examination*

The structure and function of each of the speech organs should be assessed systematically to ensure that the physical requirements for speech production are met. Following are the structures that should be looked at.

- **Lips:** The appearance of the lips should be checked for its symmetry and continuity of the upper border. Lip movements that should be assessed include **spreading** (as in producing /i/), **rounding** (as in producing /u/), and **coming together** or **puckering** (as in producing /p/).
- **Mandible:** The symmetry of the mandible and its relation to the maxilla (upper jaw) should be assessed. The movements of the mandible that need to be assessed include **opening and closing** of the jaw and **side to side** movements.
- **Tongue:** The tongue should be assessed for its **size** (by asking to protrude the tongue). Important movements such as tongue **elevation** or upward movement, **protrusion** or outward movement, **retraction** or backward movement and **lateralization** or side to side movement need to be assessed.
- **Teeth:** **Alignment** of the teeth should be checked. Also, missing teeth or overlapping teeth need to be noted.
- **Hard palate:** Check for any kind of an organic deformity in the hard palate such as a **cleft** or an opening.
- **Soft palate:** It should be checked if the soft palate is also intact and there exists no opening or cleft. Also, movement of the soft palate can be observed as described in the in-text activity of 2.8 in unit 2.

## 2.10.2 Assessment Of Phonetic Level Skills

Phonetic level evaluation includes assessment of **non-segmental** aspects and **segmental** aspects.

1. **Non-segmental analysis** is to determine the extent to which the child has acquired control over vocalization. Presence of **spontaneous vocalizations** should be assessed. It should also be assessed whether the child vocalizes whenever it is required or **demanded**. Control of **duration also needs to be determined.** The child should be able to produce sustained vocalizations for at least 3 seconds, a series of brief vocalizations lasting one half second or less and a stream of upto four vocalizations containing sounds varied in duration. Control of **loudness** can be considered to be present if child can produce sounds of 3-second duration in loud voice, soft voice and whisper as well as several syllables varying in loudness. **Pitch control** may be considered acquired if child can produce sounds in low high and mid pitches, and also combinations of low-mid-high, high-low-mid, etc. Ratings of each of these can be given as **present, present but inadequate** or **absent.**

2. **Segmental analysis** aims at finding out

   a) whether the child can produce different **speech sounds** to the extent required,

   b) whether **patterns** such as vowel-consonant (**VC**), consonant-vowel (**CV**), consonant-vowel-consonant (**CVC**), etc. can be reliably repeated,

   c) whether these patterns can be **alternated** with other patterns at an acceptable rate, for example, CV with CVC, VC with CV, etc.

   d) whether segments can be varied in **duration, loudness and pitch**; for example vary pitch, loudness and duration for the CV segment /bi/.

For assessment of phonetic level skills, utterances can be **elicited** from the child on **imitation** after the teacher. The teacher can **model** the target response that is expected from the child in a clear and precise manner. The child should then repeat this and his performance should be **evaluated**. Stimuli for assessment of duration, pitch and loudness control can be production of **different vowels** and if possible CV or VC combinations. Getting the child to **imitate** all the phonemes in the language can help in carrying out segmental assessment.

### 2.10.3 Assessment of Phonological Level Skills

*Phonological level analysis means evaluation of speech in a **linguistic context**. For this purpose, a sample of **50 utterances** (words, phrases, sentences, etc.) should be obtained from the child. This can be done in two ways. **One**, words, phrases and sentences uttered spontaneously by the child can be tape-recorded and later analyzed. However, with this method, all the phonemes in the language may not be tested adequately. The sample will be limited to the vocabulary known to the child. The **other method** of obtaining a sample for assessment is by using **pictures** of words or actions or incidents that are familiar to the child. Words should be chosen in such a way that each speech sound will be tested in the word **initial, medial and final positions**. An example of this is the three words /pɑni/, /pəpitɑ and /kəp/ which test the phoneme /p/ in word initial, medial and final positions respectively. The sample should not be limited to words only. Longer **phrases and sentences** should also be recorded for the purpose of assessment of supra-segmental skills. It will help if this sample is **tape-recorded** and then analyzed. The aim of the **segmental** analysis is to see the extent to which particular sounds have become incorporated in the child's phonology. The errors made by the child for each of the sounds can be categorized as errors of substitution, omission, distortion or addition. The **supra-segmental** parameters that need to be rated include rate, phrasing, intonation, emphasis and so on.*

*While assessment of the various non-segmental, segmental and suprasegmental features is being carried out, the errors made by the child can be categorized according to the various errors discussed so far in this unit.*

## 2.11 SUMMARY – POINTS TO REMEMBER

- ✓ *The development of speech in children with severe to profound prelingual hearing impairment is usually **delayed** if intervention does not start early.*
- ✓ *Speech production of the hearing impaired consists of **poor co-ordination** between respiratory, phonatory and articulatory systems.*
- ✓ *Errors related to **respiration and its control** include*
  - *inappropriate breathing **patterns**,*
  - *inadequate breath **support**,*
  - *inadequate breath **control** and*
  - ***forced expiration** while speaking.*
- ✓ ***Voice** problems in hearing-impaired speakers include*
  - *disorders of **pitch and pitch control**,*
  - *disorders of **loudness and loudness control** and*
  - *disorders of voice **quality**.*
- ✓ ***Articulatory** errors in speech of the hearing impaired may be in*
  - ***vowel** production,*
  - ***consonant** production and*
  - *production of **diphthongs and semivowels**.*
- ✓ Prosodic or **supra-segmental** errors in the speech of the hearing impaired include
  - *irregularities in **rate** of speech,*
  - *inappropriate **phrasing** patterns,*
  - *inappropriate **intonation** patterns and*
  - *inappropriate **stress** patterns.*
- ✓ *Speech of individuals with **mild to moderate hearing** loss is fairly intelligible with relatively limited or no errors.*
- ✓ The main components of a systematic evaluation procedure include
  - **Oral peripheral examination** of the child's speech organs (structure and function)

- Assessment of his **phonetic level** skills
- Analysis of his **phonological level** speech.

## *2.12 CHECK YOUR PROGRESS*

❖ ***Questions:***

1. *What aspects of speech are affected in the hearing-impaired?*
2. *Enumerate deviations in respiration found in hearing-impaired speakers.*
3. *List the supra-segmental errors in the speech of the hearing-impaired.*
4. *What articulatory errors are found in the speech of the hearing-impaired?*
5. *Explain the voice problems commonly found in the speech of the hearing-impaired.*
6. *Discuss the factors affecting speech intelligibility of hearing-impaired speakers.*
7. *Discuss the speech characteristics of individuals with mild to moderate hearing loss.*
8. *Discuss how the speech of the hearing-impaired can be assessed.*
9. *Enumerate vowel production errors in the speech of the hearing-impaired.*
10. *Discuss consonant errors in the speech of the hearing-impaired.*
11. *Discuss assessment of non-segmental, segmental and supra-segmental aspects of the speech of the hearing-impaired.*

## *2.13 POINTS FOR DISCUSSION/CLARIFICATION:*

After going through the unit you may like to have further discussion on some points and clarification. Note down those points:-

### 2.13.1 Points for Discussion

### 2.13.2 Points for Clarification

## *2.14 REFERENCES / FURTHER READING*

1. *Bench, R. J. (1992). Communication skills in Hearing-impaired Children. London: Whurr Publishers.*
2. *Calvert, D. R. and Silverman, S. R. (1983). Speech and Deafness. (2nd Ed.). Washington DC: Alexander Graham Bell Association for the Deaf.*

3. Ling, D. (1976). Speech and the Hearing-impaired Child: Theory and Practice. Washington DC: Alexander Graham Bell Association for the deaf.

4. Schow, R. L. and Nerbonne, M. A. (1996). Introduction to Audiologic Rehabilitation. (3rd Ed.) Boston: Allyn and Bacon.

# UNIT 3: TYPES OF ASSESSMENT: NORM REFERENCED AND CRITERION REFERENCED TEST, COMPREHENSIVE AND CONTINUOUS ASSESSMENT, SUMMATIVE AND FORMATIVE, FORMAL AND INFORMAL, CONVENTIONAL & ALTERNATE, PERFORMANCE BASED AND CURRICULUM BASED

## o STRUCTURE

Introduction

- o **Objectives**
- o Developmental model, its stages, target behaviors and sub-skills at both the phonetic level and phonological level

Stage 1: Vocalizations freely and on demand and using vocalizations as a means of

- o communication

Stage 2: Bases of suprasegmental patterns and using different voice patterns meaningfully

- Stage 3: Acquiring all diphthongs and vowels and using different vowels to approximate words
- Stage 4: Acquiring consonants by manner and some words said clearly with good voice patterns
- Stage 5: Acquiring consonants by place and using more and more words
- Stage 6: Acquiring consonants by voicing and more words said clearly with good voice patterns
- Stage 7: Acquiring initial and final blends and all speech intelligible.

- o **Approaches for teaching speech**
  - Auditory global approach
  - Multi-sensory syllable unit approach

- Associated phoneme unit approach

- **Summary-Points to remember**
- **Check your progress**
- **Assignment**
- **Points for discussion/clarification**
- **References/Further reading**

## 3.1 INTRODUCTION

"One of the greatest achievements in the world is that of a child born deaf who learns to talk" (A.G.Bell Association, 1979). Anyone who is involved in the teaching of speech to hearing impaired children would agree wholeheartedly with this statement. Teaching the hearing impaired child to talk is indeed a great achievement and helping him speak with **ease and intelligibility** appears to be one of the greatest **challenges** facing the educators of the deaf today. There are many models, approaches and strategies for teaching speech to the hearing-impaired.

One of the **models**, which are extensively used, is the **developmental and corrected model** developed by **Ling** (1976). In this unit we will discuss various **stages, goals and sub-skills** of this model. We will also discuss the manner in which a teacher in the Indian context, can implement the above mentioned goals and sub-skills. The various **approaches and strategies** for teaching speech to the hearing-impaired will also be discussed.

## 3.2 OBJECTIVES

At the end of this unit, you will be able to:

- List the seven major stages of **Ling's developmental model** at the phonetic and the phonological levels
- Identify the **target behaviors** and the **sub-skills involved** at each stage of the model
- Use the **activities** suggested for achieving the various sub-skills
- Apply the various **approaches** to speech teaching

## 3.3 DEVELOPMENTAL MODEL FOR SPEECH TEACHING

A normal hearing child acquires speech in a particular order and pattern. The order or pattern in which a normal hearing child acquires speech is already discussed in Unit 4. The developmental model uses the same **order and pattern** to teach speech to the hearing- impaired child. The **purpose of the model** is to enable the teachers to develop speech in the hearing impaired children in a systematic and effective way. It also

describes precise **evaluation procedures** which allow the teacher to determine what patterns have been learned by the child at the **phonetic and phonological level** (refer to Unit 3 for definition of phonetic and phonological level). Teachers can use this model with children of various ages, hearing impairment and having **different speech characteristics**.

The teaching process can be considered sequential and is divided into **seven major stages of speech acquisition**. Each stage has two levels – the phonetic and the phonological. For example if the child vocalizes randomly, then his vocalizations are considered to be at the phonetic level. However if he uses his vocalizations to attract attention his vocalizations are considered to be at the phonological level. These two levels have to be worked on simultaneously. In each stage work on phonological level will follow work on phonetic level. At the phonological level the requirements are:

- constant **exposure** to speech
- **a lot of drill work** on the use of speech skills as they are acquired at the phonetic level
- **reinforcement** of the speech patterns accurately produced.

Each of the seven stages of acquisition consists of a number of **target behaviors**. What are target behaviors? Target behaviors are **short-term goals** upon which the teacher can make an individual plan for each child depending on the child's needs. For e.g. one of the target behaviors can be – Teaching production of the consonant /s/ when a child is unable to produce it. To achieve each target behavior, a number of **sub-skills** are suggested.

In what way can this model help the teacher? With the help of this model the teacher can:

1. **Assess** the speech skills present in the child
2. **Formulate** goals
3. **Plan** effective strategies for the different sub-skills

This can be done taking into consideration the following:

1. The **capacity** of the student
2. Student's **age**
3. **Hearing level** of the student

The teacher should remember the above mentioned factors and should use the **model flexibly** depending on each student's needs. Further, to achieve each of these target behaviors the child must master a series of **specific sub-skills**. To develop any given target behavior, the teacher must—

- select first the various sub-skills involved
- carry it through
- plan her teaching strategy
- evaluate the result of her work

If the sub-skill has been mastered, she may proceed to teaching the next sub-skill; if not, she must re-plan her work, using different strategies and materials and begin again.

The target behaviors are:

1. Spontaneous production of at least twelve voluntary vocalizations during three-minute observation period.
2. Consistent use of voice to attract attention
3. Vocalizing on demand. In other words, vocalizing in response to a question or when asked to imitate. (Refer to Unit 4 for definition of vocalization).

The first stage is applicable to younger hearing-impaired children (specifically 2-3 years old). The model gives the sub-skills and the teaching strategies for the above target behaviors.

1. Spontaneous production of at least twelve voluntary vocalizations during three-minute observation period: The sub-skill involved in vocalization is the **production of voice**, which results when breath is released and the vocal folds are adducted (refer to Unit-2 for production of voice). Every child vocalizes/produces voice involuntarily

- always in laughter,
- usually when crying, coughing, sneezing or exercising,
- and in active play.

If the child has to use voice voluntarily and abundantly he should derive pleasure from vocalization. What kind of pleasure do you think a child can get through vocalizations?

a. Internally- he can get the feeling or feedback from his own voice, which he can enjoy.

b. Externally- in the form of reinforcement from others.

Observe how a parent responds when his/her child vocalizes:

- parents praise the child,
- pat him/her,
- imitate the child's vocalizations,
- smile,
- give attention, etc.

Initially, most hearing impaired children use voice spontaneously and voluntarily at least to some extent. A child born with hearing impairment does not vocalize often enough as he has received too little intrinsic or extrinsic (internal and external) reinforcement / reward. His vocalizations will therefore be limited to involuntary voicing e.g. laughter. To develop voluntary vocalizations the teacher must-

a. provoke / elicit involuntary vocalizations
b. reinforce the child's vocalizations

Children can be made to vocalize involuntarily in a number of ways for example laughing, crying, vocalizing during exertion. Generally she should select the involuntary vocalization, which are already present in the child- for example laughter.

**Activities,** which the teacher can use in order to elicit laughter, can be-

a. Tickling.
b. Physical play.

Other means of provoking vocalizations may be necessary. This is because the child should learn to produce voice in other contexts also, for example vocalizations during exertion. Games such as tug of war, one arm table wrestling can also provoke vocalizations.

The following **reinforcement** can be given-

a. Patting on the child's back.
b. Praising the child.
c. Giving the child his favorite toy to play.

**Intext activity:**

Observe a 3-year-old hearing-impaired child, who expresses his needs only by using gestures. Consider eliciting laughter to be your goal.

List the following-

a. Games which you will play with the child to elicit laughter.

b. What kind of reinforcement / reward will you give to the child once the child starts vocalizing.

2. Consistent use of voice to attract attention:

In order to use voice to attract attention the game known as "blind man's buff "can be played. In this game one person is blindfolded. The blindfolded person is supposed to touch / catch the others. The teacher can modify this game. The blindfolded person should touch the child who vocalizes and should reward the child. Each time the child vocalizes, he is touched and given a star. If he collects ten stars he should be given a chocolate.

**Intext activity:**

Think of how you will encourage the child to vocalize and how you will reward him.

3. Vocalization on demand:

When the child starts vocalizing voluntarily, he should use his voice to attract attention or use his vocalizations to fulfill his needs. If the child communicates his needs only by using gestures, or by pulling or pushing, he should be taught to accompany his non-verbal behavior with vocalizations.

Thus, as soon as the child starts vocalizing involuntarily, the teacher should select **vocalization on demand as her next goal.**

This goal can be achieved by carrying out the following **activities**: -

1. Do not respond or respond slowly when the child communicates non-verbally.
2. React quickly and pleasantly if non-verbal means of communication are accompanied by vocalizations.

**In text activity;**

In order to elicit vocalizations on demand following games can be played: -

1. Games such as throwing and catching the ball— give the ball to the child only when he vocalizes;
2. Simon says-In this game one person says-"Simon says clap your hands" And the others have to do what that person says. Here first

gross body imitations can be done followed by imitation of vocalizations.

### 3.3.2 Stage 2, at phonetic and phonological level i.e. bases of suprasegmental patterns and using different voice patterns meaningfully:

The target behaviors are:

a. Gross control over **duration of voicing.**

b. Control over **voice intensity.**

c. Control over **voice pitch.**

(Refer to Unit 5 for definition of duration, intensity and pitch).

If at Stage 1 the child has vocalized a lot, then it is more likely that he will have voice patterns, which will vary in duration, intensity and pitch. If the child's spontaneous vocalization is reinforced in a variety of situations the child will produce varied or different types of vocalizations. If it is reinforced only in one type of situation, then the child will produce only one type of vocalization. I.e. the vocalizations will be monotonous. For example:

1. The vocalizations produced during laughter are different from those produced when one is angry.
2. The vocalizations produced when one is cheering a cricket match are different from those produced when one is telling a secret in his/her friend's ears.

**Intext activity:**
What are the different vocalizations observed when children play? Observe the duration, intensity, pitch and intonation of these vocalizations. Do you observe any change in the facial expressions along with change in vocalizations?

**a. Sub-skills related to vocal duration:**
A child may be considered as having acquired basic control over duration of voice when he can in one breath, imitate groups of up to four distinct vocalizations varying in duration.eg. a, a----, a--------, a---------- ---------. (The dotted line indicates duration, for e.g. a----=2seconds, a---------=4seconds etc).

The **sub-skills** underlying this target include ability to :-

1. Sustain vocalization for at least 3 seconds. In other words the child should be able to take in a deep breath and on exhaling say 'a' for at least 3 seconds.

2. Imitate separate vocalizations differing in duration, each on one breath. In other words the child should be able to imitate the teacher's production of 'a' varying in duration e.g. a, a---, a--------, a----------.

Ability to sustain a vocalization for at least 3 seconds duration ensures that the child is now ready for subsequent development of differential intensity and pitch patterns in his vocalizations. Similarly, the breath grouping of utterances of various durations, i.e. being able to say a, a---, a---------, a---------- in one breath is essential to the regulation of breath in the production of voice.

**Sub-skill 1:** The production of vocalizations, which are sustained for 3 seconds.

The teacher can play games in which if the child vocalizes for 3 seconds he will be rewarded.

For example:

1. As long as the child vocalizes the teacher may move a toy car along the road or move a toy train along a railway track.
2. The teacher can continue to pour sand or liquid into a long vessel as long as the child sustains vocalizations for 3 seconds.
3. The teacher can draw a line with points drawn at an interval of 3". At these points the teacher can stick small appropriate sized pictures. The child can be made to vocalize until he reaches the different pictures at different points.

The imaginative teacher can invent many such duration-related activities. Games can be chosen in which other children are also involved. For e.g., musical chairs can be played by listening to a child's vocalization as well as by listening to music.

**Intext activity:**
Give examples of games, which you would play with the child in order to make him vocalize for 3 seconds.

**Sub-skill 2:** To develop the ability to imitate and to approximate separate or vocalizations differing in duration, each on one breath.

**Teaching strategies: -**

1. First start with the imitation of non-verbal behavior. E.g. imitation of hand movements, head movements etc.
2. This can be followed by imitation of lip movements.

3. Tactile cues can be used to make the child understand the concept of duration. E.g. the teacher can trace her finger down the child's arm while producing a long vocalization (a long a----------) vs. patting his hand while producing a short vocalization.

**Remember** first teacher should give a model and then ask the child to imitate.

As the production of several short vocalizations on one breath is important for release of breath co-ordinating with words in connected speech, the development of this sub-skill should not be hurried.

**b. Sub-skills relating to vocal intensity:**

The child is considered to have achieved a control of vocal intensity, if he can imitate a series of several short vocalizations varying in intensity from loud speech to a whisper, on one breath.

The sub-skills relating to vocal intensity are: -

1. Production of brief, loud utterances.
2. Production of brief quiets utterances.
3. Production of a whisper.

**Sub-skill 1:** Production of brief loud utterances.

To achieve this sub-skill the following games can be played:

1. The teacher pretends to sleep and will open her eyes only when the child produces a sufficiently loud sound/vocalizations.
2. Ask one of the child's friends to stand at the corner of the room. Ask the child to stand at the other corner. Ask the child to call out to his friend. The friend should look back only if the child calls out in a loud voice.
3. Surprising the child by playing a prank. For example, hiding behind the door and surprising him when he comes into the room.
4. Ask two boys to pretend to do boxing and one of them should pretend to have got hurt and start moaning loudly.

**Sub-skill 2:** Production of brief quiet utterances:

**Activities:**

1. Giving routine examples like—if the teacher is teaching in class and the child wants to talk to his friend, will he talk loudly or softly?
2. If two friends want to share a secret, will they talk softly or loudly?
3. If two children want to tease another child and they do not want the other child to listen, will they talk/vocalize loudly or softly.

**Sub-skill 3:** Production of whispered speech:

Even children, who do not hear above 1000Hz, can hear a forced whisper if they are fitted with an appropriate hearing aid and if the microphone is close to the speaker. Whisper at a distance of 3" from the microphone is as intense/loud as a shout from a few yards.

Simplest strategy to develop whisper is through imitation, through use of residual hearing. Children, who have insufficient residual hearing, may be taught to whisper through use of touch.

**Activities:**

1. Produce a breath stream that can be felt by hand.
2. Make the child say /a/ forcefully, but without voicing.
3. A child can pretend to sleep and the other child can be asked to whisper a sentence into the child's ears.

**c. Sub-skills related to vocal pitch:**

The target behaviors are:

Production of 3 vocalizations on one breath, each at a different pitch .

The **sub-skills** underlying this target behavior include:

1. Vocalizing / saying a prolonged /a/ for 3 seconds in high pitch and in low pitch in one breath.
2. Varying pitch between low-high and high low, while vocalizing /a/.

**Teaching strategies:**

**Sub-skill 1:** Vocalizing /a/ in high and low pitch for 3 seconds in high pitch and low pitch in one breath.

1. Child should first be taught to identify /a/ produced by the teacher in high pitch and in low pitch.
2. Visual cues can be given. E.g. a high pitched /a/ may be associated with a hand stretched above the head and a low-pitched /a/ with a hand lowered below the waist level.
3. When the child can understand the pitch of the teacher's voice correctly with visual cues, he should then be trained to identify pitch through residual hearing alone.

4. For children with profound hearing loss the following are the strategies: -

a. To decrease pitch, in other words to enable the child to vocalize in a low pitch-----

Ask the child to lower his chin towards his chest, and relax his arms and shoulders. Child's attention should be directed to the low pitch produced.
Another method is to apply downward pressure on the thyroid cartilage. This action reduces the tension on the vocal cords and increases their mass and thus lowers the pitch.

b. Similarly, for raising pitch, in other words enabling the child to vocalize in a high pitch, ask the child to raise his neck and then say /a/. This will increase the tension in the vocal cords and reduce their mass, thereby increasing the pitch.

c. If the child has no useful residual hearing, or if he cannot modify voice pitch without tactile cues, he can be asked to feel the upward and downward movement of the teacher's larynx as she / he alternately produces a high pitch and a low pitch vocalization. Then by feeling his own larynx he can attempt to match his own laryngeal movements with that of the teacher's.

d. Children with no residual hearing may be able to hear the high pitched sound of the aeroplane. A taped sample of the aeroplane can play to the child in order to help him identify the high pitch.

e. For identifying low pitch, the sound of a dog bark can be taped and played to the child.

Once the child has learnt to vary the pitch of voice through the sense of touch, then he should be made to monitor the pitch changes in his voice only through hearing.
Whether the child can hear pitch change or not, extensive practice must be given in order to ensure the oro-sensory motor patterns which underlie controlled pitch production.

**Sub-skill 2:** Varying pitch between low high and high-low, while vocalizing /a/.

1. This sub-skill can be developed when the child can vocalize in a high and a low pitch.
2. A smooth and continuous change in pitch from low to high and high to low is difficult to perceive through touching the larynx. It can be indicated visually. E.g. teacher can represent it by raising or lowering her hand.
3. Pitch breaks can occur when this sub-skill is attempted. Such breaks take place if the child can vocalize in the low pitch but cannot do so in the high pitch. Or it can also occur if the high pitch is established but not the low. When breaks occur teacher should work at

establishing one pitch, either the low or high first and then stabilize the other.

The child can be considered to have adequate control when he is able to vary his pitch of voice smoothly from the highest to the lowest point, both rapidly in one second and slowly over 3 seconds.

Simultaneously the above skills should be used meaningfully i.e. at phonological level in the following manner:

1. Vocalizing with rising pitch for asking for some toy.
2. Vocalizing in a lower pitch when he (the child ) does not get what he wants.

### 3.3.3 Stage 3, at phonetic and phonological level i.e. acquiring all diphthongs and vowels and using different vowels to approximate words:

How vowels are formed is described in Unit 3.

The vowels in Hindi are a, e, I, u, o, ae,

The commonly heard diphthongs in Hindi are

The sub-skills for production of each vowel are: -

1. Differential shaping of the vocal tract.
2. To be able to maintain each vocal tract configuration for at least 3 seconds.
3. Rapid repetition of each vowel.
4. Being able to rapidly alternate the articulators so that they can assume position for each vowel from whatever position they previously occupied. In other words rapid alternations of vowel target positions

**Teaching Strategies:**

The strategies for developing the above mentioned subs-kills will vary depending on the extent of the residual hearing of the child and his ability to use it. All other variables such as age and previous experience will have secondary importance.

**Sub-skill 1:** Differential shaping of the vocal tract.

The following are the strategies: -

1. Auditory strategies.

2. Tactile strategies.
3. Visual strategies.

**Auditory strategies:**

The simplest and the most effective strategy to teach vowels are to teach through auditory imitation. Not all children have sufficient hearing to acquire all vowels through audition. However the hearing-impaired child can hear back vowels.

**Activities:**

1. First step is to provide the child with a lot of auditory stimulation while interacting/communicating with him. For this, techniques similar to those specified for development of abundant vocalizations (Stage 1) can be used.
2. With very young children sounds made by different toys can be associated with different vowels

   E.g. a) a train with the sound made by its whistle u---u----.

   b.) an aeroplane with it's sound I----I---

   c.) sounds made by farm animals. Cow with moo, lamb with ba, and duck with kwae.

   d.) games and songs such as 'Old McDonald had a farm e—a—e—a—o--.

   *Remember to reinforce every attempt of the child to imitate. For reinforcement a variety of toys can be used.e.g.a) On imitation of /a/ a doll blinks its eyes. b) On production of /u/ a toy train moves forward. You can think of your own ideas.

**Tactile strategies:**

The child can feel configuration/shape for most of the vowels if he places a finger on the teacher's tongue as he speaks. The child is then expected to imitate the tongue height and position.

This involves four steps:

1.a) feeling with a finger the steady state position of the teacher's tongue.

b) Feeling with a finger the movement of the teacher's tongue.

2.Imitating the tongue configuration. This can be done by using another finger to feel tongue position in his own mouth.

3.a) Finger should be withdrawn.

b) Maintaining tongue position after the finger is withdrawn.

4.Trying to achieve tongue position without using fingers as a guide.

The last two steps require memory for lip position and motor kinesthetic memory. This strategy is important in order to focus the child's attention on motor kinesthetic patterns that are important for the production of vowels.

Feeling the tongue with a finger gives a kinesthetic feedback. This feedback provides information on the width and the tension in the tongue. This helps to differentiate certain vowels that have different tongue height and lip shape viz.-tense vowels (i, e, u, a) and lax vowels (I, E, U and a). The tongue is more wide spread and feels much hardness in tense vowels.

Once the tongue position for a given vowel has been established through touch, tactile strategies should be discontinued. The child should be reinforced so that he learns to maintain vowel production through normal-proprioceptive mechanism—the oro-sensory motor patterns associated with tongue placement.

**Visual strategies:**

Simpler ways of using visual strategies are: -

1. Using a 3 dimensional model, which allows the teacher to manipulate an artificial tongue within a visible mouth cavity.
2. Line drawings.
3. Using hand configurations e.g. using one hand to indicate position of the tongue and another to indicate position of the hard palate. Move the hand representing the tongue to indicate position of the tongue in the production of that vowel.

Remember:

1. Tongue position for vowels cannot be adequately visualized unless teacher makes exaggerated movements.
2. Giving an exaggerated model will lead to habitually exaggerated movements by the child.

**Sub-skill 2:** Maintenance of target voçal tract configuration:

Sustaining each vowel for several seconds serves 3 purposes: -

1. It enables the child to establish/achieve an ideal target position for the vowels.
2. It lays the foundation for maintaining tongue position. This foundation is important for the first stage of teaching consonants.
3. It provides control of articulators for sufficient duration. This is useful for making laryngeal and articulatory adjustments for the production of vowels.

**Teaching strategies:**

1. If auditory strategies have been used strategies similar to those used to achieve control of vocal duration can be used.
2. If tactile strategies have been used to develop a target vowel the same strategy can be used for the above sub-skill.

One can sustain vowels for a long duration depending on the breath supply, but one cannot sustain diphthongs.

**Sub-skill 3:** Rapid repetition of targets.

1. Once the first few vowel targets have been achieved and each can be sustained in isolation for about 3 seconds, the child should be taught to say them with a labial consonant preferably /b/ e.g. ba, bi, bu. Child should be taught to produce a string of ba, bi, bu on one breath.
2. Same can be done with other vowels—be, bu, bo etc.

He teacher should take care that there is no diphthongization.

**Activities:**

Nursery rhymes such as ba ba blacksheep etc can be used.

**Sub-skill 4** Rapid alternations of vowel target positions:

The purpose of this sub-skill:

1. To further strengthen the motor-kinesthetic patterns associated with each vowel.
2. To ensure that the child's speech organs are trained to take target positions from the previous positions.
3. To enable the child to achieve movements associated with vowel formation to be made at rates commonly observed.

**Teaching strategies:**

1. The teacher may use the child's left hand to indicate one vowel and his right hand with another vowel.e.g the teacher can lift the child's left hand while saying /i/ and then his right hand while saying /u/.
2. Two vowels can be alternated on separate breaths i.e. /i/ on one breath and /u/ on the other.
3. Two vowels can be alternated slowly on the same breath.e.g.i---u-----.
4. Child should be able to achieve the rate of at least 2 vowels per second on one breath.
5. Later strings of several vowels can be alternated.

Order of target and sub-skill development:

1. Step 1:- Teach /a/, /i/, /u/, /au/, /ai/. All 4-5 sub-skills underlying the three vowels should be taught before progressing to step 2.
2. Step 2: - Teach /o/, /oi/, /E/, /u/ and /I/.

Diphthongs should be taught in a similar manner.

At phonological level:

As soon as the child has learnt to produce first two or three sub-skills for producing vowels or diphthongs at phonetic level, the child must be encouraged to use these phonemes in phonologic speech i.e. meaningfully.

**Activities:**

There are various ways in which a child can be encouraged to use vowels. Child's imitations can be encouraged in everyday situations: -

1. /au/ can be used when a child is hurt or when he is pretending to be hurt.
2. Child can be made to use /u/ to indicate surprise or pleasure e.g. following games can be played:-

---Pretending to fall on a banana peel and saying /au/, /u/

---Vocalizing /a/, /u/ when pinched

---Throwing plastic toy insects and saying /a/, /u/, /o/ in surprise

### 3.3.4 Stage 4, at phonetic and phonological level, i.e. consonants by manner with /a/, /u/ and /i/:

Teaching production of:

1. Plosives-/p/, /b/.
2. Nasal-/m/

3. Fricative-/h/.
4. Fricatives-/f/, /v/.

Refer to Unit 3 for manner of production of plosives, nasals, and fricatives.

The following are the **sub skills** - for the production of /p/:

1. Production of /p/ in single syllables releasing various vowels, viz./a/, /u/, /i/.
   i.e. /pa/, /pi/, /pu/.
2. Production of /p/ in a series of repeated syllables formed with any vowel. E.g./pupupu/, /pipipi/ etc.
3. Production of /p/ in a series of repeated syllables formed with various vowels e.g./pupipa/, /papipu/.
4. Alternation of syllables released with /p/ and syllables released with other consonants. E.g. /pama/, /pimi/, /pifi/.
5. Production of /p/ in inter-vocalic position e.g./apa/, /epa/ etc.
6. Production of /p/ in final position e.g. /ap/, /ep/.

Similarly, the sub-skills for production of all the other consonants viz./b/, /m/, /h/, /f/, /v/ are the same as those mentioned for the production of /p/.

The teaching strategies are as follows:

a. Auditory strategies.
b. Visual strategies.
c. Tactile strategies.

## 3.6 CHECK YOUR PROGRESS

### QUESTIONS:

1. Enumerate the purposes of the Ling's developmental model.
2. Enumerate the seven stages of the developmental model.
3. Discuss the sub-skills and the target behaviors for the Stage 1.
4. What the teaching strategies used for developing the sub-skills for the Stage 2 and 3.
5. Discuss the auditory, visual and tactile strategies for teaching the phoneme /s/.
6. Discuss the strategies for teaching voicing and voiced distinctions.

## 3.7 ASSIGNMENT

a. Draw a **flow chart** or **diagram** illustrating the Ling's developmental model.

b. Discuss the advantages and disadvantages of the three approaches used for teaching
speech.

## 3.7 POINTS FOR DISCUSSIONS / CLARIFICATION

After going through the unit you may like to have further discussion on some points and clarification. Note down those points:-

### 3.7.1 Points for Discussion

### 3.7.2 Points for Clarification

## 3.8 REFERENCES / FURTHER READING

1. Ling D. (1976). Speech and the Hearing-impaired Child: Theory and Practice. Washington DC : Alexander Graham Bell Association for the Deaf.

2. Calvert, D. R. and Silverman, S.R. (1983). Speech and Deafness. (2nd Ed.). Washington D. C: Alexander Graham Bell Association for the Deaf.

# UNIT 4:
# TOOLS AND TECHNIQUES OF EDUCATIONAL ASSESSMENT: OBSERVATIONS, INTERVIEWS, DEVELOPMENTAL SCALES, STANDARDIZED AND CRITERION BASED TESTS, TEACHER MADE TESTS AT DIFFERENT LEVELS AND CLASSROOM ASSESSMENT TECHNIQUES (CONVENTIONAL AND MODERN)

STRUCTURE

- Introduction
- Speech teaching strategies for K.G., Primary and Secondary school level
- Corrected model for correcting the deviant patterns in the speech of the hearing-impaired
- Teaching aids and equipment for auditory, visual and tactile feedback for speech
- Parent / care giver involvement in the development and maintenance of speech
    - Summary – Points to remember
- Check your progress
- Assignment
- Points for discussion / clarification
- References / Further readings

## 4.1 INTRODUCTION

**In unit 6 we have looked at the developmental model for teaching of speech to the hearing-impaired. In this unit we will discuss** more strategies **for developing speech at the KG, primary and secondary school level. By now you are well acquainted with the developmental stages and the various skills and target behaviors that a child should acquire at each developmental stage. However, due to a number of factors, some children may fail to achieve the target behaviors at the right stage, resulting in deviant speech patterns. We will discuss the** corrective strategies **for eliminating these deviant patterns and also review the various** teaching aids **that can be used for optimizing use of other sense modalities for acquiring intelligible speech. To sum up the unit, we will look at few strategies for ensuring parent participation in development and maintenance of speech. This is important as it is established that a team effort involving the** teachers, speech-language pathologists and the parents **is crucial in developing good speech patterns in the hearing-impaired child.**

## 4.2 SPEECH TEACHING STRATEGIES FOR K.G., PRIMARY AND SECONDARY SCHOOL LEVEL:

Teaching speech to the hearing–impaired preschool and primary children is not only a challenge but also a **rewarding experience**. Also, hearing-impaired children at primary and secondary school level need to have intelligible speech for **effective communication**. It is difficult to develop clear intelligible speech in children with severe hearing impairment.

For intelligible speech to be achieved a speech program must-

- Be based on sound **principles**
- Have demanding yet attainable **objectives**
- Employ / use a variety of workable **strategies**

**A) Preschool and primary children:**

Preschool and primary children have **unique needs** that must be taken into account when planning a program of speech instruction. Some of the needs of young hearing-impaired

children that should be considered when planning a program for speech instruction are:

- The need to be **actively involved** in the program not just verbally but physically as well
- The need for success and positive **reinforcement**
- The need for **love and support** for all efforts
- The need for personal one to one **attention**

These basic needs may be incorporated in the speech program in various ways:

1. Lessons should include some kind of **activity or game** to keep the child actively involved and to stimulate interests and motivate him.
2. Practice items / **drills** should be included which will give the child a feeling of success.
3. Items involving development of **new skills** should be a part of every lesson.
4. Teacher should constantly **praise and reward** the child's efforts during the speech lesson. For example verbal expression of approval, points, stars or other tangible rewards should be given.
5. Lessons should be conducted on a one-to-one basis, in order to give the child **undivided attention**.
6. Each child's **strengths and weaknesses** should be determined. The strengths should be capitalized upon and the weaknesses should be remediated / lessened.
7. Since speech develops in an orderly manner in a normal child, the hearing-impaired child should be taught in the same **orderly manner**.
8. Since speech is learned best through audition, maximum use of **residual hearing** should be a part of all speech instruction and should be supplemented by use of **touch and vision** when needed.
9. Speech is a learned skill, which must be taught to the hearing-impaired child. Since it is a skill it requires **sufficient practice** for mastery. Therefore daily individual speech training is required for preschool and primary children.
10. Speech is developed most effectively in an **environment** that is relaxed yet demanding when it comes to use of speech. Therefore the child should be encouraged to use speech in classrooms, hallways, dining rooms, play areas etc.

**Overview of the speech program:**

There are four basic components to the pre-school-primary speech program:

- Tongue drills and breath control exercises,
- Sound development and syllable drills,
- Vocabulary and sentence work,
- Auditory development with utilization of visual and tactile cues when necessary.

This program is supported by a number of **other services** offered outside the classroom, for example-daily rhythm and music class, where they are taught songs, dances and rhythmical movement. Every child in the pre-school and primary receives 15 minutes of individual speech work everyday.

**Objectives for speech development:**

1. To vocalize and use voice meaningfully.
2. To develop a pleasant and relaxed voice quality.
3. To vocalize with proper pitch, intensity and duration.
4. To develop speech imitation skills.
5. To develop good tongue and breath control.
6. To make maximum use of residual hearing to improve reception and aid speech production.
7. To supplement auditory reception of speech with visual and tactile cues.
8. To correctly articulate the vowels and consonants in syllables, words and sentences.
9. To use skills mastered on the phonetic level in spontaneous speech.
10. To feel pleased and satisfied with communicative efforts, using speech.

To think that all objectives are accomplished with every child by the end of preschool would be a false assumption. Some of the objectives are **ongoing** and receive attention throughout the child's academic years.

**Strategies for speech development:**

The teachers working with the young preschool child should use **all opportunities** for encouraging vocalizations. The children are expected, encouraged and helped to

- Ask for what they want or need
- Verbally react to situations they encounter throughout the day
- Use speech in their interactions with one another and with adults in their environment

These are examples of speech at the **phonological** level.

**Formal speech training** can begin immediately as most children at 31/2 or 4 years of age will be already vocalizing and using their voices meaningfully.

- The primary technique used is **imitation.** Syllables, words and sentences are spoken first by the teacher and then imitated by the child. With young children who have difficulty in understanding imitation of speech, begin imitating **simple gross motor movements** and then move to imitation of lip movements and **rhythm**. This can be done using rhythm sticks or dance to establish patterns for imitating. These activities help to develop imitative motor skills that contribute to speech development. Throughout the speech lesson the use of **audition** is emphasized. In the initial development of speech skills, **group amplifiers** are used as they amplify a wider range of frequencies than the hearing aid and are generally more powerful and more consistent.

- As speech is a skill involving adequate control of tongue movements and breath control, the children in preschool and primary should spend a brief part of each lesson concentrating on **tongue movements and breath stream.** The purpose of breath control exercises is to help the child maintain a continuous flow of speech without having to pause unnaturally for breath. To achieve this, the child takes a deep breath and babbles continuously until he / she runs out of air. Blowing pin-wheels and balloons are examples of other activities which develop breath control.

- The development of **phonetic elements** of speech with the preschool and primary children is carried out utilizing the **Ling's model**. The ultimate goal of the speech development program is to enable the

child to use the skills he has mastered during the speech period, in his spontaneous communications throughout the day. This depends on:

- The motivation of the child
- The awareness and encouragement of those who his speech monitors, teachers and parents.

- The teacher must be alert to help the child **use the skills** developed. She must keep the parents informed of the child's progress. Working together toward the goal of intelligible speech will eventually bring results well worth the time and the effort.

**B) Intermediate level:**

Ling (1978) puts forth that, "Faulty speech of the hearing-impaired is more frequently due to inadequate teaching rather than to the impairment per se".

The **teacher** is the key to the success of any speech program and must possess **basic qualities**. For this the teacher must have:

- Knowledge of **physiology and neurology** of the auditory and the speech mechanism in order to plan out appropriate speech teaching strategies.
- The skill necessary to identify those **factors which influence** a child's speech production. To develop this skill extensive practice to listening to the speech of the hearing –impaired is necessary.
- The teacher must be skilled in the use of both the **formal and the informal assessment** of speech, objectives and must be experienced in the application of various approaches.

**Objectives:**

1. To develop the child's imitative ability.
2. To encourage meaningful vocalizations
3. To develop good tongue and breath control
4. To develop the non-segmental aspects of speech i.e. pitch, intensity and duration
5. To develop the phonetic elements of speech emphasizing co-articulation and automaticity
6. To assure use of skills acquired at phonetic level to phonological level using proper rhythm, accent, intonation and phrasing.

To achieve these objectives the following **strategies** are used:

1. Repetitive speech tasks to develop **imitative ability**.
2. **Babbling** to maintain a pleasant voice and to gain control of breath stream.
3. Use of xylophone, piano, songs and rhymes to improve auditory **perception for pitch**.
4. To develop and maintain **control of pitch, duration and intensity** during speech.
5. **Phonetic skill** development utilizing the techniques suggested by Ling (1978 )

In all instructions, consistent use of **appropriate amplification** is required. The **auditory trainer** has been found to be more effective in the development of speech skills. As children move to the middle grades (5, 6, 7) teachers should work on speech targets given by Ling. To facilitate **transfer of skills** to phonological level, vocabulary from content subjects, songs, poems, prayers can be used extensively.

## At the intermediate level:

1. **Vocabulary development** for comprehension and expression receive major emphasis.
2. At 9 years of age children are expected to **classify syllables** and words under correct spellings. The teacher can dictate syllables or words and children should identify the correct sound by writing the syllable or word.

**Content of the speech program for children from 5th to 8th standard:**

For 5th standard children, practice materials / drills for **mastery of consonant blends** appearing in words should be given. For 6th standard children **rules for syllabification** should be taught. Different consonant combinations and unusual pronunciation of words with "ch" should be taught. For 7th standard children exercise for "j" sound, rules and practice for pluralization, past tense, changing verbs to nouns, work on homographs and similar looking words should be carried out. For 8th standard children, practice should be given to change nouns to adjectives, to use analogies, to use unusual words, stress-syllable drills, syllabification of words, spelling words, telling number of syllables in a word, identify accent, identify similarities in words. Speech lessons can be built around (incidental) day to day language needs during activities

like bowling, swimming, school sports etc. Speech skills mastered on the phonetic level should be practiced on the phonological level. Activities such as acting, reading, conducting class meetings, choral singing provide opportunities to use the mastered speech skills.

**C) Secondary school level:**

Studies carried out by Donnelly (1964 ) and Subtelny (1978 ), indicate that both receptive and expressive skills can be improved in the hearing-impaired students of college age.

**Objectives:**

The normal hearing individuals continue to develop language and increase their language skills at the college level. Hearing-impaired are no exception. The only difference is that more efforts need to be put in to ensure that their language skills continue to improve at the secondary level. Hence a few modifications are necessary.

Modifications include:

- Reducing the drill work and concentrating on the pragmatic applications of skills. In other words focus on the use of speech skills in day to day activities.
- Focussing on the speech activity requested by the student.
- Building up the speech program around the special interest of the individual.

**Principles and strategies:**

For the hearing-impaired adolescent:

- The rapid growth in the size and mass of the larynx, results in lowered fundamental frequency of voice. This may contribute to difficulty in controlling voice. (Refer to unit 2 for explanation). If the voice pitch does not stabilize appropriately, specific voice therapy will be needed.
- The teacher should adopt a flexible approach. Guiding the hearing-impaired adolescents to make full use of a speech program requires sensitivity, integrity and maturity on the part of the speech teacher. The strategies for guiding the hearing-impaired teenagers through the

process of speech development must be specially tailored to suit the attitudes and interests of the adolescents.

## 4.3 CORRECTED MODEL

**During the developmental stage the child may not acquire the target behaviors adequately. This may be because—**

1. **Pre-requisite behavior for the development of new skills may not have been adequately established.**
2. **All sub-skills may not be adequately acquired.**
3. **Newly learnt skills may not have been incorporated at the phonological level.**

**Hence** deviant patterns **in the speech of the hearing-impaired children are most likely to occur. The corrected model suggests a range of strategies that may be used in the remedial treatment of deviant patterns.**

**A)** DEVIANT PATTERNS AT STAGE 1 (Vocalizations freely and on demand) and STAGE 2 (Bases of suprasegmental patterns):

**At this stage the child may develop the following deviant patterns- breathy voice, pharyngeal tension, vocal abuse, and falsetto voice.**

- Breathy voice: **This occurs when there is relatively little tension on the vocal folds. Breathiness is usually due to failure to approximate the vocal folds firmly. This may be corrected by using the following** strategies:

1. **Exercises involving exertion**
2. **Games in which the child has to hold his breath for some time and then vocalize. For example- the child holds his breath with his mouth open ready for voicing and vocalizes when the teacher signals to him. In this way the vocal folds are adducted in preparation, and they will be sufficiently tense. This will result in a strong voice.**

- Pharyngeal tension: **This can occur when exercises involving exertion are used or when child is learning to modify pitch by raising and feeling his larynx. To prevent this the child should be given an opportunity to produce voice freely in play.**

- Vocal abuse: **Vocal abuse occurs due to:**

a) **Strained vocalizations, which may lead to inflammation or structural changes of the larynx.**

b) **Unnecessary laryngeal tension.**

c) **Continuous use of exercises involving exertion.**

d) **Use of either too high or too low- pitched voice.**

**This may be corrected by using the following strategies:**

1. **Use of other strategies for voicing (Refer Unit 6, 6.3.1).**
2. **Vocalizing achieved through fun and games. Thereby, overall tension is minimal.**

- Falsetto voice: **This is commonly found in children who have no residual hearing or children who make no use of the residual hearing they have. During the production of falsetto voice the vocal folds first approximate / come close together. They tense to a much greater extent than is required. These adjustments take a long time. This may be corrected by using the following strategies:**

1. **Develop skill in rapid** alternation of voiced and unvoiced sounds **at phonetic as well as phonological level. For example saying /data/, /bapa/ etc. alternately. By doing so, time is not available for the child to tense his vocal folds.**
2. **Production of different kind of laryngeal tension, for example a** forced whisper. **Forced whisper involves as much as tension as falsetto. But for the vocal folds to take any other position after forced whisper, the vocal folds should be relaxed. Thereby tension is reduced. After a forced whisper, the vocal folds tend to be relaxed. The child should be asked to say words or vocalize after the forced whisper. Thereby the words that are said after the forced whisper, are said in a relaxed manner. Thereby, tension is reduced and falsetto voice is prevented.**

**B)** DEVIANT PATTERNS AT STAGE 3 (Production of vowels and diphthongs):

**Deviant patterns during production of vowels and diphthongs were discussed in Unit 5. The following deviant patterns are seen:**

1. **Substitution.**
2. **Prolongation.**
3. **Diphthongization.**
4. **Neutralization.**
5. **Exaggeration.**
6. **Nasalization.**

1, 2 & 3. Substitution, Prolongation and Diphthongization:

**If this occurs at the phonetic level then:**

a. **Each of the 5 sub-skills described for the production of diphthongs and vowels must be developed.**

b. **Strategies already described for teaching should be applied.**

c. **Adequate phonetic to phonologic transfer should take place. In other words after the child has learnt to produce the vowel or diphthong, he should be given an opportunity to use the vowels and diphthongs meaningfully in words and sentences in everyday situations.**

**If error occurs at the phonological level then:**

a. **Teacher should build up a key vocabulary of words containing that particular vowel or diphthong.**

b. **Teacher should work on pronunciation using previously mentioned strategies.**

4. Neutralization: **(Refer Unit 5 for definition and explanation of neutralization). Neutralization occurs due to insufficient practice. This may lead to speech containing no differentiating stress patterns and abnormally slow rate. The remedial strategies are as follows:**

a. **Giving sufficient practice to the child both at phonetic and phonological level.**

b. **Child should be trained to use vowels accurately in words receiving stress.**

c. **Child should be trained to use speech at a normal rate.**

5. Exaggeration: **Exaggeration occurs due to inappropriate teaching strategies. Since the child is hearing-impaired, there is a tendency amongst the teachers and others in the child's environment to provide visual feedback by producing the sounds with exaggerated lip and jaw movements.**

**There are two strategies for remediation of exaggeration:**

a. **The child must be provided with normal speech models and not exaggerated ones.**

b. **All five sub-skills for vowels should be rehearsed without exaggeration. Attention during this should be gradually shifted from visual to auditory and motor kinesthetic patterns associated with learning each target vowel.**

6. Nasalization: **Nasalization of vowels occurs when the velopharyngeal port is open during the production of the vowels. Due to this the breath stream passes through the nasal cavity. The reason why hearing-impaired children produce this is that nasality provides stronger orosensory patterns and more intrinsic feedback. For remediating nasalization the following can be done:**

- **Yawning, sucking, blowing and whistling all require a raised velum. Make the child alternate sniffing with yawning, sucking and blowing, or whistling, in order to help strengthen velar action.**
- **Most children, including those who are hearing-impaired, like to whistle and should be taught to do so because this skill usually involves more pharyngeal action to help in velopharyngeal closure than blowing.**

C) DEVIANT PATTERNS at STAGE 4, 5, 6,and 7:

**The following deviant patterns may be observed in the production of consonants:**

1. **Faults due to inadequate breath control.**
2. **Nasalization and denasalization.**
3. **Tension.**
4. **Exaggeration and prolongation.**

5. **Intrusive consonants and voicing errors.**
6. **Substitution, omission and distortion.**

1) Faults due to inadequate breath control:

**Faults in production of consonants that may be caused by inadequate breath control include** voicing errors **and errors in** aspiration. **Adequate breath control is required for appropriate voicing. Thus if there is inadequate breath control it will give rise to voicing errors. If the child has voicing errors then tactile strategies for contrastive pairs should be used. Drills in repetition of strings of syllables, which are made up of voiced consonants, should be practiced (Refer Unit 6, 6.3.6).**

**Faults affecting aspiration i.e. de-aspiration of aspirated phonemes, can be remediated by repetition of sub-skills described for the production of /h/. Some hearing-impaired children may produce certain sounds with an excess of breath. If speech is breathy, then it is usually because there is poor control of the larynx, poor adjustment of the articulators or both. The fault is usually best treated by strengthening the voice.**

2) Nasalization and denasalization:

**These deviant patterns are due to inadequate development of velar target behaviors. The most common reason is that the nasal / non-nasal distinction has not been adequately taught. The solution is to develop or redevelop the consonants by means of the earlier mentioned strategies (Refer Unit 6, 6.3.4).**

3) Tension:

**Problems in consonant production may arise because the articulators are too tense or too lax. Tension that may be generalized throughout the body or focussed in the head or neck region is usually associated with apprehension, insecurity, or inexperience in speech production. Frequently such problems may be overcome simply by making the speech training in class and speech experience out of school interesting.**

4) Exaggeration and prolongation:

**Exaggerated lip, jaw, or tongue movements are behaviors that have been taught and reinforced. To prevent exaggeration and prolongation the teacher should**

- **speak to the child normally during conversations and lessons,**
- **avoid the presentation of exaggerated models in the speech teaching process,**
- **accept and reinforce only those patterns produced by the child that are very close to the desired target behaviors, and**
- **provide specific training to develop adequate rates of production.**

5) Intrusive consonants and voicing errors:

**Intrusive voicing occurs if the child has not learned to make voiced-voiceless distinctions. The remediation can be done by teaching the child to make voiced–voiceless distinctions as discussed earlier (sub-skills and strategies of Stage 6 of developmental model).**

6) Substitution, omission and distortion:

**These can occur because the child may have mastered the adequate production of the phoneme at the word level, but not at the sentence level. In order that the faulty patterns are remediated, considerable practice of the appropriate pattern in the sentence structures should be done.**

**Talking and singing are usually natural and pleasant experiences for any child, and for the hearing-impaired child it can be just as pleasant. Inform the mother of the child to make the child enjoy music in his earlier years. This will be advantageous to the child from the time his hearing impairment is discovered and before he is ready for a wearable hearing aid. This can be done in the following way:**

- **In the early years sing and talk to the hearing-impaired child near his ear.**
- **After specific training has been started, every opportunity should be used to utter a word and a tune near his ear.**
- **This technique is very simple and effective and it encourages children to use voice. It may be carried out while the child is lying down, while he is looking at books and pictures, during speech and speech reading lessons and on many other incidental occasions during the day.**

**The above activities will ensure that the child will get the sense of rhythm, which will eventually get carried over to speech. Besides,**

**music is also known to give relaxation to the body. This will help the child to move his articulators in a smooth and easy manner. Thereby, making his voice and articulation more natural.**

## 4.4 TEACHING AIDS AND EQUIPMENT FOR AUDITORY, VISUAL AND TACTILE FEEDBACK FOR SPEECH:

During speech production, speakers primarily use their sense of hearing (audition) to monitor what is being spoken and how it is spoken. However, either at a conscious or unconscious level they can also feel the different places within the oral cavity where the tongue touches. Not only this, the speaker also receives a feedback about the way in which the different speech organs move in relation to each other (kinesthesis). In short, speakers make use of **auditory, tactile and kinesthetic feedback** in order to monitor speech production. However, normal hearing individuals do not realize the contributions made by touch and kinesthesis as hearing is readily available to them for monitoring speech. In case of hearing impaired individuals, however, as the sense of hearing is not available for monitoring their speech production, other senses have to be used more. During teaching or correcting the speech of the hearing-impaired, use of all sense modalities is thus very important. There are a number of **teaching aids and equipment** that have been developed to facilitate use of audition, vision, touch and kinesthesis for providing feedback during teaching of speech to the hearing-impaired. Let us look at a few of these.

1) **Auditory aids:** Auditory aids are those that facilitate optimal use of residual hearing by the hearing-impaired individual. A number of such aids are available. You must have already read about these in the section on Audiology. These aids include

   - Personal **hearing-aids** of all types
   - **Group amplification systems** such as hard-wire systems, induction loop systems, FM systems etc.
   - **Speech trainers**

We will discuss auditory speech trainers in brief here.

**Speech trainer:** Various types of speech trainers are commercially available. Some of these make use of auditory and tactile modalities while some make use of the auditory modality only. Basically, a speech trainer consists of an external **microphone, amplifier and headphones**. The instrument has controls that can adjust the intensity of the output signal. This can be done separately for the two ears. A **tone control** is also available on some instruments. Also, some instruments have a **vibrator** that can be used simultaneously with the headphones. Thus,

the speech trainer with a vibrator allows the hearing-impaired individual to use the auditory as well as tactile modality for learning to speak.

2) **Visual aids:** Visual aids are ones that provide visual feedback about the aspects of speech production. Use of vision is very important for the hearing-impaired for the purpose of understanding speech (speech reading). Not only this, visual feedback is also valuable for explaining the various aspects of speech production to the hearing-impaired. **Simpler ways** of providing visual feedback include
   - Using a **mirror** for showing placement of the articulators for certain speech sounds,
   - Using **pictures and diagrams** of the oral cavity to show the placement of the various articulators,
   - Using **hand positions** and movements to demonstrate placement of active and passive articulators,
   - Using visual **prompts** to indicate vocal pitch and loudness,
   - Using **written markers** to indicate prosodic features of speech, etc.

With improvement in technology, various electronic and computerized equipment is available for maximizing visual feedback during speech production. Most of these equipment have a **microphone** that picks up the speech signal. This speech signal is **processed and displayed** on a visual monitor or screen in the form of a waveform. Types of information that can be displayed include fundamental frequency, intensity, duration, voicing, frication, various prosodic features, etc. The visual screen can be divided into two parts (**split-screen**). The teacher can use the upper part of the screen to model the correct production. The second part can be used for recording the child's production. The child has to look at the teacher's pattern and try to match his own production to it. The teacher must highlight the feature that is being dealt with and explain the strategy of its production. The child can practice for a number of times, keeping the model production constant. **Examples** of visual equipment available commercially include Visi-pitch, Vocal II, Vaghmi, Speech Spectrographic Display (SSD) and PM Pitch Analyzer.

3) **Tactile Aids:** Tactile aids are the ones that make use of the modality of **touch** for providing feedback about speech production. A simple way of providing tactile feedback to the hearing-impaired child is to place his hand on the **neck, cheeks or the nose** of the teacher and draw his attention to the vibrations occurring while different sounds are produced. There are also a number of instruments/aids that are designed to provide tactile feedback to the hearing-impaired individual. These aids consist of a **microphone** that picks up the speech signal, a **processor** that converts this signal to a tactile signal and a **transducer** that carries this tactile information to the hearing-impaired individual. The user usually wears the transducer of a tactile aid (vibrator) on the **inner part of the wrist**. Some researchers also recommend the fingertips for stimulation. Tactile aids are usually of two types: **vibrotactile and electrotactile**. In vibrotactile aids, the speech signal is presented to the skin of the user using mechanical transducers or a vibrator. In electrotactile aids, the speech signals are presented to the skin as an electrical current. Research has shown that tactile aids are useful as a **supplemental aid** for speech reading and in speech training. These aids help the hearing-impaired user in sound detection, in discriminating sounds differing in duration, in tracking connected discourse, and in developing awareness to speech. Tactile aids have not been useful in developing discrimination between finer aspects of speech production. These are shown to be helpful for individuals with profound hearing-impairment who do not appear to receive adequate help from conventional amplification. **Examples** of tactile aids available commercially include Mini Fonator, Fonator Speech Trainer and Fonator Auditory Speech Trainer.

You will get **an opportunity** to get acquainted with some of the teaching aids used for providing feedback during teaching and correction of speech.

## 4.5 PARENT / CAREGIVER INVOLVEMENT IN THE DEVELOPMENT AND MAINTENANCE OF SPEECH:

**Parents exert a** good amount of control **over their children's speech as well as over their general behavior. Parents spend** much more time **with their children than does a teacher. Many parents are** motivated **and can be motivated to take up some of the challenges necessary to ensure that the child will carry-over the speech skills taught to the child in the class. Success of any intervention program depends on the involvement of the parents in the program on a** consistent / regular basis**. If the parents do not actively participate, the efforts taken by the teacher will not stabilize and the child's speech will continue to have errors in his day to day conversations.**

Research and clinical experience have documented the fact regarding the **effectiveness of the parents' role** in the treatment of their children. At every stage in the intervention program, careful training and creating favorable parent-teacher relationships can hasten progress and time can be saved.

Guidelines to involve parents:

1. The importance of parents' role should be explained and emphasized in every parent meeting right from the beginning.
2. Demonstrations on a child can be scheduled periodically to help parents in learning ways of training the child. This can be done for groups of 8-10 parents at a time.
3. Specific written programs will make the goals and activities clearer to the parents.
4. Parents should be explained the importance of using interesting, game-oriented activities to make the whole process enjoyable.
5. The teacher should encourage the parents continually to make appropriate, interesting and innovative stimulus material on a regular basis.
6. A specific time should be scheduled everyday during which parents can listen to the child's speech in a relaxed manner and give the practice of carry-over.
7. The teacher and the parents should maintain a daily record of the child's progress. This should be done in such a way that it easy for

the child to understand and will thereby motivate him/her to perform better.

8. Regular feedback to the parents on how effective they have been will maintain their motivation.

9. The importance of consistent use of hearing aids should be emphasized as amplification can prove to be valuable in development and maintenance of good speech habits as the child will be able to monitor his speech with ease.

10. The teacher should caution the parents against rejection or over protection of the child as this will lead to a marked reduction in learning opportunities for the child.

11. The teacher should help the parents realize that the emotions of the child should be considered sensitively. He / she should be taken for outings, gatherings and social functions as this further facilitates the carry-over of good speech habits. This should be emphasized to parents whom the teacher may suspect to be having feelings of rejection.

The daily home practice with the help of parents can go a long way in helping the child develop, transfer and maintain intelligible speech. The teacher can find innovative ways to ensure the motivation of both the parents and the child. This will lessen the time demand on the teacher .

## 4.6 SUMMARY – POINTS TO REMEMBER

- **During the developmental stage the hearing-impaired child may not acquire the target behaviors adequately. Hence deviant patterns are most likely to occur in the speech of the hearing-impaired children.**
- **The corrected model suggests a range of strategies that may be used in the remedial treatment of deviant patterns.**
- Four basic components to the pre-school-primary speech program are:
  - Tongue drills and breath control exercises,
  - Sound development and syllable drills,
  - Vocabulary and sentence work,

- Auditory development with utilization of visual and tactile cues when necessary.

➪ At the intermediate level

- Vocabulary development for comprehension and expression receive major emphasis.
- Children are expected to classify syllables and words under correct spellings.

➪ Parents have an important role to play in the development and maintenance of intelligible speech. Teachers must encourage optimum parent participation at each stage to ensure carry over of intelligible speech in daily communication.

➪ There are a number of teaching aids and equipment that have been developed to facilitate use of audition, vision, touch and kinesthesis for providing feedback during teaching of speech to the hearing-impaired.

## 4.7 CHECK YOUR PROGRESS

1. Discuss the objectives of the speech teaching strategies at K.G., primary and intermediate level.
2. Discuss the deviant patterns that occur at Stages 1 and 2.
3. Discuss the remedial strategies for the deviant patterns occurring at Stages 1 and 2.
4. List out deviant patterns occurring at Stages 3, 4, 5, 6 and 7.
5. Enumerate the various teaching aids used for speech teaching and correction.
6. Write a note on use of visual aids for speech teaching and correction.
7. Discuss the importance of role of parents in development and maintenance of intelligible speech.

## 4.8 ASSIGNMENT

1. Identify a child having deviant patterns at Stage 3, and write a report of the remedial strategies used by you to correct the deviant patterns.

2. Describe in detail any teaching aid that you have seen during your clinical work. Discuss its advantages and disadvantages.

## 4.9 POINTS FOR DISCUSSIONS / CLARIFICATION

After going through the unit you may like to have further discussion on some points and clarification. Note down those points:-

### 4.9.1 Points for Discussion

### 4.9.2 Points for Clarification

## 4.9 REFERENCES / FURTHER READING

1. Harris G. M. (1970). Pre-school Services for the Deaf - The Society for Crippled Children and Adults of Manitoba. Manitoba: Winnepy.
2. Ling D. (1976). Speech and the Hearing-impaired Child: Theory and Practice. Washington DC: Alexander Graham Bell Association for the Deaf.
3. Subtelny J. D. (1980). Speech Assessment and Improvement for the Hearing-impaired.
4. Bench, R. J. (1992). Communication skills in Hearing-impaired Children. London: Whurr Publishers.

# UNIT 5: CURRENT TRENDS AND CHALLENGES IN ASSESSMENT: INDEPENDENT, DUAL PURPOSE AND CONSTRUCTIVIST PERSPECTIVE AND ADAPTATIONS

## STRUCTURE

- Introduction
- Objectives
- The role of the Organization / Trust which runs the school,
- Role of the Principal / Head Master of a Special School for H. I.
- The role of the Principal
- Qualities of the Head Master
- Duties of the Head Master
- Role of the Teachers of the Deaf
- Important Characteristics of an Effective Teacher
- Duties the Teachers of the Deaf
- Problems faced by the Teachers of the Deaf
- Schools in Urban areas, and schools in Rural areas
    - **Technology and Education of the Deaf**
    - **Unit Summary**
    - **Assignments**
    - **Check Your Progress**
- References

## 5.1 INTRODUCTION

School is critical in determining the quality of children's education. Schools can make a difference. In this Unit, we will look at some of the main effective strategies for effective classroom and school practices.

Management of the school is the collective responsibility of the teachers and the Principal of the school. This Unit discusses the duties of the headmaster, the teachers, and also mentions the problems faced by these personnel sometimes, in carrying out the duties satisfactorily. The role of the agencies running the school is also discussed briefly. However, it is absolutely vital that they function in unison at all times.

## 5.2 OBJECTIVES

After reading the Unit, the trainees would be able to specify

- The role of the Organization / Trust which runs the school,
- The duties of the headmaster
- The duties of the teachers,
- The problems faced while conducting various programmes of the school satisfactorily,
- The use of Technology in Education of the Deaf,

## 5.3 THE ROLE OF THE ORGANIZATION / TRUST WHICH RUNS THE SCHOOL

The voluntary organizations have always taken a lead in doing charitable work for the welfare of the disabled population. They have much valuable and pioneering work in this field, right from the regime of Ashoka. Since independence, there has been intensive development in the country for the disabled, sick and the aged. However, the actual needs of the country are far in excess of the resources made available for the purpose by the Government. Therefore, the work of the voluntary organizations has always been recognized and encouraged by both the Central and the State Governments.

**As for establishing and running the schools for the deaf, the following conditions have to be fulfilled by the Organizers :**

- **Government Rules and regulations applicable to concerned organizing bodies (Trusts, Societies etc.) should be strictly followed,**
- **Sufficient corpus fund must be available with the Trust,**
- **For the purpose of day to day running of the school, reliable sources of fund have to be ensured by the Organization,**
- **The Organizers should not take active interest in the day to day working of the school but restrict themselves to overall supervision to ensure smooth operation,**
- **In case of the schools for the deaf, the teaching-learning process of academic skills is quite a complex and difficult task for both the teachers and the children and there is every possibility of outwardly appearance of proper learning taking place. In reality, however, the children may be learning only rote learning and acquiring mechanical reading and writing skills without understanding. This has to be guarded against by the Organizers by taking help of expert professionals in the field.**
- **It is essential to hold regular meetings between the managing committee of the Organization and the staff of the school, to identify, discuss and resolve various problems, if any.**

## 5.4 ROLE OF THE PRINCIPAL / HEAD MASTER OF A SPECIAL SCHOOL FOR H. I.

### Qualities and Responsibilities

The Head Master/Mistress is the key figure in the school. H.M. plays a vital role in running an educational institution . Proper working and reputation of a school depends upon the H.M.. He/She being the head and leader should be able to lead his colleagues and bring about best

in his pupils. It is therefore rightly said – that a school is as great as its Head Master is.

### 5.4.1 The role of the Head Master

The factors related to school success – all of which are under the control of the Principal – are :

- Strong leadership,
- High expectations (reasonable and practical),
- Good atmosphere,
- Strong emphasis on reading,
- Careful evaluation student progress.

Research shows that Principal in high achieving schools reported that they felt that they had control over the school, the curriculum and the staff (Austin 1979). Research also shows that in schools where achievement was improving, Principals were concerned about instruction; they made their views about instruction known to faculty. They took responsibility for decisions about instruction, and they emphasized academic standards. Moreover, Principals demanded - and got,- results but allowed flexibility. It was also seen that the concept of accountability was totally accepted by the staff in these schools.

### 5.4.2 Qualities of the Head Master

The Head Master should

- posses a sound philosophy of education,
- have a clear vision of the aims and objectives of 'Education in General',
- be well versed with the additional aims and objectives of 'Education of deaf,'
- possess a good educational background and should have mastery over his subject of Special Education of H.I. (This

would help to make the school technically well equipped and maintain a good educational standard in the school.)

- have a good personality which will enable him to lead his staff towards achievement of the school objectives,
- possess qualities like patience, humbleness, enthusiasm, democratic honesty, tolerance and so on.
- be resourceful which would enable him to build a sound infrastructure of the school.

### 5.4.3 Duties of the Head Master

**Planning**

Proper planning helps to implement and achieve the objectives of school. The Head Master has to just plan out broad Annual Schedule of the school and then work out the finer details like Opening and Closing the Terms, time tables of different classes and teachers, schedule of examinations, parents meetings and meetings of school committee. He/She has to plan out list of holidays, celebrations, excursions etc... The Head Master needs to plan allotment of classes, organization and utilization of infrastructural facilities and equipment. He/She needs to plan the process of integration of the children and also plan out extension services like awareness programmes etc..

**Organising**

Planning is followed by organising activities. The Head Master has to organize the curriculum and co-curricular activities. If the number of the children in the school is over 100, it may help to set up a service centre for hearing aid repairs and an ear mould laboratory. He has to organize for hearing aid trials and spare parts bank. He needs to organize the staff and parents meeting. Quite often, he has to organize fund raising programmes. At least twice in a year, a Medical Camp should be arranged in the school for the benefit of children. The Head Master also needs to organize some training in the form of refresher courses for the teachers, or organize seminars,

workshops and invite experts to update the teachers' knowledge of the latest trends in education of the Deaf.

**Supervising**

One's performance improves if one is aware that one is being supervised. Teachers and other professionals, would definitely try to put in their best performance if they are being supervised. Supervision followed by suitable guidance may give positive reinforcement and the teachers would know that the Head Master is concerned about their quality of teaching. Even the non-teaching staff of the school would deliver its best when it is aware that all its work is being supervised and checked. The Head Master has also to supervise the overall functioning of the school. The admission procedure, class-room teaching, grouping of children for instruction especially should be carried out under his supervision. He has to supervise the Hearing Aid Trials and also fitment of hearing aids. Once a month it is always best to supervise the Attendance register, Muster and other academic and non-academic records. The responsibility of a smooth examination process lies on the Head Master, so also he has to supervise the preparatory classes for students to be integrated. Cleanliness of school and accounts would remain up to the mark if the Head Master supervises it regularly.

**Teaching Duties**

A light can never light another lamp unless it continues to burn itself, says Tagore. The Head Master has to keep himself abreast to the special methodology and technology and has to generate innovative techniques to teach the H.I. Unless he/she teaches in a class, he may not be able to experiment it at out and may lose touch of teaching and therefore it is the duty of the Head Master to take some classes. This would also inspire and motivate the teachers and prove that the Head Master is an ideal teacher for them.

**Guidance and Counseling**

Most of the parents of deaf children come in a shattered (situation) state of mind to the school and always with a feeling of 'Why only

our child?" It is the duty of the Head Master to help such parents to overcome their shock and (runway situations) grief. He should help them to realize that is not the only child and also motivate them so that they would realize that, "Yes! My child would also overcome the barriers of communication one day." The H.M. has not only to give guidance regarding hearing aids maintenance to the parents but also has to empower the parents to become equal partner in the teaching and learning process. Once the child is ready to pass out from the school either for integration or for higher studies, the H.M. also has to guide the parents for further plan of action.

The H.M. also has to guide (to provide guidance to) the teachers while setting timetables, planning out the curriculum, selecting text books and also to make supplementary teaching materials. He/She should be able to guide the teachers for grouping in auditory training and speech therapy. At times, H.M. needs to give guidance to the teachers for some problem children so also for the gifted ones. He may have to give guidance to Normal school Principals and teachers for setting up Resource rooms and appointing resource teachers. The H.M. has to be well versed with the Legislation for the Handicaps so that he would be able to give information and guide the parents regarding procurement of concessions and facilities as laid down in the 'PWD Act'.

**Maintaining Harmonious School Atmosphere**

The school should be a harmonious place to study and work. The responsibility of maintaining a cordial atmosphere in school lies on the H.M.'s shoulders. It is the duty of the H.M. to maintain a healthy atmosphere in the school. He should not exercise his authority all the time, instead should make others feel that they are all equally important as him. There has to be a sense of belongingness in everybody and everyone should feel that he is part and parcel of the whole system. The H.M. should undertake welfare activities for the staff and also follow up with the Government and the Management for the welfare of the staff. The H.M. should set up a grievance cell and hold open discussion with parents, teachers and students. The H.M. should be approachable by one and all.

## 5.5 ROLE OF THE TEACHERS OF THE DEAF

The most obvious and important duty of a teacher is to teach, impart knowledge to students. Apart from teaching the regular subjects in the curricula, the teacher has the responsibility of developing the language and speech communication skills of his/her hearing impaired children.

For teaching purpose, it is the teacher's duty to a) study the curricula, b) form objectives, c) prepare lesson plans, and d) form evaluation strategy for her class.

### 5.5.1 Important Characteristics of an Effective Teacher

The following are the important characteristics of an effective teacher: They -

i. Believe that children can succeed,

ii. Have confidence in the Principal's ability,

iii. Are able to maintain discipline in their classes without spending time punishing students,

iv. Appear to understand the rules

v. Planned their lessons in advance,

vi. Select instructional goals and materials and actively monitor student progress towards these goals,

vii. Breaks the Unit into small learning experiences so as to teach only a few objectives at one time,

viii. Designs the experiences with the assumption that every student can master the material. The teacher will teach; then test for learning. When the teacher realizes that certain students have not yet learnt the material, the teacher provides those students with additional help until they come up to mastery.

ix. Structure activities, and provide feedback which is immediate and correction oriented,

x. Seek appropriate help,

xi. Structured their classrooms, using whole group teaching techniques to fulfill their expectations,

xii. Handled their most discipline problems themselves,

xiii. Rarely sent children to the Principal's office,

xiv. Care about their students,

xv. Take a sense of pride in teaching.

### 3.5.2 Duties of the teachers of the Deaf

**i. Counselling Duties:-**

Counselling students

A teacher should have a good rapport with children. Like their children, parents too depend more upon teacher's advice than any other professionals' counseling. This is so because children feel comfortable with their teacher. And therefore, they tend to listen more to the advice of their teacher than of their parents. Also, with practice, the communication between the teacher and the children is more effective.

Counselling parents

It is also a teacher's duty to counsel parents about the following :

- Care and maintenance of hearing aids,
- Follow up of classroom teaching at home,
- Motivating the children to do homework regularly,
- Convincing children to bring their children to school regularly,
- Advising them about education and rehabilitation.

**ii. Work on the Curriculum**

It is the responsibility of the teacher of the Deaf to develop or modify the curriculum to suit the language level of the class. It is also her/his duty to update the curriculum from time to time.

**iii. Supervisory duties**

These include

- Supervising the co-curricular activities,
- Supervising the children during recess and playtime,
- Supervision of the laboratory work.

If the school conducts 'Teachers' Training Programme', the teacher also has to supervise the trainees' lessons.

**iv. Administrative duties - Assessment and record keeping in schools.**

The main objective of keeping a progress and general record of a child is to compile a systematic record as the child passes through a school so as to establish a profile of development for the benefit of teachers and parents. The report should convey to the parents a measure of their child's progress and standing in particular subjects and to indicate any strengths and weaknesses. These reports coupled with personal contacts between the teacher and the parent can often resolve some of the instructional problems. When a teacher discovers that her pupil has a nervous disposition, it is up to the teacher to put the pupil at ease by showing sympathy and a willingness to talk through the problems.

Most records contain the following information:

i. Biographical details of name, age, sex, birth date, address and general information about schools attended;

ii. Health and home conditions such as illness or handicaps which may affect the child's progress or require regular treatment;

iii. Attainments in general ability, verbal reasoning, word recognition, reading, comprehension and arithmetic taken at various in school along with the name of the test;

iv. Interests such as music, drama, sport, social activities or practical skills;

v. Attendance;

vi. Behaviour and personality including deviant behaviour (delinquency, truancy) and emotional disturbance;

vii. Other general comments by the teachers or head teachers.

In addition to this a teacher of the Deaf has to maintain the following records for the children in her class. These include –

- Keeping record of audiograms of the children in the class and getting them updated every year, through the parents,
- Checking hearing aids and maintaining the record of the repairs as well as of stock of extra batteries, cords, etc.
- Keeping record of various class tests,
- Preparing Progress Report Cards, etc.,
- Providing assistance for the preparation of the time table,
- Keeping record of class books/toy library,
- Keep record of teaching aids,
- Maintaining 'Home-school Diaries' for all the children for written communication with the parents on various related matters. Etc.

### v. Duty of convening Parent-Teacher Meetings

The class teacher should hold meetings with the parents periodically and in these meetings the teacher should encourage the parents to attend the classes with a view to observe the method of teaching and dealing with the deaf child.. This is vital because the child is in the school for only limited hours and most of its time is spent at home. This practice would help the parents to work effectively with the child at home along the same lines.

Such meetings would also provide a platform for the parents to discuss their particular problems with the teacher and to interact with the other parents simultaneously. It is necessary that the teacher maintain records of these meetings for future reference.

### vi. Public relations

General public looks upon the teachers as experts in the field. They are therefore in an ideal position to create public awareness about disabilities and importance of education fir the rehabilitation of disabled persons.

The teachers also play an important role in an integrated setup by keeping in touch with and providing assistance wherever necessary to the regular schoolteachers, parents, social workers, etc. It is the duty of the teacher to provide information and assistance to parents and children about availability of scholarships, free ships, concessions, etc.

### vii. Professional growth

The teachers of the Deaf should realize that obtaining a degree or a diploma in Special Education is only an introduction to the field of the education of the Deaf. It is only through dealing with and teaching such children for a few years at least that the teachers would gain the insight of the complexities involved in the process. In addition, it is vital for the teachers to keep abreast of the latest development in the field and to upgrade their knowledge to become more and more effective as a teacher. This can be achieved through :

- Attending refresher courses, workshops, seminars and conferences,
- Cultivating the habit of reading new books, journals on the subject.

### viii. Government duties

Currently the teachers including special teachers are called upon to do certain duties for the Government, such as:

- Election and/or census work,
- Participation in health programmes promoted by Government e.g pulse polio, health camps, etc.

### ix. Duties related to extra curricular activities

The teachers are expected to train and prepare their pupils to participate in the school's extra curricular activities such as elocution, dance, drama, sports, art competition.

### 5.5.3 Problems faced by the teachers of the deaf

Considering the heterogeneous nature of the children who enroll in schools for the deaf, the teachers have to face multifarious problems in dealing with the children. Some of these most commonly faced problems are as discussed below:

**i. Multilingualism**

The essential requirement for training in language and speech skills for the deaf is that the language spoken at home and the medium of instruction in school should be the same for optimum results. In most of the towns and cosmopolitan cities, however, deaf children who are enrolled in schools, usually come from family background where different languages are spoken. This negates teacher's efforts owing to lack of reinforcements to language usage at home hampering proper progress of the child.

**ii. Vast difference in the cognitive entry behaviour of the children**

It is seen that the socio economic background and the home environment affect a child's cognitive development to a great extent. The children from homes where they are treated with love and affection and where the parents and the siblings take interest in the child's progress, are found to be well-adjusted and better achievers than those who are deprived of such treatment at home. The latter group is naturally a problem for the teacher for whom she would be required to devote more time and attention.

**iii. Difference in ages and hence maturity of the children and the number of children in the class**

Young children love repetition and are interested in simple activities while slightly older children need more interesting, boisterous, stimulating and varied activities. The older children tend to get bored if activities are repeated for the purpose of reinforcement of relevant language and then they tend to disturb the class. When there is considerable difference in the ages and hence the maturity level of the children, the teacher finds it difficult to plan instructional activities to suit the whole class at all times. Grouping for instruction to overcome this problem, is only a partial solution.

The problems get multiplied if the children in the class are more than 6 or 8. Since the deaf children necessarily need lot of individual attention at the preschool stage, greater number of children in the class will render the instruction ineffective.

**iv. Rampant illiteracy and apathy among the parents/carers**

Instruction in school will be more effective if it is supplemented by appropriate reinforcement by the parents at home. Since the parents are many a time illiterate, the teacher cannot make use of written instructions for getting support from parents at home. Weekly meetings with the parents for the purpose of giving them guidance verbally could help to a certain extent.

In many cases, parents have the tendency, owing to various reasons, to avoid taking on an active role in the progress of the child leaving total responsibility of the education of the child on the school. This attitude of the parents negates the teacher's efforts.

**v. Wide difference in the socio-economic background of the children**

The difference in socio-economic background also has its effect on the teacher's planning of the instructions and the teacher has to be very skillful in managing the problems arising out of this; such as children from rich homes might bring fancy things and food to school which might give rise to jealousy, thefts, fights among children.

**vi. Presence of additional disability such as mental retardation, vision problem, autism etc., in the child.**

Children with additional disabilities naturally need much more attention, which the teacher may not be able to give when she is tutoring a group of children. Under the circumstances, such children not only tend to get neglected and taunted by the other children, but also they are likely to disturb the class too often thus distracting the teacher from carrying out her work.

vii. **Insufficient support from the school authorities in terms of irregular payment of salaries, lack of proper teaching materials and other equipment necessary for teaching.**

Teachers in many schools in India have to face these problems, which lie entirely beyond their control.

## 5.6 SCHOOLS IN URBAN AREAS, AND SCHOOLS IN RURAL AREAS

The persons working in the rural areas would require MUCH greater effort to achieve in the villages what ever is possible in the town. Since the rural areas are sparsely populated, the number of disabled children reaching the special education centers would be limited. In such conditions, there is a fear of clubbing together, the children with different disabilities and being given identical management. The individual needs of such children should be properly attended to. Also, young children with disability in sensory perception (such as deafness) and multiple disabilities would require long-term management lasting for 10 –15 years. Such daily programmes would naturally require special trained teachers who have to be stationed in a village for many years. It is not easy to get trained teachers to work in these areas.

The deaf benefit considerably with the rich environment in the nursery for language growth, which the children in rural areas cannot get. The primary schools start at class 1 and rarely are there any nursery classes in the rural areas. The 'Anganwadi Workers' in many places are entrusted with the responsibility of training such children. But owing to the heavy work load and lack of knowledge of handling severe and profoundly deaf children, they are unable to perform the needful.

It is not possible and economically viable to set up large number of special schools covering the sparsely populated rural areas. Vocationalization of special education for older children is a practical solution. This is discussed in detail in SESH Paper 1, Block 3. Voluntary agencies are also being encouraged and assisted by the Government to set up facilities for the purpose. Voluntary agencies

are indeed implementing projects, establishing and managing schools with a zeal and dedication.

## 5.7 TECHNOLOGY AND EDUCATION OF THE DEAF

Educators of the deaf have continually tried to make use of developments in technology to compensate for the loss of hearing. Several devices have been tried as means to make the auditory-based language accessible to deaf children. Amplification devices such as hearing aids and cochlear implants which are expected to augment the residual hearing of childrn, and the electronic equipment used for speech training, are commonly used for the purpose. In addition, in actual classroom teaching to make it effective, various types of language materials have been and are being devised to support instructions for language development irrespective of the method being used. The major ones are as given below :

### i. Teacher made material

This is material such as charts, flash cards, work cards, hand written books, etc. These are still widely used in schools for the deaf in India.

### ii. Material in print

Textbooks, series of books, curricula for teaching at different levels, teaching manuals, etc.

The objective of all this material in print was to facilitate the work of the teachers by providing ready-made material for language teaching. Some textbook series begin with a small initial vocabulary and then progressed through a series of lessons, vocabulary, phrase and sentences to be mastered by the children. The Clarke school for the deaf had developed a series of language of stories and drills (Croker Jones, and Pratt, 1920-28), which consisted of 4 volumes of language practice exercises. The stories included new vocabulary and example of language objectives to be mastered, followed by practice in writing questions, review drills of previous lessons, comprehension questions and some more exercises. These books were a landmark in the development of media and material for handicapped children.

Many more dedicated and innovative teachers of the deaf have prepared plenty of teaching material of similar type. The reading milestones series (Quigley and King, 1981-84) is the only basal-type reading programme that incorporates linguistic control while focusing on the interest and experiences of deaf children throughout the series. Syntactic structures are identified clearly and introduced in graduated steps of complexity. New vocabulary and idioms are introduced at a controlled rate. The scope and sequence of the programme are based on extensive research regarding the language comprehension and syntactic abilities of deaf children. It consists of 80 textbooks with accompanying work books and also includes placement assessments, teachers' guide lines and instructional strategies for each level.

In India, a set of large size Picture Charts with relevant vocabulary and a guide book for guidance for teaching language, has been published by N.C.E.R.T. Delhi in Hindi and by NASEOH India, in 9 other major Indian languages including English. A series of Work-books with focus on teaching strategies for grammatical language and lots of supportive exercises has been published in Hindi and Marathi by 'Chembur Colony Yuvak Mandal', Mumbai, which is used by teachers in a number of schools as reference books by teachers and work books by children in Maharashtra. There are efforts put in by many teachers to prepare material for teaching but they remain as 'material used in their schools only' because of their inability to put in efforts and expenses involved in printing and distribution.

### iii. Educational Material and the use of electronic devices

These are being used widely in Western countries and some Asian countries like Japan. These include captioned films, overhead transparencies, movies, slide productions and material for programmed instructions.

The first major computer-assisted instruction project for the education of deaf children was 'PLATO', a teaching system that included data based management, individualized instructions. LOGO (Papert,1980) is a graphic software programme that was used

with hearing impaired preschoolers as a means of introducing problem solving and creativity experiences without the need for complex language structures. The ALPHA Interactive Language Series (by Prinz and Nelson, 1985) includes a microcomputer–videodisk interface with additional hardware adaptations that allows very young deaf children to select a communiqué by pressing a series of picture keys. The words or phrases appear in print, signs, and animated graphics. The design and the flexibility of the system allows for the print and graphic expansion of vocabulary. Research results indicate that young deaf children between 2 and 6 years of age had a significant improvement in word and phrase identification, reading comprehension, and sentence construction and writing after using the system.

In western countries, use of Instructional technology has progressed very well through use of various audio-visuals and application of programmed instruction, computer assisted instruction and real time graphics, which provide effective learning environments for deaf students.

In India, a number of schools in urban areas have procured computers for use by teachers for preparing teaching material. However, although the intentions are laudable, it is by no means easy to prepare the material, graphics needed to teach the variety of subjects and topics that the teacher has to teach. Few teachers have the necessary skills and the time to do the job well. In addition, it must be remembered, that language-learning takes place through live interaction in meaningful situations and not through computer instruction A collection of suitable pictures for teaching various subjects could help considerably. The CD for the same can be prepared and used on the computer.

Logistics plays significant role in use of the electronic and other teaching material; all the material must be easily accessible to the teacher at all times. It will be helpful if material such as the Overhead Projector, transparencies and pens, and slide projector, T.V. etc., are kept suitably in one or two rooms, which have provision of curtains for darkening the rooms when required. The room should also have sitting arrangement for at least 20 children.

## 5.8 UNIT SUMMARY

Management of a school involves considerable planning and proper allocation ofresponsibilities.While the Principal as the head of the school, has the overall responsibility for maintaining proper discipline, smooth running of the day to day work, and most importantly providing the best education to the pupils, he cannot possibly do every thing by himself. The teachers and the other staff have to carry out their duties properly under his guidance and supervision.

The teachers and Principals of special schools for the deaf, in addition to all the regular duties, have to attend to some other important work such as provision and care of hearing aids, maintenance of electronic gadgets, conducting parent-guidance meetings etc. Keeping all types of important records is necessary for the proper functioning of the school.

Rehabilitation of the hearing impaired population in the Rural areas is a much more complicated task than in the urban areas. Efforts for community based rehabilitation are more viable in such areas.

In western counties, various audio-visual and computer assisted programmes are used for instruction of the deaf students. But in India, teachers and heads of schools will have to think of the chances of full fruitful utilization of such gadgets for instruction. The related problems involved as regards their maintenance, repairs and safe storage must also be given proper consideration before taking decision to purchase such expensive items.

## 5.9 CHECK YOUR PROGRESS (SELF-STUDY)

Visit 2 schools for the deaf each in the urban and the rural areas and compare their performance in terms of their overall functioning as regards space, trained teacher : pupil ratio, use of various teaching aids including amplification devices, methods of record keeping, general attendance of pupils etc.

## 5.10 ASSIGNMENTS

i. Enlist briefly the main duties of the Principal and the teacher of the deaf.

ii. Describe the electronic teaching devices that you have seen being used in the schools for the deaf.

## 5.11 POINTS FOR DISCUSSION/CLARIFICATION

After going through the unit you may like to have further discussion on some points or require certain clarifications for better understanding. Note down there points below:

### 5.11.1 Points for Discussion

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### 5.11.2 Points for clarification

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## 5.12 REFERENCES


- Averch, H.A. "How effective is schooling?" A critical Review of Research.
- Englewood Cliffs, NJ: educational Technology Publications, 1974.
- Dennis Child, "Psychology and the Teacher" Holt, Rinehart and Winston Ltd., 1977.
- Edmonds, E. "Effective schools for the Urban Poor." Educational Leadership, October, 1979.
- Good, Thomas L. "Teacher Effectiveness in the Elementary School." Journal of Teacher Education, XXX,2 (March-April, 1979), 52-63.


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