Document Information

Analyzed document	B8_HI.pdf (D165322325)
Submitted	2023-04-28 09:07:00
Submitted by	Library NSOU
Submitter email	dylibrarian.plagchek@wbnsou.ac.in
Similarity	0%
Analysis address	dylibrarian.plagchek.wbnsou@analysis.urkund.com

Sources included in the report

Entire Document

1 M. Ed. Spl. Ed. (H.I. / I.D.) ODL Programme AREA - B B 8 H.I.: IDENTIFICATION, ASSESSMENT AND NEEDS OF CHILDREN WITH HEARING IMPAIRMENT A COLLABORATIVE PROGRAMME OF NETAJI SUBHAS OPEN UNIVERSITY AND REHABILITATION COUNCIL OF INDIA

2 Chairman Prof. Subha Sankar Sarkar, Vice Chancellor, Netaji Subhas Open University, Kolkata-700 064 Convenor Prof. Atindranath Dey, Director, School of Education, Netaji Subhas Open University, Kolkata-700 064 RCI Expert Committee AREA - B DISABILITY SPECIALIZATION COURSE CODE - B 8 (H.I.) IDENTIFICATION, ASSESSMENT AND NEEDS OF CHILDREN WITH HEARING IMPAIRMENT Dr. Jayanthi Narayan Former Deputy Director, NIMH, Secunderabad. Dr. Varsha Gathoo Head and Reader, Department of Education, AYJNISHD (D), Mumbai. Dr. Sanjay Kumar Assistant Professor, DSMNRU, Lucknow, Shri Ashok Chakraborty Ex- Chairperson, ZCC, RCI & Secretary, SHELTER. Dr. Hemant Singh Keshwal Assistant Prof. of Special Education and Centre In- Charge, NIEPID- RC, Kolkata. Shri Suman Kumar Assistant Professor of Speech & Hearing, AYJNISHD- RC, Kolkata. Professor A. N. Dey Director, School of Education, NSOU. Smt. Antara Choudhury Assistant Professor of Special Education, School of Education, NSOU. NSOU Expert Committee [Board of Studies (BoS)] Professor A. N. Dey Director, School of Education, NSOU. Professor Dulal Mukhopadhyay Professor of Education (Retd), NSOU. Shri Ashok Chakraborty Ex- Chairperson, ZCC, RCI & Secretary, SHELTER, Professor Debasri Banerjee Professor of Education, Department of Education, University of Calcutta Dr. Hemant Singh Keshwal Assistant Prof. of Spl. Education and Centre In- Charge, NIEPID-RC, Kolkata. Shri Suman Kumar Assistant Professor of Speech & Hearing, AYJNISHD- RC, Kolkata. Professor Swapan Kr. Sarkar Head, SoE, NSOU Prof. Sanat Kumar Ghosh Professor of Education, SoE, NSOU. Professor Sumanta Chattaraj Professor of Education, SoE, NSOU. Smt. Swapna Deb Consultant, SoE, NSOU. Smt. Antara Choudhury Assistant Professor of Special Education, School of Education, NSOU. Dr. Abhedananda Panigrahi Coordinator, B. Ed., SoE, NSOU. Shri Prabir Naskar Assistant Professor of Special Education, SoE, NSOU. Title :

Identification, Assessment and Needs of children

with Hearing Impairment Unit Name of the Unit Writer Name of the Editor Unit-1-2

Mr.Indranil Chatterjee, Lecturer in Speech & Hearing, Shri Suman Kumar, Assistant Professor of Speech AYJNISHD, RC, Kolkata. & Hearing, AYJNISHD, RC, Kolkata. Unit-3 Mr.Saikat Das, Faculty, AYJNISHD, RC, Kolkata. Unit-4 Smt Swapna Deb, Consultant, SoE, NSOU. Unit-5 Shri Prabir Naskar, Asstant Professor of Special Education, School

3 Prologue I am delighted to write this foreword for the Self Learning Materials (SLM) of M Ed in Special Education (ODL). The M Ed in Special Education in ODL mode is a new academic program to be introduced at this University as per NOC issued by the Rehabilitation Council of India, New Delhi and subject to approval of the program by the DEB-UGC. I must admire the emulation taken by the colleagues from School of Education (SoE) of NSOU for developing the Course Structure, Unit wise details of contents, identifying the Content Writers, distribution of job of content writing, editing of the contents by the senior subject experts, making DTP work and also developing E-SLMs of all the 16 Papers of the M.Ed Spl.Ed (H.I/I.D)–ODL program. I also extend my sincere thanks to each of the Content Writers and Editors for making it possible to prepare all the SLMs as necessary for the program. All of them helped the University enormously. My colleagues in SoE fulfilled a tremendous task of doing all the activities related to preparation of M.Ed in Spl Edn SLMs in war footing within the given time line. The conceptual gamut of Education and Special Education has been extended to a broad spectrum. Helen Keller has rightly discerned that "Have you ever been at sea in a dense fog, when it seemed as if a tangible white darkness shut you in and the great ship, tense and anxious, groped her way toward the shore with plummet and sounding- line, and you waited with beating heart for something to happen? I was like that ship before my education began, only I was without compass or sounding line, and no way of knowing how near the harbour was. "Light! Give me light!" was the wordless cry of my soul, and the light of love shone on me in that very hour." So education is the only tool to empower people to encounter his/her challenges and come over being champion. Thus the professional Teacher Education program in Special Education can only groom the personnel as required to run such academic institutions which cater to the needs of the discipline. I am hopeful that the SLMs as developed by the eminent subject experts, from the national as well as local pools, will be of much help to the learners. Hope that the learners of the M.Ed Spl Edn program will take advantage of using the SLMs and make most out of it to fulfil their academic goal. However, any suggestion for further improvement of the SLMs is most welcome. Professor (Dr.) Subha Sankar Sarkar Vice-Chancellor, NSOU

5 AREA - B

IDENTIFICATION, ASSESSMENT AND NEEDS OF CHILDREN WITH HEARING IMPAIRMENT Unit 1: Audiological Assessment, Identification and Addressing Needs 1.1 Overview and need of various audiological assessment 1.2 Choice and selection of audiological tests according to age and functional abilities of the child 1.3 Overview of audiological assessment of children with additional/ associated disabilities 1.4 Selection of modality / method of management (auditory, speech reading vs manual communication) based on aided performance (aided audiogram & speech identification) 1.5 Recommendation of educational set-up (special, partial integration vs inclusive education) based on aided performance (aided audiogram & speech identification) as one of the factors Unit 2: Speech Assessment, Identification and Addressing Needs 2.1 Overview of acoustics of speech; Classification of speech sounds based on major acoustic cues 2.2 Compare and contrast speech development in typical developing children and CWHI 2.3 Phonological errors as a function of audiogram configuration (flat, gradually sloping and steeply sloping) and degree of hearing loss 2.4 Selection of appropriate strategies, material, and equipment for teaching speech 2.5 Need for use of regional language based speech assessment tests Unit 3: Language & Communication Assessment, Identification and Addressing Needs 3.1 Parameters of selecting medium of instruction for CWHI: Language/s used at home, school & society 3.2 Language assessment of the deaf: Challenges and concerns (standardized versus teacher made tools; Setting norms of children 'with' versus 'without' disability;

6 modality dependent nature of language; measuring receptive language; identifying measurable indicators) 3.3 Biological foundations and research in early language experiences in the past two decades: From input to uptake 3.4 Processing sign languages in early years: Neural reorganization; Access to age appropriate language; Ease of intake; Universal grammar; Modality dependent versus modality independent components 3.5 Studying language assessment component in ICF; Recommendations related to language assessment reflecting in National Curriculum Framework (NCF) Unit 4: Educational Assessment, Identification and Addressing Needs 4.1 Concept & principles of Educational Assessment 4.2 Scope & priorities in educational assessment 4.3 Methods, Techniques & tools for educational assessment & Reporting: Formal & Informal 4.4 Outcomes of educational assessment: Identification, addressing educational needs; linking with pedagogical decisions 4.5 Setting up of an educational assessment clinic/centre: Need & Requirements (essentials & Desirables) Unit 5: Team Approach in Assessment, Identification & Assessing Needs 5.1 Team Approach: concept & types (Multidisciplinary, Interdisciplinary and Trans-disciplinary); 5.2 Role of various stakeholders: professionals, personnel, parent and the child; 5.3 Constitution of team with respect to CWHI: Considerations on child's age, severity and associated conditions; 5.4 Team's role before, during and after assessment; Identifying and addressing the need and planning IEP / IFSP 5.5 Team's role in outcome measures: Periodic assessment and evaluation; review of performance against previously set goals

7 Netaji Subhas Open University AREA - B B 8 H.I.: IDENTIFICATION, ASSESSMENT, AND NEEDS OF INDIVIDUALS WITH HEARING IMPAIRMENT B 8 H.I. ppppp IDENTIFICATION, ASSESSMENT, AND NEEDS OF INDIVIDUALS WITH HEARING IMPAIRMENT UNIT ppppp 1 AUDIOLOGICAL ASSESSMENT, IDENTIFICATION, AND 09 - 53 ADDRESSING NEEDS UNIT ppppp 2 SPEECH ASSESSMENT, IDENTIFICATION AND ADDRESSING NEEDS 54 - 74 UNIT ppppp 3 LANGUAGE AND COMMUNICATION ASSESSMENT, IDENTIFICATION AND ADDRESSING NEEDS 75 - 117 UNIT ppppp 4 EDUCATIONAL ASSESSMENT, IDENTIFICATION AND 118- 146 ADDRESSING NEEDS UNIT ppppp 5 TEAM APPROACH IN ASSESSMENT, IDENTIFICATION AND ASSESSING NEEDS 147 - 178

8

9 Unit - 1 ❏ Audiological Assessment, Identification, And Addressing Needs Structure 1.1 Introduction 1.2 Objectives 1.3 Overview and Need of Various Audiological Assessments 1.3.1 Need for Audiological Assessment 1.3.2 Overview of Audiological Assessment 1.3.3 Objective of Audiological Assessment 1.4 Choice and Selection of Audiological Test According to Age and Functional Abilities of the child 1.4.1 Intgroduction 1.4.2 Birth to 2 years of Age 1.4.3 2 years to 5 years of Age 1.4.4 School Age Children 1.5 Overview of Audiological Assessment of Children with Additional/Associated Disabilities 1.5.1 For Children with Language Disorders 1.5.2 Audiotorty Processing Disorder 1.5.3 Psychological Disorder 1.5.4 Developmental Disabilities 1.6 Selection of Modility/Metyhod of Management (Auditory, Speech Reading vs Mannual Communication) Based on Aided Performance (Aided Audiogram & Speech Identification) 1.6.1 Introduction 1.6.2 Oral Communication

10 1.6.3 Manual Communication 1.6.4 Speech Reading 1.7 Recommendation of Educational Set-up (Special, Partial Integration vs. Inclusive Education) Based on Aided Performance (Aided Audiogram & Speech Identification) as one of the Factors 1.7.1 Introduction 1.7.2 Special School 1.7.3 Segregated in a Special School or Partial School 1.7.4 Integrated Education in Regular School 1.8 Let Us Sum Up 1.9 Unit end exercises 1.8 References 1.1 Introduction Hearing loss, also known as hearing impairment, is a partial or total inability to hear. A deaf person has little to no hearing. Hearing loss may occur in one or both ears. In children, hearing problems can affect the ability to learn spoken language and in adults, it can create difficulties with social interaction and at work. Hearing loss can be temporary or permanent. Hearing impairment

can develop due to various pathological conditions, such as, at the outer ear level, it can be due to the excessive formation of ear wax, malformation of pinna, external auditory canal, or the insertion of foreign body in the EAC. At the middle ear level,

the hearing loss may occur due to the infection, ear discharge, ossicular chain discontinuity, perforation of the tympanic membrane, and the inner ear level, it can be an infection, certain disease, hereditary, aging or noise and may occurs at birth or after birth. Hearing loss can be divided into three types: - Conductive, sensorineural

and mixed

hearing loss. Conductive hearing loss occurs if there is a

pathology in the outer ear or middle ear,

i.e., the conductive mechanism of the ear. If there is a problem in the inner ear or

11 auditory nerve, the hearing loss is of sensorineural type, and if there is a problem in the conductive and sensorineural mechanism it is of mixed type. Similarly, there is a various degree of hearing loss which may vary from individual to individual. Some individuals may have a mild degree of impairment, while others have severe to profound degree of impairment. There are also various effects of hearing loss in individuals. For example, a person may have difficulty in perception of speech, while others

may have difficulty in acquiring age-appropriate speech and language skills.

Similarly, a child with hearing loss may have poor academic performance. Hence, for reducing the impact of the hearing impairment, early identification and intervention are necessary and for this suitable hearing assessment is required. An audiological assessment is a painless, noninvasive hearing test that measures a person's ability to hear different sounds, pitches or frequencies. The diagnostic test is performed in a soundproof booth under headphones. The test takes approximately 30 to 60 minutes to complete. Following the test, an audiologist will discuss the results and options for treatment, which might include hearing aids. Audiological assessment, which includes a full history and assessment of hearing and communication needs, can identify any hearing loss and associated difficulties. There are various types of hearing tests available which helps in identifying and the diagnosis of hearing loss. Unlike most adults whose hearing loss can be defined in one clinic visit, children often require repeated visits before the configuration and degree of hearing loss is defined. Audiologic assessment in children is often a challenging, time- intensive and ongoing process, particularly when assessing the very young infant. Infants and young children do not possess the breadth of responses that adults do, requiring modifications of behavioral audiologic techniques. In addition, there is sometimes the need for electrophysiological tests to provide a baseline estimate of auditory function until complete behavioral audiologic findings can be obtained. Along with these the audiological assessment results helps in finding the various intervention strategies which help in the development of speech-language and auditory skills in a child. These may include speech reading activities, use of manual signs, speech therapy etc.

12 1.2 Objectives After studying this unit carefully, teacher educator will able to learn about: 1) The aims, objectives, and needs of audiological assessments 2) The various audiological tests used to determine hearing loss 3) The identification and selection of appropriate tests for various age groups 4) Audiological assessment of children with additional/ associated disabilities 5) Importance of audition, speech reading and manual communication in management of hearing impairment 6) Educational management of children with hearing impairment 1.3 Overview and Need of Various Audiological Assessments 1.3.1 Need for audiological assessment: I. Early Identification of Hearing Loss: it is important to identify the hearing loss at an early stage so that quality rehabilitation can begin at an early stage.

Various causes such as trauma, infections, hereditary, inappropriate obstetric care, etc may lead to hearing loss in a child. the audiological tests helps in identifying whether there is a presence of hearing loss or not. These tests can be performed in a medical setup as well as in primary health care centers. Such tests are called screening tests. II. Medical Diagnosis: The hearing tests help in medical diagnosis and thereby assists in further recommendation for treatment i.e. either medical, surgical or rehabilitative. The audiological tests provide information about the site of the lesion of the auditory system. Like, which part of the auditory system is normal and abnormal and helps in treating them, that is, type of hearing loss. It also provides information about how much it is affected, that is, degree of hearing loss. III. Follow up procedures for monitoring of hearing status: In some cases, hearing sensitivity may vary over a period of time, due to which, it is important to assess the hearing sensitivity on a regular basis. It helps the audiologists to monitor their

13 changes in hearing and provide them further treatment advice. Hearing of a client may vary due to excessive noise exposure, any long history of ototoxic drugs, which may also lead to hearing loss. Along with

these, people with progressive or fluctuating hearing loss also need to be monitored for their hearing status.

That is why follow up is recommended to these individuals. IV. Planning of rehabilitation programs: hearing tests allows audiologists to plan adequate rehabilitative programs according to the person's hearing loss. The audiological assessment helps in the selection of the suitable hearing aid, it's fitting, planning for the educational services, vocational placement and job identification. In children, the need for speech and language therapy is also selected by seeing the audiological tests result. 1.3.2 Overview Of Audiological Assessment The goal of hearing assessment is to quantify and qualify to hear in terms of the degree, type, site (as appropriate) and configuration of the hearing loss. In all cases following a hearing assessment, the audiologist must communicate the results of the assessment to the patient. If a hearing loss is identified, the audiologist must review with the patient the impact on communication and provide initial information regarding possible treatment options. These options may include counseling, medical or surgical intervention, prescription/provision of personal hearing instruments, prescription/ provision of advanced listening technologies, skill development through aural (audiologic) habilitation/rehabilitation, or simply monitoring of the condition through periodic assessment. Hearing assessment is conducted using a test battery approach. The basic components of this test battery approach include: 1. Case history 2. Otoscopic exam 3. Acoustic immittance measures 4. Pure-tone audiometry 5. Speech audiometry 6. Additional site of lesion testing 7. Counseling

14 Other tests may be included in the battery contingent on the results of the basic battery and interventions that are recommended and the nature of the patient being assessed. On the other hand, the audiological tests can be categorized into: I. Informal audiological tests: includes screening tests II. Formal audiological tests: includes screening and diagnostic tests Formal audiological tests can be further classified into: A. Subjective audiological tests: where the subject participates like, tuning fork tests, speech audiometry and pure tone audiometry B. Objective audiological tests: It does not require the subject's participation like immittance audiometry, otoacoustic emission, auditory brainstem response audiometry and auditory steady-state response audiometry The Informal Hearing Assessment Process The goal of informal audiological tests is to: ● develop an idea of how the child uses his or her hearing in various environments across the course of the day; and ● try to discover what variables support the best use of hearing in order to continuously improve the use

of hearing. The main objective of informal hearing tests is "Early Identification of hearing loss".

It includes various tests like Behavioural observation audiometry, Sound Field Audiometry, visual reinforcement audiometry etc. Behavioral observation audiometry: It can be performed in hospitals, primary health centers on new-born babies, and in the school environment on school-going children. It is based on behavioral observation of a subject in response to various auditory stimuli. This test procedure only identifies/ detects the

cases with a potential hearing loss. Its major limitation is that it does not provide information about the type and degree of hearing loss and any ear specific information.

The test procedure is performed under certain guidelines provided by the

15 American Speech and Hearing Association (ASHA). It is a time and money-saving test procedure

for the hearing assessment of that population who are at risk

to develop hearing loss due to some pathologies. Procedure: It can be performed on new-born babies and children up to 6months of age. Behavioral observation audiometry (BOA) is often employed with two clinicians working together. While one clinician may sit in front of the child, who may be seated on the parent's lap, to occupy the child's attention, the second clinician, located behind and to the side of the mother, FIGURE: development of auditory localization in infants: (A) At 3 months, the head moves somewhat jerkily along a horizontal plane, (B) At 5 months, localization is in straight lines, first horizontally and then vertically. (C) At 6 months, the head and eyes move in an arc toward the sound source. (D) At 8 months, the eyes and head move directly to the sound source. Phonemes such as S, S, S, S or a variety of toys or noisemakers may be used. Crinkling cellophane or onionskin paper makes the sort of soft, annoying sound that is extremely useful in techniques such as these, but like most non-calibrated sounds, it provides little or no information about the configuration of the hearing loss. For a sound to be localized, hearing thresholds must be similar in both ears, although not necessarily normal. As a child's ability to localize sound matures, it progresses from the eye and head movement seen horizontally, then vertically, then on an arc and finally in a direct line to the sound source. If a child does not turn to locate a sound by the age of 8 months, it can be suspected that something is wrong, although not necessarily hearing loss. Mental disability and some childhood symbolic disorders may manifest themselves in a similar lack of response. If a child cannot be tested by using formal methods, an imitation of

16 vocalization can be tried. The clinician can babble nonsense syllables, without the child watching, to see if the child will imitate. If imitation does take place, it indicates that hearing is good enough to perceive voice. If no response is noted and the clinician babbles again in the child's line of vision, the child with a severe hearing impairment may attempt to imitate but may do so without voice. This is the most important diagnostic sign. In addition to being a strong indication of hearing loss, silent imitation indicates that the child's perceptual function is probably intact. If the child vocalizes, voice quality can be evaluated. Although the vocal quality of individuals with hearing loss is sometimes different from that of individuals with normal hearing, it must be remembered that the voice of the very young child who has a hearing impairment frequently cannot be differentiated from that of the child with normal hearing. It is possible to observe a child's reaction to the examiner's imitation of the child's sounds. In this case, the examiner gives a response to the child's babbling or other vocalizations. A child with normal hearing may cease vocalization and may sometimes repeat it. There are instances in which this procedure works when nothing else does, as the child may stop and listen, the interpretation being that the examiner's voice was heard. In the

early months (up to 4 months of age) hearing assessment is restricted to very few responses from the baby such as startle and Auro-Palpebral reflex. Also, these responses are generally seen as relatively loud auditory signal. The other responses shown by infants and/or children are

widening of eyes, vocalization, awareness of sound, cessation of activity, rudimentary localization etc. Auro-Palpebral reflex

is the

contraction of the orbicularis palpebral muscle of the eye. It is usually seen as an eye blink (a quick closing of the eye) or tightening of the eyelids of the eyes that are already closed. The startle reflex is seen as a small jump or jerk of the infant's body. Both these responses are seen immediately after the presentation of

an

auditory stimulus (sound) of high intensity However these responses are momentary and disappear quickly after repeated presentation of

the

sound stimulus. Hence the tester needs to be alert and quick in his/ her observations. In startle reflex besides small jump, the infant's arms go apart, the fingers spread, the legs extend, the eyes wide open and the head is thrown back as a response to load sound. But if any of this response is not seen/observed for loud sound then it is possible that the infant/child may have hearing loss and for the confirmation of the

same.

Limitations of Behavioral Observation Audiometry

17 1. It is a time-consuming procedure. 2. No ear specific information is obtained about baby's/

infant's hearing sensitivity. 3. It provides information only about degree of hearing loss but not about type of hearing loss. 4. The infant should be fully awake or at least in light sleep, well-fed and physically well. 5. As the judgment about the presence or absence of

an infant's/ baby's response is

made by the clinician hence there are high chances of "subject biasing" or "subject variation. This affects the reliability of this procedure. 6. The parental co-operation and the infant's participation is essential for

the validity of responses,

Visual Reinforcement Audiometry (VRA): Visual Reinforcement Audiometry (VRA) is based on the response of head turn or localization towards the sound source. The elicitation of this response is based on head control, which a normal child usually acquires by 6 months of age. VRA is

a

technique appropriate for the children between the age ranges of 6 months to 24 years. The technique is modification of a earlier well-known technique called "Conditioned Orientation Response Audiometry (CORA)". Like

sound

field audiometry, this procedure is also performed in a two room test situation/test environment. The tester sits in one room while the child is made to sit in other room with the parent. In child's room, two small loud speakers are placed on either side of the midline, in front of the child. Above each loud speaker an attractive picture or a doll is placed. A bulb is placed inside the doll or the picture, which can get illuminated to make the doll or picture visible each time when a sound is presented. A warble-tone of known (loud) intensity is presented from any one of the loudspeakers and the doll or the picture is illuminated at the same time. The child is made and trained to understand that when the sound is hard, a light will glow in

the

doll or

in the picture. Thus the child is made to understand that the association between the sound and light is pleasurable and rewarding. Once the child has understood this association then the sound is presented alone. If the child turns his/her head correctly when the sound is presented then the child and his/her response is rewarded with visual reinforcement by allowing the doll or the picture to light up (illuminate). The intensity levels of the signal can be

lowered gradually either in 5 dB or 10 dB steps to find out the

18 lowest intensity level (threshold) at which the child responds correctly. Thus the child's hearing sensitivity can be assessed reliably by using this technique. Besides warble tones, the tester can assess the child's hearing sensitivity by using 'speech' as a stimulus. Thus the tester can assess the child's hearing sensitivity by asking him to pick

up a specific toy or a picture, which placed in front of him or can be asked

to follow or obey simple commands. The child's responses will enable the audiologist to assess his/her

hearing sensitivity. Sound-Field audiometry Several approaches for the testing of infants use multiple loudspeakers in a sound- field situation. Recordings of animal noises and baby cries have been effective in eliciting responses, even when filtered into narrow bands. Although a sound such as a whistle, bell, drum, or some vocal utterance may appear subjectively to represent a specific frequency range, this often turns out not to be true. What may seem to be a high-pitched sound may have equal intensity in the low- and high-frequency ranges, as verified by spectral analysis. Several kinds of responses may be observed when sounds are presented to a child from different directions in the sound field. The child may look for the sound source, cease ongoing activity, awaken from a light sleep, change facial expression, or offer a cry or other vocalized response. Once again, a response to sound has considerable significance, whereas a lack of response is not necessarily meaningful. A useful setup for sound-field localization is shown in Figure 8.3. Frequently, children respond to the off-effect of a sound but not to the on-effect. Evaluation of responses to the cessation of sound often goes well with the use of noisemakers, but it can be adapted to sound-field audiometry. A high-intensity pure tone or narrow noise band can be introduced for a minute or so and then abruptly interrupted. This interruption may produce a response, whereas the initial presentation of the sound does not. It is generally the case that at age 2 months, a soft voice begins to become a better stimulus than a loud voice. At 1 to 3 months, percussion instruments are best at eliciting APRs, startle responses such as the Moro reflex,2 and overall increases in activity or crying. At 4 months, percussion instruments are less successful than they were earlier, but the human voice gains in effectiveness. By 6 months of age, much reflex activity begins to disappear. Sound-Field test Stimuli Audiologists do not completely agree on the best acoustic stimuli for testing small children. Many, but not all, authorities believe that pure tones are probably not the ideal stimuli because they are not meaningful to children. Pure tones have the obvious advantage of supplying information about children's hearing

19 sensitivity at specific frequencies. If a child shows no interest in pure tones, however, other carefully controlled acoustic stimuli may be used. The justification for narrowband filtering of a signal for a small child is obvious, and many clinicians use the narrowband noise generators on their clinical audiometers. The belief is that this provides specific frequency information if the child responds. Such an approach may be very misleading. The narrow bands on many audiometers are not very narrow at all, and they may reject frequencies on either side of the center frequency at rates as little as 12 dB per octave. This allows sufficient energy in the side bands to produce a response when a child has not heard the frequency in the center of the band. A variety of sound effects (e.g., cow mooing, bird singing, glass shattering) subjected to steep-slope filtering can be useful with very young children as well as older children and adults with special needs (Abouchacra & Letowski, 1999). It is obvious that audiologists must understand the nature of the equipment they use, and if they elect to test with narrow bands or filtered sounds, they should ascertain for themselves just what the bandwidths are. Advantages

of Sound Field Audiometry: 1. Itis useful technique to assess hearing sensitivity of newborn babies, infants, children and difficult to test population like children with multiple problem like children with mentally retardation, children with hyperactivity, autism etc. 2. The very minimal co-operation is required from the subject. Limitations/Disadvantages of Sound Field Audiometry: 1. It is a time consuming procedure. 2. It does not provide "ear specific information" about the hearing status of a subject. 3. It provides information only about "degree" of hearing loss but no information about "type" of hearing loss. 4. Initial expense/cost is high. 5. For validate the results of sound field audiometry, it need to supplemented by at least any one objective tests like immittance audiometry, BERA or Otoacoustic Emission Test(OET). 6. For early identification of hearing impairment, several procedures have been adopted. Also due to advancement in science and technology, considerable progress

20 has been made in the past few years in testing the hearing of infants and children. These procedures are designed in considering the responses, which the child is capable of giving This depends upon various factors like chronological age, mental age, neurological status of child and any other addition 1.3.3

Objective of Audiological Assessment It does not require the participation of the subject and assess the person's hearing ability by using modern and sophisticated instruments. These tests must be performed by a well-trained, well-qualified and experienced audiologist. The objective hearing tests are standardized tests and useful in both clinical audiology for diagnostic rehabilitation purposes. The various objective assessment procedures are: 1. Immittance Audiometry 2. Brainstem Evoked Response Audiometry 3. Otoacoustic Emission Tests Immittance Audiometry Immittance audiometry is commonly known as an impedance audiometry. It is an objective procedure to assess the integrity and functioning of the human auditory system. In this procedure a small probe is inserted into the ear canal. With the help of a pressure release pump, an air pressure is exerted on the eardrum. The pressure in the ear canal is varied from t 200 mm HO (water) to- 200 mm HO (water). The tympanic membrane responds to this chance Of air pressure in the external ear canal. This results in some degree of displacement/movement of the eardrum. There are two tvpes of drum movement namely arum tight condition and "drum free" condition. In drum tight condition, the tympanic least mobile while in drum free condition; is most mobile. The instrument shows the tympanic membrane in a graphical form "tympanogram. Depending upon pathologic ear, various types of tympanograms are obtained. This helps the audiologist to suggest proper line of treatment to the subjects suffering from various types of hearing impairment. This procedure is quick and reliable

21 Figure: Types of tympanogram Interpretation Type A- Normal Middle Ear Function, SN loss, Cases with sensorineural hearing loss Type As- Otosclerosis or Tympanosclerosis Type Ad- Ossicular Chain discontinuity Type B- Fluid in the middle ear Type C- Eustachian Tube dysfunction/blockage Type D- Abnormalities of Tympanic membrane

22 Advantages of Immittance Audiometry: 1. It requires very little/minimum participation of the subject. 2. The test is very fast/quick and takes few minutes to perform. 3. Itis a reliable objective test to predict the hearing sensitivity of a subject. 4. It provides useful diagnostic information about the status of the middle ear, which helps the ENT doctor and an audiologist for accurate diagnosis and management. 5. It can be used as an effective screening device. Limitations/Disadvantages of Immittance Audiometry: 1. The cost of equipment is high i.e., it is a costly procedure. 2 Regular calibration and servicing of the instrument is must. 3. Only trained and qualified professionals can perform the test. 4. Test cannot be performed it the subject have impacted wax, ear discharge, pain in the ear and any other ear infections. 5. The test cannot be carried out on the child if he or she is crying, chewing, drinking milk, swallowing, vocalizing or talking. Brainstem Evoked Response Audiometry (BERA) Electrical activities are continuously ongoing in human brain. It is possible to measure these activities. These activities undergo a change and results in a very definitr particular waveform patterns when any sensory stimuli are provided. For measuring responses from the brain, electrodes are usually placed on the mastoid process behind the outer ear and the vertex (top of the skull), with a ground electrode placed on the opposite mastoid, the forehead, or the neck. Stimuli with rapid rise times, such as clicks, must be used to generate these early responses. Tone pips, or bursts, which provide some frequencyspecific information, can be used. When a summing computer is used, seven small wavelets generally appear in the first 10 milliseconds after signal presentation. Each wave represents neuroelectrical activity at one or more generating sites along the auditory brain-stem pathway. The findings of Legatt, Arezzo, and Vaughan (1988) indicate the following simplified scheme of major ABR generators:

23 Wave Number Site I VIIIth cranial nerve II VIIIth cranial nerve III Superior olivary complex IV Pons, lateral lemniscus V Midbrain, lateral lemniscus, and inferior colliculus VI and VII Undetermined Routine ABR audiometry can be performed in several ways, only one of which is described here. The patient is first seated in a comfortable chair, often a recliner, which is placed in an acoustically isolated, electrically shielded room. The skin areas to which electrodes will be attached are carefully cleansed, and a conductive paste or gel is applied to these areas. One electrode is placed on the vertex or the forehead and one on each earlobe or the mastoid process behind the external ear. An electrode opposite the ear being tested serves as a ground electrode. After the electrodes are taped in place, electrical impedance is checked with an ohmmeter. The impedance between the skin and the electrodes, and between any two electrodes, must be controlled for the test to be performed properly. An insert receiver is placed into the test ear, or a circumaural earphone is placed over the test ear, and the patient is asked to relax. The lights are usually dimmed, and the chair placed in a reclining position. The ABR is not affected by sleep state; therefore, the subject may sleep while the responses are being recorded. This characteristic of the ABR is important because it allows anesthetized or comatose individuals to be evaluated. One ear is tested at a time. A series of 1,000 to 2,000 clicks may be presented at a rate of 33.1 clicks per second. The click rate must not be one that is divisible by 1 with a resultant whole number in order to differentiate the real response from electrical artifacts in the room, such as the 60 Hz electrical current. The starting level is about 70 dB nHL (n is the reference to the normative group threshold for click stimuli). In response to the stimulus, the ABR waveform appears as several narrow peaks and troughs within 1 to 10 ms of the signal onset. The main positive peaks are labeled, after Jewett (1970), in Roman numerals for Waves I, III, and V. If responses are not present, the intensity is raised 20 dB; if responses are present, the level is lowered in 10 or 20 dB steps until Wave V becomes undetectable. After the test has been completed, a hard copy may be printed out and these data may be summarized on a special form.

24 A complete ABR test provides the following information about each ear: 1. Absolute latencies of all identifiable Waves I to V at different intensities. 2. Interpeak latency intervals (i.e., I to V, I to III, III to V), or relative latencies. 3. Wave amplitudes (absolute and relative). 4. Threshold of Wave V if hearing threshold estimation was the purpose of the test. 5. A comparative response with a higher click rate (e.g., 91.1 clicks/second) if the ABR was for neurological assessment. The ABR has developed into the most important test in the diagnostic site-of-lesion battery and has proven to be sensitive, specific, and efficient in detecting lesions affecting the auditory pathways through the brain stem. Figure: A patient is seated in a comfortable chair to encourage relaxation during ABR testing and ABR waveforms OTOACOUSTIC EMISSION The normal cochlea are capable of producing sounds in the absence of external stimulation and it was first described by Kemp in 1979. These are known as spontaneous otoacoustic emissions (SOAEs) and it occurs in over half the population of persons with normal hearing as a continuous tonal signal that can be recorded in the external

25 auditory canal. A second class of OAEs occurs either during or immediately following acoustic stimulation. These responses are called evoked otoacoustic emissions (EOAEs), and there are several types. The two major types of EOAE are transient and distortion- product emissions. Transient-evoked otoacoustic emissions (TEOAEs) are produced by brief acoustic stimuli, such as clicks or tone pips. When two "primary tones" that vary in frequency by several hundred hertz (F1 and F2, where F2 7 F1) are presented to the ear, the normal cochlea responds by producing energy at additional frequencies. These are called distortion-product otoacoustic emissions (DPOAEs). A probe is placed in the external auditory canal that contains a miniature loudspeaker to present the evoking stimulus. A tiny microphone is also placed to pick up the emission and convert it from a sound into an electrical signal. The device that delivers the stimuli for DPOAE testing differs from the one for measuring TEOAEs because the probe that is fitted to the ear must have two openings (ports) that can deliver the two primary tones. Because DPOAEs are separate in frequency from the evoking stimuli, averaging background noise is less of a problem for measurement of DPOAEs than it is for TEOAEs, and fewer stimulus presentations are required, which may reduce test time slightly. Acoustic control of the test environment for OAE testing is less critical than might be imagined because the noise that must be averaged out is the noise contained in the ear of the subject. If subject noise levels are too high, for example, in crying babies, the noise may mask the emission because the sensitive microphone used cannot differentiate one acoustic signal from another. The presence of an EOAE suggests that there is very little or no conductive hearing loss caused by middle-ear abnormality. It further suggests that responding frequency regions of the cochlea are normal or exhibit no more than a mild hearing loss. If OAEs are present in sensory/neural hearing loss, then outer-hair-cell function is intact and the locus of the disorder is known to be retro cochlear. Absent OAEs in the presence of sensory/neural hearing loss confirm cochlear pathology but do not rule out the possibility of concomitant retro cochlear involvement. The result is that OAE measures allow for improved diagnostic differentiation among the different types of hearing losses (Prieve & Fitzgerald, 2009). Pre-requisites of a Formal Hearing Test Before performing an actual hearing test, certain basic procedures need to be performed. These include:

26 (a)

Otoscopy or Examination of an-Ear: The ear of a subject needs to be examined by using an otoscope or torch before performing an actual hearing test. An ENT doctor or an audiologist usually performs this examination. An otoscope is an instrument with a magnifying glass and an attached light. This is inserted in the subject's ear canal where the doctor can see the magnified structures clearly. This is essential so as to ensure that the subject's ear carnal 1s tree trom wax, foreign body or any ear infection before performing the hearing test. The E.N.1. doctor/the audiologist examines the subject's tympanic membrane with the help of an Otoscope and can draw some conclusions about the status of the middle ea. Such as the tympanic membrane is normal, perforated, dull etc. (b) Case History:

The case history is a very important diagnostic tool as it helps to obtain certain relevant information abuts the subject's problem. It is said that case history taking both an art and

science and 50% diagnosis can be made on the basis of case history if it is taken appropriately and scientifically. This highlights/

emphasizes

the importance of case history. In other words, this helps to reach a diagnosis of the hearing disorder. In case of a child, the information about the child's complaint, his general health, his birth history, any other major family history for hearing loss etc. can be collected from his family members or parents. In case of adults, the information regarding his/her hearing problem can be collected from him/her. This includes all necessary information about his problem/complaint such as duration of the problem, pain in the ear, discharge from the ear, ringing in the ear, and other signs of hearing loss. This will also

include information about his/her medical problems such as diabetes,

hypertension any other serious illnesses and the medicines taken for the same. All this information is very useful, important and valuable as it helps to understand the cause of deafness and thus help to plan or suggest appropriate remedial measures.

Formal Subjective Hearing Tests These tests are those tests, which are carried out using simple or sophisticated equipments. Professionals perform these tests. In these tests the subject needs to participate actively where he has to indicate that he has heard the sound. For giving reliable and accurate response, he should understand all the instructions given to him before the test. Thus in these tests, the

tester also needs to participate actively. To

undergo these tests, the subject need to meet certain basic requirements such as normal intelligence

27 (average intelligence), adequate attention span, focusing skills to listen and to respond to various auditory stimuli, etc. The subject needs to wear headphones so as to listen to various auditory stimuli and responds accordingly. As these tests demands and involves subject's active participation hence these tests are called "Subjective tests".

PURE-TONE AUDIOMETRY Pure tone audiometry is generally the 1st quantitative hearing test done to assess the nature and degree of hearing loss in adults and in children over about four years of age to properly plan the most appropriate interventions. Other tests include immittance testing (testing middle ear function) and speech audiometry. Introduction Pure tone air conduction and bone conduction tests determine whether or not there is any hearing loss; what type of hearing loss it is; the frequencies that are affected (configuration); and whether hearing loss is unilateral or bilateral. Even though pure tone audiometry is a useful measure of basic hearing function, it does not indicate how well speech is received or understood. Pure tone audiometry indicates what hearing thresholds (dB) are required to just be able to perceive a tone at different frequencies (Hz). A pure tone audiology threshold at a specific frequency is the decibel level at which a sound is perceived 50% of the time. The decibel scale used in pure tone audiometry is dB Hearing Level (dB HL). The dB HL intensity scale is based on normal human hearing with 0 dB HL representing the median threshold for otologically normal young adults. Pure tone testing is the measurement of an individual's hearing sensitivity to calibrate pure tones at different frequencies. The basic audiological assessment focuses on pure tone air conduction thresholds in the frequency range 125Hz - 8 KHz. The test is conducted in a sound isolated environment. Each ear is tested separately using various transducers such as headphones, insert earphones or bone conductors. As it is a behavioral test, it is dependent on the response from the individual being tested. Pure tone thresholds at each frequency are plotted on a graph called an audiogram, which depicts the type, degree and configuration of the hearing loss.

28 Pure tone audiometers Pure tone audiometers are used to measure hearing thresholds. They vary from simple, inexpensive screening devices used in public health programs, to more elaborate and expensive diagnostic audiometers used in hospitals and clinics. They yield quantitative as well as qualitative information about hearing sensitivity. Certain components are common to all audiometers: ● Audio oscillator generates pure tones of different frequencies, usually at discrete steps of 125, 250, 500, 750, 1000, 2000, 3000, 4000, 6000 and 8000 Hz. ● Amplifier amplifies the produced oscillations to a fixed intensity level (e.g. 110 dB HL) without appreciable distortion. ● Attenuator controls the amplified oscillations so that the energy reaching the ear may be varied over a range of 0 to 110 dB HL in 5 dB HL increments. The maximum intensity allowed at each frequency is indicated on the hearing level disc. Due to variations in sensitivity of the ear at different frequencies, more energy is needed at the very low and very high frequencies. For this reason, only the mid frequencies (1000 Hz to 3000Hz) may be presented at a level of 110 dB HL. For all the other frequencies a reduced maximum value is indicated. Due to lower sensitivity for bone conduction, these maximum values are lower for bone conduction than for air conduction. The maximum hearing level for the lower frequencies (125 – 250 Hz) is generally 70 dB HL. ● Earphones transform electrical energy into acoustic energy which is presented to the ear. Alternatively a bone conductor may be used when the sound is to be sent directly to the inner ear via the skull. Rubber cushions are fitted to the earphones. Alternatively insert earphones may be used, which are inserted into the ears. ● Producing a masking noise is an important facility available on most audiometers. Masking is especially required when the hearing thresholds differ significantly between of the ears. It is necessary to calibrate the audiometer to ensure accurate testing. Exchange of information across the world is possible if audiometers are all calibrated in the same way. The Calibration Standard of the International Standards Organisation (ISO) has been widely accepted; some countries, including the USA, have their own standards (ANSI). According to this standard the audiometer is adjusted in such a way that a

29 previously determined sound pressure for each frequency is delivered to the earphone. This known sound pressure was determined by testing large numbers of 1825yr olds with normal hearing to determine how much sound pressure must be delivered to the earphone to reach normal hearing thresholds. Pure tone audiometry An audiogram is a graphic representation of a hearing test. With a pure tone test, it is called a pure tone audiogram. It is usually drawn in graphic form, with the frequencies of the signals presented on the horizontal axis (Hertz / Hz) and the intensities of the signals on the vertical axis (decibels / dB). Pure tone audiometry determines a hearing threshold i.e. the lowest level in dB HL at which certain sounds can just be heard 50% of the time that it is presented at that level. This threshold is then plotted on the audiogram and the value is compared to normal and abnormal thresholds. Figure: an audiogram

30 Pure Tone Air Conduction Testing Figure: Pure tone audiometry conducting in a audiometric room Pure tone air conduction audiometry determines the hearing levels at different frequencies at which one can only just hear a tone presented to the external ear canal. Before testing is commenced, very clear instructions must be given so that no misunderstanding exists about how to respond during testing: ● Tell the client that earphones will be placed on the head and that tones will be presented at different frequencies, to one ear at a time ● Explain that the purpose of the test is to determine the hearing threshold level i.e. the level at which he/she can just hear the tone ● Tell the client to respond by pressing the button or lifting his/her finger as soon as he/she hears the tone ● The tone is initially be presented loudly so that the client hears it properly ● Then the sound is presented more and more softly ● He/she must release the button or drop the finger as soon as the tone is no longer audible

31 ● Explain that the tone will then be presented a little louder, and that he/she must respond as soon as he/she hears the tone as before ● It must be understood that the button must be pushed or the finger lifted every time the tone is heard ● Ask whether he/she is conscious of the fact that one ear may perhaps hear better than the other. If this is the case, then testing should commence with the better ear so that when testing is begun in the poorer ear, and it appears that the discrepancy between the ears is <40 dB, a masking noise can be presented to the better ear to prevent the client from hearing with that ear. If the client thinks the hearing is similar in both ears, then testing may be commenced in either ear ● Before commencing the test, ensure that the client understands all the instructions. During the test, continuously check that the client is responding correctly; if not, the test must be stopped to repeat the instructions before continuing the evaluation PURE TONE AUDIOGRAM For a beginner it is wise to follow a fixed testing procedure until sufficient experience has been obtained. The following stepwise approach about how to conduct a pure tone audiogram in adults and older children is intended as a guide for beginners. The experienced tester may alter the steps to adapt to the situation and to the client. Step 1: Connect the audiometer to the power supply and switch it on. Ensure that it is "live" by noting whether the power light is on Step 2: Properly connect the earphones to the apparatus and place them on the client's head. It is usual to place them in such a manner that the blue phone covers the left ear and the red phone the right ear. Some phones are marked "Right" and "Left". Ensure that the opening of the earphone is positioned directly over the external ear canal; the height of the phones may be adjusted to allow proper positioning. Ensure that hair is not interposed between the earphone and the ear. Insert earphones may also be used Step 3: Select the 1000 Hz frequency and set the output switch so that the tone is presented to the better ear. The reason that the test commences with 1000 Hz is because this falls in the middle of the most sensitive area of the hearing spectrum. It is also a clear tone to hear for a person who has never been tested before

32 Step 4: Initially present the sound at 30 dB HL. If a response is obtained it suggests that 30 dB sound is above the client's threshold. If no response is observed the level is raised to 50 dB and then raised in 10 dB increments until a response is elicited or the limit of the audiometer is reached at that frequency Step 5: Once a response is obtained the level is lowered in 10dB steps until the client stops responding. It is then raised in 5dB steps until he/she again responds. The sound is at this stage raised and lowered in 5dB steps until the client indicates 50% of the time that he/she hears the sound. The hearing threshold for that specific frequency is defined as the lowest intensity level in dB where a person hears a sound 50% of the time. This level is then transcribed onto the audiogram Step 6: Switch the frequency to 500 Hz and repeat the above steps. In most cases the difference between the thresholds of neighbouring frequencies does not differ much. Therefore the threshold level at 1000 Hz in Step 5 is used as the starting point for Step 6. Step 7: Repeat the tests at 250 and 125 Hz Step 8: Repeat the test at 1000 Hz as a control. If the difference between the initial and repeat measures is > 5 dB, it is assumed that the accuracy is satisfactory. If the difference in thresholds between the two tests at 1000 Hz is <10 dB, then the reliability of the test is suspect and it should be repeated from the start Step 9: Proceed to test at 2000, 4000 and 8000 Hz (intermediate frequencies at 750, 1500 and 3000 Hz are only tested if there are sharp drops i.e. <20 dB) in the audiogram at the octave frequencies 1 Step 10: Repeat all the above steps on the poorer hearing ear. Determine for every frequency whether it is necessary to mask. When, why and how to mask is discussed later. In general, if the air conduction threshold of the test ear, and the bone conduction threshold of the nontest ear 1 Interval between one pure tone and another with half or double its frequency differ by <40 dB, then the better ear must be masked to ensure that only the responses from the poorer ear are recorded. The reason for this is that interaural attenuation for air conduction is approximately 40dB. In other words, a sound presented to the test ear must be 40 dB louder than the bone conduction threshold of the non-test ear before that ear hears the sound Step 11: Masking: A signal of significant magnitude presented to one ear may be perceived by the other ear. This is known as crossover of the signal. Air conduction and

33 bone conduction audiometry are often confounded by such crossover or contralateralisation of the signal. When crossover occurs one therefore needs to isolate the ear you are trying to test. Masking is the procedure whereby noise is presented to the non-test ear (NTE) to keep it occupied while the test ear is being evaluated. Masking Procedure: ● Tell the client that he/she will hear a "noise" in the NTE which he/she must try to ignore ● He/she must only react to the pure tone ("whistle" or "beep-beep") ● Determine the initial masking level as indicated above ● Present the tone at the unmasked threshold level ● If there is a response, check the masking level by raising the masking level by 5 dB and again by 5 dB ● If there is a response - stop! The threshold is correct ● If there is no response, raise the tone by 5 dB steps until a response is elicited ● Check whether it is correct by raising the masking level twice in 5 dB steps ● Indicate the masked threshold on the audiogram as well as the minimum and maximum masking levels used Pure Tone Bone Conduction Test Figure: a bone vibrator

34 The purpose of a bone conduction test is to determine whether an abnormal air conduction test is due to conductive (middle ear), or sensorineural (inner ear or auditory nerve) pathology. Normal bone conduction with abnormal air conduction indicates a middle ear pathology. When the hearing threshold in both tests is more or less equal, it is likely to be a sensorineural problem. Figure: placement of bone vibrator on mastoid during bone conduction testing Bone conduction audiometry is done with an electromagnetic vibrator or bone conductor which is placed on the mastoid bone behind the ear and is held in place with a headband. The procedure for masking is usually the same as the air conduction testing. 1.4 Choice and Selection of Audiological Tests According to Age and Functional Abilities of the Child 1.4.1 Introduction Most of the audiometric can be applied with great reliability to children beyond ages 4 or 5 years. In such cases, the examination is often no more difficult than it is with cooperative adults. However, in many instances, because of the level at which a particular child functions, special diagnostic procedures must be adopted. Because the average prevalence of hearing loss in children identified through newborn hearing screening programs is 1 per 1,000 infants screened and because up to 3.1 percent of children and youth have hearing loss in at least one ear (Mehra, Eavey, & Keamy, 2009), the need for choice and selection of assessment procedure for children is self-evident.

35 1.4.2 Birth to 2 years of age Infant hearing Screening must be performed after birth in order to identify the presence and absence of hearing loss. As earlier there were no such tests available to detect hearing impairment just after birth, legislation for the implementation of universal infant hearing screening has been passed throughout most of the United States. Since the implementation of newborn hearing screening programs, an encouraging trend has been seen in the reduction of the age

of hearing loss identification and subsequent intervention (Harrison, Roush, & Wallace, 2003). The purpose of early hearing detection and intervention (EHDI) programs is

to identify children with hearing loss before they reach the age of 3 months. A number of criteria must be met before newborn screening of any disorder can be justified, including (1) a sufficient prevalence of the disorder to justify the screening, (2) evidence that the disorder will be detected earlier than would be the case without screening, (3) the availability of follow-up diagnostics immediately after the failure of a screening, (4) treatment accessibility immediately following diagnosis, and (5) a documented advantage to early identification Infant's hearing screening can be done by using various tests like, APGAR test, Auditory brain-stem response (ABR) audiometry, Otoacoustic emissions etc. Auditory brain-stem response (ABR) audiometry has become increasingly popular as a neonatal testing system When testing infants on the high-risk registry, it is important to compare responses to norms that correspond to children's gestational ages, rather than to their chronological ages, because immaturity of the central nervous system in a premature child can have a profound effect on results and must be taken into account. Follow-up testing is essential when ABR results are either positive or negative for infants on the high-risk registry. Equipment used for measuring ABRs in infants was initially rather costly and more sophisticated than that which was required in the neonatal nursery. Less expensive, dedicated units that have a higher degree of portability without sacrifice in quality have replaced this equipment. In recent years, automated systems have been developed that are easy to use; require little in the way of interpretation of results; and can be used by trained technicians, including volunteers. Electrodes and earphones are disposable and easy to apply and remove. Results with this kind of equipment have been very encouraging and can have a pronounced effect on lowering the cost of neonatal screening.

36 Figure: Auditory brain- stem response (ABR) audiometry used to screen an infant's hearing sensitivity The use of otoacoustic emissions (OAE) as a neonatal screening method has emerged rapidly in recent years. The OAEs have been shown to be specific, sensitive, and cost-effective measures in infants (Dhar & Hall, 2011). If all the requirements can be met, including a tightly fitting ear piece, quiet test environment, and so on, it can be assumed that infants whose ears produce evoked emissions have normal peripheral hearing, or no worse than a 30 dB hearing loss. The first few days of life are ideal for measuring OAEs because bodily movement makes it difficult to perform and evaluate, and neonates spend many hours each day in sound sleep. However, the presence of even a slight conductive hearing loss eliminates the measurable emission. Those who fail the OAE screenings should be followed up with ABR or other testing as deemed appropriate by the attending clinician. If the cochlea is normal and a lesion exists in a retrocochlear area, there is a good chance for normal- appearing emissions to be evoked. This fact produces a cogent argument in favor of a combination of OAE and ABR testing. Some screening programs pass an infant when an ABR screen is passed following a failed OAE screen. Given that a failed OAE may signify outer-hair-cell damage, some have questioned if such practice might be missing an early predictor of late-onset progressive hearing loss in children if strict adherence to follow-up guidelines is not maintained (Mann et al., 2001). Auditory neuropathy/

37 dys-synchrony (AN/AD) is often missed in newborn children because most hospitals screen using otoacoustic emissions. Patients with auditory neuropathy/dys-synchrony exhibit no auditory brain-stem response (ABR), no middle-ear muscle response, and both normal otoacoustic emissions and normal cochlear microphonic. An absent or grossly abnormal ABR is not always associated with deafness. In contrast, a hearing loss of 30 dB or more usually predicts absent otoacoustic emissions, but normal emissions can be seen in some patients whose behavioral audiograms imply total deafness. Observation of each child must be done by the audiologist before beginning of the audiological tests, like the relationship between the child and adult, their posture while standing or sitting and gaits. ASHA's most recent guidelines for pediatric hearing assessment (American Speech-Language Hearing Association, 2004) recommend that testing include behavioral, physiologic, and developmental measures, with a corroboration of test results with the child's case history, parental reports, and the clinician's behavioral observations. Presence of otoacoustic emissions can quickly give the audiologist the knowledge that hearing is no worse than the level of a mild hearing loss. Tympanometry can determine a number of middle-ear disorders, including abnormal middle-ear pressure; eustachian tube dysfunction; effusion, mobility, and integrity of the middle-ear ossicles; thin or perforated tympanic membrane; and patency of pressure- equalization tubes. Additionally, the sensation level or absence of the acoustic reflex can give general kinds of information about a possible sensory/neural hearing loss. Subsequent pure-tone testing (preferably done with insert earphones to circumvent potential ear canal collapse from the pressure of supra-aural earphones) can yield meaningful results without the addition of bone-conduction measures if normal tympanograms and the presence of acoustic reflexes have ruled out a conductive component to any identified hearing loss. A major problem with otoacoustic emissions and immittance tests with very small children results when children move about or cry. For a test to be accurate, the patient must be relatively motionless. Furthermore, any vocalizations—for example, crying— will be picked up by the probe microphone. An experienced team of clinicians can often work so efficiently that children are distracted and tested before they have time to object. At 1 year of age, the child with hearing loss may begin to lose the potential for normal spoken-language development. For this very reason, early screenings are of great importance. Lack of speech often brings a potential problem to the attention of the

38 parents or other caretakers. At 18 months, the normal child usually obeys simple commands. Speech tests are useful to evaluate children at this age because a child may give good responses to soft speech while apparently ignoring loud sounds. It is interesting that quiet-voiced speech sometimes elicits a response when whispered speech does not. Broadband signals and speech signals are used to test children below 2 years of age as these types of signals catches the attention of the child. But it has a major drawback, as many children with hearing loss have reasonably good sensitivity in some frequency ranges and impaired sensitivity in other ranges. During the first 6 to 8 months of age, behavioral observation audiometry (BOA), visual reinforcement audiometry (VRA) and sound field audiometry is often employed for the better responses of the child. 1.4.3 2 years to 5 years of age At 2 to 3 years of age, children who have no problems other than hearing loss can often be taught to respond to pure tones, especially warble tones. For this reason, awareness tests with voice, whispers, pitch pipes, and other special stimuli may begin to take a back seat in the evaluation process as clinicians increasingly rely on test stimuli with greater frequency specificity and procedures that more closely approximate true threshold responses. In spite of the goal to obtain frequency-specific auditory responses, behavioral assessment with children frequently begins with speech audiometry. Speech audiometric procedures permit a greater interplay between the audiologist and child, allowing for the establishment of the requisite rapport needed for subsequent pure-tone testing. Some children do not respond to pure tones, and by their almost stoic expressions, it appears that they cannot hear. A large number of these children can be conditioned to respond to speech signals. If they possess the appropriate language skills, many children can point to parts of their bodies or to articles of clothing. If this kind of response can be obtained, the clinician can recite a list of items, to which the child points. The level of the signal can be raised and lowered until speech threshold is approximated. Speech audiometry could be performed by doing speech detection threshold (SDT), speech recognition threshold (SRT) by using pictures of spondaic stress. Speech audiometry is often possible with children, even when they have very severe hearing losses. Use of the Ling Six Sound Test (Ling, 1989; Ling & Berlin, 1997) can provide frequency-specific hearing-loss information even when reliable tonal responses cannot be attained. The six sounds /a/, /u/, /i/, /S/, /s/, and /m/ are representative

39 of the speech energy contained within all the speech sounds of English. In particular, audibility of /a/, /u/, and /i/ indicates usable hearing through 1,000 Hz; audibility of /S/ suggests hearing through 2,000 Hz; and audibility of /s/ indicates hearing through 4,000 Hz. How well children can recognize those phonemes, and the formant frequencies they represent, can illustrate how well a hearing aid may meet their acoustic needs. At times the Six Sound Test is the only speech measurement that a child can or will perform. It is most useful when carried out in conjunction with other speech and pure-tone audiometric procedures. Many times, in testing small children, the problem is to get them to respond. The ingenuity of the clinician can frequently solve this problem. For a child to want to participate, usually the procedure must offer some enjoyment. Some children, however, are so anxious to please that they deluge the clinician with many false positive responses on pure-tone tests, so that it is difficult to gauge when a response is valid. In such cases, slight modifications of adult-like tests may prove workable with some older children. A child may be asked to point to the earphone in which a tone is heard. The ears may be stimulated randomly, and in this way the appropriateness of the response can be determined. The same result may be achieved by using pulsed-tone procedures, asking the child to tell how many tones have been presented. Many times it appears that no approach to a given child produces reliable results. This is particularly true of children with mental disability. However, Spradlin and Lloyd (1965) suggest that, given sufficient time and effort, no child is "untestable," and they recommend that this term be replaced by the phrase difficult to test. In operant conditioning audiometry (OCA), food is often used as a reward for proper performance. A child may be seated in the test room before a table that contains a hand switch. Sounds are presented either through the sound-field speaker or through earphones. The child is encouraged to press the switch when the sound, which can be either a pure tone or a noise band, is presented. If the child's response is appropriate, a small amount of food, such as a candy pellet, or a token is released from a special feeder box. Once children see that pressing the switch results in a reward, they will usually continue to press it in pursuit of more. It is essential that the switch that operates the feeder be wired in series with the tone-introducer switch so that no reward is forthcoming without presentation of the sound. In this way, the child gets no reinforcement for pushing the switch unless a tone is actually introduced and, presumably, heard. Signals that are thought to be above the child's threshold must be introduced first, after which the level may be lowered until threshold is reached. If severe hearing loss is suspected, a good starting point is 500 Hz at 90 dB HL because there is a strong likelihood of hearing at this frequency and level. Operant conditioning

40 audiometry requires much time and patience if it is to work. Often, many trials are required before the child begins to understand the task. As in other audiometric procedures, it is essential that the signals be introduced aperiodically because the child may learn to predict a signal and to respond to a sound that has not been heard. Often operant conditioning audiometry can be successful when other procedures have failed. The term tangible reinforcement operant conditioning audiometry (TROCA) was coined by Lloyd, Spradlin, and Reid (1968) to describe specifics of operant conditioning to audiometry. For a number of years clinicians have been using instrumental conditioning in testing younger children—that is, teaching the children to perform in a certain way when a sound is heard. This requires a degree of voluntary cooperation from the children, but the clinician can select a method that evokes appropriate responses. Play Audiometry: Often, using elaborate devices and procedures to test the hearing of young children is unnecessary. Many can simply be taught by demonstration to place a ring on a peg, a block in a box, or a bead in a bucket when a sound is introduced. The more enthusiasm the clinician shows about the procedure, the more likely the child is to join in. Children seem to enjoy the action of the game. Tones can be presented through earphones if children tolerate them, or through the sound-field speaker if they do not. Many children readily accept insert receivers because they are light and do not encumber movement. As has been discussed earlier, insert receivers increase interaural attenuation, which often decreases the need for masking and minimizes the possibility of overmasking in most cases. Any time testing is completed using sound-field speakers, the examiner cannot know which ear has responded. Electrophysiological Hearing Tests: It has been obvious for some time that objective tests for measuring hearing in young children are highly desirable. Thus, there has long been a search for a clear electrophysiological measure of hearing sensitivity to employ when other measures of hearing are inconclusive. Past electrophysiological tests have monitored changes in pulse rate, respiration, heart rhythm, and skin resistance. Procedural limitations and poor reliability have precluded these attempts at electrophysiological assessment from gaining popularity in the assessment of children. Electrophysiological tests today for the assessment of hearing thresholds primarily involve auditory evoked potentials through auditory brain-stem response (ABR) audiometry and the auditory steady-state response (ASSR). A primary advantage to these objective measures is that the procedures are effective during sleep. Many small children will sleep naturally during ABR testing or may be anesthetized with no effects on test accuracy.

41 1.4.4 School age Children The exact number of school-age children who have hearing impairments is not known. Surveys that attempt to come up with figures are also confounded by factors such as geographic location and season of the year; there are more failures during cold weather. It is probable that more than 5 percent of the public school population has a hearing impairment at any given time. Thus it is important to perform early hearing screening programs in schools by an audiologist. 1.5 Overview of audiological assessment of children with additional / associated disabilities 1.5.1 For children with language disorders: A young child's unwillingness to cooperate may be common to all sensory modalities and could indicate a disorder or combination of disorders other than hearing loss (e.g., mental disability or emotional maladjustment). If a child does not respond to visual stimuli such as lights or shadows or to touching or vibration, one might wonder whether the problem is in fact behavioral. However, if a positive response is obtained in one modality and a negative one in another, a certain pattern appears, which is more significant than a generalized response (or lack of response). Although long lists of possible causes for significant language delay have been postulated, such delay is usually produced by hearing loss, some congenital or early acquired symbolic disorders, attention deficit hyperactivity disorder (ADHD), mental disability, emotional disturbance, or autism. A common error committed by clinicians is to consider causes as an either-or condition and to attempt differential diagnosis to rule out all but one cause. The experienced clinician will have observed that the presence of one significant disorder increases, rather than decreases, the probability of another. When a small child has a language disorder, and hearing loss cannot be eliminated as a possible causal factor, the resources and experience of the clinician are called on for an appropriate diagnosis. The behavioral characteristics of the clinical entities mentioned here can frequently be ruled out on the basis of observation of behavior and developmental history. The problem then remains to differentiate between the hard-of-hearing and the otherwise language disordered child. Even though the child with brain injury is said to manifest such symptoms as impatience, hyperactivity, poor judgment, perseveration, and dysinhibition, often there is a symbolic disorder without the presence of bizarre behavior. Audiologists

42 frequently see children who are either believed to have hearing losses or whose auditory behavior is so inconsistent as to cast doubt on the presence of normal hearing. A parent or teacher may complain that a child's responses to sound are inconsistent, that performance is better when background noises or competing messages are at a minimum, and that it is possible that the child "just doesn't pay attention." Sometimes auditory test results appear normal on such a child, and the parents are mistakenly assured that all is fine. The audiologist must constantly be alert for auditory-processing disorders that can coexist with other learning and language disabilities. Screening tests are needed so that children with auditory processing disorders, however mild, will not be overlooked but will be correctly referred to the proper specialists, such as speech-language pathologists, for complete diagnosis and therapy (Martin & Clark, 1977). 1.5.2 Auditory processing disorder: The term auditory processing disorder is often applied to children whose recognition or use of language is not age-appropriate and/or is inconsistent with their level of intelligence. Many of these children also have additional learning disabilities that prevent them from progressing normally in their education. APD has been estimated to occur in 2 to 3 percent of children, with occurrence twice as likely in boys (Chermak & Musiek, 1997). Since APD has become recognized, it may be a favored diagnostic category, and there may be reason to be concerned that over diagnosis of this condition may occur, leading to inappropriate educational methods. Accurate diagnosis of APD is based on a multifaceted, comprehensive assessment, which includes input from audiologists, speech-language pathologists, psychologists, and educators. Auditory Neuropathy is probably rare in children, although this is controversial. Symptoms include mild-to-moderate sensory/neural hearing loss, abnormal or absent ABRs, absent or markedly elevated acoustic reflexes, and normal OAEs. The presence of OAEs strongly indicates that the lesion in these cases is medial to the cochlea. Amplification with hearing aids is met with mixed success, and many experts urge the use of signs for the teaching of language. 1.5.3 Psychological Disorders: Hearing loss that is congenital or acquired early in life can have an effect on social, intellectual, and emotional development, including "egocentricity, difficulty in empathizing with others, rigidity, impulsivity, coercive dependency, and a tendency to express feelings by actions rather than by symbolic communication" (Rose, 1983). As a child without normal hearing continues to develop, the normal parent−child relationship

43 is invariably affected, lending further justification for intervention at the earliest possible time. 1.5.4 Developmental Disabilities: Children with developmental disabilities may include those with mental disability, cerebral palsy, epilepsy, autism, or a wide variety of physical or mental challenges. While a high percentage of children with developmental disability have cognitive impairments as well, many have normal or greater than normal intelligence. Hearing loss among these children may go undetected because behaviors of auditory inattention may be attributed to the child's more overt handicap. Evaluation of children with developmental disabilities presents a true challenge to the audiologist. Responses from children who are profoundly multidisabled may be more reflexive than representative of true attention behaviors (Flexer & Gans, 1985). Such responses may be better evaluated in the context of the child's developmental age than his or her chronological age. Hearing may be considered normal if the development of auditory responses is generally consistent with the age level of the child's other developmental behaviors. This judgment becomes more difficult if the child's cognitive and developmental ages have not yet been determined. 1.6 Selection of modality/method of management (auditory, speech reading vs manual communication) based on aided performance (aided audiogram & speech identification) 1.6.1 Introduction Clinical hearing assessments deûne the auditory thresholds for a wide range of frequencies. This information assists clinicians in prescribing an aid with the proper acoustic parameters to amplify the speech spectrum at a comfortable level, while ensuring that other sounds do not exceed the dynamic range of the subject (Byrne et al, 2001). There are many communication choices available for those who are hard of hearing. Factors that may affect choices for improving communication for individuals who are deaf or hard of hearing include: ● Degree and type of hearing loss ● Individual differences in ability to use certain options ● Personal preference

44 1.6.2 Oral Communication Oral communication is a choice for many hard-of-hearing individuals, whether they have mild, moderate, or severe hearing loss. Those with milder hearing loss may participate in "speech training," which helps them to determine the words being spoken by the shape and movement of the lips. The combination of auditory information and visual information helps these individuals to communicate using spoken language. Along with speech reading training, individuals may receive speech and articulation training to help their speech to become clearer, more precise, and easier to understand. AUDITORY TRAINING Hearing aid fitting marks the beginning of the habilitation or rehabilitation program of a child with hearing impairment. It is not enough to only fit a good hearing aid to the child. The child has yet to learn to make the maximum use of the information that he or she is getting through the hearing aid. This can be achieved through systematic 'auditory training' which is aimed at teaching a child with hearing impairment to make use of residual hearing to the maximum extent possible." There are many philosophies and approaches to auditory training. All of them aim to help the child use the auditory sense effectively. Auditory training should become an integral part of the child's intervention program. "Auditory training is a set of procedures aimed at helping the aurally handicapped become more proficient in attending to the sounds of speech, discriminating one from another and effecting or increase in retention of sounds." (Kelly, 1953) "Auditory training constitutes a systernatic procedure designed to increase the amount of information that a person's hearing contributes to his total perception." (Sanders, 1971) "Auditory training consists of three facets: (1) discrimination of individual speech sounds, (2) hearing all orientation, (3) improvement of tolerance levels". (Alpiner, 1978) "It is the creation of special communication conditions in which the teachers and audiologists help hearing impaired children acquire many of the auditory percept on abilities that normally hearing children acquire naturally without their intervention". (Erber, 1982)

45 Stages of Auditory Training As mentioned before, there are different approaches to auditory training and different philosophies. However the very basic framework of auditory training which involves a step-by-step approach from the least to most difficult tasks is more or less maintained. The stages described below are the basic ones followed in the Traditional Approach' promoted by Hirsch (1966), Ling (1976) and Erber (1982). 1. Awareness or Detection of sound: It is the basic process of determining whether the sound is present or absent. It involves orientation towards the sound in readiness to get more information about it. It helps the child understand which things produce sound and which do not. It is also the basic step which must be acquired before the child can be taught to associate the sound and its source. Awareness of sounds helps the child to remain in contact with the surrounding acoustic world. 2. Discrimination: It involves perceiving the difference between sounds-the acoustic qualities, intensities, durations etc., understanding that different objects produce different sounds or that the same source may produce different sounds. Discrimination of same vs. different and generalization of sounds into different categorios are complementary abilities. 3. Identification: It involves labelling or naming what has been heard. The child can indicate the ability to identify a by pointing to the sound, pointing to a picture associated to the sound, pointing to a written word or sentence or repeating whatever is heard. identification of speech stimuli is related to the child's developing awareness that objects have names and these names have acoustic representations. This is a very important skill in communication. 4. Comprehension: It involves understanding. the meaning. It depends on language skills. It implies that the child can acquire new information through hearing and can act appropriately on that basis. It is a prerequisite for communication. 1.6.3 Manual Communication Individuals with more severe hearing loss, for whom communicating through speech presents more difficulty, may choose to pursue manual communication. One of the more popular communication choices for individuals with severe to profound hearing loss is manual communication. "Manual" refers to use of the hands in communicating language. One commonly known method is American Sign Language (or ASL). Sign language has its own grammar, denoted by hand position, movement, and placement in space.

46 Another form of manual communication (used in conjunction with oral language) is cued speech. Deaf or hard of hearing individuals may use cued speech, a manual system, to aid in their production and comprehension of spoken language. Cued speech uses a combination of hand movements and spoken language to differentiate between sounds that look the same on the lips. 1.6.4 Speech Reading Speech reading involves attempting to perceive speech by using visual cues to supplement whatever auditory information is available. Speech reading is used selectively in some instances such as an adult with severe, progressive hearing losses or some cochlear implement recipients where speech perception is challenging at best and attempting to maximize the use of visual cues. Traditional speech reading method: During the early 1900s, four methods of teaching speech reading were popularized. 1. Bruhn method (Mueller- Walle method) Martha Emma Bruhn (1912) ● Give emphasis on rapid syllable drill e.g. she/may/fe (She-may-free) ● Practiced recognizing homophonous words using sentence context cues. 2. Nitchie method Edward B Nitchie (1912) ● Emphasized the importance of the psychological process of speech reading practice centered on sentence materials and the identification of homophonous words through contextual cues. 2. Kinzie method (1917): Cora Kinze ● Combined the analytic syllable drill of Bruhn with more synthetic exercises of Nitchie. The constructed graded lessons for adults and children. 3. Jena method: (Karl Brauckmann 1944) ● Emphasis on mimetic (imitating or copying movements) and kinesthetic (perception of movement position and tension of body parts) forms sensations. Syllables are presented in a rhythmic pattern

47 Speech reading includes (Cherry .R, and Rubinstein A 1988): ● Lip-reading ● Facial expression ● Gesture, posture, and movement ● Situational cues ● Knowing the topic ● Knowledge of language ● Keeping informed ● Emotional factors ● Use your hearing. Speech Reading Training Techniques Speechreading approaches use one of two general approaches (analytic or synthetic) for speech reading instruction. A. Analytic speech reading training Analytic approach advocated by Bruhn and Brackman to speech reading is based on the concept that before an entire word sentence or phrase (the whole) can be identified it is necessary to preserve visually each of its basic parts. E.g. Phonemes g words g sentences. Analytic speech reading training objectives are directed towards developing vowel recognition and consonant recognition skills. The logic underlying much speech reading curricula is gradually to increase patient's reliance on the auditory signal for discriminating phonemic contrasts while they speech read. Vowel speech reading training objectives:(Tye –Murray 1992) One possible hierarchy of analytic vowel speech reading training objectives will discriminate words with /i/ and /u/ e.g. me and moo.

48 One possible hierarchy of analytic vowel speech reading training objectives: ● Will discriminate words with /i/ and /u/ e.g. me and moo. ● Will discriminate words with /i/ and /a/ à keep from cop. ● Will discriminate words with /u/ and /a/ à coop from cap. ● Identification of words with /i/, /u/ and /a/, using a four-item and then six-item response set. For e.g. Bean from bean, pot, pit, pool. ● Identification àwordsà/i/, /u/, and /a/ àopen set of familiar vocabulary. Consonant speech reading training objectives: There are three different types of speech features: Manner, Voice, & Place and consonants can be categorized according to this. The visual signal associated with consonant production ideally complements the auditory signal. Cues that signal manner and voice often are easier for hard of hearing persons to hear than are cues that signal place of articulation. Hierarchy of consonant analytic speech reading training objectives: ● Will discriminate consonant pairs that differ in place of production and share either voice or manner. e.g.: tag from the bag ● Will discriminate consonant pairs that share similar places of production but differ in manner and voice. e.g.: pan from man ● Will Discriminate consonant pairs that share place and manner and/or voice oe.g.: park from bark ● Identification à share manner à using four-item and then six-item response set oe.g. tag from tag, bag, back, and gas ● Identificationà voiced or voiceless àusing four items and then six-item response set e.g pop from pop, cop, cap, and top. ● Identification share place àusing four-item and then six-item response set o e.g. pan from pan , man, bat, and mat ● Identification of words from an open set of familiar vocabulary

49 B. Synthetic speech reading training Synthetic approaches of Nitchie and Kinzie to speech reading emphasizes that the perception of whole is paramount regardless of which of its parts is perceived visually. It considers the sentence and phrase to be the basic units. Synthetic speech reading training objectives: ● Will follow simple directions using a closed response set. ● Will identify a sentence illustration from a set of four dissimilar pictures. ● Will identify a sentence illustration from a set of four similar pictures. ● Listen to topic related sentences and repeat and paraphrase them ● Listen to two related sentences and then draw a picture of them or paraphrase them. ● Will speech read a paragraph –long narrative and then answer questions about it. A procedure known as continuous discourse tracking (CDT) developed by De Fillipppo and Scott (1978) is being used in speech reading assessment and therapy. Rules to follow when speech reading 1. Watch the talker's lips: This seems obvious but often a speech reader can be distracted by other events in the room, or the talker's hand gestures. Also, there may be a boundary to watch the talkers' eyes instead of the mouth. 2. Provide information to the talker about how to communicate: This may include asking the talker to speak clearly and at a slightly louder than normal conversational level. The talker should not shout or exaggerate lip movements. The talker should face speech readers, and should not show or cover the mouth such as with a hand. 3. Try to ensure that the room is well lit and that position in the room allows for optimal speech reading performance. Light sources should not cast shadows on the talker's face. The speech reader can position himself near to the talker so that he can see the talker's mouth and facial expressions.

50 4. Try to minimize background noise: Background noise might be minimized by ensuring that radios and TV are turned down or off. 5. Know the topic of conversation: During the conversation, ask someone the topic of conversation. It is much easier to recognize a message. Speech readers can learn something about the topic beforehand if he knows the topic in advance. 6. Pay attention to context cues:The situation in which the conversation occurs may provide information about what is being said the talker's facial expressions and what has been discussed beforehand may also be informative. 7. Keep a positive attitude:Speech reading can be tiring stay motivated and do not be distracted by anxiety and self-doubts. 1.7 Recommendation of Educational Set-up (Special, Partial Integration Vs Inclusive Education) Based On Aided Performance (Aided Audiogram & Speech Identification) As One Of The Factors 1.6.1 introduction Educational obstacles related to hearing impairments stem around communication. A student with a hearing impairment may experience difficulty in: ● the subjects of grammar, spelling, and vocabulary ● taking notes while listening to lectures ● participating in classroom discussions ● watching educational videos ● presenting oral reports Underscoring the difficulty that students with hearing impairments may have in presenting oral reports are the potential language development problems linked to hearing impairments. Arizona's Department of Education's Parent Information Network notes that "Since children with hearing impairments are unable to receive some sounds accurately, they often cannot articulate words clearly."

51 1.7.2 Special school: Children with hearing impairment study either in a special school or in a regular mainstream school. It is possible for these children to cross over from a special to a regular mainstream school if and when they want to. Special Education as a separate system of education for disabled children outside the mainstream education evolved way back in the 1880s in India. It was based on the assumption that children with hearing impairment had some special needs that could not be met in mainstream schools and therefore, they need to study in a separate school with other children having similar needs. In 1947, India had a total of 32 schools for the blind, 30 for the deaf and 3 for mentally retarded. The number of schools rose to around 3000 by the year 2000 (Department of Education, 2000). 1.7.3 Segregated in a Special School or partial school: Children diagnosed late or those who have not developed adequate functional language are enrolled in Special pre–school programmes. In special schools, special teachers help children build a strong foundation of language which would ease out the formal education in primary and secondary school, again, either in an integrated setup or in a special school depending upon the child's achievements. Teachers in special schools develop conversational skills by using various techniques. Special preschool curriculum to suit the needs of the children is devised and activities such as directed activity, storytelling, guided play are contrived to develop receptive and expressive language in the preschool hearing-impaired children. 1.7.4 Integrated education in regular school:
For children diagnosed and intervened at a very early stage and most importantly who have developed functional language could be included in regular preschool programs. However, assistance from special teachers or resource teachers would be required so that the child develops good reading and writing skills and a continual language enhancement
program. Inclusive education means refers to an education system that accommodates
all children regardless of their physical, intellectual, social, emotional, linguistic or other conditions.

Inclusive Education is about restructuring the cultures, policies, and practices in schools so that they respond to the diversity of students in their locality. It has the following characteristics: Inclusive Education ❏ acknowledges that all children can learn; ❏ acknowledges and respects differences in children: age, gender, ethnicity, language, disability, HIV and TB status, etc.;

52 ❏ enables education structures, systems, and methodologies to meet the needs of all children; ❏ is part of a wider strategy to promote an inclusive society; and ❏ is a dynamic process that is constantly evolving 1.8 Let Us Sum Up ● Various audiological tests were used to assess the hearing ability of a child with hearing loss. It may be objective or subjective depending upon the various factors like, age, cognition, motor skills etc. of the child. ● Behavioural observational audiometry is done for the screening purpose, combined with the sound field testing. ● Pure tone audiometry is one of the most reliable subjective test to find out the exact threshold of the child with hearing loss. ● Audiological assessment are needed to identify the children with hearing loss by using various formal and informal tests, and based on the tests results the appropriate intervention strategies, that is, amplification and speech and language therapy is suggested to the child with hearing impairment. ● Sometimes we need to assess the difficult to test population which may include children with ADHD, autism, Intellectual disability etc. audiological assessment may be carried out with the various behavioural tests along with the objective tests like, Otoacoustic Emissions, Auditory brainstem implant and Auditory steady- state response audiometry on behalf of the conventional pure tone audiometry. ● Depending upon the various audiological tests, the intervention strategies are selected. The methods and modality of intervention is selected based on the aided performance of the child with hearing loss. 1.9 Unit end exercises 1. Discuss the need for the audiological assessment. 2. Discuss various audiological tests used to identify the children with hearing loss. 3. Write shot-notes on:

53 ● Pure tone audiometry ● Behavioural observational audiometry ● Difficult to test population. ● Auditory brainstem response ● Special and partial school ● Integrated education vs inclusive education ● Speech reading 4. Discuss the audiological assessment of children with difficult to test population. 5. What are the different methods of management in a child with hearing impairment according to his/ her aided performance? 6. Discuss the various educational set up according to the aided performance of a child with hearing impairment. 1.10 References: 1. Bagatto, M. P., Moodie, S. T., Seewald, R. C., Bartlett, D. J., & Scollie, S. D. (2011). A Critical Review of Audiological Outcome Measures for Infants and Children. Trends in Amplification, 15(1), 23−33. doi: 10.1177/1084713811412056 2. Katz, J. (2015). Handbook of Clinical Audiology (7th ed.). Philadelphia: Wolter Kluwer Health. 3.

Martin, F. N., & Clark, J. G. (2015). Introduction to audiology (12th ed.).

NY: Pearson. 4.

Newby, H. A. (1985). Audiology: principles and practice (5th ed.). New York: Appleton-Century-Crofts. 5. Northern, J. L., Downs, M. P., & Hayes, D. (2014). Hearing in children (6th ed.). San Diego: Plural Publishing. 6. Sabo, D. L. (1999). The Audiologic Assessment of the Young Pediatric Patient: The Clinic. Trends in Amplification, 4(2), 51−60. doi: 10.1177/108471389900400205

54 Unit 2 ❏ Speech Assessment, Identification And Addressing Needs Structure 2.1 Introduction 2.2 Objective 2.3 Overview of Acoustics of Speech; Classification of Speech Sounds Based on Major Acoustic Cues 2.4 Compare And Contrast Speech Development In Typical Developing Children and CWHI 2.5 Phonological Errors as a Function of Audiogram Configuration (Flat, Gradually Sloping And Steeply Sloping) and Degree of Hearing Loss 2.6 Selection of Appropriate Strategies, Material, and Equipment for Teaching Speech 2.7 Need For Use of Regional Language Based Speech Assessment Tests 2.8 Let Us Sum Up 2.9 Unit end exercises 2.10References: 2.1. Introduction Acoustic phonetics is a subfield of phonetics, which deals with acoustic aspects of speechsounds. Acoustic phonetics investigates time domain features such as the mean squared amplitude of a waveform, its duration, its fundamental frequency, or frequency domain features such as the frequency spectrum, or even combined spectrotemporal features and the relationship of these properties to other branches of phonetics (e.g. articulatory or auditory phonetics), and to abstract linguistic concepts such as phonemes, phrases, or utterances. 2.2 Objective : The main objective of this unit is to make students/ teacher educator aware about: ● The acoustic of speech and speech sound classification according to acoustic cues

55 ● The difference between development of speech sounds in normal and hearing impaired children ● Phonological errors according to the different audiogram configurations ● Different strategies, material, and equipment for teaching speech ● Need for use of regional language based speech assessment tests 2.3 Overview of Acoustics of Speech; Classification of Speech Sounds Based on Major Acoustic Cues The study of acoustic phonetics was greatly enhanced in the late 19th century by the invention of the Edisonphonograph. The phonograph allowed the speech signal to be recorded and then later processed and analyzed. By replaying the same speech signal from the phonograph several times, filtering it each time with a different band-pass filter, a spectrogram of the speech utterance could be built up. A series of papers by Ludimar Hermann published in Pflügers Archiv in the last two decades of the 19th century investigated the spectral properties of vowels and consonants using the Edison phonograph, and it was in these papers that the term formant was first introduced. Hermann also played back vowel recordings made with the Edison phonograph at different speeds to distinguish between Willis' and Wheatstone's theories of vowel production. Further advances in acoustic phonetics were made possible by the development of the telephone industry. (Incidentally, Alexander Graham Bell's father, Alexander Melville Bell, was a phonetician.) During World War II, work at the Bell Telephone Laboratories (which invented the spectrograph) greatly facilitated the systematic study of the spectral properties of periodic and aperiodic speech sounds, vocal tract resonances and vowel formants, voice quality, prosody, etc. Integrated linear prediction residuals (ILPR) was an effective feature proposed by T V Ananthapadmanabha in 1995, which closely approximates the voice source signal. This proved to be very effective in accurate estimation of the epochs or the glottal closure instant. A G Ramakrishnan et al. showed in 2015 that the discrete cosine transform coefficients of the ILPR contains speaker information that supplements the mel frequency cepstral coefficients. Plosion index is another scalar, time-domain feature that was

56 introduced by T V Ananthapadmanabha et al. for characterizing the closure-burst transition of stop consonants. Speech sounds can be analyzed from the viewpoint of three as-pects: (1) acoustic, (2) physiological and articulatory, (3) functional. Phonetics is connected with linguistic and non-linguistic sciences: acoustics, physiology, psychology, etc. Speech sounds have a number of physical properties, the first of them is frequency, i.e. the number of vibrations per second. Phonetic contrasts are signaled by various acoustic dimensions in the temporal and spectral domains. Those dimensions that are used perceptually to identify speech sounds are called "phonetic cues"; they are acoustic cues that contribute to phonetic categorization. For example, the ûrst formant (F1) of a vowel sound corresponds to the height of that vowel; as the vowel height decreases, F1 increases. Hence, F1 serves as a phonetic cue for contrastive vowel height. There are multiple co-occurring phonetic cues for any particular contrast, which creates a high amount of redundancy in the signal. A classic example is the contrast between voiced and voiceless stops in word- medial position, which has been claimed to contain at least 16 different acoustic cues (Lisker, 1978). A wealth of literature has revealed that changes in one acoustic dimension can be compensated by conûicting changes in another dimension (for multiple examples, see Repp, 1982). For example, trading relations can be observed in the integration of cues for syllable-initial stop consonant voicing; changes in voiceonset-time that signal voicing can be somewhat offset by changes in the pitch domain that signal voicelessness (Whalen et al., 1993). As these and other cues covary in natural speech, the listener must integrate them in a way that yields reliable and accurate identiûcation of the incoming information. It has been shown that the use of acoustic cues for phonetic contrasts is affected by the developmental age (Nittrouer, 2004, 2005) as well as language background (Morrison, 2005) of a listener. The vocal cords vibrate along the whole of their length, producing fundamental frequency, and along the varying portions of their length, producing overtones, or harmonics. When the vibrations pro-duced by the vocal cords are regular they produce the acoustic impression of voice or musical tone. When they are irregular noise is

57 produced. When there is a combination of tone and noise, either noise or tone prevails. When tone prevails over noise sonorants are produced. When noise prevails over tone voiced consonants are produced. The complex range of frequencies which make up the quality of a sound is known as the acoustic spectrum. The second physical property of sound is intensity. Changes in intensity are perceived as variation in the loudness of a sound. The greater the amplitude of vibration, the greater the intensity of a sound; the greater the pressure on the ear-drums, the louder the sound. Intensity is measured in decibels (dbs). Although acoustic descriptions, definitions and classifications of speech sounds are considered to be more precise than articulatory ones, they are practically inapplicable in language teaching, because the acoustic features of speech sounds cannot be seen directly or felt by the language learner. Acoustic descriptions, however, can be ap-plied in the fields of technical acoustics. They are also of great theo-retical value. The research work made in acoustic phonetics is connected with 1) the methods of speech synthesis and perceptual experiment for the study of cues of phonemic distinctions and for the exploration of dif-ferences in tone and stress; 2) the design of speech recognizing ma-chines, the teaching of languages, the diagnosis and treatment of patho-logical conditions involving speech and language. The future work in acoustic phonetics will be connected with brain functioning and ar-tificial intelligence. "Experimentation will involve the whole of speech programming and processing, including the relations between the acoustic level of speech and operations at the grammatical, syn-tactical, lexical and phonological levels." Speech sounds are broadly divided into two categories, namely, Vowels and Consonants. If we say the English word shoe, we realize that this word is made up of two sounds, one represented by the letter sh and the letter oe. When we produce the word represented the letter sh slowly, we realize that during the production this sound, the air escapes through the mouth freely and we do not hear any friction. The sound that is represented by the letter sh in the word shoe is a consonant and the sound

58 represented by the letters oe in the word shoe is Vowel. (All sounds during the production of which we hear friction are consonants, but not all consonants are produced with friction). If we say the words she, shoe, shy, show, ship and shout, we will realize that when we produce the sounds represented by the letters e, oe, y, ow,i and ou in these words, the air escapes through the mouth freely without any friction. All these sounds are therefore vowels but each one of them sounds different form the others. These sounds should therefore be sub-classified. Similarly, if we say the words shoe, see, zoo, and who, we will hear friction during production of the sounds represented by the letters sh, s, z and wh. All the se sounds are therefore consonants. The air -stream mechanism: All English sounds (vowels as well as consonants) are produced with a pulmonic regressive air-stream mechanism, i.e., lung-air pushed out. The state of glottis; Speech sounds can be classified voiceless or voiced, depending upon whether the vocal cords are wide apart and the glottis is wide open (voiceless) or the vocal cords are kept loosely together and they vibrate (voiced). The position of the soft-palate; Speech sounds can be classified as oral or nasal, depending upon whether the soft-palate is raised so as to shut off the nasal passage of air (oral) or it is lowered to open the nasal passage of air simultaneously with an oral closure (nasal). Sounds can also be nasalized. And (e) The active and passive articulators: Of the various articulations described, at least two are required for the production of any speech sound; some articulators move during the production of speech sounds. These are termed active articulators. Certain other articulators remain passive and the active articulators move in the direction of these. These are termed passive articulator. The lower tip and the tongue are the active articulators. The upper lip and the entire roof of the mouth are the passive articulators. It should be remembered, however, that the upper lip and the soft palate are capable of independent movement; but when either of these is one of the articulators involved in the production of a sound, it is always the other articulator (the lower lip in the case of the upper lip and the back of the tongue in the case of the soft palate) that moves towards these. So the upper lip and the soft palate are considered passive articulators. The stricture involved: The term 'stricture' refers to the way in which the passage of air is restricted by the various organs of speech.

59 Types of stricture: Complete closure and sudden release: The stricture may be one of complete closure, i.e., the active articulators come into firm contact with each other, thus preventing the lung-air from escaping through the mouth. Simultaneously there is a velic closure, i.e., the soft palate is raised, thereby shutting off the nasal passage of air. Thus the lung-air blocked in the mouth. When the oral closure is released, i.e., when the active articulator is suddenly removed from the passive articulator, the air escapes with a small explosive noise. "Sounds produced with a stricture of complete closure and sudden releases are called Plosive". The initial sounds in the English word pin, bin, tin, din, kin, and gun are plosives. Complete closure and sudden release: If after blocking the oral and the nasal passages of air, the oral closure is removed slowly, i.e., if the active articulator is removed slowly from the passive articulator, instead of the explosive noise that is characteristic of plosive consonants, friction will be heard. "Sounds that are produced with a stricture of complete closure and slow release are called Affricatives." The initial sounds in the English word chin and jam are affricate consonants. Complete oral closure: the active and passive articulators are in firm contact with each other, thereby blocking off the oral passage of air completely. But the soft palate is lowered so that there is a velic opening, i.e., the nasal passage of air is opened. The lung-air will then escape through the nostrils freely. "Sounds that are articulated with a stricture of complete oral closure are called Nasals". The final sounds in the English words sum, sun, and sung are some examples of nasal consonants. Intermittent closure: The soft palate is raised, thereby shutting off the nasal passage of air. The active articulator strikes against the passive articulator several times with the result that the air escapes between the active and passive articulators intermittently. Such a stricture is termed intermitted closure. Sounds that are articulated with a stricture of intermittent closure are called trills or rolled consonants. The letter r in English words like red and ran is pronounced as a trill by most Scottish people. For some consonants the active articulator strikes against the passive articulator just once and then quickly flaps forward. Such consonants are called taps or flaps. The letter r in very is pronounced as a tap by some English people. Close approximation: The active articulator is brought so close to the passive articulator that there is a very narrow gap between them. The soft palate is raised so as
60 to shut off the nasal passage of air. The lung-air escapes through the narrow space between the active and passive articulators, producing audible friction. "Sounds that are articulated with a stricture of close approximation are called Fricatives". The initial sounds in the English word five, vine, thin, then, sip, zip, sheep and hat are fricatives. Partial closure: the active and passive articulators are in firm contact with each other. The soft palate is raised, thereby shutting off the nasal passage of air. If the sides of the tongue are lowered so that there is plenty of gap between the sides of the tongue and the upper molar teeth, the air will escape along the sides of the tongue without any friction. "Sounds that are articulated with a stricture of complete closure in the centre of the vocal tract but with the air escaping along the sides of the tongue without any friction are called laterals". The initial sound in the English word love is a lateral. Open approximation: The soft palate is raised, thereby shutting off the nasal passage of air. If the active articulator is brought close to the passive articulator so that the gap between them is wide the air will escape through this gap without any friction. "Sounds that are articulated with a stricture of open approximation are called frictionless continuants and semi vowels. In fact, Peter Ladefoged uses the term approximants to refer to sounds that are articulated with a stricture of open approximation. 2.4 Compare and Contrast Speech Development in Typical Developing Children and CWHI During the first year of life, babies produce a variety of vocalizations (sounds), beginning with simple cries at birth and progress through various stages to the first meaningful word. Babies first seem to develop speech naturally as they grow and most parents are not even aware how the process of speech development unfolds. However, not all children develop speech at the appropriate time. Hence, it is important to know and understand how speech and language develop in normal children. Once we know how normal development takes place it will provide a base to understand how the development of speech gets affected in children with hearing impairment.

61 By 3 months Makes cooing sounds By 5 months Laughs and makes playful sounds By 6 months Makes speech-like babbling sounds like puh, ba, mi, da By 1 year Babbles longer strings of sounds like mimi, upup, bababa By 3 years Says m, n, h, w, p, b, t, d, k, g, and f in words Familiar people understand the child's speech By 4 years Says y and v in words May still make mistakes on the s, sh, ch, j, ng, th, z, l, and r sounds Most people understand the child's speech The chart shows the ages when most English-speaking children develop sounds. Children learning more than one language may develop some sounds earlier or later. The foundation work for communication development begins in the first year of life. As the child matures he/she gains control over speech mechanism and moves on to various stages like reflexive crying, babbling and to voluntary speech production (i.e., meaningful words and sentences). The rate of acquisition varies from child to child as in vocabulary growth, and the process can go on throughout one's life. This development follows an orderly sequence and is predictable in character. The early stages are very important for the development of subsequent stages. Regardless of the linguistic community in which they grow up, all infants seem to pass through the same stages of vocal development. These stages are not discrete, that is, they may overlap from one stage to another. Description of these stages and the approximate ages associated with each are as follows: Reflexive Vocalizations (Birth to Two Months): Newsborns produce predominantly reflexive sounds such as crying and vegetative sounds (burping and swallowing). Reflexive sounds are mainly produced on exhalation and consist of sounds, which are vowel like in nature. The vegetative sounds are produced on both inhalation and exhalation and are of brief duration. Both reflexive sounds and vegetative sounds are

62 involuntary and not under the immediate voluntary control of the child. The common sounds made by the newborn are cries and comfort sounds. Crying sounds: Early crying is generally a discomfort sound and is also the first attempt of the infant to communicate in the environment. This cry is short and may accompany inspiration as well as expiration of air. Initially there is no variation in the cry but as the baby gains better control over respiration and phonation, cries increase in length and variation. When the baby is around 2 months old, parents can differentiate several distinct types of cry, that is, cry of hunger, discomfort etc., by its different pitch levels. Crying sounds help in the practicing of essential motor coordination and in the establishment of necessary feedback loops between the larynx, the mouth and the ear. In addition, the differential cry establishes a primitive communication (interaction link) between the child and the parent. Some vowel like sounds, that is, sounds like a, e and ai which sound nasalized may also occur in the early period. Cooing and laughter: During this stage, the infant begins to produce some comfort state vocalizations generally known as cooing gooing or gurgling sounds. They are mainly observed during orjust after feeding or some other forms of relief from distress, that is, when the child is in a comfortable state. When the cooing sound is heard carefully, the front vowels i, e and back consonants k, g will seem to predominate, but they are not nasalized as in crying. However, the child still lacks control over reflexive sounds like burping gurgling which appear frequently. Crying helps the child become accustomed to modified breathing patterns required for speech production. Apart from this, they produce other non-crying sounds during feeding or in response to smiling or laughter by the mother. All these sounds increase Development of Speech in production as crying decreases. The child at this stage shows signs of social awareness, which is evident in his following the adult's movements with the eyes and smiling. He responds selectively to the speech of the adults and also discriminates speech from non-speech sounds. By 3 months of age, the infant does show control of timing of vocalizations. This is evident when the infant vocalizes in response to speech of others. By four months of age there is more laughter. They produce self- generated babble sounds for their own enjoyment but appear more different sounding like "ma-ma-pa-pa or ta-ma-ta-ma. Babbling (4 to 7 Months): The stage of reflexive vocalization is followed by vocal play and babbling. Around 4 months of the sounds they produce in vocal play are

63 characterized by the appearance of very loud and soft sounds, very high and very low sounds (squeals and growls). Some babies produce long series of raspberries (bilabial trills), sustained vowels and occasionally rudimentary syllables of consonants and vowels occur. A good amount of this vocal play is carried on when the child is alone and it disappears when someone attracts his attention. Babbling refers to the child's production of chains and series of syllables (4 to 5) in a single breath. It is characterized by the chaining and linking of sounds together on one exhalation and may sound like ka-ka ge-ka or ba-ba da-ba-da. Syllables of all types, are produced including the CV (Consonant Vowel as in ba) which is most common followed by VC (Vowel consonant as in ab) and VCV (Vowel Consonant Vowel as in aka). Although these strings of syllables are more similar to standard sounds of a language they do not have any meaning. The baby just seems to be exploring by playing with his tongue, lips and larynx and gaining control over them and producing various sounds. In babbling we often hear the repetition of intonation and stress patterns so similar to the patterning of adult utterances that many parents feel that their baby is trying to tell them something. This is because they change the series of sounds in a sequence and may also change the length of the pause between the individual syllables. During this period sounds of other languages occur in the free speech. One of the important characteristics towards the end of this period is they often appear to listen carefully to their own babble and repeat it with slight change. Socialized babbling: Around 6 to 7 months when the infant can sit up and tries to crawl, some of the babbling seems to have an instrumental function which is evident when he seems to use it to get attention to reject, to demand and to request, that is, he babbles more in a social context. This is also known as socialized babbling. In this, front vowel ai or mid-vowels a and consonants like t, d, n and I are heard in combination ta da ba. Now the child seems to take more pleasure in babbling in front of others. He seems to be talking to himself and also sometimes to parents/caregiver. Canonical babbling (6 months and older): The main features of this period is the production of sequences of consonant vowel syllables with adult like timings. For the first time, babies sound as though they are actually trying to produce words. Multisyllabic utterances in this period are often classified into two groups. Reduplicated babbling ie, strings of identical syllables, like baba or Variegated babbling (i.e., strings with varying consonants and vowels like bagidaba. Both types of utterances occur at this stage, although reduplicated babble predominates initially. With the increase in age, the variety of

64 consonants increase in hearing babies. The infant hearing his own vocalizations and the vocalizations of those around him takes on increased importance during this time. At this point vocalizations of the child with deafness begin to decrease. In addition, the range of consonants within babbling also decreases especially after eight months. The hearing child increasingly produces h, l and r sequences. Some hearing infants begin to produce more speech like sounds as early as six weeks of age; however, children with H.I. do not show the same patterns. Inflected Vocal Play (8 Months to 10 Months and Above) Babbling which has a rich variety of sounds, can be heard as expressions of questions, commands, surprises etc. This is possible because of the addition of the tonal characteristics (intonation) that are imposed on babbling. Usually these utterances have no meaning but sound pleasant and delightful. There is marked gain in back vowels and front consonants. The infant begins to sound as though he is talking and masters' coordination necessary for meaningful speech. His imitation is more purposive. This is the last stage of babbling, which overlaps with the early period of meaningful speech. It has a rich variety of stress and intonational patterns. This is also known as jargon, conversational babble, or modulated babble. This jargon speech continues in some children for a longer duration whereas some children quickly move on to first words. Around 8 months the infant begins to imitate the communication of others, using echolalic speech. This period according to some authors is called as echolalic stage. Echolalia is speech that is an immediate imitation of some other speaker. In the beginning the child imitates only those sounds he has produced spontaneously. He will also imitate stressed syllables for example, he may repeat "na-na" when mother says "banana" though he may not be associating the production with the actual object. At the later part of this period, the babbling patterns becomes short and phonetically more stable. The jargon may sound like questions, commands and statements. By nine to thirteen months, children "understand" some words based on a combination of sound, non-linguistic and paralinguistic cues and context. Many speech sounds will develop sound-meaning relationships knows as Phonetically Consistent Forms (PCFs) e.g., biki for biscuit. These sounds function as words for the infant even though they do not resemble the adult model (word used by adults). During the age of 1 to 1% years the child has been an active listener and explorer. The child listens to the parents and others speaking throughout the routine tasks. The child responds to parental stimulation but selectively. The parent's smile, gesture or spoken word acts as rewards and increases the frequency of vocal behavior.

65 First Word: By the age of 1 to 1 h years most of the children say their first words. Their first utterances are single words and are often duplicative like baba for daddy, mama for mummy. The labials and dental sounds are most prominent in the first words. First word stage is marked by the presence of ideomorphs or self-made words. Before producing adult like words, the child uses different self-made syllables and words to denote different objects and actions, which are known as ideomorphs or protowords. Some ideomorphs could be short forms of the jargon. The child uses these utterances to describe a range of objects and events e.g. if... for injury or hot milk. He uses different intonations on the same ideomorphs to denote different meanings in different situations. And the child, does this till he masters the adult models. provides a summary of the development of speech. In the next the six months that follow the first word, the baby acquires more words with his vocabulary growing to approximately 50 words. Up to this point, the primary focus was on the sounds of language providing some detail on how vocalization development leads to the production of true words in a baby. Now we will see that how these jargon is replaced by coded and rule bound language. Development of Speech in Children with Hearing Impairment For the development of normal speech and language it is believed that the period of development from birth to approximately three years is a critical period. Thus, the domain of language is most directly affected by hearing loss in infancy. The development of speech and language can vary according to the onset of the hearing impairment and the type of hearing loss. In the following sections these are discussed in children with pre-lingual and post lingual hearing impairment. Pre-lingual Hearing Impairment A significant degree of impairment in hearing before

acquisition of speech and language is known as pre-lingual hearing loss.

Such as loss affects the child's normal development of speech and language His deafness does not permit (deprives) him to hear the verbal communication interactions present in his environment. Hence, the pre- lingual hearing impaired child has delayed speech and language or has problems in developing the spoken/verbal language at both comprehension and expression levels and it if not habilitated, will have other impairments that are secondary to the hearing loss. This is because, firstly, hearing loss sharply reduces the number of listening experiences that the child has and thus slows down the process of learning to talk. Secondly, certain type of loss makes it impossible for the child to distinguish some of 66 the elements of speech for example, a child with high frequency loss may misarticulate high frequency sounds such as s or sh because he is not able to hear them. As a result, he will not be able to say sounds he does not hear unless he uses hearing aids or undergoes structured special training. The development of speech by children with hearing impairment child and the degree to which an auditory verbal feedback loop can be directly related to the severity of the hearing loss, age of established. When a young child has hearing loss, he cannot learn to understand or express verbal language without assistance. This is because hearing loss reduces drastically the number of listening experiences the child has. This also reduces the process of learning the following aspects of language: 1. The hearing loss hampers the initial mastery of sounds of his language and/or affects the auditory feedback control, which is required for speech development. 2. In cases with severe hearing loss it makes it impossible for a person to hear the non-phonetic elements (suprasegmentals) in his own speech. This disturbs the effectiveness of his oral communication. 3. Hearing loss also disturbs the ability to adjust the levels of one's voice to the situation. 2.5 Phonological Errors as A Function of Audiogram Configuration (Flat, Gradually Sloping and Steeply Sloping) and Degree of Hearing Loss Phonological" errors", both pathological and slips of the tongue, are not" errors" in the sense of deviation from a learnable grammar. Rather," errors" follow a grammar, although it may be different from the target grammar native speakers acquire regularly. Children with a language pathology make consistent" errors" that follow identifiable rules. Phonological errors are seen in children with even mild to moderate sensorineural hearing loss (Zanichelli & Gil, 2011). Phonological slips are" errors" that involve phonological units which do not carry semantic content, including phonetic features, segments (consonants or vowels), sub-

67 syllabic sequences of segments (consonant clusters, rimes), syllables, and lexical stress (Jaeger 2005). Phonological "errors" are assumed to have two different causes: perceptual misidentification of sounds, or accurate perception but inability to reproduce the sound, leading to substitution of an unpronounceable syllable for a friendlier one (Stemberger 1989)." Errors" are thus generally divided into the classes contextual and non-contextual. The source of contextual" error" can either be found in the utterance itself or in the planning of the utterance. "Errors" can be further classified as either paradigmatic or syntagmatic. Paradigmatic "errors" have target and "error" units that share a quality of some linguistic paradigm, such as they are both words, both morphemes or both phonemes, and they are competing for the same spot in the utterance. Research has resulted in the classification of six different types of" errors": substitution, addition, omission, movement, exchange and blend. Substitution" errors" occur when one element of the utterance is substituted for another, which can occur on the phonological, morphological and lexical levels. Addition" errors" of phonology involve an inserted element into an incorrect location. If the "error" is contextual, the source is still spoken in the correct location. Omission" errors" occur in two different ways phonologically. First, there are assimilation" errors", where a phonological unit is omitted in the context of another phonological string which also lacks the element, making the "error" and source more structurally similar. The other type of omission "error" is the dissimilation "error", which occurs when a segment is planned for several slots in an utterance, and one of these instances is deleted. It is difficult to judge an "error" as dissimilation or assimilation because often, both possible sources occur in the utterance. Movement" errors" are a combination of omission and either addition or substitution. One element is deleted from its originally planned location and either added or substituted elsewhere. Exchanges and blends are strictly contextual and syntagmatic. Exchange "errors" occur when two elements exchange positions. Blend "errors" involve two different lexical units that are planned for the same slot in a phrase and their phonological forms blend together in a single unit.

68 2.6 Selection of Appropriate Strategies, Material, and Equipment for Teaching Speech Teachers frequently approach the speech therapist with questions and concerns regarding how a student is functioning within the classroom. Often these concerns are brought up at a Needs Assessment Team Meeting. In addition, parents also express concerns about the student and are an integral part of the team. Strategies can be provided to both teachers and parents as a part of the Needs Assessment Team process or on an individual basis as concerns arise. These speech and language strategies were primarily developed to provide classroom teachers with ideas to implement within the classroom prior to considering a referral for a speech and language evaluation. A chart to facilitate documentation of prior interventions is included also. When developing the strategies, efforts were made to address the most common areas of need. Please note that all suggestions may not be appropriate for every student and you may need to modify them on an individual basis. There are various teaching strategies

used for teaching speech to the hearing impaired are: 1. Auditory global approach 2. Multisensory syllable unit approach 3. Associated phoneme unit approach 1.

Auditory global approach For correct acquisition and production of speech the child must have an intact auditory channel. The child listens to adult speech, internalizes them and then starts producing them. The Journey from starting to produce a speech sound to fully master is production needs lot of self- corrections by the child him herself. He/she hears to adult speech, imitates and learn from it as a model then produces it correctly by sent corrections (with the help of auditory feedback). However, the child also uses other cues such as visual, kinesthetic along with auditory cues for speech acquisition. In case of children with hearing impairment mainly the auditory channel is used, along with the other sensory channels.

69 The selection of modality depends on the child's hearing level after amplification. For example in case of minimum benefit from amplification device, the visual, and tactile modes are largely used to supplement the minimum residual hearing. The term "auditory global" was given by Calvert and Silverman (1975). It mainly stresses the use of auditory method with minimum or no use of visual and tactile cues. The authors also emphasized early and continuous use of amplification device, comprehensive intervention at school as well as home, natural methods to model and teach speech and use of connected speech. 2. Auditory-Oral Approach In this approach speech reading and contextual cues are used along with residual hearing for understanding speech. The child is taught to combine hearing cues (with amplification device) with speech reading (lip reading cues) and understanding the context in which the conversation is carries out. This is a very useful approach for children with restricted residual hearing. However, this approach needs lot of practice by the child. Moreover, in absence of contextual cues, understanding becomes difficult. It can be easily incorporated by teachers in classroom during teaching sessions. The teacher can model the child how to speak, utter certain sounds/words etc. When used with young children after early identification and intervention, they can be easily mainstreamed. 3. Aural-Oral Approach The focus is on speaking and sound production. The therapist uses different types of modelling to show the child how to speak correctly. The child's aural skills(auditory) are developed for attaining oral (veroal skilis). In this approach the following is advocated and used by therapist/teachet 1) Directly talking with the child 2) Use of simple speech 3) Use of facial expressions and body language 4) Repeat the key words 5) Speak things from the child's context 4. Auditory verbal approach

70 It is a parent oriented approach, where the child's residual hearing is maximally used to understand speech of others and to learn to use spoken language for communication. In this approach the audition is taught in four classical levels: detection, discrimination and identification. VT is based on some fundamental principles like early detection, fitting of appropriate amplification device, regular assessment and therapeutic management, direct parent involvement, mainstreaming the child into regular educational system. With improved technology in amplification devices. it is very much possible to teach the child only through auditory channel. 5. Multi-sensory syllable unit approach As the name suggests the auditory channel is accompanied by other sensory channels. It is useful for children with limited residual hearing. Visual and tactile stimulation is used with auditory stimulation. Written forms /orthographic representation of sounds, words are used along with oral speech. Labelling is used for all the vocabulary in the child's environment. 6. Ling's approach Developed in 1976 by Ling. In this approach maximum use of residual hearing is advocated. In this approach the child is taught to understand speech of others as well as correct own speech production by using residual hearing. Two principals of Ling's approach are: 1. The hearing impaired child should be taught to develop speech in the same order as a normal hearing child will follow. 2. The speech organs move rapidly and precisely during speech production, which should be taught to hearing impaired children so that they can produce correct speech. Speech is taught at phonetic and phonological level, e.g., in phonetic level- nonsense syllables, repeated syllables are used. Then these skills are adapted to the phonological level. Initially vowels are taught in imitation, then consonants are taught. Teaching is an art which includes knowledge, presentation, an art of dissemination and above all every aspect of paralinguistic. Teaching demands broad knowledge of subject matter in all horizons, complete curriculum with standards, positive and caring attitude with enthusiasm, and a desire for learning and techniques of classroom management and a desire to make a difference in the lives of children with hearing impairment.

71 The existence of materials is totally based on the creativity and innovative ways of teachers. No one can assume even a single material without a Teacher because it is a teacher who uses the materials in the classroom effectively and the effective usage of those materials is reflected by the involvement of the students. We should know the difference amongst Teaching, Aid and Material. As per www.dictionary.com, "material used by a teacher to supplement classroom instruction or to stimulate the interest of students.". As per Merriam Webster, "Teaching Aid is an object (such as a book, picture, or map) or device (such as a DVD or computer) used by a teacher to enhance or enliven classroom instruction" and "Material denotes or consists of physical objects rather than the mind or spirit." There are various materials and aids developed for correcting the speech of a child with hearing impairment. Auditory aids, auditory trainer or speech trainer, tactile aids, visual aids and some electronic equipment like- N-indicator, vocal two, and S-indicator are used. An auditory aid is a device designed to improve hearing by making sound audible to a person with hearing loss. It includes hearing aids, speech trainer and other assistive devices. Hearing aids are classified as medical devices in most countries, and regulated by the respective regulations. Tactile aids are those which make use of the modality of touch for providing feedback about the speech production. Visual aids provide visual feedback about the aspects of speech production. 2.7 Need For Use of Regional Language Based Speech Assessment Tests Clinical history is critical for speech and language assessment. Information from relatives, friends, or witnesses is often necessary owing to the patient's decreased ability to communicate. ASHA's Preferred Practice Patterns for the Professions of Speech-Language Pathology(2004)indicates that comprehensive speech-language pathology assessment includes these components:

72 ● Case history, including medical status, education, socioeconomic, cultural, and linguistic backgrounds and information from teachers and other related service providers ● Patient/client/student and family interview ● Review of auditory, visual, motor, and cognitive status ● Standardized and/or non-standardized measures of specific aspects of speech, spoken and non-spoken language, cognitive-communication, and swallowing function, including observations and analysis of work samples ● Identification of potential for effective intervention strategies and compensations ● Selection of standardized measures for speech, language, cognitive- communication, and/or swallowing assessment with consideration for documented ecological validity and cultural sensitivity ● Follow-up services to monitor communication and swallowing status and ensure appropriate intervention and support for individuals with identified speech, language, cognitive-communication, and/or swallowing disorders There are various speech assessment tests developed for the children with hearing impairment in English. But due to language problem, most of these tests are not reliable for the assessment of speech for children who are apart from the English speaking areas. This causes the tests to be unreliable for the assessment of speech in child who speaks Hindi or other languages. Hence, there is a need for the development of speech assessment tools in regional language as to improve the validity and reliability of the tests. And a valid tests results. 2.8. Let Us Sum Up ● Phonetics is connected with linguistic and non-linguistic sciences: acoustics, physiology, psychology, etc. Speech sounds have a number of physical properties, the first of them is frequency, i.e. the number of vibrations per second. ● Speech sounds are classified into two categories i.e., vowels and consonants. ● The development of speech in a typical developing children is quite different from the development of speech in children with hearing impairment as the child

73 who has hearing loss has already missed some phonemes in the normal developmental ages. ● The children with hearing impaired may go for various educational setups like, special schools, partial schools etc. They also go for inclusive education and integrated education with some assistance. 2.9 Unit end exercises 1. Discuss the acoustics of speech. 2. What are the different classification of speech sounds based on the major acoustic cues? 3. Discuss about the phonological errors. What are the phonological errors seen in a child with hearing impairment based on their audiogram configuration? 4. Write short notes on: ● Acoustic phonetics ● Inclusive education ● Integrated education ● Vowels and consonants 5. Write about the different treatment approaches for teaching hearing impaired child. 2.10 References: 1. A G Ramakrishnan, B Abhiram and S R Mahadeva Prasanna, "Voice source characterization using pitch synchronous discrete cosine transform for speaker identification," Journal of the Acoustical Society of America Express Letters, Vol. 137(), pp., 2015. 2. A. P. Prathosh, T. V. Ananthapadmanabha, and A. G. Ramakrishnan, "Epoch extraction based on integrated linear prediction residual using plosion index," IEEE Transactions on Audio, Speech and Language Processing, 2013, Vol. 21, Iss. 12, pp. 2471-2480.

74 3. Essays, UK. (November 2018). The Classification And Description Of Speech Sounds English Language Essay. Retrieved from https://www.ukessays.com/ essays/english-language/the-classification-and-description-of-speech-sounds- english-language-essay.php?vref=1 4. T. V. Ananthapadmanabha, "Acoustic factors determining perceived voice quality," in Vocal fold Physiology - Voice quality control, O.Fujimura and M. Hirano, Eds. San Diego, Cal.: Singualr publishing group, 1995, ch. 7, pp. 113–126. 5. T V Ananthapadmanabha, A P Prathosh, A G Ramakrishnan, "Detection of the closure-burst transitions of stops and affricates in continuous speech using the plosion index," Journal of the Acoustical Society of America, Vol. 137, 2015. 6. Winn, M. B., Chatterjee, M., & Idsardi, W. J. (2012). The use of acoustic cues for phonetic identification: effects of spectral degradation and electric hearing. The Journal of the Acoustical Society of America, 131(2), 1465–1479. doi:10.1121/ 1.3672705

75 Unit-3 p p p p p Language & Communication Assessment, Identification and Addressing Needs Structure 3.1 Introduction 3.2 Objectives: 3.3 Parameters of selecting medium of instruction for CWHI: Language/s used at home, school & society 3.3.1 Age of Identification and Intervention 3.3.2 Family Involvement 3.4 Language assessment of the deaf: Challenges and concerns (standardized versus teacher made tools; Setting norms of children 'with' versus 'without' disability; modality dependent nature of language; measuring receptive language; identifying measurable indicators) 3.4.1 Challenges and concerns 3.4.2 Standardized versus teacher made tools 3.4.3 Setting norms of children 'with' versus 'without' disability 3.4.4 Modality dependent nature of language 3.5 Biological foundations and research in early language experiences in the past two decades: From input to uptake 3.5.1 Human Brain 3.5.2 Evolutionary Aspect of Brain and Language 3.5.3 Biological basis of language: Selectivist vs. Constructivist 3.5.4 Bio linguistics vs. Connectionist approach 3.5.5 Review on related literature related to Language Delay and Deprivation and Literacy 3.5.6 Review on related literature related to Spoken Language Development

76 3.5.7 Review on related literature related to Systems Combining Spoken Language with Visual Codes 3.5.8 Sign Systems' Development and Intervention 3.6 Processing sign languages in early years: Neural reorganization; Access to age appropriate language; Ease of intake; Universal grammar; Modality dependent versus modality independent components 3.6.1 Speech and Language Development children with deafness 3.6.2 Access to age appropriate language and ease of intake 3.7 Studying language assessment component in ICF and Recommendations related to language assessment reflecting in National Curriculum Framework (NCF) 3.7.1 Studying language assessment component in ICF 3.7.2 Recommendations related to language assessment reflecting in National Curriculum Framework (NCF) 3.8 Let us sum up 3.9 Unit end exercises 3.10. References 3.1 Introduction A communs1ication

option, mode, modality, or method is the means by which the child and family receive and express language. The choice of a communication modality that facilitates language development and allows the child who is hard of hearing or deaf to readily engage in communication interchanges with family and caregivers is a primary issue throughout childhood (Carney & Moeller, 1998).

There is a huge continued controversy exists over the specific communication options. Frequently, professionals with whom parents are in contact in clinical and educational settings have strong opinions regarding the issue (Tye-Murray, 1998).

Every child who is hard of hearing or deaf needs to develop language early in life and that the child and family need a method to communicate which facilitates natural, meaningful, and abundant interchanges.

77 3.2

Objectives:

After studying this course the student- teachers will be able to • Explain the

parameters of selecting medium of language instruction for children with hearing impairment at home, school & society • Critically analyze challenges and concerns related to language assessment of the deaf • Comprehend the biological foundations of language and related research in early language experiences of deaf • analyze the processing of sign languages in early years of deaf children • Study the language assessment component in ICF 3.3 Parameters of selecting medium of instruction for CWHI: Language/s used at home, school & society As families choose a medium of instruction or

communication approach for use by the family with infants who are deaf or hard of hearing there are multiple parameters or factors that impact their decision. Several of these parameters or factors are explored further below 3.3.1 Age of Identification and Intervention

The advent of newborn hearing screening has lowered appreciably the age of detection and subsequent intervention to between three and five months of age (Harrison et al., 2003), significantly earlier than the previous ages of identification of hearing loss in children late in the language-learning period (2.5 years and greater for mild and moderate hearing loss (Harrison and Roush, 1996). Language- based family centered early intervention provided before the first six to eleven months of life results in better language scores at older ages than intervention later in childhood (Yoshinaga-Itano et al., 1998 &
Moeller, 2000).
Language ages of children who received early intervention were within the average range when compared to hearing-age matched peers (Moeller, 2000). Five-year- olds who received later intervention had significantly lower vocabulary and verbal reasoning scores than the matched hearing-age sample.
The benefits of early intervention on later language development were found for children who communicated using either an auditory-oral or a Total Communication approach, with little influence of degree of hearing loss (
Yoshinaga-Itano et al., 1998 & Moeller, 2000).
78 3.3.2
Family Involvement The active involvement of the family in various aspects of the Early Intervention process appears to be a primary mediator of outcome regardless of the communication option used. Two factors accounted for a significant amount of the variance in children's language scores: family involvement and age of enrollment. The factor accounting for the greatest variance was family involvement. This was measured
through
family participation in the intervention program, and characteristics such as family adjustment and effectiveness of communication with the child (Moeller, 2000). There were numerous earlier studies
which
also supported the benefits of active participation of families in the early intervention process (
Greenberg, 1983; Greenberg et al., 1984; Watkins, 1987). Status of hearing within families: Some commonalities exist in language development between children who are deaf and children who are hearing. Language development is contingent on frequent, consistent, and accessible communication. These factors are the same for children of parents who are able to hear, as well as children of parents who are not able to hear. The mode of communication (signed or spoken language) is not a factor (Marschark, 2001). However, children who are deaf and born to hearing parents generally start learning language later, and with less consistent and less useful experiences. Such children do not share a native language with their family. Their hearing loss, on average, is not identified until their first birthday. These children are exposed to less linguistically rich environments than
deaf children of deaf parents or hearing children of hearing parents.
Because of these differences in language exposure, children who are deaf in homes with hearing caregivers commence their language learning at a later age than their peers (Marschark 2001). In families where parents are learning a new language, such as Sign Language (SL) or Signed English (SE), with which to communicate with their child, children have a tendency to acquire inconsistent or incorrect linguistic input (Kuntze, 1998; Marschark 2001). This early language deprivation explains the troublesome statistic that 90
percent of deaf children born into homes with only hearing caregivers experience delays in language acquisition compared to hearing children in hearing families and deaf children in deaf families (Kuntze 1998;
Meier & Newport, 1990). Because most children who are deaf do not have deaf parents (Moores, 2001), it is not surprising to see language delays from these children. Many actually are
79
language deprived up until their school exposure, which might be their first experience with a competent language model.
Use of Hearing Aids/Cochlear Implant: Several of the communication options available for use with children are highly dependent on the child having access to the acoustic features of speech through the use of either hearing aids or a cochlear implant that will facilitate the development of spoken language. The majority of children with hearing loss of mild to severe degree benefit from conventional amplification devices for the reception of spoken language and environmental sound. Even families who choose visual language may desire their child to use a hearing aid for the purpose of environmental sound awareness, alertness, and safety.
The

age of the child at hearing aid fitting was negatively correlated with children's number of words produced per minute, proportion of questions asked, and vocabulary, controlling for age at the time of the initial testing (
Ramkalawan & Davis, 1992).

Notably, all children received amplification after the age of 12 months.

Evidence suggests that earlier cochlear implantation (two to three years of age) results in greater overall vocabulary growth than children implanted later (four to five years of age) and a reduction in the gap between the chronological age and the language age of deaf children and their hearing peers (Brackett and Zara, 1998; Nikolopoulos et al., 1999).

Speech Intelligibility: Access to the acoustic features of speech through conventional hearing aids or a cochlear implant appears critical if a goal of the family is for their child to develop intelligible speech. Children with lesser degrees of hearing loss tend to have more intelligible speech than those with greater impairments; those with profound hearing loss have great difficulty developing intelligible speech using conventional forms of amplification (Boothroyd, 2000). Early speech reception skills appear to facilitate good speech production and speech intelligibility. Evidence suggests that children who were trained to communicate using an auditory or auditory-oral approach versus a sign language method (even one that incorporates the use of residual hearing) have better speech intelligibility at later ages (Geers et al., 1984; Markides, 1988; Geers & Moog, 1992). Compared to deaf children who use conventional hearing aids, there is evidence that children who use cochlear implants have better speech intelligibility and larger phonetic inventories (similar to that of children with normal hearing), with age of implantation apparently related to speech outcomes (Brackett & Zara, 1998). For this group of young children with profound hearing

80 loss, the cochlear implant provided sufficient acoustic speech features and self- monitoring capabilities for optimal speech production to occur, information that could not be provided by conventional amplification devices. Presence of Additional Disabilities: The numbers of children who are hard of hearing or deaf who have one or more additional disabilities (cognitive, visual, motor, attention, behavioral) is large. A family of a child with one or more developmental disabilities in addition to hearing loss has greater challenges in the selection of a communication approach. The ongoing family-centered diagnostic process appears critical for this population, particularly in infancy and early childhood when the child's strengths and limitations for communication have not been delineated fully. Children who are hard of hearing or deaf and who are visually limited or blind represent a unique population with regard to available communication options that

called somatosensory form of communication. Following Table presents some of the additional parameters that can influence the family's selection of a communication

medium. Parameters Considerations Language used in the home ● Spoken (English) ● Bilingual (use of 2 spoken languages) ● Visual (SL) ● Combination of visual and spoken (bilingual) Family Involvement ● Abundant opportunities for language learning and communication in the home ● Level of participation in intervention ● Home situation/family membership and other demographic factors ● Consistency in learning & using SL, cued speech ● Socio-economic circumstances ● Work schedules Age of Identification & Intervention ● Before 6 to 11 months of age ● After 6 to 11 months of age Literacy ● Speech perception ● Development of phonological awareness

81 Community resources ● Availability of certified AV therapists; auditory- oral therapists, sign language interpreters, SL community, etc. ● Availability of Early Intervention programs that use above approaches Hearing status ● Degree of hearing loss ● Stability of hearing loss Hearing Aids & Cochlear Implants ● Consistent use of Hearing Aids/FM system ● Cochlear implant candidacy ● Financial constraints related to acquiring assistive device technology ● Expectations regarding benefits of device Speech Intelligibility ● Access to acoustic speech features through hearing aids/cochlear implant ● Speech therapy Presence of additional disabilities ● Visual ● Motor ● Cognitive ● Attention/Behavior Availability of later educationaloptions ● Mainstream with support services ● Special school 3.4 Language assessment of the deaf: Challenges and concerns (standardized versus teacher made tools; Setting norms of children 'with' versus 'without' disability; modality dependent nature of language; measuring receptive language; identifying measurable indicators) Assessment is an important part of monitoring learning, creating educational programming, and identifying children for services. For deaf children, engaging in meaningful assessment is a complex and multifaceted process (Miler, M.et.al, 2016 & Wood, N. & Dockrell, J., 2010). Well done assessments support learning and growth, while inaccurate assessment data may lead to potentially faulty decision-

82 making and poorly designed educational plans for deaf children in schools. Inaccurate assessments can also lead to the misdiagnosis of additional disabilities. Of particular importance is capturing the language and literacy development of deaf children in schools, as understanding these skills is essential to educational planning and decision-making. There are many approaches that can be utilized during the assessment process, and no one test can provide all the information necessary for the deaf children. Assessment and evaluation of progress among children who are deaf or hard of hearing is a complex process. Challenges often go undetected by individuals unfamiliar with the hidden impact of a hearing loss. Challenges to professionals in the field of deaf education are particularly notable in the areas of information access, communication modalities, language, selection and application of assessment tools, technology, and access to highly qualified personnel. Therefore, there is need to (Miler, M.et.al, 2016) address the challenging nature of assessing language for the deaf population and (Wood, N. & Dockrell, J., 2010) review the factors that influence the selection of assessment approaches and tools for deaf children, including the assessment purpose and language being assessed. 3.4.1 Challenges and concerns: Language and literacy development are essential to educational programming for deaf children; however, assessing these skills remains a challenging task. Deaf children often use a wide variety of languages and/or communication systems in their home, school, and community, which make assessing language proficiency difficult For example; the language of instruction, language of socialization, and language of the home may all be different for a deaf child. As such, a child may use spoken language, sign language, or some combination of both in their daily lives. This unpredictability in language use may leave gaps in a child's linguistic repertoire, making it hard to establish the primary language to be used during the assessment administration or even which languages should be included in the assessment. Although there are challenges to appropriately assessing the language and literacy development of deaf children, the conditions of the assessment will be improved if the child is assessed in what is believed to be the child's most proficient language based on background information about the child and her/his language history. The length of time a child has used a language should always be a factor in determining the language in which an assessment will occur. The assessment of all languages and communication systems used by the child is also necessary for a comprehensive portrait of a child's abilities (Jamieson & Simmon 2011 & Pizzo

83 & Ford). When conducting the assessments of these various languages, the use of a qualified examiner who can communicate directly with the child contributes to the validity of the assessment. Finally, the assessment should also include multiple sources of information from across various contexts (e.g., home, school, community) and informants (e.g., educators, family, etc.) in order to document across- and within-context skills (Pizzo, L.& Chilvers, 2016). 3.4.2 Standardized versus teacher made tools: The various types of assessment approaches have been traditionally grouped into two categories: formal and informal assessment. Despite being controversial for some groups of learners (e.g., young children and culturally and linguistically diverse children), formal assessment is often preferred in schools, as each test is constructed to produce scores that are valid and reliable. Informal assessment, however, is the most widely used form of assessment in classrooms and educational settings, as it lends itself well to monitoring and documenting a child's learning on a regular basis. Formal assessment uses psychometrics to create a test with the power, validity, and reliability to isolate specific skills and compare a child's performance to that of other children . In order to have confidence in the scores produced, the test must be administered the same way each time it is given .When a test is administered outside of its intended population, however, there may be required deviations to the administration protocol that can impact the validity of the scores. In most standardized assessments are intended to be used nationwide and are created based on a sample of children that often mimics the Census data. For deaf children, these standardized tests can provide insight into how a deaf child compares to other children at their age or grade using normative data. A handful of these assessments have also collected normative data specifically with deaf children; however, the heterogeneity of the population, small sample size compared to their hearing counterparts, and sample bias all render the scores problematic at best . There are very few tests designed for deaf children, which creates challenges to the validity of the tests, as the items may be based on auditory concepts inaccessible to a deaf child and it may be impossible for them to be translated into a signed language (Jamieson, J.R.; Simmons, 2011). As a result, deviations to the administration protocol may be necessary for equity (Case, B. 2005). For deaf children who use a sign language, sign translations of test content are frequently used, as the overwhelming majority of standardized tests are designed and administered in spoken English. These translations can occur in three ways. First, if the examiner

84 is proficient in the child's sign language, they can directly administer the test to the child in that language. Second, the examiner can collaborate with an ancillary examiner who is proficient in the language and understands how to administer tests appropriately. Finally, the examiner can use a sign language interpreter to translate the test during the testing session. While these strategies can help to expand the available test materials for deaf children, the interpretation process creates challenges of their own. Even when an examiner is able to administer a test in sign, without standardized test administration protocols or a sign language script, it is hard to administer the test in exactly the same way each time it is given. Access to an ancillary examiner who has both the knowledge of the assessment and the language skills necessary is not typical outside of schools for the d/Deaf. Even when there is a trained person to assist, they might be taken away from other important duties in order to assist in the test administration. Sign language interpreters may be available for the assessment even when ancillary examiners are not; however, without formal training on assessment, the interpreter may inadvertently affect the child's scores (Cromwell, J.2005). Each of these situations poses threats to the semantic equivalence for the test, an important aspect of test validity. Semantic equivalence is when a translation of the test keeps the item content and difficulty the same across both languages (Barrueco, S.; Lopez, M.; Ong, C.; Lozano, P.2012). 3.4.3 Setting norms of children 'with' versus 'without' disability: A classical issue in the development of assessment instruments for children is a decision on who constitutes the norm (Singleton & Supalla, 2003). Ideally, separate norms are developed for children 'with' and 'without' disability subgroups of the total sample when it is known that the developmental path of the acquisition of the language in question is different for these groups. To illustrate, spoken language tests sometimes have separate norm for boys and girls (Zink & Lejaegere, 2002), or for children who are born in bilingual families or in families in which the parents do not speak the language in question (Verhoeven & Vermeer, 2001). Deaf children of deaf parents would constitute such a subgroup as deaf children of deaf parents, on average, tend to have a higher level of proficiency in comparison with deaf children of hearing parents (Boudreault & Mayberry, 2006; Hoiting, 2005; Herman & Roy, 2006; Maller et al., 1999). Johnson (2004), very rightly, has questioned the appropriateness of using an entire population of children who are exposed to sign language to develop normative scores. With the exception of the sign language assessment instrument developed by Anderson and Reilly (2002),

85 which was normed with exclusively deaf children of deaf parents, all the norm- referenced assessment instruments that have now been developed have used combined groups of native (deaf and hearing) children and nonnative deaf children to develop normative scores (Herman et al., 1999; Maller et al., 1999). At present, deaf children of deaf parent is unfortunately not large enough to develop separate norms for subgroups. The norms were extracted on the basis of all the deaf children who participate in norming study. 3.4.4 Modality dependent nature of language: Crossing modalities from oral to sign language impacts the semantic equivalence of the assessment, as appropriately signing the test item may affect the content of that item through a concept called iconicity. Iconicity is when a sign used to represent a concept or object may look visually like the referent (Miller, M. 2008). When the iconicity is high, a sign may inadvertently give a child the cues to the correct answers . For example, if the test item asked, "which shape is the circle?" and the answer choices were a square, circle, triangle, and a diamond, simply signing the question inadvertently gives clues to the answer, as the signs for these shapes mimic them closely. When translation does not modify the content of an item, it still may change the level of difficulty of it. For example, sign language phonology or morphology can affect the difficulty of an item by providing cues that can help elicit the correct answer. These content changes have been well documented for ASL translations of math assessments, as they may provide number or mapping cues that can be used to solve the problem presented (Ansell, E.; Pagliaro(2001),& Ansell, E.; Pagliaro,(2006) & Kritzer, K.; Pagliaro, C.; Ansell, E. (2004). For example, an item might ask, "If Sally has 3 balls and Bobby has 2 balls, how many do they have altogether?". The sign for "altogether" also means "to add" in the context of math. The use of this sign thus signifies which mathematical operation to use. Identifying measurable indicators: (1) Use a variety of assessment tools and strategies to gather relevant functional, developmental, and academic information about the child, including information provided by the parent that may assist in determining— (i) Whether the child is a child with a disability under disability acts. (ii) The content of the child's IEP, including information related to enabling the child to be involved in and progress in the general education curriculum

86 (2) Use multiple measure or assessment as the sole criterion for determining whether a child is a child with a disability and for determining an appropriate educational program for the child; and (3) Use technically sound instruments that may assess the relative contribution of cognitive and behavioral factors, in addition to physical or developmental factors. (4) In other evaluation procedures public agency must ensure that— (i) Instruction are provided and administered in the child's native language or other mode of communication and

in the form most likely to yield accurate information on what the child knows and can do academically, developmentally, and functionally, unless it is

clearly not feasible to so provide or administer; (ii) Are used for the purposes for which the assessments or measures are valid and reliable; (iii) Are administered by trained and knowledgeable personnel; and (iv) Are administered in accordance with any instructions provided by the producer of the assessments. (5) Assessments and other evaluation materials include those tailored to assess specific areas of educational need and not merely those that are designed to provide a single general intelligence quotient. (6) Assessments are selected and administered so as best to ensure that if an assessment is administered to a child with impaired sensory, manual, or speaking skills, the assessment results accurately reflect the child's aptitude or achievement level or whatever other factors the test purports to measure, rather than reflecting the child's impaired sensory, manual, or speaking skills (unless those skills are the factors that the test purports to measure). (7) The child is assessed in all areas related to the suspected disability, including, if appropriate, health, vision, hearing, social and emotional status, general intelligence, academic performance, communicative status, and motor abilities; (8) Assessments of children with disabilities who transfer from one public agency to another public agency in the same school year are coordinated with those children's prior and subsequent schools, as necessary and as expeditiously as possible

87 (9) In evaluating each child with a disability under disability act, the evaluation is sufficiently comprehensive to identify all of the child's special education and related service's needs, whether or not commonly linked to the disability category in which the child has been classified. (10) Assessment tools and strategies that provide relevant information that directly assists persons in determining the educational needs of the child are provided. 3.5 Biological foundations and research in early language experiences in the past two decades: From input to uptake: Human being is the only living being on the earth to have a highly developed language system, which no other creatures possess. To understand this extraordinary capacity of linguistic behavior, we have to find out the way human differs from the rest of the animal kingdom, in terms of the evolutionary aspect. In evolutionary biology, one concept is very popular and has a wide range of implications in different branches of the human cognition, and that one is as follows – ontogeny repeats phylogeny. The most vital proof of this fact can be traced out from the structure of the human brain. It can be divided into three constituents, among which the most fundamental one is popularly known as the reptilian brain. Out of this reptilian brain evolves the mammalian brain. After that the deposition of the gray matter, popularly known as the neocortex, ultimately transformed it into the human brain. This neocortex is divided into different hemispheres, popularly known as the left and the right hemispheres. 3.5.1 Human Brain: The mammalian brain became the human brain by adding the massive grey matter (neocortex) which envelopes most of the earlier brain and amounts to about 85 per cent of the human brain mass. The brain is actually divided into its 'hemispheres' by a prominent groove. At the base of this groove lies the thick bundle of nerve fibers which enable these two halves of the brain to communicate with each other. The left hemisphere usually controls movement and sensation in the right side of the body, while the right hemisphere similarly controls the left side of the body. We saw that with the mammalian brain emerged feelings such as attachment, fear and anger and associated behavioral response patterns. And human emotional responses depend on neuronal pathways which link the right hemisphere to the mammalian brain which in turn is linked to the even older reptilian brain. The way is fascinating in which work is divided between the two halves of the brain, their different

88 functions and the way in which they supplement and co-operate with each other. A general overview of the functional division of activities between the two hemispheres would be: Left Hemisphere: Communicates by using words, has highly developed verbal abilities, is logical and systematic, concerned with matters as they are. Right Hemisphere: Communicates using images has highly developed spatial abilities, is intuitive and imaginative, concerned with emotions and feelings. 3.5.2 Evolutionary Aspect of Brain and Language: Brain and language both are subject to the evolution. Evolution is, as Darwin recognized, a complex process that inherently involves all aspects of the life cycle and environment of the species and its relationships to other species. Everything depends on everything else, and the interaction through natural selection is the crucial factor if anything is. A Darwinian approach to the study of language of course involves more than the application of the theory of the natural selection. We will, for example, make use of the principle of pre-adaptation, that is, natural selection channeling development in a new direction because of previous modifications for some other role. This principle is extremely important, for it demonstrates how natural selection operating in small steps can effect radical changes in behavior. Therefore in case of language, same thing can be referred to. From some of the present day experiments it can be clearly deduced that the principle of pre-adaptation, works an important role even in the work of the linguists. They are referring to the fact that there is a biologically determined language acquisition device, acquired in course of evolution, which plays a crucial role in case of the language acquisition. This theory of innateness is nothing but the resonance of the same principle of pre- adaptation. Moreover it is found that even a pre-linguistic child has the capacity to make a differentiation between voiced and voiceless bilabial sounds at the time of sucking. The rate of sucking gets higher when (s) he is exposed to the voiced bilabial sounds, in comparison to there non-voiced counterparts. This type of pre- linguistic ability is basically acquired by the human being by the course of evolution. And this ability, by and large, is universal throughout the different cultures. Even in case of the deaf child, it is found that the pattern of babbling is quite same as that of the normal child, in the prelinguistic period. The difference originates only in the level of the verbal child, which is specific to the culture. Therefore the notion of language essentially incorporates two levels of discussion- one, the pre- linguistics evidences shows that the existence of a universal pre-adaptive principle, which can be equated with the concept of the innateness hypothesis and two, in course of development, the child acquires the language specific particular grammar,

89 which is channelized to a particular direction because of the preadaptive innate principle. 3.5.3 Biological basis of language: Selectivist vs. Constructivist There is a big issue related to language is that whether it is innate, for, clearly, language must be learned. Nor is the issue whether the aptitude for learning a language is inborn: it takes a human being, with a functional brain to learn a tongue. The question to explore is whether there is biological foundation at the root of organization and internal structure of language. The scholars considering spoken language acquisition have divided over internal and external causation dichotomy. Two prototypical models of language acquisition are "Selectivist" and "constructivist" models, respectively. The Selectivist model, which depends on internal causation argument, can be associated with Noam Chomsky. The Selectivist model assumes that "language template is pre-organized in the neuronal structure of the brain, so that the fact of being an integral part of a given environment selects the borders of each individual neuronal structure, without affecting its fine organization, which pre-exists". The constructivist model, which assumes external causation of language acquisition, follows lines drawn by behaviorists such as Piaget and Skinner. This model assumes that "language is built up constantly from a continuous interaction with a well-structured environment". 3.5.4 Bio linguistics vs. Connectionist approach: Bio linguistics

approach involves the study of questions concerning (1) language, (2) language development, and (3) language evolution. It is explicitly considered to the study of the biology of language. The connectionist approach is radically different, as is explained in Rethinking Innateness. The main query is how seriously one should take biological constraints. Connectionist approach

is concerned with intelligent behavior in general. It includes organically based intelligence (human language, basket weaving, nest building, etc.) as well as

silicon based

intelligence (chess playing computers, computers that recognize speech etc.). Thus connectionists are interested in general-purpose learning algorithms that work across domains and across organisms, whether based on DNA or on silicon. 3.5.5

Review on related literature related to

Language Delay and Deprivation and Literacy: Historically, researchers frequently cited the hearing level of the d/hh child as the sole culprit for performance, or lack of performance, in a variety of areas, including literacy, theory of mind, and language development(

Goldin-Meadow, S.; Mayberry,

90 R. 2001& Woolfe, T.; Want, S.C.; Siegal, M. 2002).

In recent years, however, some have posited that deprivation of language at early ages may be responsible for difficulties with later achievement in these areas rather than hearing loss itself (

Hall, M.; Eigsti, I.; Bortfeld, H.; Lillo-Martin, D.(2017) & Henner, J.; Caldwell- Harris, C.L.; Novogrodsky, R.; Homeister, R.J.(2017).

This perspective allows for a broader consideration of languages and modalities and a wider array of strategies for meeting the needs of d/hh children and places special emphasis on the importance of language access at early ages. Although the literature on language deprivation and its effects on academic outcomes such as literacy is in its early stages, researchers have examined the differences between d/hh students who had early versus late exposure to language for a number of years. Mayberry(2007)and Mayberry and Lock(2003), for instance, documented differences in language development and language outcomes for children who were exposed to ASL early in life as compared to those exposed to ASL later. However, such differences are not only present in those who go on to use ASL: there is also potential for children with even a mild to moderate hearing loss and who use primarily or only spoken language to experience the effects of language delay (

Halliday, Tuomainen, and Rosen,2017).

Other researchers have found a strong relationship between language proficiency (regardless of modality) and literacy among older d/hh learners. Together, these bodies of literature suggest a strong need for accessible exposure to language from birth. The important research documenting the effects of language delay or deprivation on literacy development is of paramount importance to the field. However, the research base is still limited in terms of our knowledge of language and communication interventions that may be most effective for those children who do not receive the ideal early language exposure. Below, we explore the development of and instruction in the most common modes of communication for d/hh children. We have broken these into two major areas: the use of natural languages, such as ASL and spoken English are explored first. These are grouped together because they are both languages that can be naturally acquired and are full and independent languages. Then, we examine what is known about systems that involve spoken language and visual supports, specifically signed versions of English and cued speech. These are grouped together because they are systems of communication that have been created to support the learning of a natural language (English) among d/hh children. Neither of these are a language in their own right, but are tools that have the goal of making English more accessible and visual. Natural languages and visual systems differ in how they develop, but users of both have the goal of providing d/hh children with educational experiences that will support their development of both language and literacy skills.

91 3.5.6

Review on related literature related to

Spoken Language Development: In this section, we summarize existing studies on the development of listening and spoken language (LSL) skills among d/hh students, beginning with predictors of proficiency and continuing with a summary of studies that explore the impact of various amplification strategies. We then consider potential influences on listening and spoken language development over time, and its relationship to literacy and language proficiency in general. According to the Gallaudet Research Institute, in 2010, the majority of d/hh children in the United States were educated using spoken English only (53%). Because our knowledge of and discourse around how spoken language develops among d/hh children and the availability of technologies that may support access to speech have both changed dramatically in recent years, this review focuses only on the research published on this topic within the last 20 years. Among studies of language acquisition after cochlear implantation, study designs and salient participant demographics vary widely from longitudinal case studies of a single child (

Ertmer, D.J.; Strong, L.M.; Sadagopan, N. 2003) to short-term investigations with multiple children (Vavatzanidis, N.K.; Murbe, D.; Friederici, A.; Hahne, 2015)

Some studies focus on participant language development from as early as seven months old (

Cejas, I.; Barker, D.H.; Quittner, A.L.; Niparko, J.K. 2014)

while others investigate the period immediately after implantation or several years after implantation up to ages 10–15 (Johnson, C.; Goswani, U. 2010).Other researchers focus on exposure to early intervention rather than age or time relative to implantation (

Yanbay, E.; Hickson, L.; Scarinci, N.; Constantinescu, G.; Dettman, S.J. 2014)

and thus, include a range of ages and language histories within their samples. These differences in participant age, language history, age of implantation, and time after implantation are sensitive to differences in the exposure to language and language training among participants. Because of the diversity of language and implantation histories among children with cochlear implants (CI), there are no instances of replication or direct extensions of previous studies, which makes it difficult to compare or accumulate findings in efforts to generate cohesive, research- based conclusions about the nature of language development in this diverse population. However, there are some patterns related to language proficiency, the impact of CI and LSL on language acquisition, and the development of phonological awareness through spoken language and its impact on later reading. Findings from recent research suggest that purposeful interactions and early language exposure and learning are important for d/hh students to develop spoken language proficiency. Purposeful

92 interactions with educators and family members impact the overall language outcomes of d/hh children regardless of when they were identified as having a hearing loss. However, children who are identified with hearing loss earlier and provided with early intervention services at a younger age demonstrate more robust vocabulary knowledge compared to infants and toddlers identified and enrolled in intervention services later. Likewise, in a study by Miller, Lederberg, and Easterbrooks (2013) of five emergent d/hh readers, the researchers demonstrated the effectiveness of explicit instruction in syllable and onset-rime awareness (

Figueras, B.; Edwards, L.; Langdon, D. 2008).

This suggests that purposeful interactions and early language exposure are important throughout development and that earlier exposure to these interactions is supportive of early language development. A higher volume of purposeful interactions and language exposure also supports the development of executive function skills. For example, Figueras and colleagues argued that "the behavioral manifestations of EF [executive function] difficulties observable in deaf children are unlikely to be a consequence of deafness per se but rather result from the language delays that are a consequence of the deafness." This is similar to the language deprivation argument put forth by Hall and colleagues .Therefore, the literature suggests that exposure and interactional experiences are key factors in early language and social development, regardless of how this exposure or experience is achieved or the modality in which it is delivered. There is great variability regarding the impact of cochlear implants on d/hh children's proficiency and rate of spoken language acquisition; however, the patterns of interactions and language exposure identified above are relevant to CI users, as well. Early identification and access to language impact language acquisition for CI users as they do for the general LSL population. For example, in a study by Figueras and colleagues researchers found strong correlations between executive functioning and spoken language, but no difference between children who used CIs and those that did not. Similarly, Jones and colleagues found that there was no difference in narrative performance between deaf children using hearing aids and those with CI. Further, they found that there was also not a difference based on hearing levels. However, it is documented that the volume of exposure to accessible auditory input produces great variability in results related to children's language acquisition. Taken together, these findings again point to language access and interactions using meaningful language as the salient variables, not merely access to sound. This complex relationship between language, speech, and audition requires nuanced research into how this is related to literacy development. The

93 relationship between language proficiency and literacy outcomes is well documented (

Ching, T.Y.C.; Cupples, L.2015).

Therefore, students with complex language histories often demonstrate difficulty when developing literacy. However, there are some areas of literacy where d/hh students demonstrate proficiency on par with hearing peers, such as written expression discourse and phonological awareness among young LSL users. Many studies of literacy achievement examine subtest scores for isolated areas of literacy in order to better understand composite skills of literacy (e.g., phonological awareness, word recognition, vocabulary). For example, Goldberg and Lederberg (2015) found that d/hh preschool children who used amplification and had better phonemic awareness recalled more letter names and letter sounds than their peers with less developed phonemic awareness and that the preschoolers learned letter sounds partly through the use of phonological information contained in letter names (

Coryell, J.; Holcomb, T.K.1997).

However, Jones and colleagues found that "deaf children showed equivalent performance to their hearing peers at the macro-level; however, performance on micro-level narrative skills was poorer, and less relevant and detailed answers were provided to the inferencing probe questions than hearing peers." This suggests that relative weaknesses on some literacy-related

sub skills may not entirely be indicative of overall literacy proficiency

among d/hh students using LSL because of differences in how language is perceived and processed. However, Nelson and Crumpton demonstrated that "vocabulary awareness was the major predictor of d/ hh students' [using LSL] listening comprehension, reading comprehension, and nonword spelling skills:: [and] phonemic awareness skills significantly contributed to their reading decoding.". Overall, the evidence suggests that regardless of modality, language development has profound implications for the literacy development of d/hh children. Interventions that systematically use ASL to support reading (among signing d/hh students) seem to show promise, though more and rigorous research is needed to fully understand this complex relationship between languages and modalities. In general, earlier exposure to an accessible language seems to be key for supporting language development and later literacy skills. In the section that follows, we turn our attention to visual systems that have been invented with the purpose of supporting the English language development of d/hh children, specifically the research available on signed forms of English and on cued speech.

94 3.5.7

Review on related literature related to

Systems Combining Spoken Language with Visual Codes: The second popular method for exposing d/hh children to a means of communication is through the use of invented communication systems that seek to represent English visually in order to make it more accessible to this population. There are two more frequently-used communication systems used with d/hh children. The first is the use of signed representations of English, which to greater and lesser extents use invented signs to express morphemes and words from English that did not have natural sign language equivalents. These systems also use signs borrowed from ASL, but which are presented in English word order. The second is cued speech, which is an invented system of hand positions placed systematically around the face to disambiguate phonemes in English to assist with speech reading. 3.5.8 Sign Systems' Development and Intervention In this section, we explore the literature available on signing systems that were created and intended to be representations of English expressed via the visual modality. Unlike the research with ASL and spoken English, there has not been as much new research on sign a system in recent years. As a result, we included all available research on sign systems, how they develop, and interventions to support their use here. Sign systems are artificially-derived forms of English expressed using signs, some borrowed from ASL and some invented to differentiate between similar English words or to express words in English that did not previously have a sign equivalent (

Luetke-Stahlman, B.1996 &

Bennett, J.G.; Gardner, R., III; Leighner, R.; Clancy, S.; Garner, J.2014).

There are a number of different sign systems, such as Signing Exact English, Seeing Essential English, Manually-Coded English, and Pidgin Sign English. Though each of these systems has features that make it distinct from the others, they are all representations of English conveyed through the signing modality; therefore, we review the research available on each of them together. According to the Gallaudet Research Institute, in 2010, 12.1% of d/hh students were educated in classrooms that used sign-supported spoken language. Though this statistic may under-represent the number of students who are taught using signed English, it is the nearest approximation available. The data-driven research available across all of these systems is somewhat dated, but includes single case intervention studies, small-scale pilot studies, larger group designs, surveys, and one quasi-experimental study. While some researchers have completed

95 studies with the intention of testing what type of communication is more accessible or preferable for use with d/hh children (signing systems, ASL, or written English), because the purpose of this article is to explore outcomes related to language development or impacts on literacy based on signing system usage, we do not include articles of this type in this review. The purpose of sign systems was to support the development of English language skills among d/hh students. The reasoning behind this was that because d/hh children did not have auditory access to English, providing a pathway to English that relied on the eyes instead of the ears may provide the accessible input necessary for language acquisition. Some researchers specifically felt that the use of signing systems held particular promise for conveying English morphemes. This resulted in a great deal of debate among researchers and others, starting in earnest regarding whether the potential exists to learn an auditory language through visual channels. Some have argued that a contact version of a signed English system may be useful in codes witching between ASL and print English or for teaching English grammar or as a tool to support communication among children with cochlear implants. However, others have posited that signed English systems used in classrooms are frequently ungrammatical in both English and in ASL, thus sending a confusing linguistic message to children. In fact, in a study of preschool-age children, researchers found that d/hh students interacted more during a storytelling activity that was in ASL or contained ASL- like signing as compared to storytelling activities using strict signed English. There is also evidence that teachers using signed English tended to use fewer complex grammatical structures as compared to teachers who were just speaking in English. This could be due to the cognitive strain of attempting to use multiple modalities of expression simultaneously. Critically, evidence has shown that even among teachers who had high levels of proficiency in signed English, at best, they were found to be only 86% accurate in their representation of English using this system. Like all languages and communication systems, there is an issue of complete and accessible opportunities for exposure among d/hh children for signed English. Overall, there have been a limited number of studies that systematically examined the relationship between signing systems and English knowledge or reading comprehension. Studies investigating the impact of using signing systems on literacy achievement have produced mixed results. For instance, one study found a correlation between signed English proficiency and reading comprehension .However, other studies suggested that poor achievement in English syntactical knowledge among

96 d/hh children who were educated using a signed English system meant that signed English was ineffective at supporting the development of English syntactic understanding. Others have found that students raised in signed English environments showed typical development in terms of lexical and syntactic skills, but a significant deficit in morphological knowledge, an important facet of language development [58]. Longitudinally, time in a signed English program was not predictive of English skill among a group of d/hh students, suggesting that exposure over time to signed English may not support the development of English grammatical understanding . More recently, researchers found significant variability in the overall language and literacy abilities of d/hh learners who use signed English, ranging from two standard deviations below the mean to at or above the mean . Problematically, in this line of research, assessments of language development (i.e., the Clinical Evaluation of Language Fundamentals [CELF]) administered using simultaneous communication were found to be predictive of reading scores, but these findings cannot distinguish between the effects of mastery of signed English versus general mastery of English. Therefore, it is difficult to ascertain whether signing systems specifically are related to these scores. In perhaps the only study explicitly examining the effects of an intervention using signed English, Bennett and colleagues found using single case research that four children were able to correctly articulate signed English sentences following English grammar after an intervention that explicitly taught English grammatical structures via simultaneous communication. Unfortunately, this study did not include a measure of comprehension, meaning that participants could have learned to copy the pattern without necessarily acquiring a deeper understanding of the syntax. Similarly, incorporating signed English pictures into written texts appeared to increase d/hh students' comprehension; however, it is unclear whether it was the presence of the signs at all compared to the signs specifically being signed English that provided the scaffolding students needed to access the texts. The research exploring signed English systems is limited in that, although colloquially, many in the field use the term signed English as a "catch-all" for all signing systems, these studies explored different manifestations of signed English systems that may be more or less comparable to one another. In general, the findings do not tell a generalizable story: some found higher achievement in some areas after instruction in signed English, while others found lower achievement or areas of significant difficulty. In many cases,

97 it is difficult to tease apart the effect of the presence of signs in general versus the specific use of signed English as the causal factor contributing to children's development of English knowledge. 3.6

Processing sign languages in early years: Neural reorganization; Access to age appropriate language; Ease of intake; Universal grammar; Modality dependent versus modality independent components Development for children with hearing impairment differs greatly from children born with normal hearing. Children with normal hearing will learn the sound of their mother and fathers voice, and learn to cry when they are hungry to let their parents know to feed them. Beginning at birth a baby frequently communicates with his or her caretakers, by using sounds to do so. Children are able to learn and take in their environment while adapting to constant change in their development. During this time they are able to take in new languages; this time is crucial in their language development because they have to be constantly learning. As children develop they go through different stages of learning words and beginning to talk. Around 4-6 months babies start to become more responsive usually starting to understand the word "no" they also begin to start babbling. Babbling, or baby talk, is referred to as when the infant begins experimenting with uttering sounds. It can be described as, "a speech-based phenomenon that reflects the maturation of the articulatory apparatus responsible for spoken language production" (Petitto, 2005). Babbling is usually in repetition for vowel-consonant combination like ba ba ba. At about 7-12 months their development has strongly increased since birth. At this age they know familiar faces and their babbling changes into using first words. At one-two years of age the child may start to use short sentences and they also can start to follow simple commands. During this time the child will like to listen to stories and will enjoy them repeated several times. Between the ages of two-three, a child will start being able to understand more complex commands and their vocabulary should be expanding during this age. Throughout this period of development it is common that parents might start noticing some speech errors while the child is communicating. During this age it is normal for speech errors to occur as the child's language starts to develop. From ages three to four children start attending preschool. Their sentences should be much longer then years past and they should be able to understand questions. From ages four to five years old a stranger should be able to understand about 90% of 98 what the child is saying. A child at this age should be able to speak fluently and should be clear in what they are saying. Although not all children will develop along these exact times, it is important for a child to be around these ages in their development (Owens, 2012). If the child is not developing along this developmental time frame it could be cause for concern for language disorders. 3.6.1 Speech and Language Development children with deafness: Baby signing: Deaf children usually do not speak at the normal developmental time period. Children who are born deaf have no way of knowing what an auditory language sounds like and do not know how to imitate words. Then it is important for parents or caregivers to begin teaching their child Sign Language and help the child to develop their communication. Baby signing is a great way to get a head start on a child's communication. It is a type of sign language infants can use in order to communicate with their caregivers. Even though baby signing could be confused with Sign Language it is considered a simpler form of Sign Language. The reason that babies do not use the complete form of Sign Language is because they do not have the fine motor skills yet and caregivers may not be fluent in Sign Language, thus not exposed to the full and complex language structure. Baby signing is used because it teaches simple words that are functional for a child to use in their environment (milk, more, tired, etc.). Baby signing is a great way of communication for baby and caregiver because the infant can express their needs before they start using words. This makes the infant less frustrated and it helps the parent have a better understanding of their child's wants. Parents have found that baby signing can be extremely helpful during these early times in development (Pizer, 2007). Neural reorganization: Neural plasticity is the functional and structural reorganization of the brain in response to a given event or set of events. These can arise from physiological or developmental processes or damage and can be mediated by cognitive or sensory mechanisms. In congenitally deaf people, neural plasticity has been observed in the superior temporal cortex (STC) a region that is associated with auditory and speech sound processing. Although sensory deprivation triggers the reorganization of the cortex, the origin of the anatomical and functional changes observed in the superior temporal cortex of deaf individuals is not only sensory, but also cognitive, as they cannot acquire language through sound, and visual communication strategies, such as the use of sign language and speech reading, need to be developed. Understanding the differential contribution of sensory and cognitive experience to

99 neural reorganization is fundamental for establishing the relationship between plasticity and underlying functional specialization. Sign languages have developed naturally in deaf communities. Like spoken languages, they are organized at phonological, morphological, syntactic and semantic levels. Not only do auditory deprivation and language experience mediate plastic changes in deaf individuals, but the robust left-hemisphere involvement in language potentially allows a clear anatomical segregation between them: as the left STC is involved in the processing of language independently of modality, plastic changes in this region are likely to be mediated by mechanisms supporting the development and acquisition of sign language, and not by general visual processing effects; this constraint may not be true of the right STC. Studying neural reorganization in deaf brains allows us to disentangle plastic changes, and their interaction, both when they are due to life-long sensory-motor adaptation to auditory deprivation, and when they are due to life-long sign language experience. Several research findings reveal that plastic effects in the left STC have a linguistic origin, and are shaped by sign language experience, whereas the right STC also shows plasticity due to sensory deprivation. So we may conclude that sensory and cognitive factors cause plasticity in anatomically and functionally distinguishable substrates, and that after plastic reorganization, cortical regions preserve the nature of the computation they perform both at a sensory and cognitive level. 3.6.2 Access to age appropriate language and ease of intake: In

Western countries, it is founded that only 5−10% of deaf children are born to deaf parents or in an environment where there is adequate sign language input for the child to develop language competence in a natural way (Neidle et al., 2000; Mitchell and Karchmer, 2004). This means that the remaining 90−95% of deaf children at birth is not surrounded by a natural language in the visual-gestural modality, which is fully accessible to them, but rather by spoken language. A variety of factors determines the language acquisition path for them: (1) hearing parents can decide to learn and use sign language themselves with the child (Chen- Pichler and Lillo-Martin, 2018); (2) parents can choose a schooling model that favors interaction and instruction in sign language to different degrees (3) parents are often confronted with the choice of giving their child a cochlear implant that will facilitate access to the spoken language signal after regular and intensive training. These elements make it evident that for most deaf children access to language during the critical period will be uncertain and in any event more incomplete or degraded than in the default case where rich language input is part of the environment. Take for instance the favorable, albeit uncommon, case where parents

100 decide to use sign language with the child and choose for a day care and school that offers a bimodal bilingual approach: even in this favorable case, most adult language models will be non-native (hearing parents, hearing teachers and classroom interpreters that learn sign language as a second language) and some of them will use mixed forms of language (in general, spoken structure imposed on sign), thus providing an input that is strictly speaking qualitatively different from the native one. The obvious consequence of this situation is that the majorities of signers in Deaf communities have acquired their sign language under such special circumstances and do not fall under the strict definition of native speakers or signers. To this we must add the fact that regular contact with sign language may happen at different stages in life and it is quite common for deaf children to be initially raised only with spoken language and for them to be exposed to sign language past the first year of life, turning them technically into early or late learners of what normally becomes their main language of communication. In this situation, it is quite often the case that access to spoken language is so limited in early life that late acquisition of a sign language is not

second language learning, but simply delayed in first language

learning at an abnormal age (late childhood, adolescence, or adulthood), leading to abnormal neurological mappings of language (Mayberry, 2010; Mayberry and Kluender, 2017; Woll, 2018). Research has confirmed the expectation that such different paths of language acquisition should impact on language competence (Boudreault and Mayberry, 2006; Cormier et al., 2012; Skotara et al., 2012; Hänel- Faulhaber et al., 2014, 2018, unpublished; Lillo-Martin, 2018). Next to such a typical language acquisition paths, linguistic research must also take into account that most deaf signers have bilingual competence as a result of spoken language acquisition to varying degrees, even if it is the language acquired first chronologically. Nowadays spoken language competence in signers takes two different paths: mostly competence in the written form, as a result of schooling and interaction with the ambient hearing society; competence in the spoken modality because of the spreading of cochlear implants, which typically involves mainstreaming in education and intensive speech therapy. In this picture, post lingual deaf children constitute yet another case, as they will have acquired spoken language for the most part when they lose their hearing, thus being able to rely on full-fledged language acquisition during the first year of life as base for subsequent sign language acquisition.

For linguistic research, they also required (3) capability to make grammaticality judgments with ease. Freel et al. (2011) also establish this age limit of 3

years
in the acquisition of sign language in order to count someone as native signer. Such accommodations seem desirable in practical terms, but it might be the

101 case that even with these slight departures from strict

native hood,

it is still hard to find sign language consultants, given their scarcity in some areas.

Grammar:

Sign languages employ various articulators such as the hands, the upper part of the body, the head, and the face to express grammatical features simultaneously. It uses the geometrical properties of the signing space to realize morphological. syntactic, semantic, and pragmatic categories in the three-dimensional signing space (Engberg-Pedersen, 1993; Padden, 1998; Aronoff et al., 2005; Pfau and Steinbach, 2016; Steinbach and Onea, 2016). Sign languages grammaticalize and integrate gestural elements, since sign languages and manual as well as non-manual gesture use the same modality. As a consequence, the interface between these two systems is permeable (Liddell and Metzger, 1998; Emmorey, 1999; Liddell, 2003; Pfau and Steinbach, 2011; Grosvald et al., 2012; Goldin-Meadow and Brentari, 2017) and leads to a more prominent presence of iconicity at different grammatical levels (Taub, 2012). By contrast, there is much less transparency between the signals used in auditory communication and their meaning (Schlenker, 2018).

Modality components:

Sign and spoken languages use two different modalities, the visual-gestural modality of sign languages and the oral-auditory modality of spoken languages. Although the two modalities clearly differ in the production and perception of communicative signals, the underlying linguistic structures seem to be very similar across both modalities (Meier, 2002, 2012; Sandler and Lillo-Martin, 2006). In addition, psycho and neuro-linguistic studies with non-impaired and impaired deaf signers show that sign languages access the same neural networks involved in auditory speech processing, albeit with some concrete modality-specific features (Poizner et al., 1987; Emmorey, 2002, 2003; Corina and Knapp, 2006; Campbell et al., 2008; Corina and Spotswood, 2012; Dye, 2012; Woll, 2012). 3.7

Studying language assessment component in ICF and Recommendations related to language assessment reflecting in National Curriculum Framework (NCF) 3.7.1 Studying language assessment component in

ICF: The International Classification of Functioning, Disability and Health, known more commonly as ICF, classified health and health-related domains. As the functioning and disability of an individual occurs in a context, ICF also includes a list of

102 environmental factors. It also measure health and disability at both individual and population levels. ICF was officially endorsed by all 191 WHO Member States in the Fifty-fourth World Health Assembly on 21 st May 2001, taken the international standard to describe and measure health and disability. ICF is

operationalized through the Second Edition of WHO Disability Assessment Schedule (WHODAS 2.0). It was developed through a collaborative international approach with the aim of developing a single generic instrument for assessing health status and disability across different cultures and settings. Descriptors Components of Assessment & Analysis of Capacity & Performance Purposeful Sensory Experiences • Yearly formal assessment of auditory Listening comprehension of language Learning and Applying Knowledge • Document continued typical growth in first language learning to reading ASL skills for semantics, grammar/morphological, copying syntax, pragmatics, conversation, solving simple problems Metacognitive/play Communication receive spoken • Assess ab ove ASL skills with parents receive non-verbal in the interactions speaking producing nonverbal • Assess spoken English skills : receive/produce ASL receptive & expressive semantics, conversation grammar/morphological, syntax, Interactions and Relationships pragmatics, conversation, complex interpersonal metacognitive/play informal social relationships family relationships Impairment-based goals/Build Capacity: • Increase spoken English vocabulary, grammar/morpheme development, syntactic complexity: present and past verb tenses, prepositions and prepositional phrases, descriptive vocabulary, question forms • Increase skills in social language and conversation for spoken English • Improve ability to initiate interactions appropriately in both languages Socially-based goals/ Build Performance for Participation: • Use more complete spoken English sentences with enough information for turn-taking with partner in a conversation • Ask friends to play and tell them what he is doing • Ask friends what they are doing and join into their play

103 • Make a simple play plan with friends with pretend roles and sequence • Participate with friends in songs, finger plays, and nursery rhymes; act them out with props; Imitate and then independently sing songs and finger plays with movements or signs • Problem solve and negotiate with peers during play Activity & Participation: Profoundly Deaf Child 104 Activity & Participation: Profoundly Deaf Child (Impairment-Based Goals to Build Capacity) • Increase ASL vocabulary and syntactic complexity (including classifier phrases) • Relate present & past experiences reporting who, where, what, when • Determine if he has enough information to do activity • Develop more elaborate play scripts (sequence, roles) • With picture support retell/act out stories that have been read/told • Develop sight word vocabulary • Identity what a letter, word, sentence, • Identify letters with mouth shapes; identify letters with hand shapes • Lip read peoples' names • Write sight word vocabulary Activity & Participation: Profoundly Deaf Child (Socially-Based Goals/Build Performance for Participation) • Use whole body strategies & sign modifications to compensate for lack of facial cues in communicating • Tell ASL classifier stories (whole entity classifiers, instrumental, physical characteristics) • Ask clarifying questions to adults & peers • Determine who has needed information • Ask peers to play; tell peers what he's doing • Begin conversations with peers • Maintain turn-taking in conversation with peers • Age appropriate use of interpreter • Ask Nurse for help with health care at school

105 India - A Linguistic Giant Our language scenario has tempted researchers to call India variously as a "sociolinguistic area" "a linguistic giant" and a "language laboratory". The multilingual and pluricultural nature of our society makes it clear that we need more than one language for 'national cohesion', 'cultural integration' and 'social area mobility'. Different languages have different roles to play; they are complementary. The imagery of 'salad bowl' is appropriate: each language has its characteristic features and contributes to the richness of the overall pattern. India is a country in which the Indo European family of languages is spoken mostly in north and central India. Of this group, 54 languages constitute 3/4 of the Indian population. About 1/4 of languages i.e. 20 belong to South India of Dravidian family. In Assam 20 languages are spoken. In northeast India 98 languages are spoken, even though its population density is much less than that of other states of the country. In total therefore, in the NE 118 languages are spoken. In this context, the role of Hindi and English becomes very important. In spite of all this diversity, it is to be acknowledged that Indian languages have been gaining through tourists, media, print and electronic, and other sources. Therefore, what should a language teacher or a teacher of any other subject know about the language he/she is teaching in? Obviously, that the teacher has to be fluent in the language being used and can handle it with ease. The teacher has to be effective and economical given our limited time and facilities. NCF 2005 Gives a Fresh Impetus to Language Education: 1. A renewed attempt should be made to implement the three language formula. 2. Children's mother tongues, including tribal languages should be considered as the best medium of instruction. 3. Proficiency in multiple languages including English should be encouraged in children. 4. Reading should be emphasized throughout the primary classes. Culture and language are intermingled. NCF 2005 advocates an interdisciplinary approach. However, teachers of different subjects do not discuss these matters. Language can relate all the subjects, as it is the heart of education so is the heart of children. Centrality of language, and achieving it would be a great milestone. The three-language formula is an attempt to address the challenges and opportunities of the linguistic situation in India. The primary aim of the formula is to promote multilingualism and national harmony.

106 Home Language/ First Language/ Regional Language / Mother Tongue: Primary school education must be covered through the home language(s). It is imperative that we honour the child's home language(s). According to Article 350A of our Constitution, 'It shall be the endeavour of every State and of every local authority within the State to provide adequate facilities for instruction in the mother tongue at the primary stage of education to children belonging to linguistic minority groups." In the non-Hindi speaking states, children learn Hindi. In the case of Hindi speaking states, children learn a language not spoken in their area. Sanskrit may also be studied as a modern Indian language in addition to these languages. Care must be taken to honour and respect the child's home languages / mother tongues. At the primary stage, child's language(s) must be accepted as they are, with no attempt to correct them. It is known that errors are a necessary part of the process of learning and that children will correct themselves only when they are ready to. We have to spend time by providing children comprehensible, interesting and challenging inputs. While children come to school equipped with basic interpersonal communicative skills, they need to acquire cognitively advanced levels of language proficiency. In addition, higher-level proficiency skills easily transfer from one language to another. It is thus imperative that we do everything we can to strengthen the sustained learning of Indian languages at school. Second Language – English: The goals for second language curriculum are twofold: attainment of a basic proficiency such as is acquired in natural language learning and the development of language into an instrument for abstract thought and knowledge acquisition through literacy improving linguistic skills in one language improves it in others, while reading failure in one's own languages adversely affects second language reading. Other Indian languages need to be valorized to reduce the perceived hegemony of English. Home Language and School / Standard Language: A child acquires his / her home language, naturally through larger kinship groups, street and neighborhood and societal environment. Children are born with an innate language facility, and research has shown that Indians have a flair for languages. (domestic help, multilingual beggars, tsunami spoilers, spelling bees, scrabble)They internalize an extremely complex system of language before they come to school.

107 They come armed with 2/3 languages of which we do not make use, we do not exploit them. Languages provide a bank of memories and symbols inherited from fellow speakers and created in their own lifetime. It is a medium through which knowledge is constructed. Language is identity. Let us first recognize this inbuilt language potential of our children as well as remember that languages get socio culturally constructed and change our daily lives. There is a difference between dialect and language. Similarly, the language spoken at home is different from the one spoken in the school, which is usually the standard language, though there is much give and take between the two. For instance, standard Hindi has been derived from Khari Boli. Sometimes, the converse is also true, Avadhi, Brij, Maithili, Bhojpuri were fully developed languages once, now they are dialects. Whenever the child enters the school in his / her locality it is assumed that his/her first language, or mother tongue is the one spoken in the school, which may not always be true. Therefore, the child is educated in the standard form of the language. In such a situation the child is placed in a dilemma as to which language is to be used or which one is correct. At home, e.g., the student may use Brij, but in the school he / she learn standard Hindi, which is different. Other subjects taught through the medium of Hindi also use its standard form. Multilingualism - A Resource: A creative language teacher must use multilingualism, a typical feature of the Indian linguistic landscape, as a classroom strategy and a goal. This is also a way of ensuring that every child feels secure and accepted, and that no one is left behind on account of his / her linguistic background. Language subsumes multilingualism / bilingualism. Multilingualism - where each language is assigned its own distinctive societal functions - may be the wave of the future. The Constitution of India perceives multilingualism as a resource. We should talk about medium of education instead of medium of instruction. The need is to explore the role of language in education and the role of language in a child's life, since language is not content, but language gives life to content. Studies have shown that bilingual or multilingual people are capable of greater cognitive flexibility and creativity, and perform better academically than monolinguals. Polyglots may be polymaths as well. Perhaps it is the ability to switch codes that comes from knowing more than one language. Bilingualism / multilingualism confer definite cognitive advantages.

108 Braille, Sign language: Languages would ideally build on this resource, and would strive it through the development of literacy scripts including Braille for the acquisition of academic knowledge. Children with language-related impairments might be introduced to standard sign languages, which can support their continued growth and development to the fullest. Studying sign language and Braille could be included as options for learners without disabilities. 3.7.2 Recommendations related to language assessment reflecting in National Curriculum Framework (NCF): Language evaluation need not be tied to "achievement" with respect to particular syllabi, but must be reoriented to the measurement of language proficiency. Evaluation is to be made an enabling factor for learning rather than an impediment. Ongoing assessment could document a learner's progress through the portfolio mode. National benchmarks for English language proficiency would help greatly in achieving certain basic standards. English is perceived to open up opportunities. A student may be allowed to 'pass without English' if an alternative route for English certification (and therefore instruction) can be provided outside the regular school curriculum. The transfer of skills could be achieved from one language to another. In this context the objective of teaching languages is not simply to make the students learn language skills but to enable them to play their communicative roles effectively and select languages from their linguistic repertoire and within those chosen, select registers and styles, befitting the roles they are playing. Conclusion The right to choose any language is fundamental for searching for and earning the right to livelihood. More so in a globalized world, whose opportunities are to be availed of with the skills one possesses, may be, as language teachers. For instance, the culture of the English speaking may be dominant but English is no longer a political instrument of the downtrodden. Today proficiency in the language is a skill, liquid assets and financial gains for educators in India and abroad. Language as a constellation of skills, thought encoders and markers of identity cuts across school subjects and disciplines. Language has to be maintained as a marketable skill. And therefore, he / she who can will talk his / her way in a world of global opportunities.

109 3.8 Let us sum up In unit 3.1 we thoroughly studied the parameters of selecting medium of instruction for CWHI at home, school & society. After that we go through the challenges and concerns related to language assessment of the deaf, problems faced by assessor while using standardized and teacher made tools, setting norms of children 'with' versus 'without' disability; measuring receptive language etc. In unit 3.3 we again able to comprehend the biological foundations and related research in early language experiences of deaf. We also able to know the neural reorganization; access to age appropriate language and Ease of intake; grammar; and modality components of sign language, At the end we also comprehend the recommendations made in National Curriculum Framework (NCF) related to language assessment and language assessment component in ICF. 3.9 Unit end exercises 1. Describe the parameters of selecting medium of language instruction for children with hearing impairment at home, school & society. 2. Critically analyze the challenges and concerns related to language assessment of the deaf. 3. Explain biological foundation of language. 4. Illustrate the processing of sign language in early years within deaf individuals. 5. Describe the recommendations made in National Curriculum Framework (NCF) related to language assessment. 3.10. References & Links: American Psychological Association Procedural Manual and Guide for the Standardized Application of the ICF: http://www.apa.org/monitor/jan06/changing.aspx Australian ICF-related data standards: http://meteor.aihw.gov.au/content/index.phtml/ itemId/320319 Hollenweger, J., Lienhard, P. (2007). Schulische Standortgespräche. EinVerfahren zur Förderplanung und Zuweisung von sonderpädagogischen Massnahmen. Bildungsdirektion des Kantons Zürich. Zürich: Lehrmittelverlag des Kantons Zürich. 110 Hurst R 2003. The international disability rights movement and the ICF. Disability and Rehabilitation Vol 25, No, 11-12, 572-576 ICF checklist: http://www.who.int/ classifications/icf/training/icfchecklist.pdf Martinuzzi, A, Salghetti, A, Betto, S, et al. (2010).

The international classification of functioning disability and health, version for children and youth

as a road- map for projecting and programming rehabilitation in a neuropaediatric hospital unit. J Rehabil Med 42: 49-55 Stucki G, Reinhardt JD, Grimby G, Melvin J 2007. Developing 'human functioning and rehabilitation research' from the comprehensive perspective. J Rehabil Med 2007; 39: 665-671

United Nations 2006.

Convention on the Rights of Persons with Disabilities. http://www.
un.org/disabilities/

default.asp?navid=12&pid=150 Veitch C, Madden R, Britt H, Kuipers P, Brentnall J, Madden R, Georgiou A, Llewellyn G 2009. Using ICF and ICPC in primary health care provision and evaluation: http://www.who.int/classifications/network/ WHOFIC2009_D009p_Veitch.pdf Washington Group on Disability Statistics http://unstats.un.org/unsd/methods /citygroup/ washington.htm WHODAS2 http://www.who.int/classifications/icf/whodasii/en/index.html WHO Family of International Classifications http://www.who.int/classifications/en/ WHO Family of International Classifications Network (including a list of Collaborating Centres): http://www.who.int/classifications/network/en/ World Health Organization 2001. ICF browser: http://apps.who.int/classifications/ icfbrowser/ World Health Organization 2001. The International Classification of Functioning, Disability and Health (ICF). Geneva: WHO. http://www. who.int/classifications/icf/en/ World Health Organization (2007)

The International Classification of Functioning, Disability and Health, Children and Youth
version

Geneva: WHO. http:// www.who.int/classifications/icf/en/ FURTHER INFORMATION AND RESOURCES. Boothroyd A. (2000). Management of hearing loss in children: no simple solutions. In: Seewald RC, editor. A sound foundation through early amplification.

111 Proceedings of an international conference. Staefa, Switzerland: Phonak AG. p 1–12. Brackett D, Zara C. (1998). Communication outcomes related to early implantation. Am J Otol 19: 453–460. Carney A, Moeller MP. (1998). Treatment efficacy: hearing loss in children. J Speech Lang Hear Res 41:S61–S84.

Geers A, Moog J, Schick B. (1984). Acquisition of spoken and signed English by profoundly deaf children.
J Speech Hear

Dis 49: 378–388. Geers AE, Moog JS. (1992).

Speech perception and production skills of students with impaired hearing from oral and total communication education settings.

J Speech Hear Res 35: 1384–1393. Greenberg MT. (1983). Family stress and child competence: the effects of early intervention for families with deaf infants. American Annals for Deaf 128:407– 417. Greenberg MT, Calderon R, Kusche C. (1984). Early intervention using simultaneous communication with deaf infants: the effect on communication development. Child Dev. 55:607–616.

Harrison M, Roush J. (1996). Age of suspicion,

identification and intervention for infants and young children with hearing loss:

a national study. Ear

Hear 17: 55–62. Harrison M, Roush J. Wallace J. (2003). Trends in age of identification and intervention in infants with hearing loss. Ear Hear 24:89 –95.

Kuntze, M. (1998). Literacy and Deaf children: The language question. Topics in Language Disorders, 18(4), 1–15.

Markides A. (1988). Speech intelligibility: auditory oral approach versus total communication. J Brit Assoc Teachers Deaf 12:136 –141.

Marschark, M. (2001). Language development in children who are deaf: A research synthesis.

Alexandria, VA: National Association of State Directors of Special Education.

ERIC ED 455 620

Moeller MP. (2000).

Early intervention and language development in children who are deaf and hard of hearing. Pediatrics 106:

E43.

112

Nikolopoulos TP,

O'Donoghue GM, Archbold S. (1999). Age at implantation: its importance in pediatric cochlear implantation. Laryngoscope 109: 595–599.

Ramkalawan TW, Davis AC. (1992). The effects of hearing loss and age of intervention on some language metrics in young hearing-impaired children.

Brit J Audio 26:97–107. Tye-Murray N. (1998). Intervention plans for children. In: Tye-Murray N. Foundations of aural rehabilitation. San Diego: Singular. P 381–413. Watkins S. (1987). Long term effects of home intervention with hearing-impaired children. American Annals for Deaf 132:267–271.

Yoshinaga-Itano C, Sedey A,

Coulter DK, et al. (1998).

Language of early and later identified children with hearing loss. Pediatrics 102:1161–1171.

Anderson D, Reilly J. The MacArthur communicative development inventory: Normative data for American Sign Language, Journal of Deaf Studies and Deaf Education, 2002, vol. 7 (pg. 83-106) Braden, J.P. Hard of hearing and deaf clients: Using the WISC-IV with clients who are hard of hearing or deaf. In WISC-IV: Clinical Use and Interpretation; Scientist-Practitioner Perspectives; Priftera, A., Saklofske, D.H., Weiss, L.G., Eds.; Elsevier Academic Press: London, UK, 2005; pp. 352–381.

Boudreault P, Mayberry RI. Grammatical processing in American Sign Language: Age of first-language acquisition effects in relation to syntactic structure,

Language and Cognitive Processes, 2006,

vol. 21 (pg. 608-635) Herman R, Holmes S, Woll B., Assessing BSL development—Receptive skills test, 1999Coleford, EnglandForest Bookshop Herman R, Roy P. Evidence from the wider use of the BSL receptive skills test, Deafness and Education International , 2006, vol. 8 (pg. 33-47) Hoiting N. Schick B, Marschark M, Spencer P. Deaf children are verb attenders: Early sign vocabulary development in Dutch toddlers, Advances in sign language development of deaf children, 2005New YorkOxford University Press (pg. 161-188) https://successforkidswithhearingloss.com/for-professionals/assessment-of-student- skills-challenges-needs/ Johnson T. The

assessment and achievement of proficiency in a native sign language within a sign bilingual program:

The pilot Auslan receptive skills test, Deafness and Education International, 2004, vol. 6 (pg. 57-81)

113 Jamieson, J.R.; Simmons, N.R. Children and youth who are hard of hearing: Hearing accessibility, acoustical context, and development. In The

Oxford Handbook of Deaf Studies, Language, and Education; Marschark, M., Spencer, P.E., Eds.; Oxford University Press: Oxford, UK, 2011; Volume 2, pp. 290–305. Maller S, Singleton J, Suppalla S, Wix T. The development and psychometric properties of the American Sign Language Proficiency Assessment (ASL-PA), Journal of Deaf Studies and Deaf Education, 1999, vol. 4 (pg. 249-269)

Cejas, I.; Barker, D.H.; Quittner, A.L.; Niparko, J.K.

Development of joint attention in young deaf and hearing children: Effects of chronological age and language skills.

J. Speech Lang. Hear. Res. 2014, 57, 1831–1841

Scott, J.A.; Homeister, R.J. American Sign Language and academic English: Factors influencing the reading of bilingual secondary school deaf and hard of hearing students. J. Deaf Stud. Deaf Educ. 2017, 1, 59–71

Strong, M.; Prinz, P.M. A study of the relationship between American Sign Language and English literacy.

J. Deaf Stud. Deaf Educ. 1997, 1, 37–46.

Goldin-Meadow, S.; Mayberry, R. How do profoundly deaf children learn to read? Learn. Disabil. Res. Pract. 2001, 16, 221–228. Hall, M.; Eigsti, I.; Bortfeld, H.; Lillo-Martin, D. Auditory deprivation does not impair executive function, but language deprivation might: Evidence from a parent-report measure in Deaf native-signing children.J. Deaf Stud. Deaf Educ. 2017, 1, 9–21

Woolfe, T.; Want, S.C.; Siegal, M. Signposts to development: Theory of mind in deaf children. Child

Dev. 2002, 3, 768–778. Henner, J.; Caldwell-Harris, C.L.; Novogrodsky, R.; Homeister, R.J. American Sign Language syntax and analogical reasoning skills are influenced by early acquisition and age of entry to signing schools for the deaf. Front. Psychol. 2017, 7, 1982. Mayberry, R.I. When timing is everything: Age of first-language acquisition effects on second-language learning. Appl. Psycholinguist. 2007, 28, 537–549. Mayberry, R.I.; Lock, E. Age constraints on first versus second language acquisition: Evidence for linguistic plasticity and epigenesis. Brain Lang. 2003, 87, 369– 384. Halliday, L.F.; Tuomainen, O.; Rosen, S. Language development and impairment in children with mild to moderate hearing loss. J. Speech Lang. Hear. Res. 2017, 6, 1551–1567.

114

Johnson, C.; Goswani, U. Phonological awareness, vocabulary, and reading in deaf children with cochlear implants.

J. Speech Lang. Hear. Res. 2010, 53, 237– 261.

Nelson, N.W.; Crumpton, T. Reading, writing, and spoken language assessment profiles for students who are deaf and hard of hearing compared with students with language learning disabilities.

Top. Lang. Disord. 2015, 2, 157–179.

Gallaudet Research Institute. Regional and National Summary Report of Data from the 2009–2010 Annual Survey of Deaf and Hard of Hearing Children and Youth;

GRI, Gallaudet University: Washington, DC, USA, 2011.

Ertmer, D.J.; Strong, L.M.; Sadagopan, N. Beginning to communicate after cochlear implantation: Oral language development in a young child. J. Speech Lang. Hear. Res. 2003, 46, 328–340. Vavatzanidis, N.K.; Murbe, D.; Friederici, A.; Hahne, A. The basis for language acquisition: Congenitally deaf infants discriminate vowel length in the first months after cochlear implantation. J. Cogn. Neurosci. 2015, 12, 2427–2441.

Yanbay, E.; Hickson, L.; Scarinci, N.; Constantinescu, G.; Dettman, S.J. Language outcomes for children with cochlear implants enrolled in different communication programs. Cochlear Implant. Int. 2014, 15, 121–135.

Vohr, B.; Jodoin-Krauzyk Tucker, R.; Johnson, M.; Topol, D.; Ahlgren, M. Early language outcomes of early-identified infants with permanent hearing loss at 12 to 16 months of age. Pediatrics 2008, 3, 535–544.

Figueras, B.; Edwards, L.; Langdon, D. Executive function and language in deaf children.
J. Deaf Stud. Deaf Educ. 2008, 3, 363–377. [CrossRef] [PubMed] Jones, A.C.; Toscano, E.; Botting, N.; Marshall, C.R.; Atkinson, J.R.; Denmark, T.; Herman, R.; Morgan, G. Narrative skills in deaf children who use spoke English: Dissociations between macro and microstructural devices. Res. Dev. Disabil. 2011, 59, 268–282. Demir-Lira, Ö.E.; Applebaum, L.R.; Goldin-Meadow, S.; Levine, S.C. Parents' early book reading to children: Relation to children's later language and literacy outcomes controlling for other parent language input. Dev. Sci. 2019, e12764. Ching, T.Y.C.; Cupples, L. Phonological awareness at 5 years of age in children who use hearing aids or cochlear implants. Perspect. Hear. Hear. Disord. Child. 2015, 25, 48–59.

115 Goldberg, H.R.; Lederberg, A.R. Acquisition of the alphabetic principle in deaf and hard-of-hearing preschoolers: The role of phonology in letter-sound learning. Read. Writ. 2015, 28, 509–525. Coryell, J.; Holcomb, T.K. The use of sign language and sign systems in facilitating the language acquisition and communication of deaf students. Lang. Speech Hear. Serv. Sch. 1997, 28, 384–394. Luetke-Stahlman, B.; Milburn, W.O. A history of Seeing Essential English (SEE I). Am. Ann. Deaf 1996, 1, 29–33. Bennett, J.G.; Gardner, R., III; Leighner, R.; Clancy, S.; Garner, J. Explicitly teaching English through the air to students who are deaf or hard of hearing. Am. Ann. Deaf 2014, 1, 45–58 Moores, D.F.; Sweet, C. Relationships of English grammar and communicative fluency to reading in deaf adolescents. Exceptionality 1990, 2, 97–106.

Schick, B.; Moeller, M.P. What is learnable in manually coded English sign systems?
Appl. Psycholinguist.1992, 13, 313–340. Gaustad, M.G. Longitudinal effects of manual English instruction on deaf childrens' morphological skills.Appl. Psycholinguist. 1986, 7, 101–128.

Geers, A.; Moog, J.; Schick, B. Acquisition of spoken and signed English by profoundly deaf children.
J. Speech Hear. Disord. 1984, 4, 378–388. [CrossRef] Nielsen, D.C.; Luetke, B.; McLean, M.; Stryker, D. The English-language and reading achievement of a cohort of deaf students speaking and signing standard English: A preliminary study. Am. Ann. Deaf 2016, 3,342–368. Miller, M.; Thomas-Presswood, T.; Metz, K.; Lukomski, J. Psychological and Psychoeducational Assessment of Deaf and Hard of Hearing Children and Adolescents; Gallaudet University Press: Washington, DC, USA, 2016.

Pizzo, L.; Ford, L. Developing a comprehensive linguistic profile to support learning: The assessment of d/deaf and hard of hearing multilingual learners. In Deafness and Diversity Supporting: Learners Who Are d/Deaf or Hard of Hearing Multilingual Learners; Cannon, J., Guardino, C., Eds.; Gallaudet University Press: Washington, DC, USA, in press; Volume 2. Pizzo, L.; Chilvers, A. Assessment and d/Deaf multilingual learners: Considerations and promising practice. Am. Ann. Deaf 2016, 161, 56–66.

116 Singleton JL, Supalla S. Marschark M, Spencer P. Assessing children's proficiency in natural signed languages, Oxford handbook of deaf studies, language and education , 2003New York Oxford University Press(pg. 289-302) Verhoeven L, Vermeer A., Taaltoets alle kinderen [Language test for all children] ,2001Arnhem, The NetherlandsCitogroep Wood, N.; Dockrell, J. Psychological assessment procedures for assessing deaf or hard-of-hearing children. Educ. Child Psychol. 2010, 27, 11–22. Zink I, Lejaegere M., N-CDIs: lijsten voor communicatieve ontwikkeling [N-CDIs: Lists for communicative development], 2002Leuven, The Netherlands Acco Boudreault, P., and Mayberry, R. I. (2006). Grammatical processing in American sign language: age of first-language acquisition effects in relation to syntactic structure.
Lang. Cogn. Process. 21, 608–635.

Chen Pichler, D., and
Lillo-Martin, D. (2018). "Hearing parents and deaf children learning a sign language together" in Talk at the 4th International Congress on
Family-Centered Early

Intervention for Children who are Deaf or Hard-of- Hearing ;

Bad Ischl, Austria; June 15, 2018.

Cormier, K., Schembri, A., Vinson, D., and

Orfanidou, E. (2012). First language acquisition differs from second language acquisition in prelingually deaf signers: evidence from sensitivity to grammaticality judgements in British sign language. Cognition 124, 50–65.

Freel, B. L., Clark, M. D., Anderson, M. L., Gilbert, G. L., Musyoka, M.,

and

Hauser, P. (2011). Deaf individuals' bilingual abilities: american sign language proficiency, reading skills, and family characteristics.

Psychology 2, 18–23.

Hänel-Faulhaber, B., Kügow, M., Skotara, N., Salden, U., and

Röder, B. (2014). ERP correlates of German sign language processing provide evidence for sensitive/ critical periods of language learning. BMC Neurosci. 15:62

Lillo-Martin, D. (2018). Differences and similarities between late first-language and second-language learning. Biling. Lang. Cognit. 21, 924–925

Mayberry, R. I. (2010). "Early language acquisition and adult language ability: what sign language reveals about the critical period for language" in Oxford handbook of deaf studies, language, and education, Vol. 2. eds. M.

Marschark, and P. Spencer (Oxford: Oxford University Press), 281–291.

117 Mayberry, R. I., and

Kluender, R. (2017). Rethinking the critical period for language: new insights into an old question from American sign language. Biling. Lang. Cognit. 21, 886–905. doi: 10.1017/s1366728917000724

Mitchell, R.

E., and

Karchmer, M. A. (2004).

Chasing the mythical ten percent: parental hearing status of deaf and hard-of-hearing students in the United States. Sign Lang. Stud. 4, 138–163.

Owens, R. E. (2012). Language development an introduction. Geneseo, NY: State University Press. Petitto LA. How the brain begets language. In: McGilvray J, editor. The Cambridge Companion to Chomsky. Cambridge, UK: Cambridge University Press; 2005. pp. 84–101. Pizer, G., Walters, K., & Meier, R. P. (2007). Bringing Up Baby with Baby Signs: Language Ideologies and Socialization in Hearing Families. Sign Language Studies, 7(4), 387-430. Neidle, C., Kegl, J., MacLaughlin, D., Bahan, B., and

Lee, R. G. (2000). The syntax of american sign language. Functional categories and hierarchical structure. Cambridge, MA: MIT Press.

Skotara, N., Salden, U., Kügow, M., Hänel-Faulhaber, B., and

Röder, B. (2012). ERP correlates of early language deprivation: a comparison of native signers and signers with delayed language acquisition in processing German as L2. BMC Neurosci. 13:44.

Woll, B. (2018). The consequences of very late exposure to BSL as an L1. Biling. Lang. Cognit. 21, 936–937.

118

Unit-4 ❏ Educational Assessment, Identification And Addressing Needs Structure 4.1 Introduction 4.2 Objective 4.3 Concept & Principles Of Educational Assessment 4.5 Principles Of Educational Asssessment 4.6 Scope And Priorities In Educational Assessment 4.7 Methods, Techniques, Tools For Educational Assessment, Reporting Formal And Informal 4.8 Outcome Of Educational Assessment 4.9 Pedagogic Decesions 4.10 Factors Affecting Educational Performance 4.11 Setting Up Of An Educational Assessment Clinic/ Centre- 4.12 Let's Sum Up 4.13 Check Your Progress 4.14 References 4.1 Introduction The partial or total inability to hear is termed as hearing loss , also known as hearing impairment. A person with little or no hearing is known as deaf. Hearing loss can be unilateral or bilateral. Hearing loss can affect the ability to learn spoken language and in adults it can create difficulties with social interaction and at work. Hearing loss can be caused by a no. of factors like genetics, ageing, exposure to noise, some infections, birth complications, trauma to ear, and certain medications or toxins being chronic ear infections. Conductive hearing loss, mixed hearing loss and sensory neural hearing loss are the three main types of hearing losses. The increase in intensity of sound above the

119 usual level necessary before the listener can detect it can categorize the severity of hearing loss. 10% of the total population is globally affected by hearing loss. There are well established legal requirement for providing comprehensive educational and related services to hearing impaired and deaf children. Children with hearing impairment are included among those with a wide range of handicaps covered under the individuals with disabilities education act of 1975, better known as public law (PL) 92-142. For our purposes, PL 94-142 mandates – the least restrictive, individually appropriate free public education for hearing impaired children from 3 – 21 years old, a provision of the full range of intervention modalities involved in aural rehabilitation and the empowerment of parents with significant input into the child's educational plan. The factors to be considered for optimal educational place go beyond the degree of hearing loss, and issues requiring special needs for issues including the presence of other handicaps, maximization of the child's psychosocial development, family considerations, geographical considerations, and viewpoints about educational approaches for the hearing impairment. A systematic process of documenting and using empirical data on knowledge, skill, attitudes and beliefs to refine programs and improve student leaning is called as educational assessment or educational evaluation. Those children who cannot benefit fully from the curriculum provided for children of their age or cannot be catered adequately in an ordinary educational setting are considered to have special educational needs. Children with hearing impairment can be considered for special educational needs(SEN children). 4.2 Objective The objectives of the education of hearing impairment are; § Helping in Development of full potential by providing learning experiences in school of hearing impaired children, § Use of residual hearing for the development of speech and language skills to master communication skills in everyday situations of the hearing impaired, § To help hearing impaired children develop a correct sense of value and citizenship, § To help hearing impaired children grow up well-adjusted and independent so that they can integrate into society.

120 4.3 Concept & Principles Of Educational Assessment Audiology is an education related service along with other related services such as speech language pathology, psychology and occupational therapy. There are definition differences impacting the services given by an audiologists like agency responsibility including the education system of all states and the specified lead agency within each state , identification specifying the use of appropriate screening techniques as a part of identification program, assessment of communication functions as determined by use of audio logic procedures, habituation by orienting about assistive listening devices, direct provision of services, creation , administration of programs to prevent hearing loss, selection and fitting of assistive listening devices along with counseling. 4.5 Principles of Educational Asssessment The important principles are- 1. VACS 2. SMART § Valid- the work is relevant to the assessment criteria § Authentic- the work has been produced solely by the learner. § Current – the work is still relevant at the time of assessment. § Sufficient- the work covers all the assessment criteria. § In short, we can say that VACS help in assuring assessment details are accurate § Specific- the activity relates only to what is being assessed and is clearly stated § Measurable- the activity can be measured against the assessment requirements, allowing any gaps to be identified. § Achievable- goals can be achieved at the right level. § Relevant- the activity is realistic and give consistent result. § Time bound- the target dates and times can be agreed

121 4.6 Scope And Priorities In Educational Assessment Scope and priorities in educational assessment of hearing impaired is more focused on communication access in the school environment extending the traditional clinical evaluation. The goal is not only limited to define the parameters of hearing loss, including the necessary referrals for diagnostic treatment, hearing instrument fittings, but also determining the individual educational implications. Assessment should always include information directly from the child whether as a series of question or play through counseling tools summarizing the individual and environmental assessment areas and recommended procedures. A comprehensive profile of child's auditory abilities as standard measures is included as a part of audiologic assessment of individuals hearing. Information about speech recognition tests in varied acoustic situations, detailed information about speech perception to analyze suprasegmentals and phonetic features of speech, phonemes, words, sentences and discourse as considered as a part of hearing assessment. Otoacoustic emissions test should be used for analyzing the child's integrity of auditory system. Child's personal hearing instruments should also be tested to assure intended benefits. Child's communication in classroom and school environments with teachers and peers is also required for assessing information for assessment of communication access. Measurement and assessments has always played an important tale in helping man cope with his environment. A task or series of tasks used to obtain systematic observations, that are presumed to be representative of educational or psychological traits are called as tests. Evaluation may be defined as a process through which a value judgment or decision is made from a variety of different measurements or tests. The purpose of assessment is to obtain relevant and accurate data necessary for making important decisions with least possible error, for planning effective future strategy, the most important to a special educator being in the area of program development, design and remediation. Educational assessment or educational evaluation is the systematic process of documenting and using empirical data on the knowledge skills, attitudes and beliefs to define programs and improving student learning. Assessment is often used interchangeably with tests, but not limited to tests. Assessment can focus on the individual learner, the learning community, a corse , an academic program, or the educational system as a whole.

122 IDEA 2004 provides language that impacts the assessment and eligibility determination for all students who are suspected of having a disability. A child may not be determined to be eligible for special education or a child with a disability [Determination of Eligibility: §300.534 (b)(1)(i, ii)] if the determinant factor for that eligibility determination is: · Lack of instruction in reading or math~ or · Limited English proficiency ~ and · The child does not otherwise meet the eligibility standards under §300.7(a). IDEA 2004 addresses the evaluation and assessment of all students [Determination of Needed Evaluation Data §300.533(a)(a)(iiii)] in requiring the assessment and alignment of core curriculum using Researchbased instructional strategies that are student focused. This would include review of existing evaluation data on the child, including: § Evaluations and information provided by the parents of the child~ · § Current classroombased assessments and observations~. § Observations by teachers and related services providers Historical Perspective Education for students who are deaf or hard of hearing

is one of the earliest areas of specialized education in this country. The focus of educational practice has evolved over time between language instruction with emphasis on spoken language to emphasis on using sign language and everything in between. While educators may disagree on methods and practice, all educators agree that language development is the heart of educational need for these children. As an invisible disability, the impact of hearing loss is challenging at best to understand. In 1817 Thomas Hopkins Gallaudet and Laurent Clerc established the first school for deaf students in the United States~ the American Asylum for the Deaf and Dumb, in Hartford, Connecticut. The first educational programs in the United State were in state schools where most instruction was conducted in American Sign Language and English was taught in its written form. This followed the method of instruction used in France where Clerc, a deaf man, was educated. However, in 1880 the Milan (Italy) Conference voted to ban use of sign language with students worldwide in favor of oral educational techniques viewingsigns as an inferior means of communicating. Throughout the United States, stateschools and private schools changed their educational methods to one of an Auditoryoral approach.

123 In Tennessee, as in most states, services for students who were deaf or hard of hearing began at the state school for the deaf. The Tennessee School for the Deaf (TSD) opened in 1844 by an act of the state legislature. Today the school offers an individualized and comprehensive educational program. The school provides a total learning environment that utilizes state of the art curricula, materials, and methods to prepare students for adult life. Students from all over the state stay on campus throughout the school year, going home every weekend, for school holidays, and for summer vacation. The school also offers a comprehensive outreach program to assist Local Education Agencies in educating children who are deaf and hearing impaired in the local community. Educational assessment can be sub divided into- § Placement, formative, summative and diagnostic assessment § Objective and subjective § Referencing § Informal and formal § Internal and external 4.7 Methods, Techniques, Tools For Educational Assessment, Reporting Formal And Informal Types and approaches to educational assessment- § Formative- summative § Informal- formal § Continuous-final § Process-product § Divergent- convergent 1. Formative vs. summative assessment The assessment that is designed to assist the learning process by providing feedback to the learner, which can be used to identify strengths and weakness and hence improve future performance, is called as formative assessment.it is most appropriate when the results are to be used internally by those involved in learning

124 process.The assessment primarily used to make decisions for grading or determine readiness for progression is called as summative assessment. It usually occurs at the end of an educational activity for judging the learner's overall performance. It helps in providing communication between students and stakeholders. 2. Informal vs. formal assessment- Informal assessment is most often used to provide formative feedback in which the judgments are integrated into other tasks.it is comparatively less threatening and less stressful to students but prone to subjective bias.When the students are aware that the task they are doing is for assessment purposes are called formal assessment.it has a higher standard of reliability and validity, summative in nature, tending to have greater motivation impact but increased stress. 3. Continuous vs. final assessment- Continuous assessment occurs throughout a learning experience, is most appropriate when student/ instructor knowledge of process or achievement is needed to determine the subsequent progression or sequence of activities. Final or terminal assessment is that which takes place at the end of learning activity. It is most appropriate when learning can only be assessed as a complete whole rather than as constituent part basically used for final decision making. 4. Process vs. product assessment- The assessment focusing more on steps/ procedures underlying appropriate ability or task i.e. the cognitive steps in performing certain tasks whereas product assessment focuses more on result or outcome of a process, is more useful for documentation of proficiency or competency in a given skill, i.e. summative purposes . 5. Divergent vs. convergent assessment – Divergent assessment are those for which a range of answers or solutions might be considered correct whereas divergent assessment tend to be more authentic and most appropriate in evaluating higher cognitive skills . Convergentassessment is easier to evaluate or score than divergent assessment.

125 Approaches and methods of educational assessment Approach is an axiomatic, flexible emphasizes in planning overall strategy providing general guideline on ways of performing a work. it does not identify all the steps involved. Instead it just indicates the direction to proceed in or ways of handling some major or important tasks. Method refers to how you are going to assess. It is more rigid, procedural, specific emphasizing on techniques used in class. It can also be defined as a overall plan for orderly presentation of language material based upon a selected approach. Stern (1983: 453) defines approaches as the conceptualization of language teaching has a long, fascinating, but rather tortuous history. Assessment Tools for Students who are Deaf or Hard of Hearing Recommended Assessment Tools: The specific tests listed under each area represent possibilities from which to choose. Many tests are usable only in part, such as the use of only visual or performance subtests from a more comprehensive standardized evaluation. Almost all evaluation tools require some form of modification which the evaluator must note in the student's record. Cognitive/Intellectual Assessments § Universal Nonverbal Intelligence Test (UNIT) – (Bracken & McCallum)- it is a set of individually administered specialized tasks. These tasks are designed to measure fairly the general intelligence and cognitive abilities of children and adolescents from ages 5- 17 years who may be disadvantaged by traditional verbal and language loaded measures. § The Wechsler Intelligence Scale for Children –Fourth Edition (WISC-IV) – (David Wechsler) – individually administered clinical instrument for assessing the intellectual ability of children aged 6 years through 16 years, 11 months. § Kaufman Assessment Battery for Children (K-ABC) – (Alan S. Kaufman & Nadeen L. Kaufman)- assesses the intelligence and achievement of 2 ½ - 12 ½ - year-old children. § The Test of Nonverbal Intelligence-Third Edition (TONI-III) – (Linda Brown, Rita J. Sherbenou, Susan K. Johnson) – Language free measure of cognitive ability.

126 § Comprehensive Test of Nonverbal Intelligence (CTONI) – (Donald D Hammill, Nils A Person, J. Lee Wiederholt) – also a language free measure of cognitive ability. § Cognitive Assessment System (CAS) – (Jack Naglieri, J.P. Das) – an assessment battery designed to evaluate cognitive processing in children 5-17 years of age. Derived from the Planning, Attention, Simultaneous, and Successive (PASS) theory. § The Battelle Developmental Inventory (BDI) – (Jean Newborg, John R. Stock, Linda Wnek) – a standardized individually administered assessment battery of key developmental skills in children from birth to 8 years-of-age. § Benton Visual Retention Test (BVRT) – (Abigail Benton Sivan) – assessment of short term visual memory. § Test of Visual Motor Integration (VMI) – (Keith E. Beery)- A developmental sequence of geometric forms to be copied with paper and pencil to assess visual perception and motor coordination Psycho-social § Meadow-Kendall Social/Emotional Assessment Inventory for Deaf Students (MeadowOrlans) § Kinetic House-Tree Person Drawings – (Robert C. Burns) Projective drawings used to assess social emotional functioning. § Children's Apperception Test (C.A.T.,) – (Leopold Bellak, Sonya Sorel Bellak) – an apperceptive method of investigating personality by studying the dynamic meaningfulness of individual differences in the perception of standard stimuli. § Children's Depression Inventory (CDI) – (Maria Kovacs) assessment to identify depression in children. Behavior § Conners' Rating Scales (C. Keith Conners) – Identifies a behavioral profile of a child in six specific areas based on responses from teachers, parents, or the child themselves.

127 § Achenbach Child Behavior Checklist – (T.M. Achenbach) – Identifies a behavioral profile of a child in eight specific areas based on the responses from teachers, parents, or the child themselves. Expressive and Receptive Language: § Test of Auditory Comprehension of Language-Third Edition (TACL-3). The TACL- 3 measures a child's auditory comprehension skills including word classes and relations, grammatical morphemes, and elaborated sentences. The child is presented with a picture and points to the phrase or sentence that matches what he/she hears. § The Screening Instrument for Targeting Educational Risk (S.I.F.T.E.R.) /The Preschool S.I.F.T.E.R. The S.I.F.T.E.R. is used by the teacher to rate the child in comparison to other children in the classroom on 15 items. The responses are plotted on a chart which indicates pass, marginal or fail for each of the five areas of academics, attention, communication, classroom participation, and school behavior. If a child fails in a specific area, they should be referred for further evaluation. The Preschool S.I.F.T.E.R. was developed to be used with preschool children and is similar to the S.I.F.T.E.R. § Cottage Acquisition Scales For Listening, Language, and Speech. This curriculum includes a developmental checklist for assessment and planning for diagnostic therapy. The language section includes steps from pre-verbal through to complex sentences including pragmatic development. § The Bzoch-League Receptive-Expressive-Language Test (REEL-2), 2 nd . Ed. The REEL-2 is a scale designed for infants and toddlers up to 3 years of age. It measures and analyzes emergent language for intervention planning. Results are obtained from a parent interview and are given in terms of an Expressive Language Age, A Receptive Language Age, and a Combined Language Age. § The Reynell Development Language Scales III (RDLS III), 3rd ed. The RDLS III assesses receptive and expressive language using real objects rather than pictures for the child to interact with. It is designed for children from 15 months to 7 years of age. The comprehension scale comprises sections such as agents and actions, attributes, locative relations, vocabulary and complex grammar, and inferencing, etc. The expressive scale comprises sections such as verb phrases, auxiliaries, clausal elements, inflections, etc.

128 ∫ The Preschool Language Scale-4 (PLS-4) The PLS-4 is a standardized test of auditory comprehension and expressive communication for infants and toddlers. The auditory comprehension subscale assesses basic vocabulary, concepts and grammatical markers in preschool and higher-level abilities such as complex sentences, making comparisons and inferences, etc. in older children. The expressive communication subscale asks preschoolers to name objects, use concepts that describe objects, express quantity, use grammatical markers, etc. For older children it includes word segmentation, completing analogies, telling a short story in sequence, etc. This test also includes an articulation screener and a language sample checklist. ∫ Preschool-Clinical Evaluation of Language Fundamentals (CELF-P) The CELF- P evaluates expressive and receptive language ability. It focuses on word meanings, word and sentence structure, and recall of spoken language. This tool was standardized for children ages 3 years, 0 months to 6 years, 11 months and uses pictures as stimulus for all three areas of language development. The linguistic concepts subtest evaluates the child's knowledge of modifiers and his/her ability to interpret one-level oral directions. The sentence structure subtest evaluates comprehension of early acquired sentence formation rules and the child's ability to comprehend and respond to spoken sentences. The recalling sentences in context subtest evaluate recall and repetition of spoken sentences. Formulating labels assesses the child's ability to name pictures. The word structure subtest assesses the child's knowledge and use of early acquired morphological rules and forms. ∫ The MacArthur Communication Development Inventory: Words, Gestures, and Sentences These questionnaire/checklists ask parents to identify various words that their child either says or signs. It includes vocabulary relating to: things in the home, people, action words, description words, pronouns, prepositions, question words, as well as sentences and grammar. ∫ The Rossetti Infant-Toddler Language Scale: A Measure of Communication and Interaction This scale assesses preverbal and verbal areas of communication and interaction including: Interaction-Attachment, Pragmatics, Gesture, Play, Language Comprehension and Language Expression. The examiner can directly observe or elicit a behavior from the child or use the caregiver's report to equally credit the child performance. Results reflect the child's mastery of skills in each of the areas

129 assessed at 3 month intervals. A parent questionnaire with guidelines for parent interview is also included. ∫ Systematic Analysis of Language Transcripts (SALT) A 30 minute play session is videotaped and every spoken and signed language utterance is transcribed. This analysis includes information regarding the number and types of spontaneous utterances that the child and caregiver produce. This analysis is intended to provide a portrait of the child's language, as well as the type of language the caregiver uses while communicating with the child. In order to measure the child's growth a videotape is made every six months. ∫ SKI-HI Language Development Scale This scale is developmentally ordered and contains a list of communication and language skills in varying intervals for different ages. Each age interval is represented by enough observable receptive and expressive language skills to obtain a good profile of a child's language ability. ∫ Oral and Written Language Scales (OWLS) The OWLS assesses higher order thinking, semantics, syntax, vocabulary, and pragmatics. It includes a Listening Comprehension Scale (picture pointing), an Oral Expression Scale (answering questions, and sentence completion) and a Written Expression Scale (use of conventions, syntactical forms, and ability to communicate meaningfully). ∫

Grammatical Analysis of Elicited Language, Pre-Sentence Level(GAEL-P) This test contains three sections: readiness skills, single words, and word combinations. The examiner uses structured play and pictures to elicit language specific to these three areas. The test was developed for children with hearing loss and can be administered in spoken or signed English. ∫ Teacher Assessment of Grammatical Structures (TAGS) The TAGS consists of rating forms to be completed by the therapist regarding the child's understanding of grammatical structures in sentences of at least four words that contain a subject and a verb. The grammatical categories are noun modifiers, pronouns, prepositions, adverbs, verbs, and questions. Teacher Assessment of Spoken Language (TASL) Auditory/Listening Skills: ∫ Early Speech Perception Test (ESP) for Profoundly Hearing-Impaired Children. The ESP test battery is a test of speech perception for profoundly deaf children as

130 young as 3 years of age. The ESP may be used to establish objectives and to measure the effects of a hearing aid or cochlear implant in terms of their impact on the child's speech perception ability. The kit includes a manual, response forms, box of toys, full color picture cards and audiocassette. § The Lexical Neighborhood Test (LNT) and the Multi-syllabic Lexical Neighborhood Test (MLNT) Lexical Neighborhood Test (LNT) and the Multi- syllabic Lexical Neighborhood Test (MLNT) are two new open-set tests of word recognition. The LNT and MLNT are based on the lexical characteristics of word frequency and neighborhood density, and include words found in the vocabularies of children age three to five. Studies have shown that normal hearing three- and four-year old children are able to recognize all the words from these two open-set speech perception tests at very high levels of performance. Therefore, these results have been used as a benchmark for children with hearing loss. § Functional Auditory Performance Indicators (FAPI): An Integrated Approach to Auditory Development. The FAPI assesses the functional auditory skills of children with hearing loss. It examines

seven categories of auditory development: sound awareness, sound is meaningful, auditory feedback,

localizing sound source, auditory discrimination, short-term memory, and linguistic auditory processing. §

Meaningful Auditory Integration Scale (MAIS)/Infant-Toddler: Meaningful Auditory Integration Scale (IT-MAIS). These scales were

developed for children who have a profound hearing loss and

designed to be administered to parents by an audiologist. The parent is asked questions regarding use of amplification/ cochlear implant and auditory behaviors regarding environmental and speech sounds. § The Listening Inventory for Education: an Efficacy Tool (L.I.F.E.) The L.I.F.E. is designed to determine amplification benefit and considers input from both the student and the teacher. The protocol also provides suggestions for intervention accommodations designed for the specific situations that are identified as problems. Speech Skills. (suprasegmental, phonetic and phonologic development) § The Arizona Articulation Proficiency Scale-Third Edition The Arizona-3 is a tool designed to identify misarticulations and total articulatory proficiency. The stimulus

131 pictures show children in more current clothing styles and activities. The test materials also include ethnic diversity. § The Goldman Fristoe: Test of Articulation 2 This test assesses a child's articulation ability by sampling both spontaneous and imitative speech production. Pictures and verbal cues are used to elicit single word answers that demonstrate common speech sounds. It measures the articulation of speech sounds and identifies and describes the types of articulation errors produced by the child. § The Ling Phonetic-Phonologic Speech Evaluation Record: A Manual. This tool is used to assess the segmental and nonsegmental aspects of speech at both the phonetic and phonologic levels. The phonetic level responses are obtained through imitation. Phonologic level responses are obtained from spontaneous language samples. § Identifying Early Phonological Needs in Children with Hearing Impairment This is a standardized test used to assess how young children with hearing loss spontaneously use first-level phonological patterns. It numerically rates whether the child's patterns are missing, emerging, or mastered. §

St. Gabriel's

Curriculum for the Development of Audition, Language, Speech

and Cognition.

This curriculum outlines the development of early speech, the development of early auditory feedback skills, and an order for the acquisition of vowels, diphthongs, and consonants. It also provides a developmental checklist of phonological processes. § Cottage Acquisition Scales For Listening, Language, and Speech. This curriculum provides a developmental checklist for assessment and diagnostic planning for therapy. The speech section tracks objectives from Phonetic-Phonologic Speech Evaluation Record and also links these objectives to phonetic listening development. § Spoken Communication for Students Who are Deaf or Hard of Hearing: A Multidisciplinary This curriculum includes a Student Speech Record (SSR) which is used to evaluate the following: non-verbal communication (attention, turn taking, eye contact, and breath support) and suprasegmentals, vowels and diphthongs, and consonants at the phonetic, phonologic, and pragmatic levels. The SSR also includes an oral peripheral examination form.

132 ¶ The Central Institute for the Deaf (CID) Picture Speech Intelligibility Evaluation (SPINE) The SPINE uses colorful pictures to evaluate speech intelligibility in children as young as 6 years of age. The assessment package includes 300 full- color picture cards, a test manual, and 25 response forms. ¶ Paden-Brown Phonological Kit This tool is designed to assess spontaneous use of first level phonological patterns in children with hearing loss. It utilizes a list of 25 words that are typically within the speaking vocabulary of young children with hearing loss. Vocabulary: ¶ Peabody Picture Vocabulary Test (PPVT-3) The PPVT measures a child's understanding of individual words (receptive vocabulary). It is designed for children 2 years 6 months to 18 years of age. Raw test scores are converted into standard cores, percentile ranks and age equivalents. The Expressive Vocabulary Test (EVT) ¶ Expressive One-Word Picture Vocabulary Test (EOWPVT) The EOWPVT assesses a child's English speaking vocabulary by asking the child to name objects, actions and concepts pictured in illustrations. The test ends on 6 consecutive incorrect responses. ¶ Receptive One-Word Picture Vocabulary Test (ROWPVT) The ROWPVT assesses a student's knowledge of vocabulary by asking the child to point to the object being named. The test ends when the child cannot correctly identify the pictured meaning of the word in 6 out of 8 consecutive items. ¶ Test of Early Reading Ability-3 rd ed (TERA-3) The TERA-3 measures reading ability of young children ages 3-6 through 8-6. Rather than assessing a child's reading readiness it assesses their mastery of early developing reading skills. The three subtests include: Alphabet (knowledge of the alphabet and its uses), Conventions (knowledge of the conventions of print), and Meaning (measuring the construction of meaning from print). An overall Quotient is computed using all three subtest scores.

133 Basic Concepts: ¶ Boehm Test of Basic Concepts-Revised (BTBC-R) The BTBC-R is administered to children in Kindergarten, 1st, and 2nd grade (and older children who are deaf or hard of hearing) and tests basic concepts of comparison, direction, position, quantity, and time. ¶ Bracken Basic Concept Scale-Revised (BBCS-R) The BBCS-R measures basic concept acquisition and receptive language skills of children from 2 years, 6 months to 8 years of age. It includes eleven conceptual categories-colors, letters, numbers, counting, sizes, comparisons, shapes, direction/position, self/social awareness, texture/materials, quantity, and time/sequence. Sign Language: ¶ Checklist of Emerging ASL Skills Available in:

Easterbrooks, S & Baker, S. Language Learning In Children Who Are Deaf And Hard Of Hearing: Multiple Pathways. (2002) Allyn and Bacon,

Boston, Mass. This checklist provides a series of indicators to judge whether a deaf child has components of ASL in his or her communication system. The evaluator should not judge a child's skills based on English ability. The focus should be on ASL. The checklist should be filled out by at least three different evaluators who are familiar with the child and who are proficient in ASL. ¶ ASL Development Observation Record Available through: ASL Resource Teacher, Early Childhood Education Program, California School for the Deaf, Freemont (CSDF), 39350 Gallaudet Drive, Fremont, CA 94538 (510) 794-2536 This tool was developed by the Early Childhood Education program at the CSDF to document the ASL language development of deaf children from the time they entered the program to Kindergarten. The goal of the observation record is to identify the language strengths and needs of each child and to document the progress made over the time spent in the Early Childhood Education program. This record also serves as a guide for teachers in assessing their role as language models and how they use language with the children. ¶ The American Sign Language Proficiency Assessment (ASL-PA) Available by contacting: Dr. Sam Supalla, Department of Special Education, Rehabilitation, and School Psychology, College of Education, University of Arizona, Tucson,

134 AZ 85721 (520) 621-9466 (TTY) E-mail: ssupalla@u.arizona.edu The ASL-PA globally assesses the expressive ASL skills of children ages 6-12 years of age. Items/target features are based on ASL acquisition studies. Language samples are elicited from varied discourse contexts. There are no sample norms presently available. § Test of American Sign Language (TASL) Available by contacting: Dr. Philip Prinz, Department of Special Education and Communicative Disorders, San Francisco State University (415) 338-7655 E-mail: pm@sfsu.edu The TASL consists of two production measures (Classifier Production Test, and Sign Narrative) and four comprehension measures (Story Comprehension, Classifier Comprehension Test, Time Marker Test, and Map Marker Test). It is designed to be used with deaf students ages 8-15 years. Assessment methods Assessment methods are the strategies, techniques,, tools and instruments for collecting information to determine the extent to which students demonstrate desired learning outcomes. Assessment methods can be categorized into 2 broad categories i.e. direct method or indirect method also known as formal or informal method of assessment. Below are several guidelines to follow when selecting assessment methods: 1. Collect information that will answer the program's questions 2. Use multiple methods to assess each student learning outcome 3. Include both indirect and direct assessment methods Include both qualitative and quantitative methods 4. Choose methods that allow the assessment of both strengths and weaknesses 5. Utilize capstone courses or "second-year" projects/assignments to directly assess student learning outcomes 6. Use established accreditation criteria/standards when developing the assessment plan. There are several methods of educational assessment of hearing impaired, some are listed below-

135 Method Description Direct/ indirect data Alumni Survey Surveying program alumni can provide Indirect information about program satisfaction, preparation (transfer or workforce), employment status, skills for success. Surveys can ask alumni to identify what should be changed, altered, maintained, improved, or expanded. Capstone Project A capstone project or course integrates Direct or Course knowledge, concepts, and skills that students are to have acquired during the course of their study. Capstones provide a means to assess student achievement across a discipline. Certification or These standardized tests are developed Direct Licensure Exam by outside, professional organization to assess general knowledge in a discipline. Competitions External reviewers score, judge the Direct (Juried) performance, work, etc. of students Course Course evaluations assess student Indirect Evaluation experience and satisfaction with an Survey individual course and are generally administered at or near the end of the semester. They provide the faculty, department, and institution with student perceptions of the classroom aspect of their educational experience Embedded Embedded assessment techniques utilize Direct Techniques existing student course work as both a grading instrument as well as data in the assessment of SLO.

136 Method Description Direct/ indirect data Entrance/Exit Interviews are conducted with students direct Interviews when they enter college and when they leave—either through graduation or early departure. These interviews can be designed to measure SLO, but can also be used to learn about students' perceptions, gather feedback, on various college services, activities, etc Exit Exam/ A comprehensive exam given near the Direct Comprehensive end of the student's academic career Test (usually during the final semester prior to graduation). The exam is generally given to determine a student's acquisition and application of a particular type or form of knowledge or skill, as well as the ability to integrate knowledge from various disciplines. The exam can be written, oral, or a combination. Focus Groups A series of structured discussions with Indirect students who are asked a series of open- ended questions designed to collect data about beliefs, attitudes, and experiences Performance Students can be evaluated on direct participation in campus and/or community events, volunteer work, presentations, clinical, internships, musical or art performances, etc. The performance of students is rated/ scored using a rubric/scoring guide. Pre and post tests Typically an exam is administered at the Direct beginning and at the end of a course or program in order to determine the progress of student learning

137 Method Description Direct/ indirect data SWOT Analysis A facilitated analysis of the internal indirect strengths & weaknesses of the course, program, department as well as the external threats & opportunities Standardized A test that is developed outside the Direct tests institution for use by a wide group of students using national or regional norms Observations Information can be collected while Indirect observing "events" such as classes, social gatherings, activities, group work, study sessions, etc. Observation can provide information on student behaviors and attitudes Locally A test that is developed within the Direct developed tests institution to be used Direct Tests internally. The test is typically administered to a representative sample in order to develop local norms and standards "Maps" and/or A map/matrix is a grid of rows and Indirect Matrices columns that organizes information that can be used for assessment purposes by summarizing relationships between goals, SLO, courses, syllabus outcomes, course work, assessment methods, etc. Maps/ matrices can be used to review curriculum, select assessment methods, make comparisons, etc. Reflective Reflective essays can be used as an Direct/ Indirect Student Essays assessment method to determine student understanding of course content and/or issues as well as students' opinions and perceptions

138 Method Description Direct/ indirect data Portfolio Students' work is collected throughout a Direct program which is assessed by faculty using a common scoring guide/rubric. Portfolios may contain research papers, reports, tests, exams, case studies, video, personal essays, journals, self-evaluations, exercises, etc. Syllabus review Reviewing a syllabus involves determining Indirect if the course is meeting the goals and outcomes that have been established In 4.8 Outcome of Educational Assessment Analysis, reporting, interpretation, documentation, feedback and pedagogic decisions The American association of higher education (AAHE) assert in its Nine principles of good practice for assessing student leaning (1992) that – ….assessment makes a difference when it begins with issues of use and illuminous questions that people really care about. Best ways to analyze, report, interpret and document assessment information are- TheUniversity of California at Chicago (1998) recommends- ● Identified goals and objectives should be presented in relation to data. ● Data analysis must be done using by selecting and using appropriate procedures. ● Well balanced picture of the program must be presented using qualitative and quantitative method. ● Varying analysis and reporting procedures according to the identified audience. ● Elaboration of pros and cons of the academic program in prepared written statements.

139 ● Recommendations based on analysis of data using identified goals as a framework ● Interpretation of data about student's mastery of subject matter, of research skills or of writing and speaking. ● Any graduate of your program getting jobs, accepted into reputable graduate school. PEDAGOGIC DECESIONS In designing pedagogic decisions consider and include the following Learning process For achieving their objectives what learning experiences and strategies will be used for students Assessment methods How will the information be collected? What measures will be used to know that students are meeting learning objectives? From whom, and at what point, will you gather data? Assessment process When will the assessment be conducted? Who will be responsible for each component? What is the overall timeline for the assessment plan? Status, outcomes What do you find and how did the data support these findings? Decisions , plans, recommendations Based on your findings what will you plan now? Salient features of NCF (2005) ● Values enshrined in the constitution of India. ● Reduction of curriculum load ● Ensuring quality education for All (EPA). ● Systematic changes and common schools system NCF (2005) has also recommended 5 guiding principles for curriculum developments-

140 o Connecting knowledge to life outside school o Ensuring that learning shifts from role method o Enriching curriculum so that it goes beyond text books o Integration of examination and classroom life. o Nurturing an overriding identity informed by caring concerns within the democratic policy of the country. RTE ACT 2009 It was enacted on 4 august 2009, describing the modalities of free and compulsory education for children between 6- 14 in India. The important features are- ● Free and compulsory education toall. ● Admission to all. ● Quantity and quality of teacher ● No discrimination and harassment ● All round development ● No detention ● Justiciable ● Establishment of school management committees (SMC) to strengthen participatory democracy and governance in elementary education ● Reservation of 25% of seats for children belonging to socially disadvantaged, economically weak to ensure better education. 4.9 Factors Affecting Educational Performance Results of the CADS survey and other reports have identified multiple factors that influence communication and education of the hearing impaired in the USA. Specifically, these factors affect the child's ability to acquire competency in English as the language of instruction in American schools. In February 1988, the United States Federal

141 Commission on Education of the Deaf (COED) submitted a report entitled, Toward Equality: Education of theDeaf, which emphasized the need for a higher level of competence in the English language among the deaf (The Commission on Education of the Deaf, 1988). A recent study by Geers and Moog (1989) suggests that such mastery of English is the predominant predictor of reading achievement. The degree to which the hearing-impaired child masters language depends on a number of patient and program variables (Nowell, 1985). Student Progress Monitoring § Monitoring student progress assists teachers, parents and administrators in making informed instructional decisions. § Monitoring student progress demonstrates the student's rate of growth toward meeting the annual instructional goals § Monitoring student progress provides documentation for informed decision making regarding placement, effective use of communication modalities, and language development. § Monitoring student progress provides students with feedback and motivation to learn. § Monitoring student progress provides D/HH teachers with objective evidence that the student is progressing academically. IDEA -2004, mandates accountability at several levels including the demonstration of student progress. While achievement tests (e.g. SAT-HI, IBS) have been used for decades in the field of education with learners who are deaf or hard of hearing, there is a need and mandate to monitor student's academic growth at frequent and regular intervals. Documentation of student progress may include formal and informal assessments including those described previously e.g. systematic observations, formal and informal assessments. The only evidenced- based measures currently available include Curriculum Based Measurement (CBM) and Mastery Monitoring (MM). § CBM- Correct Word-Incorrect Sequence (C-IWS) and Total Words Written (TWW) may be use dot monitor students' progress in written English. § Criterion- based assessment (e.g.Brigance,Syntactic Structures, DIBELs,) may be used as Mastery Monitoring progress monitoring tool

142 § Test of Silent Contextual Reading Fluency (TOSCRF) may be used with secondary
students who are deaf or hard of hearing and who are
reading at the 4+ grade level § Functional Behavior Analysis (FBA) – to monitor students social behavior Individualized educational plan An IEP must be developed for those eligible for special educational services after the evaluation is completed. The IEP is a legal document jointly developed and agreed on by parents and representatives of the educational agency. Professionals from outside agencies may be asked to participate when appropriate. The IEP must specify the current status of the child, annual goals and short-term objectives for instruction, the educational and support services needed to meet the goals, the type of classroom in which the instruction will take place, the extent to which the child will participate in regular school activities, the evaluationplan, and the date the services will be SETTING UP OF AN EDUCATIONAL ASSESSMENT CLINIC/ CENTRE- India is a land of diversity. It has multiplicity in languages, in people and this tradition.it has rain forest and desserts, high mountains and long coasts. Similarly the educational setup in India does not have a uniform pattern. There are: 1. village and town level set up Ø Municipal corporations Ø Municipalities Ø panchayats Ø Community level participations Bringing the community closer to the school Taking the school closer to the community Ø Parent teacher association Ø School complex 2. District level set up Ø District institute of education and training

143 Ø District board of education 3. State level setup Ø Unitary set-up Ø Two tier set-up Ø Three tier set- up Ø Four tier set- up Ø State level bodies Comparison of features of systems of education Features Formal system Informal system Non- formal system Duration Fixed, eg-10+2 No duration can be Flexible, may vary system of schooling, specified according to needs 3 years for graduation. Age Age groups well A continuous process, No age bar defined at every age any age and all ages. Children outside

144 Features Formal system Informal system Non- formal system Clientele Young people of Free for all schools, the specified age, sex unemployed youth, and socio-economic working people adult status literates and illiterates Cost Costly Almost free Cost- effective Objectives Academically sound Unspecified Goal oriented Nature Rigid Unorganized Flexible 4.10 Let's Sum Up ∬ Assessment is the process of observing, recording, and documenting children's growth and behavior over time in order to make decisions about their education. ∬ Assessment has many purposes, but it is primarily used in planning developmentally appropriate curriculum. An initial assessment is made of all children when they enter a program, but ongoing assessment continues as long as a child remains enrolled in a program. ∬ Most assessment methods involve observing children. Formal observation by researchers has led to the creation of developmental milestones. Early childhood teachers usually use informal observation methods to collect data. ∬ There are several types of assessment tools that are used in early childhood programs. These include anecdotal records, checklists, participation charts, rating scales, samples of products, photographs, and tape recordings. All of these methods have advantages and disadvantages. ∬ Materials that have been collected during the assessment process should be placed in a portfolio for each child. Portfolios document children's learning and development. When observing children, it is important to record only objective statements. Once data is recorded, it may be interpreted. ∬ This interpretation takes knowledge and skill. It requires a thorough understanding of child development. Information you collect on children must also be kept confidential. This is perhaps the most important guideline to follow.

145 4.11 Unit end exercises ∬ Write about the principles of educational assessment? ∬ What are the tools of educational assessment? ∬ Write short note on set up of educational assessment? ∬ Discuss about pedagogic decisions for CHWI. ∬ What are the techniques /methods of educational assessment? ∬ How Will You Measure The Outcome Of Educational Assessment? 4.12 References 12. Albertini, J. & Schley, S. (2003). Writing: Characteristics, instruction,
and assessment.
In M. Marschark & P. Spencer (Eds.), Handbook of
deaf studies, language, and education (pp.123-131). New York: Oxford University Press. 13.
Allen, T. E. (2001). A comprehensive evaluation of the Postsecondary Educational Opportunities for Students who are Deaf or Hard of Hearing. Washington, DC: Gallaudet University. 14. Amselle, J. (1997). Adios bilingual education. Policy Review 86, 52-55. 15. Anderson, G. B., & McGee, S. (1998). Creating school to work initiatives for deaf students. Perspectives in Education and Deafness, 16(5), 4-7. 16. Bahr, P. R. (2007). Double jeopardy: Testing the effects of multiple basic skill deficiencies on successful remediation. Research in Higher Education, 8(6), 695- 725. 6 17. DCS. (2007). Deaf Community Services. Website. Retrieved April 25, 2008, from Deaf Community Services of San Diego Inc.: http://www.dcsofsd.org/about.php 18. Dickinson, J. (2010). Access all areas: Identity issues and researcher responsibilities in workplace settings. Text & Talk, 30(2), 105-124. 19. Escobedo, G. (2007). A retention /persistence intervention model: Improving success across cultures. Journal of Developmental Education, 31(1), 12-37. Garcia, F. (2004). Developing Sociopolitical Literacy. AERA (pp. 34-40). San Diego:

146 20. Heldref. Harris, R., Holmes, H. M., & Mertens, D. M. (2009). Research ethics in sign language communities. Sign Language Studies, 9(2), 104-131. 21. Hermans, D., Knoors, H., Ormel, E., & Verhoeven, L. (2007). Modeling reading vocabulary learning in deaf children in bilingual education programs. Journal ofDeaf Studies and Deaf Education, 13(2), 155-174. 22. Humphries, T., & Allen, B. (2008). Reorganizing teacher preparation in deaf education. 23. Sign Language Studies, 8(2), 160-180. Lang, H. (2002). Higher education for deaf students: Research priorities in the new millennium. Journal of Deaf Studies and Deaf Education, 7(4), 267-280. 24.
MacSweeney, M., Waters, D., Brammer, M., Woll, B., & Goswami, U. (2007). Phonological processing in deaf signers and the impact of
age of first language acquisition. NeuroImage, 40(3) 1369-1379. 25.
Manning, K. (1992). A rationale for using qualitative research in student affairs. Journal of College Student Development, (33)2, 132-136.

147 Unit-5 ppppp Team Approach in Assessment, Identification & Assessing Needs Structure 5.1 Introduction 5.2 Objectives 5.3 Team Approach: concept & types (Multidisciplinary, Interdisciplinary and Trans-disciplinary) 5.3.1 Concept 5.3.2 Types of Team approach: 5.3.2.1 Multidisciplinary Team approach 5.3.2.2 Interdisciplinary Team Approach 5.3.2.3 Trans-Disciplinary Team Approach 5.4 Role of various stakeholders: professionals, personnel, parent and the child 5.4.1 Objective 5.4.2 Role of professional 5.4.3 Role of Personnel 5.4.4 Role of Parents 5.4.4.1 Parents as Implementers of Professional Advice 5.4.4.2 Parents as Service Providers 5.4.4.3 Parents as Teachers 5.4.4.4 Parents as Political Advocates 5.4.4.5 Parents as Family Members 5.4.5 Role of Child 5.5 Constitution of team with respect to CWHI: Consideration on child's age, Severity and associated conditions

148 5.5.1 Function 5.5.2 Member of constitution team 5.5.3 Respect to Children with Hearing Impairment 5.5.4 Consideration on child's age 5.4.5 Severity 5.5.6 Associated condition 5.6 Team's role before, during and after assessment; Identifying and addressing the need and planning IEP / IFSP 5.6.1 Team Role before Assessment 5.6.2 Team role during Assessment 5.6.2.1 Role of Audiologist 5.6.2.2 Role of Services Coordinator 5.6.2.3 Role of Family-Infant Teacher 5.6.2.4 Role of Speech/Language Pathologist (SLP) 5.6.2.5 Role of Teacher of the Deaf/Hard of hearing 5.6.2.6 Role of ENT Physician 5.6.2.7 Role of General Physician 5.6.3 Team role after Assessment 5.6.4 Identifying and addressing the need and planning IEP / IFSP 5.6.4.1 Need and planning IEP / IFSP 5.6.4.1 Difference between an IFSP and an IEP 5.7 Team's role in outcome measures: Periodic assessment and evaluation; review of performance against previously set goals 5.7.1 Concept 5.7.2 Team Role of outcome measures 5.7.2.1 Cognitive abilities 5.7.2.2 Linguistic and Commutation abilities 5.7.2.3 Self-directed movement

149 5.7.2.4 Process of activity 5.7.3 Periodic assessment and evaluation 5.7.3.1 Effective periodic assessment 5.7.3.2 Periodic assessment evaluation 5.7.4 Review of performance against previously set goals 5.88888 Let us sum up 5.9 Unit end exercise 5.10 References 5.1 Introduction

No single treatment or intervention is the answer for every child or family. Good intervention plans will include close monitoring, follow-ups and any changes needed along the way. There are many different options for children with hearing loss and their families.

These are

working with a professional (or team) who can help a child and family learn to communicate,getting a hearing device, such as a hearing aid andjoining support groups.Taking advantage of other resources available to children with a hearing loss and their families.

The said course helps learners to appreciate the role of professionals to address the needs of the child with hearing impairment in a holistic manner using team approach and its importance to reflect on their role in assessment and identification of needs. 5.2 Objectives After learning this unit learner will be able to understand • Team Approach: concept & types (Multidisciplinary, Interdisciplinary and Trans- disciplinary) • Role of various stakeholders: professionals, personnel, parent and the child • Constitution of team with respect to CWHI: Considerations on child's age, severity and associated conditions • Team's role before, during and after assessment; Identifying and addressing the need and planning IEP / IFSP

150 • Team's role in outcome measures: Periodic assessment and evaluation; review of performance against previously set goals 5.3: Team Approach: concept & types (Multidisciplinary, Interdisciplinary and Trans-disciplinary) Team approach is a model involving a team of professionals with complementary backgrounds and skills working together toward common goals. This approach is increasingly advocated by scholars and policy makers as a means of assuring quality of outcomes and quality of work environment. In terms of hearing impairment requires the expertise of professionals from multiple disciplines e.g., ENT Doctor, Audiologist, Speech-Language Pathologists, Auditory-Verbal Therapist, Rehabilitation Worker, Special Educator, Parents and Family member. Specially, family involvement is a key component of a collaborative intervention approach for successful infant- toddler interventions. With the help of team approach we get specifically the line provides information about: • Different types of hearing problem. • Diagnosis and intervention strategies of

therapy • Educational opportunities • Vocational training and job opportunities • Special Employment Exchanges • Government Schemes and facilities • Organizations working for PWDs • Prevention and management. 5.3.1.-

Concept Team approach is a model involving a team of professionals with complementary backgrounds and skills working together toward common goals. This approach is increasingly advocated by scholars and policy makers as a means of assuring quality of outcomes and quality of work environment. Also team approach should be idea generation, conflict and performance. At this time, accurate evaluation of hearing for children of all ages is possible. Therefore, if any adult involved in the care of a child suspects the possibility of hearing loss, an immediate referral should be made for appropriate diagnostic evaluation. Universal newborn screening

151 does not rule out the possibility of a newly acquired hearing loss or a progressive loss that had been previously undiagnosed. The development of symptoms or physical examination findings consistent with a syndrome should be used to direct further diagnostic testing. The main benefit of team approach is team collaboration more heads is better than one head. Because more heads provide a particular pin point diagnoses and treatment plans referrals to one professional that help family get informed and connected complete all evaluations/consultation in quickly. 5.3.2.-Types of Team approach: A child with hearing loss means delay the speech, language and cognitive ability. Early identification and effective treatment of hearing loss improves language, communication and cognitive skills. In this regard most agencies work with the team of professionals to establish an individual treatment plan for hearing impairment child for the purpose of the development of speech, language and auditory attention. Because speech, language and auditory attention is a most important factor for the development of academic skill. That is why team approach is very essential part in children with hearing impairment. There are three types team approach. These are Multidisciplinary, Interdisciplinary and Trans-disciplinary. The terms multidisciplinary, interdisciplinary and Trans-disciplinary are increasingly used in the interchangeably. But when applied the team approach to a specific context in the field of hearing impairment it should be most important that with the help of team approach students with hearing impairments development academic functioning, communication skills, sensory- motor skills, social / emotional skills, daily living skills, strategies or adaptations career / vocational skills and utilization of residual hearing. Therefore,

to achieve quality education for students with hearing impairment, services must be provided using a team approach, including members

with disability specific expertise in educating students with hearing impairment. 5.3.2.1-Multidisciplinary Team approach: The term multidisciplinary refers to cooperation of experts from different scientific disciplines. In multidisciplinary team approach focus on two or more disciplines work together on a common problem. Like that a particular task and project etc. So in this regard Multidisciplinary Team approach is provide the serve serves children with hearing loss comprehensive evaluations. These extensive assessments are designed to address hearing, health, communication, academic, psychological and behavioral concerns. The evaluation process is dynamic in nature

152 as the student's family, school team and the Hospital's assessment experts work together to share perspectives, identify assessment goals and collaborate to obtain the best developmental outcomes for students with hearing loss. Another part is Educational options. In education option children with hearing impairment vary on according to the degree of hearing loss and cognitive ability of the child. Development of communication skills is the basic goal of early education programs for hearing- impaired children. Advantages of a Multidisciplinary Team (Galiie, B.2018) • It gives a full access to an entire team of experts and every

access to the best possible options that are currently available. • It improves service coordination

for greater efficiencies offered to the child for easier. • It expedites the referral process and that referral process must be specific

maintain their health status. • It creates new avenues for service implementation

in different departments and organizations. That help pulls the

resources to provide immediate care whenever it may be necessary. • It allows children to create goals for themselves. These are specific daily, weekly, monthly, and yearly goals for themselves.

Disadvantages of a Multidisciplinary Team (Galiie, B.2018) • There is always a time pressure involved in providing services. •

Different team members come from unique backgrounds. Like

jobs happen on different schedules as well, which creates challenges when trying to provide services. Then there is the issue of a psychiatrist not necessarily knowing what a social worker does, and vice-versa. • It requires frequent collaboration to be effective. •

It is dependent upon available resources. • Incomplete decisions happen without complete information. 5.3.2.2- Interdisciplinary Team Approach: The interdisciplinary team approach is approach in the evaluation and assessment of children with hearing impairment. The interdisciplinary process involves professionals from various disciplines providing their unique contribution regarding different aspects of the child's development

153 and also emphasis on family functioning. The defining feature of this approach is the ability to integrate and synthesize information through an interactive group process. So that here member is aware about their interpretation informs the whole and are able to formulate conclusion and also recommendations based upon the combined efforts of all. The member are psychiatrists, neurologist, pediatric audiology, speech language and auditory verbal therapy, child development for cochlear implant team, genetics, ophthalmology, radiology, medical social work and psychology working closely together with the child, family and schools is needed to develop a cost-effective and comprehensive management programme for children with hearing impairment. Advantages (BBA,2018) • It is a multimodal methodology. Because it has Psychological, social and cultural factors enter into the process and also effectively a singular approach. • It is a coordinating approach. Because here all the team member is present in one umbrella and provide all essential support service for the develop the functional ability. • It is Effectiveness of Interdisciplinary Care. Because its develop in psychological well-being and quality life. Disadvantage, Cassady, (n.d) • It is a time demand, more energy from faculty and also complex. • It is a depend on Personality Issues. Because Some team member has rigid their personalities and want to stick to a single method of assessment. 5.3.2.3.-Trans-Disciplinary Team Approach: The transdisciplinary approach was introduced in the United States in the 1970s as a team model for educating children with cerebral palsy. The approach has since been adopted in some rehabilitation settings. Specially in children with hearing impairment. They have oral language disorders due to lack of normal auditory processing. This disadvantage effect on academically, socially and vocationally. We are knowing very much about that most learning is mediated by language and most curriculum development and teaching within the school context proceeds on the assumption that students have the age-appropriate listening and speaking skills necessary to cope with the social and academic language demands that are placed upon them in school. The trans-disciplinary team works to deliver training where

154 needed and to support students across the school with a hearing loss. This includes working alongside other professionals. The ultimate goals of the trans-disciplinary approach are to promote integrated assessment and to develop a unified treatment plan that is jointly carried out by all team members. Three primary features trans-disciplinary model from other team models. (Arch Phys Med Rehabil Vol 79, April 1998 Carol Rosen,C, A. Cate Miller, MA) First, the trans-disciplinary model underscores team communication and coordination of care. Team meetings are required, particularly to promote staff communication. Team meetings are coordinated by a facilitator who fosters development of a holistic treatment plan based on the child's needs. Second, in trans-disciplinary teamwork, there is a high degree of collaboration among team members in conducting assessments. Also team members collectively plan and implement the assessment. Results are then discussed and integrated treatment goals are developed during the team meetings. Third, in the trans-disciplinary approach, discipline-specific assessments are supplemented by a global, environment-referenced measure. This assessment specifically measures the child's adaptation to environmental demands in daily activities. Advantages (Levinton, L 2014) • Efficient service making more effective use of the primary intervention. The team of experts makes it possible to build a more consistent and coherent intervention program. • Professional development of the professional team through the acquisition of additional skills. • Contribution of the parent's unique knowledge of their child to the process. • Service adapted to the needs and priorities of the family. • Reducing the burden on the family which does not need to approach each professional separately. Disadvantages (Levinton, L 2014) This approach requires an investment of time (budget for: meetings, joint evaluation, follow-up, intensive contacts, investment in accompanying and supporting the process.

155 5.4 Role of various stakeholders: professionals, personnel, parent and the child A stakeholder is an individual, group or organization who is impacted by the outcome of a project. They have an interest in the success of the project, and can be within or outside the organization that is sponsoring the project.Stakeholders can have a positive or negative influence on the project. In the field of special education especially children with hearing impairment Stakeholders to build goodwill partnerships and to create shared purpose and understanding that will support delivery of key responsibilities 5.4.1-Objective According to National Academy of Sciences (2019) the objectives of stakeholder are • It is a call-in system. Because

child care providers can contact a central location to report their status

when it needed. • It is based on Age-specific exercise. Where any lack it should provide useful content for young children with hearing impairment

who have been traumatized. • Up-to-date information from parents e.g., how to reach them in an emergency, medications the child may need to have if evacuated. 5.4.2.-

Role of professional There are many professional approach are available for hearing impairment learner. These are: Sl.No Approach Role 1 ENT Doctor An ENT doctor is able to examine the ear and if any suspected to diagnosis or detect to the what the actual cause of hearing loss then suggested to recommend suitable treatment and refer to Audiologist and to know about depth information about the whether the hearing mechanism is normal and abnormal. 2 Case History Before completing any diagnostic audiometric test, it is important to carefully complete a case history. The case history should always be completed face-to- face with the patient, rather than having the patient complete a case history 156 checklist or questionnaire in the waiting room. During the taking of the case history, your job is to find out if the patient has recently experienced any of the common symptoms of hearing problem. Given that these symptoms occasionally are an indication of a more threatening medical problem, they are important to know and understand. 3 Responsibilities Audiologists play a central role in the identification, of Audiologists assessment, diagnosis and re/habilitation of patients with permanent childhood hearing loss. Professional roles and activities in audiology include clinical/education services, prevention and advocacy also advocate in education, administration and research. 4 Roles Speech Language pathologists

Speech-language pathologists (SLPs) play a role in the screening, assessment, and re/habilitation of children with permanent childhood hearing loss. Professional roles and activities in speech-language pathology include

are Critical Roles, Range of Responsibilities, Collaboration and Leadership. 5 Roles Auditory Verbal Therapist • A key element of this approach is teaching children to make effective use of their residual hearing either via hearing aids or a cochlear implant. • Therapists work one-on-one with the child to teach him or her to rely only on listening skills. Because parent involvement is an important part of the auditory-verbal approach, therapists also partner with parents and caregivers to provide them with the skills they need to help the child become an auditory communicator. • In this approach, neither speech reading nor the use of sign language is taught. Sl.No Approach Role

157 5.4.3 Role of Personnel Role of personal approach main approach main consider in primary ear and hearing care requires specialists, grassroots health personnel community workers to join together in a working pairment and Phase II: Running the early intervention programs in children with hearing impairment. Examples of role of personnel are: • The educational impact of hearing loss • Audiometry and hearing loss simulation • The use of technology to enhance student learning • Behavior intervention skills • Services for students who are deaf and hard of hearing with special needs • Communication skills (e.g., sign language, listening and spoken language) • Differentiated instruction • Curricular adaptations and teaching strategies known to benefit children/youth who are deaf and hard of hearing (e.g., use of visual aids, multi sensory teaching) • Use and maintenance of equipment. Example Hearing aid. • Facilities requirements/acoustical accommodations 5.4.4.-Role of Parents Family is the primary unit in the life of an individual where as parents are the pillars of an individual. So parents and family need to fulfill certain responsibilities in order to function. A family must generate income, protect and maintain its members and home, nurture and love one where as parents taught children social norms and educated. Especially a child is hearing impairment; these responsibilities become more essential part about parents. Because this is time bounded, expensive and more energy oriented and every ordinary tasks becomes more difficult and more stressful. Besides this there is the difficulty of helping the hearing impaired child develop a good self-image and social skills as well as learn the problems solving exercising which is foster to safety his/her life. In this regard parents of children with hearing impairment take on multiple roles. These are: 5.4.4.1.-Parents as Implementers of Professional Advice: If a child was not making satisfactory progress in the special education program, it was often assumed

158 that the parents were not assuming their responsibility for implementing the program at home. But recent age therapists and educators have accepted the potential of parents. Also parents are now active partners in not only implementing of professional advice but also plan out and carry out the same at home. 5.4.4.2.-Parents as Service Providers: Parents groups serve as a mechanism through which parents give each other mutual support and share information. Parents initiated and supported efforts often at great personal expense has won the legal right to free and appropriate public education in the least restrictive environment, better conditions in residential facilities and integrated vocational, residential and recreational services in the community, provisions for better financial security. 5.4.4.3.-Parents as Teachers: Role of parents as teachers and members of the multidisciplinary team. Here parents are provided training to make them more resourceful and for better involvement. 5.4.4.4.-Parents as Political Advocates: The development of parents' organizations evolved from small, local support groups of parents to national professional organizations. The primary function of many parent organizations has changed from providing direct services to advocating for political, legal, economic and social change. 5.4.4.5.-Parents as Family Members Professionals are becoming more aware of the necessity to consider the needs and roles played by all members of the family with a child with hearing impairment. It has been recognized that family has a value in developing and implementing programs for the children. It is also realized that family members have much to offer professionals. They often have unique insights gleaned from their day-to-day experiences living with the children. 5.4.5.-Role of Child • In classroom instruction children with hearing impairment should always focus teachers face what teacher talking about study and instruction. • Children with hearing impairment shouldsit close and have all visual barriersremoved including other students. • Child should be placed appropriatelyduring circle time so that everyonecan be seen • Deaf and hearing children shouldrole-play interactions so they canlearn how to do things appropriately.

159 • Children need to know to wave a handor tap a deaf/hard-of-hearing childand wait for them to look up. • Teachers may need to repeatdirections and/or show visuals of theactivities included in center time • A classroom aid, parent, or volunteermay need to be paired with the deaf,hard- of-hearing child at each centerto give more detailed instructionsand use visuals • Individuals around the schoolincluding recess aids, volunteers,lunch aids, office staff, nurse, etc.need to be aware of the deaf/hardof-hearing child. They may need tobe aware of the device and how tofix it if problems arise, how tohandle the child's feelings, and tohelp the child become sociallyinvolved with other children 5.5 Constitution of team with respect to CWHI: Consideration on child's age, Severity and associated conditions Team constitution is a most important factor in children with hearing impairment. Because team exercise should be to secure good outcomes and a positive future for children and young people with hearing impairment. The main aim of the team in children/young with hearing impairment should make good progress, achieve well and enjoy school, family and community life. 5.5.1.-Function of the constitution team • Provide family-focused support from the confirmation of hearing impairment. • Support, advise and empower staff in schools and settings to understand the needs of children and young people with hearing impairment. • Provide assessment and advice in relation to the child / young person's hearing impairment. • Ensure that the views, wishes, perspectives and experiences of the children and young people are fully reflected in their provision. • Support children and young people to develop a positive understanding of their own hearing impairment. • Carry out assessments in relation to specialist equipment. • Make specialist provision for children with particular needs in a number of specialist resources bases attached to mainstream schools.

5.5.2.- Member of constitution team Certainly, parents need these experts. But, as important as these team members will be, parents are the only ones who can be the team manager. It doesn't really matter how much professionals know, parents should never let them become a replacement for their involvement with their own child's education and development. (Professionals in Hearing Loss,2019) Parents will probably meet the constitution team members of the team in the following order: • Health professional • Audiologist • ENT doctor • Service coordinator • Speech and language pathologist • Teacher of the deaf or hard of hearing • Regular classroom Sl. Member of Role No Constitution Team 1 Health professional The health professional is paediatrician and family doctor. The health professional on whom parents depend for the general health care of parent's child, is probably a paediatrician, who treats only children, or a family practice physician, who treats adults as well as children in the family. The professional treat inflammations and infections of the ear and upper respiratory system that can affect hearing, as well as other conditions that children may encounter 2 Audiologist The audiologist has must specialize in the study of hearing disorders. An audiologist identifies the hearing loss, measures it, and aids in the habilitation of the deaf and/or hard of hearing person, by recommending appropriate hearing aids. 3 ENT doctor An ENT doctor is a physician who specializes in diseases of the ear, nose, and throat. He/she must examine a child to rule out any medical complications before parents purchase a hearing aid. An ENT should check every child periodically assessment. 4 Service coordinator The service coordinator is responsible for coordinating all services for the child and will serve as the person for parents to contact when seeking to obtain necessary services and assistance. The service

161 coordinator is also required to assist parents in identifying and locating available services and service providers, and to inform parents (and families) of the availability of advocacy services. 5 Speech and language pathologist A speech and language pathologist specializes in the diagnosis and habilitation of speech and language problems. This team member may meet with a child on a regular basis to work on the fine points of speech and language development and speech correction. He/she will explain how parents can help with the child's speech and language development. 6 Teacher of the deaf or hard of hearing The teacher of the deaf or hard of hearing should be certified by the State Department of Education to teach students who are deaf or hard of hearing. Parents should begin talking to these special teachers, from programs in their area, even if the child is only an infant. This person can help parents get started immediately with communication and language development, even if the hearing aids have not yet arrived. Most areas have programs for infants and toddlers and their parents. Teachers in these programs will become one of the most valuable members of the team, providing home visits and one-on-one early intervention for parents and children. 7 Regular classroom Another choice commonly made for children with hearing loss is mainstream placement. The term mainstreaming is used to refer to the placement of regular education classes based on their skill level. Mainstream education does seek to educate the "whole child" and provide exposure to many preschool programme. However, many schools turn to more directive teaching models by kindergarten wherein children sit at desks, teachers instruct, and children acquire facts, skills, and concepts through drill and practice. 5.5.3.-Respect to children with hearing impairment Man is a social animal, without society human just being is like animal. So human interaction with society with the help of verbal interaction and that involves speech, language and communication. In that sense speech, language and communication depend upon our hearing ability which is to perceive the sound about nature. But when child/ person suffering from hearing impairment he/she has difficulty in perceiving or identifying sound clearly due to auditory problems and it affects verbal interaction which is speech, language and communication. Due to this problem child can face early development of language, cognition, and social-emotional. So Sl. Member of Role No Constitution Team

162 constitutional team should respect about child to develop his/her personal-social, cognitive and academic aspect in different dimension about social context and foster how developspeech, language and communication. Sl. Components of No respect Role of Constitution Team 1 Language Due to delayed language development with unclear speech and incorrect pronunciation constitution team should be encourage child in speech correction. 2 Emotion and behavior Due to lack of verbal expressing child should have problem in emotional and behavioral. So constitution team should be reduced the problem behavior regard various social/academic aspect and develops the normal peer acceptance in mainstream in regular class room it develops the normal peer acceptance and reduces the problem in emotional and behavioral. 3 Self-confidence Due to lack of verbal communications children with hearing impairment face on lack of self-confidence and its effects on social inter action. That is why children with hearing impairment live in a world of isolation poor self-image for being always mistaken to be slow in response and they form a group of their own, an association of the deaf for their common interest and interaction. So in that case constitution team should be develop on adjustment in social inter-action with the normal peers in regular and mainstream class. 4 Social interaction Due to poor comprehension and expression, or actively avoid social contact and communication children with hearing impairment socially left-out by normal peers. So constitution team should be placement of regular education classes based on their skill level in mainstream education and exposure social interaction to hearing peers who can model age-appropriate language and social development. 5 Academic performance Hearing impaired children are frequently handicapped in various degree of hearing loss and it affects to difficulty in receiving the correct messages. Regarding this affects child should be delay in academic performance and particularly reading which relies heavily upon language skill. So Constitution team should be developing the academic performance specially in cognitive abilities and develop verbal intelligence

163 5.5.4.-Consideration on child's age For the purpose of Consideration on child's age in children with hearing impairment it's based on school age children.

For school-aged children, learning problems related to hearing loss typically manifest as poor performance in language-based subjects, class tests, class participation, and verbal interaction with peers and teachers.

When summed, the impact of these difficulties leads to reduced academic achievement and often to school failure, especially in the lower grades.

Concept: -

To best serve the needs of a child with hearing impairment, all persons who provide services to the child should work as a team. This team includes the child's parents, primary care physicians, audiologists, educators, and speech–language pathologists. After the members of an assessment team determine the impact of the child's hearing loss in various domains, the focus of intervention should be to provide optimal support services to the child. The team also should commit to long-term monitoring to assess the effects of the hearing impairment on academic achievement and the effectiveness of the intervention plan according to

age level of the child. According to The Phoenix Society,2019 the role of constitution team consideration on child's age in children with hearing impairment it should base on three phages. These are Pre-school level, School age and Adolescent. SL. Consideration on No child's age Level Year Role of constitution team 1 Pre-school level 4 years and younger • Develop toilet training, bed wetting, clinging behaviour's etc. • Allowing parents and primary caregivers to stay with the child while he/she is hospitalized in order to prevent damage. • Holding, rocking and offering physical as well as verbal support that the child will be taken care of helps the small child to re-establish a sense of security in the world. 164 2 School age 5-12 years • Child has an increasing capacity to grasp reality of the permanence of loss. • It is important to determine the child's perception relevant to the cause of the loss and to correct and clarify misconceptions. • May have difficulty focusing and concentrating in school. 3 Adolescent. 13-18 years • Grief may be masked by: substance abuse, truancy, social isolation and withdrawal from family and/or peer group, impulsivity, sexual acting out and promiscuity, reckless, risk-taking or self- defeating behaviour's. • Grief may also be masked in over achieving for underachieving. The child who is trapped in perfectionism demands as much concern as the child who is apathetic, cynical, and underachieving. • Mood swings are common in adolescence and in all likelihood this will be intensified by the loss. • Often adolescents seek emotional support more readily from peers than adults and age appropriate support groups can be very helpful. • May have difficulty focusing and concentrating on studies or may become lost in intellectual pursuits such as reading, and computer related activities. SL. Consideration on No child's age Level Year Role of constitution team

165 5.4.5.-Severity 5.5.6.-Associated condition The constitution team Learner with hearing impairment who face other associated or multiple condition that disability category combination of those learners who have physical, cognitive and communicative impairments (Multiple disabilities,2017). The team member should provide in appropriate accommodations and adaptations strategies for the purpose of successful classroom activities of the learner with hearing impairment who face other associated or multiple condition.

166 New Teacher Induction Program.2011, suggest the follows constitution team regard Accommodation& Adaptation Strategies for Learner withhearing impairment who face other associated or multiple condition are: • Curriculum should be learners need based. That is why curriculum should have more emphasis on long and short-term planning. • Selecting and using effective strategies to improve learners 'self-monitoring, self- assessment, and goal-setting for their own learning. • For the purpose of better achievement of the learner's classroom assessment and evaluation strategies should be ongoing and continuous. • To assess and evaluate learners' work simple achievement charts should be used. • Informing and helping learners and parents to understand the assessment and evaluation strategies to be used and giving them meaningful feedback for improvement. 5.6-Team's role before, during and after assessment; Identifying and addressing the need and planning IEP / IFSP For the purpose of the assessment team is the main unit of work in children with hearing impairment. Because with the help of team diagnose the problem and solve it through the team assessments specifically the line provides information about different types of hearing problem, diagnosis and intervention strategies of

therapy, educational opportunities, vocational training and job opportunities, special employment exchanges, Government Schemes and facilities, Organizations working for PWDs and

Prevention and management of disabilities in specially in hearing impairment. 5.6.1-Team Role before Assessment: According to Tame side local offer for children and young people with hearing impairment/deafness (nd) team role should be before assessments in hearing impairment are: 1. Information to parents about child impairment. 2. Understanding the child's type and degree of hearing loss 3. Communication options those are available for the purpose of communication 4. Inform about how use and maintenance of hearing aids, cochlear implants, FM systems

167 6. Inform about how the professionals are available and their roles. 7. Inform about what the services available are and how to access them. These are Opportunities to meet other parents, Offering joint visits for hearing aid fitting and cochlear implant appointments and offering and supporting an informed choice etc. 8. Supporting parents with advice about the development of their child and providing suitable individual programmes of need. These are interaction and communication skills and developing language and listening skills 9. Supporting transition from home to nursery or early years setting and then from there into school. 5.6.2-Team role during Assessment According to Boys Town National Research Hospital, 2019 team role in hearing impaired children during assessment are: 5.6.2.1-Role of Audiologist • Keeps track of the amount of hearing. • Uses special technology and knowledge to fit hearing aids. • Monitors and programs cochlear implants. • This is the person to contact if you have any questions or concerns about how your child is hearing or how listening devices are working. 5.6.2.2-Role of Services Coordinator • A services coordinator is one of your first contacts with the early intervention program. • Your services coordinator becomes a central point of contact between you and the early intervention program and/or other professionals. • This professional will work with you to identify and meet the child's needs by coordinating both formal and informal supports. • Sometimes many professionals become involved in your team. It can be crushing to keep up with all the contacts to keep things running smoothly. The services coordinator can assist with this and many other needs.

168 5.6.2.3-Role of Family-Infant Teacher • The Family-Infant Teacher may have a background in a variety of disciplines (e.g., teacher of the deaf, speech-language pathologist; audiologist, special education teacher, early childhood specialist). • Be sure to know the professional background of your teacher. • It is important that your teacher have special expertise in working with infants

who are deaf or hard of hearing and their families. 5.6.2.4-

Role of Speech/Language Pathologist (SLP) • Sometimes, your family-infant teacher is a speech language pathologist (SLP), who has special training in working with young children who are DHH. • An SLP is skilled at promoting spoken language development; guiding you through the development of listen, talking, and learning words and concepts. • Some SLPs are skilled in sign language, and can help the family learn to sign, if that is the family's chosen approach. • An SLP is also skilled in promoting communication through alternate approaches (pictures, communication boards) for children with additional special needs. 5.6.2.5-Role of Teacher of the Deaf/Hard of hearing • This professional has specialized training

in educating children who are deaf or hard of hearing. •
These teachers may be endorsed to work with young children, or they may work in classrooms with school age children. • A teacher of the deaf/hard of hearing has in-depth understanding of the ways in which hearing loss affects learning, and knows strategies to promote listening, language, learning and communication access. 5.6.2.6-Role of ENT Physician • The ENT physician specializes in evaluating and diagnosing the cause of your child's hearing loss and makes recommendations for your child's medical treatment options. • Your child's ENT physician will take care of your child's medical hearing and other ENT needs throughout their childhood and adulthood. • The ENT doctor will examine your child and provide medical clearance for obtaining hearing aids.

169 • Your ENT doctor may be involved with a Cochlear Implant (CI) team or will help you link with a Cochlear Implant team, if you desire such services and they are indicated for your child. • The ENT doctor's recommendations are sent to your child's general physician regard other medical services are well coordinated. 5.6.2.7-Role of General Physician • Child needs to see the family practitioner or pediatrician regularly in order to grow up to be healthy and strong. • Physician will be asked to approve and sign the Individualized Family Services Plan (IFSP) developed by your baby's team. • Your team will work to ensure that educational and medical services are communicating with each other and coordinating care. This is in everyone's best interest. 5.6.3.- Team role after Assessment According to National Deaf Children's Society, April 2017 the team roles after assessment of children with hearing impairment are: • Get to know the child's parents so that you can share knowledge and develop a support plan with them for purpose of future development. • Meet with the Teacher of the Deaf to identify the deaf child's individual needs and learning priorities also plan the necessary adaptations required within the early years setting and in any learning experiences • Undergo training in identified areas of need, with advice from the Teacher of the Deaf • Make need based adaptations to the environment. • Arrange opportunities for the child to visit and familiarize themselves with staff and the environment. • Tell other children about deafness and what they can do to help their peer communicate and socialize. • Attend multidisciplinary meetings and individual meetings with the agencies who have supported the deaf child and their family to date in order to gather information and advice to support their specific needs

170 5.6.4.- Identifying and addressing the need and planning IEP / IFSP Individualized education program (IEP) planning and individualized family service plan (IFSP) planning are the processes of determining, based on assessment data, a child's or student's educational needs and then completing a written statement, such as an IEP or IFSP, that is developed, reviewed, and revised by a team of individuals. An IEP is an education document for children ages 3 to 21. It focuses on special education and related services in schools. An IFSP is much broader. It is used for children from infancy through age 2, involves the family more, and may include professionals from several disciplines in planning for the child. An IFSP is based on an in-depth assessment of the child's needs and the needs and concerns of the family. It contains 1) information on the child's present level of development in all areas; 2) outcomes for the child and family; and 3) services the child and family will receive to help them achieve the outcomes. 5.6.4.1- Need and planning IEP / IFSP: According to Pennsylvania, (n.d.) Need and planning IEP / IFSP are: • The IFSP and IEP are plans that identify services and supports so that family members and early education programs are actively engaged in promoting the child's learning and development. • The IFSP/IEP team determines the skills/abilities and appropriate supports and services either in the natural environment or the least restrictive environment to accomplish the established goals and outcomes. • These decisions are not made by matching the child's areas of delay with a particular early intervention discipline. Rather, supports and strategies are individualized and build on the strengths and skills the child demonstrates in all areas of development. • The IFSP and IEP are plans that consider: the strengths of the child; concerns of the parent/guardian; most recent evaluation results; academic, developmental and functional needs of the child; communication needs of the child; and will incorporate revisions to the plan to address lack of progress.

171 5.6.4.2- Difference between an IFSP and an IEP. According to PACER Center, (2011) there are some significant deference's between an IFSP and an IEP. These are

172 5.7 Team's role in outcome measures: Periodic assessment and evaluation; review of performance against previously set goals Children with hearing loss can have a major impact on other aspects of a child's development – particularly on communication and social interaction skills. The child may use sign language, speech or a combination of the two. Unless steps are taken to help the child feel confident in social situations, they are likely to be withdrawn – remaining on the edge of groups of children or preferring a one-to- one activity with an adult. 5.7.1.-Concept- Outcome measures are tools that can be used to measure a variety of aspects of children with hearing impairment and wellbeing. Outcome measures often take the form of questionnaires about how hearing impairment individual feels or functions. These would generally be filled in by a child or young person, or by a parent, peer, clinician, teacher or similar professional. Outcome measures have a continuous research process that process are the extent to which a particular outcome measure. This outcome measure is 'valid' – whether it actually measures what it claims to measure and 'reliable' – whether the measure would produce similar scores in the same conditions if used again. 5.7.2.-Team Role of outcome measures- There are four important roles in outcome measure in children with hearing impairment. These are Cognitive abilities, Linguistic and Commutation abilities, Self-directed movement and Process of activity. 5.7.2.1.-Cognitive abilities: The intelligence of Children with hearing impairment is differing on the basis of degree and type of disabilities. Cognitive competence encompasses the skills and capacities needed at each age and stage of development to succeed in school and in the world at large. Also cognitive competence is defined by skills in language and communication, as well as reading, writing, mathematics, and problem solving. So team should be providing stimulating, challenging and supportive environments in which to develop these skills healthy self-regulatory practices and modes of persistence required for academic success.(Gottfried, 2013). 5.7.2.2.-Linguistic and Commutation abilities: Linguistic and Communication is frequently a high priority outcome, as well as high need area for children with hearing impairment. Communication has been defined as expressing one's needs and wants, developing social closeness, sharing information, and fulfilling social 173 etiquette responsibilities. (Schlosser &Sigafoos, 2006).It is most important factor that team should be providing guidance on constructing home and school environments that affect normal language acquisition. As language is essential for making good educational progress and social development, any language delay should be addressed by the school. It is important to monitor the learner's language and refer them to the Teacher of the Learner with hearing impaired for assessment if it is felt they do not have age-appropriate language or are starting to fall behind. The Teacher Learner with hearing impairment will monitor a pupil's language, listening, speech and communication development using a number of specific tests. Where language delay is identified, specific programs of work will need to be put in place which target individual learning needs. 5.7.2.3.-Self-directed movement For most children, movement in daily life activities is automatic and requires little thought and simple movement is based on a complex interaction of sensory, motor and cognitive components. But children with hearing impairment frequently experience limitations in their abilities due to auditory clue. That is why they limited in their ability to engage in social interaction, initiate intentional communication and explore and manipulate their environment. The sensory, social, and language input they receive may be drastically reduced or altered compared with their typically developing peers. Despite the fundamental importance of early motor development, research aimed at specifying effective and efficient early motor interventions has been hindered by a variety of conceptual and methodological problems. 5.7.2.4.-Process of activity: It agrees that "active participation in life tasks". (Diener, Lucas, &Oishi, 2002, p. 66) Therefore, the subjective well-being depends on the changes that occur on people's lives when they are involved in activities or achieve their goals (Diener, Lucas, &Oishi, 2002). Halpern (1993) as well as Ruble and Dalrymple (1996), suggests that success in children with hearing impairment in particular is the achievement of a balance between subjective and objective goals, or finding a "person-environment fit." While objective societal values such as competitive employment and independent living are important, they do not capture the complete picture of what it means to become an adult. With the person-environment fit perspective, these goals are evaluated and adjusted within the individual's unique context. A balance between objective goals and the individual's subjective experience results in the person's optimal well-being in adulthood. For example, not only is it important whether an individual with special needs is employed, but also how

174 well the job fits his or her interests and provides a level of support adequate for success. 5.7.3.-Periodic assessment and evaluation Periodic assessment is specific assessments which focus on especially in subject's current level. Periodic assessment helps identify strengths and weaknesses in both individuals and groups and enables teachers to priorities the next steps in teaching and learning. According to Passport Health Plan (nd) Periodic Assessment is a federally mandated Medicaid program for children with hearing impairment. This assessment required providing comprehensive services and furnishing all Medicaid coverable, appropriate, and medically necessary services needed to correct health conditions. 5.7.3.1.-Effective periodic assessment: It • requires evidence from a wide range of contexts, for example observation of group work, oral responses and homework • can be based on individual or group activities • will have most impact where outcomes can feed directly into medium- and short-term planning • requires a structured, consistent approach to the review of evidence • depends on good subject knowledge and a clear understanding of progression in key concepts and skills within the subject. 5.7.3.2.-Periodic assessment evaluation: It • does not require special assessment activities but involves making use of the opportunities provided by planned teaching and learning • provides a broad picture of achievement, giving a better view of pupils who may have progressed unevenly in different aspects of the curriculum • draws on a wide enough range of evidence to link pupils' achievement to national standards in a meaningful way, as well as indicating next steps for learning and longer term targets. • reveals aspects of the curriculum that need to be strengthened • supports evaluation of progress and the setting of appropriate learning targets at both individual and group level.

175 5.7.4.-Review of performance against previously set
goals Performance based goal can be controlled by the person who set the goals
when possible. This goal focus on person based. According to Performance or previously set goals helps managers (2019), review of performance against previously set goals are: • Performance and previously set goals, helps the team member identify problems in children with hearing impairment in the workplace. • After identifying a problem, the team member should select appropriate decision criteria. These criteria reflect the factors which the team member thinks are relevant in a decision. Because all criteria are not equally important, the team member must prioritize each one by allocating weights to the decision criteria • This criterion indicating the relative importance of the relevant criteria by assigning a weight to each. • Problem must list, but not evaluate, feasible problem-solving alternatives. Then, he or she must analyze each one. • As each alternative is evaluated against the criteria, the strengths and weakness of each alternative will become evident. • Most of the time team member take decisions about contain judgments which are reflected in the criteria chosen, the weights assigned to them, and the evaluation of the alternatives. • The decision-making process can fail if the chosen alternative is not implemented properly. • Successful decision implementation includes identifying those who will be affected by the decision and gaining their commitment to the decision. 5.8.-Let us sum up In this unit, we discussed the concept and type of team approach in children with hearing Impairment. Also discussed about role of various stakeholders as well as constitution team with respect to children with hearing impairment especially in child's age, severity and associated condition. Hence, we have further discussed about identifying and addressing the need and planning IEP / IFSP and major discussed in difference between an IFSP and an IEP. The unit end with a discussion on the team role in outcome measures especially in periodic assessment and evaluation children with hearing impairment.

176 5.9.-Unit end exercise 1. Write in details about types of team approach in CWHI and it advantage disadvantage. 2. What do you mean by stakeholder? Discuss in details about Role of Professional and parents approach in CWHI. 3. What do you mean by IEP and IFSP? Discuss in details about IEP and IFSP and it difference. 4. What do mean by outcome measure in CWHI? What are the role of team member about outcome measure? 5. Discuss in shortly about periodic assessment and Evaluation in CWHI. 5.10.- References 1. A resource guide: Mainstreaming a child with a hearing impairment: What teachers need to know,2006 Retrieve on 08.11.2019 from https:// digitalcommons.wustl.edu/cgi /viewcontent.cgi?article= 1103& context= pacs_capstones 2. BBA,2018 The Advantages of an Interdisciplinary ApproachRetrieve on 13.11.2019 from https://www.apmhealth.com/news-updates/apm-blog/item/130- the-advantages-of-an- interdisciplinary-approach 3. Beginnings Professionals in Hearing Loss,2019 Retrieve on 17.11.2019 from https://ncbegin.org/professionals-in-hearing-loss/ 4. Boys Town National Research Hospital, 2019 Retrieve on 17.11.2019 from https://www.babyhearing.org/language-learning/early-intervention-team 5. Carol Rosen, A. Cate Miller, MA 1998, Retrieve On 13.11.2019 from https:// www.archives-pmr.org/article/S0003-9993(98)90145-9/pdf 6. Community-Based Rehabilitation Promoting ear and hearing care through CBR, World Health Organization 2012 Retrieve on 08.11.2019 from https://www.who.int/pbd/ deafness/news/CBREarHearingCare.pdf 7. Considerations In The Education Of Children With Hearing LOSS,(1999) Retrieve on 17.11.19 from https://www.pediatric.theclinics.com/article /S0031-3955(05)70087- 0/fulltext

177 8. Developmental Disorders Series Hearing Impairment Child Assessment Service, Department of Health, HKSAR 2008,Retrieve on 17.11.2019 from https:// www.dhcas.gov.hk/english/public_edu/files /SeriesI_HearingImpairment_Eng.pdf 9. Diener, E., Lucas, R. E., &Oishi, S. 2002, Subjective well-being: The science of happiness and life satisfaction. In C. R. Snyber, & S. J. Lopez (Eds.), Handbook of positive psychology (pp. 65-73). New York: Oxford University Press 10. Early, Periodic, Screening, Diagnosis & Treatment Retrieve on 08.11.2019 from http://passporthealthplan.com/wpcontent/uploads/2014/11/ EPSDT_revisedWomensHealth.pdf 11. Gaille, B.2018, 11 Multidisciplinary Team Advantages and Disadvantages Retrieved on 13.11.2019 fromhttps://brandongaille.com/11-multidisciplinary-team-advantages- and disadvantages 12. Gottfried AW. Home Environment and Early Cognitive Development: Longitudinal Research. London, UK: Academic Press; 2013. 13. Happy Stakeholders in Special Education Communicating with All the Parties with Claims on Special Education, n.d. Retrieve on 08.11.2019 from https:// www.thoughtco.com/happy-stakeholders-in-special-education-3110477 14. Hearing Impairment (HI) Team Retrieve on 17.11.2019 from https:// schools.oxfordshire.gov.uk/cms/content/hearing-impairment-hi-team 15. Halpern Quality of life as a conceptual framework for evaluating transition outcomes. Exceptional Children. 1993; 59:486−498 16. Lorena Cassady (nd)The Disadvantages of Interdisciplinary Teams in the Classroom Retrieve on 13.11.2019 from https://classroom.synonym.com/disadvantages- interdisciplinary-teams-classroom-7721082.html 17. Multiple disabilities Retrieved on 23/11/2019 from https://en.wikipedia. org/wiki/ Multiple_ disabilities 18. National Academy of Sciences 2019 Retrieved on 11.11.2019 from https://www.nap.edu/ read/18550/chapter/7 Retrieved on 11.11.2019 19. New Teacher Induction Program, 2011. Planning, Assessment and Evaluation, Retrieved on 23/11/2019, from http://www.bgcdsb.org/ User Files/ Servers/Server_5912063/ File /NTIP/ Ministry%20docs/Plan_assess_evaluate.pdf 20. National Deaf Children's Society April 2017 Retrieve on 17.11.2019 from http:// www.essexlocaloffer.org.uk/wp-content/uploads/2016/05 /Supporting-the-achievement- of-hearing-impaired-children-in-early-years-settings.pdf

178 21. Project Management 101, 2019 Retrieve on 8.11.2019 from https:// www.projectmanager.com/blog/what-is-a-stakeholder 22. PACER Center, 2011 Retrieve on 17.11.2019 from https://www.pacer.org/parent/ php/PHP-c59.pdf 23. Pennsylvania Office of Child Development and Early Learning, n.d. Retrieve to 17.11.2019 from http://www.eita-pa.org /assets/IFSP.IEP-annotated.pdf 24. Performance or previously set goals helps managers, 2019 Retrieve on 18.11.2019 from https://www.coursehero.com/file/p2t2dr/performance-or-previously-set-goals-helps managers-identify-problems-in-the/ 25. Passport Health plan, nd Retrieve on 18.11.2019http://passporthealthplan.com/wp-content/uploads/2014/11/EPSDT_revisedWomensHealth.pdf 26. Role of Parents in care of hearing impaired, nd Retrieved on 8.11.2019 from http:/ /vikaspedia.in/education/parents-corner/guide-to-parents-their-role/role-of- parents#section 27. The Peak performance Centre, nd Retrieve on 08.11.2019 from http:// thepeakperformancecenter.com/development-series/skill-builder/personal-effectiveness/ goal-setting/setting-goals/performance/ 28. Schlosser RW, Sigafoos J. AAC interventions for persons with developmental disabilities: Narrative review of comparative single subject experimental studies. Research in Developmental Disabilities. 2006; 27:1–29 29. The Phoenix Society, 2019. Retrieve on 17.11.19 from https://www.phoenixsociety.org/ resources/entry /developmental-considerations 30. Tame side local offer for children and young people with hearing impairment/ deafness(nd) Retrieve on 17.11.2019 from https://www.tameside.gov.uk/localoffer/ Deaf-Provision.pdf

Hit and source - focused comparison, Side by Side

Submitted text	As student entered the text in the submitted document.
Matching text	As the text appears in the source.

Entire Document

1 M. Ed. Spl. Ed. (H.I. / I.D.) ODL Programme AREA – B B 9 H.I. : CURRICULUM AND TEACHING STRATEGIES FOR CHILDREN WITH HEARING IMPAIRMENT A COLLABORATIVE PROGRAMME OF NETAJI SUBHAS OPEN UNIVERSITY AND REHABILITATION COUNCIL OF INDIA

2 AREA - B DISABILITY SPECIALIZATION COURSE CODE - B9 (H.I.) CURRICULUM AND TEACHING STRATEGIES FOR CHILDREN WITH HEARING IMPAIRMENT RCI Expert Committee Dr. Jayanthi Narayan Former Deputy Director, NIMH, Secunderabad. Dr. Varsha Gathoo Head and Reader, Department of Education, AYJNISHD (D), Mumbai. Dr. Sanjay Kumar Assistant Professor, DSMNRU, Lucknow, Shri Ashok Chakraborty Ex- Chairperson, ZCC, RCI & Secretary, SHELTER. Dr. Hemant Singh Keshwal Assistant Prof. of Special Education and Centre In- Charge, NIEPID- RC, Kolkata. Shri Suman Kumar Assistant Professor of Speech & Hearing, AYJNISHD- RC, Kolkata. Professor A. N. Dey Director, School of Education, NSOU. Smt. Antara Choudhury Assistant Professor of Special Education, School of Education, NSOU. NSOU Expert Committee [Board of Studies (BoS)] Professor A. N. Dey Director, School of Education, NSOU. Professor Dulal Mukhopadhyay Professor of Education (Retd), NSOU. Shri Ashok Chakraborty Ex- Chairperson, ZCC, RCI & Secretary, SHELTER, Professor Debasri Banerjee Professor of Education, Department of Education, University of Calcutta Dr. Hemant Singh Keshwal Assistant Prof. of Spl. Education and Centre In- Charge, NIEPID-RC, Kolkata. Shri Suman Kumar Assistant Professor of Speech & Hearing, AYJNISHD- RC, Kolkata. Professor Swapan Kr. Sarkar Head, SoE, NSOU Prof. Sanat Kumar Ghosh Professor of Education, SoE, NSOU. Professor Sumanta Chattaraj Professor of Education, SoE, NSOU. Smt. Swapna Deb Consultant, SoE, NSOU. Smt. Antara Choudhury Assistant Professor of Special Education, School of Education, NSOU. Dr. Abhedananda Panigrahi Coordinator, B. Ed., SoE, NSOU. Shri Prabir Naskar Assistant Professor of Special Education, SoE, NSOU. Title : Curriculum and Teaching Strategies for Children with Hearing Impairment Unit Name of the Unit Writer Name of the Editor Unit-1 1.1, 1.2, 1.3 Ms Jignya Shah, Lecturer, Amarjyoti Rehabilitation Dr. Varsha Gathoo, Head and Reader, Dept. of and Research Centre, TTC,Delhi. Education, AYJNISHD(D), Mumbai. 1.4, 1.5 Ms Kasturi Kulkarni, Asst. Prof, CCYM'S Hashu Advani College of Special Education, Mumbai Unit-2 Ms Kasturi Kulkarni, Asst. Prof, CCYM'S Hashu Advani College of Special Education, Mumbai Unit-3 Ms Punam Mhatre, Special Educator,Dept of Education, AYJNISHD(D) Mumbai Unit-4 Ms Sharmishta Oak, Academic Associate , YCMOU, Nashik, Maharastra Unit-5 Dr Gayatri Ahuja, Lecturer, AYJNISHD(D), Mumbai General and Format Editing Smt. Baby Dutta Choudhury, AcademicConsultant, SoE, NSOU and Mandira Chakraborty, Academic Consultant, School of Education, NSOU. Programme Coordinator Smt. Antara Choudhury,Assistant Professor of Special Education, School of Education, NSOU. The Self Instructional Material (SIM) is prepared keeping conformity with the M.Ed.Spl. Edu.(MR/HI/VI) Programme as prepared and circulated by the Rehabilitation Council of India, New Delhi and adopted by NSOU on and from the 2020-2022 academic session.

Mohan Kumar Chattopadhyay Registrar Chairman Prof. Subha Sankar Sarkar, Vice Chancellor, Netaji Subhas Open University, Kolkata-700 064 Convenor Prof. Atindranath Dey, Director, School of Education, Netaji Subhas Open University, Kolkata-700 064

Prologue I am delighted to write this foreword for the Self Learning Materials (SLM) of M Ed in Special Education (ODL). The M Ed in Special Education in ODL mode is a new academic program to be introduced at this University as per NOC issued by the Rehabilitation Council of India, New Delhi and subject to approval of the program by the DEB-UGC. I must admire the emulation taken by the colleagues from School of Education (SoE) of NSOU for developing the Course Structure, Unit wise details of contents, identifying the Content Writers, distribution of job of content writing, editing of the contents by the senior subject experts, making DTP work and also developing E-SLMs of all the 16 Papers of the M Ed program. I also extend my sincere thanks to each of the Content Writers and Editors for making it possible to prepare all the SLMs as necessary for the program. All of them helped the University enormously. My colleagues in SoE fulfilled a tremendous task of doing all the activities related to preparation of M Ed in Spl Edn SLMs in war footing within the given time line. The conceptual gamut of Education and Special Education has been extended to a broad spectrum. Helen Keller has rightly discerned that "Have you ever been at sea in a dense fog, when it seemed as if a tangible white darkness shut you in and the great ship, tense and anxious, groped her way toward the shore with plummet and sounding- line, and you waited with beating heart for something to happen? I was like that ship before my education began, only I was without compass or sounding line, and no way of knowing how near the harbour was. "Light! Give me light!" was the wordless cry of my soul, and the light of love shone on me in that very hour." So education is the only tool to empower people to encounter his/her challenges and come over being champion. Thus the professional Teacher Education program in Special Education can only groom the personnel as required to run such academic institutions which cater to the needs of the discipline. I am hopeful that the SLMs as developed by the eminent subject experts, from the national as well as local pools, will be of much help to the learners. Hope that the learners of the M Ed Spl Edn program will take advantage of using the SLMs and make most out of it to fulfil their academic goal. However, any suggestion for further improvement of the SLMs is most welcome.

Professor (Dr.) Subha Sankar Sarkar Vice-Chancellor, NSOU

5 AREA - B B 9: H.I. : CURRICULUM AND TEACHING STRATEGIES FOR CHILDREN WITH HEARING IMPAIRMENT Unit 1 Curricular Needs at Different Levels 1.1 Paradigm shift in education: school, teacher, learner & curriculum for 21st century 1.2 Causes of learning difficulties in children with hearing impairment 1.3 Differential curricular needs of early and late intervened children with hearing impairment 1.4 Curricular framework for early intervention & Early Childhood Education Unit 2: Curricular Adaptations 2.1 Bases of curricular adaptations & decision making 2.2 Step wise curricular approach and its adaptation 2.3 Types of accommodations, modifications and its applications 2.4 Strategies of adaptation of text of different school subjects 2.5 Adaptation in evaluation Unit 3: Differentiated Instructions 3.1 Relevance & Concept 3.2 Elements of differentiated instructions (Knowing the learner, assessing the learner, school climate, instructional strategies, adjustable assignments) 3.3 Need assessment & Decision making 3.4 Learning pyramid 3.5 Mastery level learning Unit–4: Literacy Development & Teaching Strategies 4.1 Deafness & literacy issues; 4.2 Theories of literacy development and their applications 4.3 Processes involved in reading & writing

6 4.4 Processes involved in speaking, listening & signing in literacy development 4.5 Meta cognitive strategies & instructional practices Unit 5: Research & Development in Literacy 5.1 Research in literacy: An overview 5.2 Priority areas of research 5.3 Identifying the gaps in literacy research 5.4 Readings in Researches on literacy development at different levels in the past two decades 5.5 Evidence based practices in literacy development

7 Netaji Subhas Open University AREA - B B 9 H.I. : CURRICULUM AND
TEACHING STRATEGIES FOR CHILDREN WITH HEARING IMPAIRMENT B 9 H.I. ppppp CURRICULUM AND TEACHING STRATEGIES FOR CHILDREN WITH HEARING IMPAIRMENT

8

9 Unit 1 ❑ Curricular Needs at Different Levels Structure 1.1 Introduction 1.2 Objectives 1.3 Paradigm shift in education: school, teacher, learner & curriculum for 21 st century 1.3.1 From segregation to integrated education to inclusive education 1.3.2 From teacher centred to student centred 1.3.3 From heterogeneity to diversity 1.3.4 Curriculum for 21st century 1.4 Causes of learning difficulties in children with hearing impairment 1.4.1 Critical Period and onset of hearing loss 1.4.2 Degree of Hearing Loss 1.4.3 Speech Perception Ability (SPA) 1.4.4 Use of Assistive Device and audibility 1.4.5 Parental Support and Environment 1.5 Differential curricular needs of early and late intervened children with hearing impairment 1.5.1 Early Identification and early intervention 1.5.2 Curricular needs of Early and late intervened children with hearing impairment 1.6 Curricular framework for Early intervention & Early Childhood Education 1.6.1 Need of curriculum framework for Early intervention & Early Childhood Education 1.6.2 The important domains in Curriculum Framework 1.6.3 Activities for ECCE Curriculum Framework 1.6.4 Teaching approaches as per Curriculum Framework for ECCE 1.6.5 List of materials for play 1.6.6 Role of Assessment in Curriculum Framework for ECCE programs
10 1.6.7 Role of stakeholders: 1.7 Domains of development facilitating the school readiness for inclusive education 1.7.1 School readiness: The concept 1.7.2 Child being made ready for school : 1.7.3 School being made ready for children : 1.7.4 School readiness of children with hearing impairment 1.8 Unit End Exercises 1.9 Let us Sum Up 1.10 References 1.1 Introduction Education has undergone a paradigm shift. The United Nations Global Sustainable Development Goals (SDGs) has enlisted goal no. 4 as quality education for creating opportunities for inclusive, equitable, quality oriented and lifelong for 'all' by 2030. Hence, inclusive education has emerged as a sustainable movement. It is a global appeal that challenges exclusionary practices in education. Hence, the 21st century classrooms are becoming more and more diverse and highlighting the need of implementing curricular frameworks that foster instructional strategies and inclusive practices suitable for every child in the classroom. The education of a child with hearing impairment is also one of the likely challenges for the teacher. This is more so as the disability is hidden and teachers may find it difficult to identify a child with hearing impairment. Hearing impairment is not just the ability of not hearing well but it is also the difficulty in understanding and using spoken language and literacy skills as well. The loss of hearing at a young age causes delays in language and communication and that is a major cause that leads to learning difficulties among the children with hearing disability. 1.2 Objectives After completing this unit you will be able to:
11 ● Discuss various Legislations and Provisions related to the Education of Disability ● Explain diversity and individual differences ● Enlist various causes of learning difficulties in children with hearing impairment ● Explain differential curricular needs of early and late intervened ● Outline the curricular framework for early intervention and early childhood education ● Explain domains of development facilitating the school readiness for inclusive education 1.3 Paradigm shift in education: school, teacher, learner & curriculum for 21 st century The term "paradigm" means pattern. According to Ausubel (1968) pattern forming is the way or an attempt to make meaning from our experiences. Paradigm shift is a fundamental change in approach or underlying assumptions. According to Merriam Webster dictionary a paradigm shift is an important change that happens when the usual way of thinking about or doing something is replaced by a new and different way. When a paradigm shift takes place, things are seen from a different perspective and focuses on different aspects of the phenomena. Paradigm shift is seen to be happening in many areas and the field of education is no exception to it. 1.3.1 From segregation to integrated education to inclusive education The education of children with disability has undergone a shift and change in the philosophy. This is primarily due to the change in the models of disability from charity and medical to social rights based model. With the current shift to a participatory or rights based model, the education of children with disabilities has moved from the segregation to integration to inclusion. Segregated education endorsed providing a separate day and residential schools which were often considered as places best meant to suit to the needs of the children with disabilities. Traditionally and till a few years ago, education of most of the children with hearing impairment has been undertaken in the self-contained classrooms of a special school (Chakraborti-Gosh, 2017).As reported in the Status of Disability in India (2003) the first special school for the deaf in India dates back to 1885 in Bombay (Hull, 1913). The children attending these schools had some homogeneous backgrounds in terms of certain factors like late identification and intervention, degree of hearing loss or language levels and communication challenges. However, these children were heterogonous in many aspects such as particular mode and methods of communication depending upon the parental hearing status, usage of

12 hearing aids and devices and speech perceptual abilities. Nevertheless, inspite of these individual differences the schools followed only one mode of communication be it oral, manual or total communication. Given the number of limited special schools and the restricted teacher child ratio, the parents had hardly any choice to opt for alternate schools if their home language (mother tongue) did not match the school language for instructions. Similarly, parents or the child's preferences for communication options were also not thought of. This was most of the times a case with many children as schools were residential. Since acquisition of one language itself is a herculean task for the children with hearing impairment, these issues were perennial. Integrated Education With the educational policies being changed due to Kothari commission (1964- 66) and schemes as mentioned earlier like the District Primary Education Program (DPEP) in India, integrated education took roots (Balasundaram, 2005).The DPEP through its project PIED focused on integration of children with disabilities by training teachers, providing barrier free environment and distribution of appropriate aids and appliances (Pandey and Advani.1995). These efforts however were based on the theory of normalisation. This was prevalent and hence there was a gate keeping approach where-in only the children who had acquired a certain level of expertise of communication and literacy in special schools would be integrated. Inclusive Education:

The right to education is stated in the Universal Declaration of Human Rights (1948) and

also in the UN Convention on the Rights of the Children (1990), reaffirmed in the World Declaration on Education for All (1990). Recently among the 17 Sustainable Development Goals (SDGs), goal four Education calls for creating opportunities for inclusive, equitable, quality oriented and lifelong for 'all' by 2030. Hence, inclusive education has emerged as a sustainable movement. It is a global appeal that challenges exclusionary practices in education. It was originated from the Salamanca World Conference on Special Needs Education (UNESCO, 1994). Ainscow and Cesar (as cited in McMaster, 2012) referred Salamanca World Conference as '

the most significant international document that has ever appeared in the field of special education'.

Inclusive education has received a widespread recognition across the world and also in the Indian context it has been embraced due to all major policies, frameworks and Acts related to education in general and disability in particular. The inclusion as a movement has been started with the early schemes such as the Integrated Education for Disabled Children, (IEDC) in 1974 to the launch of Sarva Shiksha Abhiyan [SSA] (2000) and later ratifying the UNCRPD (2007). Also with Inclusive Education for Disabled at Secondary Stage (IEDSS) (2009),

The Right of Children to Free and Compulsory Education Act (

RTE) (2009)

and recently the Rights of Persons with Disabilities Act (RPWD) (2016) all have endorsed inclusive educational practices. Inclusive education is well grounded in

13 the Indian educational system and children both with and without disabilities is being enrolled as a part of the same classroom (NCERT Position paper, 2006). These aspects of caring about learners in educational practices are embedded in the Invitational theory by Purkey (1997). The said theory is applicable in the field of inclusive education as it suggests modifying the educational system and practices (Martin, 2011). It aims to erase the differences and pessimism that inhibits learners. The following Figure 1.1 provides the invitational theory. Figure 1.1 Invitational Theory From the five P's the first 'P' stands for people. Education needs to build trust and respect about the people. This means that learners and their preferences in learning in the inclusive schools must be treated with reverence. The second 'P' stands for Places. The inclusive school as a place must be caring, sustainable and welcoming to all learners. The third 'P' stands for Policies. The policies of education in schools facilitating inclusion, needs to be one that will create an ethos of mutual trust and confidence wherein learners could perhaps freely express their desires and concerns. The fourth 'P' denotes programs that call for not only wellness and well-being, but also enrichment of learners. The fifth 'P' stands f or processes. In inclusive schools the operational processes should be democratic and support the learners the way they can learn. A research conducted by Hossein et al. (2011) to study the role of Invitational Education and Academic Performance. The research sample included 540 students. The research instruments were the Invitational Teaching Survey (Amos, Purkey& Tobias, 1984). Students' grade point average was used as an indicator of academic performance

14 during high school. Data were analysed using path analysis of direct and indirect effects of Invitational Education on intelligence beliefs and performance of high school. The result showed that the sub-components of Invitational Education, as described in the Invitational Teaching Survey (Amos, Purkey& Tobias, 1984) have positive and significant effect on incremental intelligence and performance. Findings show that Invitational Education is necessary for enhancing performance of students. 1.3.2 From teacher centred to student centred The larger paradigm shift has also seen in the centrality of the teaching learning process in the class. The shift has been from the teacher as a centre of learning to the student centered approaches to learning. The term 'Student Centered Learning' (SCL)wasadvocated in earlier times in the work of Carl Rogers and Jean Piaget. Malcolm Knowles' gave the notion of self-directed learning in adult education (Bernard, 1999). Over the past century, a strong educational movement to shift away from an emphasis on teaching to an emphasis on learning have occurred. This shift encourages the movement of power from the teacher to the student. This paradigm change was founded on the premise that students should be actively constructing their own learning. The theoretical standing of SCL is primarily grounded in the constructivist view of learning. (Landau, 2001).The concept of learner autonomy shows the overall paradigm shift and emphasizes the role of the learner rather than the role of the teacher. It focuses on the process rather than the product and encourages students to develop their own purposes for learning and to see learning as a lifelong process.SCL is viewed as a progressive approach to teaching that focuses to make students more aware of the material they are learning and its importance. In this approach teachers want to make students more active in the classroom, by encouraging them to interact with each other. 1.3.3 From heterogeneity to diversity With the paradigm shift in the philosophy and policy of education and more so because of the RTE ACT (2009) the classrooms have started becoming more heterogeneous in terms of socio cultural differences, language and gender. Earlier the schools practiced ability grouping i.e. children with same levels of ability in language, reading and maths were grouped together hence were homogeneous. So the classrooms were sectioned in a way that children belonging to a particular level studied together. However this notion did not yield results as Diversity is an inherent part of the society. Hence schools started to accommodate and facilitating learning, irrespective of the child's socio-cultural background or language levels and learning styles of children. Having diverse learner's needs is viewed in a positive way for all children, including children with disabilities as it fosters inclusivity. It also helps the group in co-operatively learning as each student brings a special and a different trait which others do not have.

15 The diverse or heterogeneous classrooms have students with varying abilities, disabilities, different learning needs and preferences. Inclusive education is built on the premise that children who learn to together live together. It believes in protecting the individuality and preferences of each child at the same time fostering collectiveness. 1.3.4 Curriculum for 21st century The Common Core State Standards and Partnership for 21st Century Skills highlight that education should focus on both core academic subject mastery and 21st century skills development. These skills help students to be ready for college and career life. Therefore the 21 st century curriculum is prepared by the Partnership for 21 st century Skill (P21). P21 advocated integrating core academic knowledge, critical thinking and social skills in teaching learning process. It helps students to master the multi dimensional abilities that are required in the 21 st century curriculum. The integrated P21 curriculum helps to complement 3 Rs that is reading, writing and arithmetic which are core academic contents. It also helps in integrating 4Cs that is creativity, critical thinking, communication and collaboration (Partnership for 21 st century skills, 2006). Hence the 21 st century framework integrates cognitive learning and skills into curriculum. This helps students to obtain through understanding of the subjects and also to solve problems of the real world (Wagner et al., 2006). The model of 21 st century education Figure1.2 The 21 st century education Paige (2009) highlighted that 21 st century curriculum should merge knowledge, thinking, innovation skills, media, Information and Communication Technology (ICT) literacy and real life experience in the context of core academic subjects. Therefore 21 st century curriculum should focus on the construction of knowledge. it should also

16 encourage students to produce the information that are meaningful to develop new skills. This kind of designed curriculum will allow students to master the knowledge and understand core academic disciplinary knowledge. As stated by Ellis (2004) the knowledge cantered curriculum is an academic curriculum. In such curriculum students are expected to acquire knowledge of heir world which is foundation for the adult life. The other domain identified was character domain. Character education was identified not only to face the increasingly challenging world but also to benefit the civil and civic society. The character education of 21 st century basically focuses on how one engage in the world. The character education was identified necessary for the development of character learning. This learning is usually likely to happen in out of school settings. That is in the areas of sports, scouting, adventure trips etc. which leads to enhancement of facing challenges. The qualities of character framework include mindfulness, curiosity, courage, resilience, ethics and leadership which are necessary to face increasingly challenging world. The solution for all above is the emerging best practice of Universal Design for Learning mostly known by acronym UDL. Universal design for learning is an approach to tutor minimizes barriers and maximizes learning for all students. Each learner in the classroom has his/her own background, preferences, strengths, needs and interests. It offers a new way of thinking about creating multiple learning opportunities in every area of course design. It offers such a framework for designing educational environments that enhance inclusive settings. There few principles of UDL framework are described below: Figure 1.2 Principles of UDL Source:kikujata.weebly.com

17 Principles of UDL: i) Multiple Means of Representations - This is the 'what' of teaching and learning. It is to support recognition learning which give learners various ways to acquire information and knowledge. The teacher needs to present information and content indifferent ways so that the content is comprehended by all. ii) Provide Multiple Means of Engagement –This is the 'why' of the learning. It supports affective learning to tap into learners' interests, offer appropriate challenges and motivate them to learn. The role of a teacher to stimulate interest and create motivation for learning. iii) Multiple Means of Actions and Expressions – This is the 'why' of the learning. It is to support strategic learning which provides learners alternative of representing what they know, Planning and performing tasks are executed here. The teacher needs to differentiate the ways that learner can express what they know and understand. 1.4 Causes of learning difficulties in children with hearing impairment Disabling hearing impairment at any stage and age of the life has a profound impact on the quality of life, interpersonal communication and psychosocial well being of the individual. Hearing impairment is hidden and outwardly not identifiable and hence, referred as invisible. However, the hearing loss of any degree or type has effects on language, speech and communication which results due to break down in auditory path way. Students with hearing impairment are heterogeneous group which vary not only in their hearing threshold but also the age of detection, type and degree of hearing loss, use of assistive device and parental involvement. Let us discuss these factors 1.4.1 Critical Period and onset of hearing loss There is a difference in a child's brain and an adult brain. Though full development of brain happens later, the primary brain development occurs by age two or three year. The critical window for language learning occurs very early. Language learning occurs from birth to approximately three years of age. At this age the neuroplasticity of brain is the greatest (Sharma et al., 2002). Therefore initial years of life are considered as optimal

18 period for speech and language development. The onset of hearing loss also plays crucial role in the acquisition of language and speech. The impact of hearing loss is greatest in children who are born with or develop hearing loss soon after birth. This because the critical period of the child is effected due to hearing loss and limited inputs.

Those who are born with this impairment or acquire it at a very young age may not hear any language at all including their mother tongue. Hence they donot learn and use spoken language automatically. 1.4.2 Degree of Hearing Loss The degree of hearing loss may range from mild to profound. The

higher hearing loss that is the severity, the greater the impact. According to ASHA (2012) children born with bilateral hearing loss that are severe (71–89 dB loss) or profound (<90 dB loss) cannot hear conversational speech (approximately 60 dB). Consequently they do not spontaneously learn to talk. The students with profound hearing loss have the hearing thresholds greater than 90dB (ASHA, 2012) and their speech perception abilities makes it difficult in learning speech communication (Erber, as cited in Hochbery, 1983). The reviews by Goldberg and Richburg (2004); Moller et al. (2007) highlights that even midland moderate hearing loss that is hearing loss less than 25 dB face significant difficulties in communication, learning and social development in students with hearing loss. 1.4.3 Speech Perception Ability (SPA) In case of students with sensory disabilities like hearing impairment the development of language and speech is delayed due to insufficient feedback from the sensory modalities that is through the sense organ – ear which is important for hearing. The severely and profoundly deaf children confronts with deficient in their knowledge of verbal language. These student exhibits significant lag in language and speech development because hearing impairment interferes with the child's speech perception ability. This results in delayed speech and language development (ASHA, 2012). In turn, it affects communication, literacy skills and social, emotional development. Language acquisition is an auditory activity. In spite of normal intellectual and functioning ability, the auditory handicap of children with hearing impairment prevents them from acquiring and utilizing the language that is effortlessly and naturally acquired by the typical hearing children. Carney & Moller (1998) and Robbin et al. (1997) reported that the average profoundly deaf child acquire language which is half of that expected from normal hearing children. The next section provides how vocabulary learning is affected in students with hearing impairment.

19 1.4.4 Use of Assistive Device and audibility The child who is identified with hearing loss, he/she should receive support services at the earliest. The continuous use of hearing aids or cochlear implant gives greater opportunity for learning spoken language. Stiles et al. (2012) demonstrated that higher levels of aided audibility were directly associated with better language outcomes in school-aged CHH. Another study conducted by Tomblin et al. (2014) found that preschool-aged Children with Hearing Handicapped who had stronger aided audibility had better speech production and language skills than those with less aided audibility. 1.4.5 Parental Support and Environment The environment including access to services that significantly influences the development of a child with hearing loss. Children with hearing loss who have access to hearing technology such as hearing aids and cochlear implants, sign language and special education are often able to participate on an equal basis with their peers who hear normally. Children who are early intervention can be benefited when parents and family members get involved in their learning and development. Research study conducted by Moeller (2000) found that the children who were enrolled in early intervention and have highly involved parents performed significantly better on vocabulary and verbal reasoning measures than children who were also receiving services but did not have engaged parents. Research has shown that children in impoverished environments have less stimulating environment, exposure to books, magazines, toys, etc., lack experiences such as visits to library, museum, zoo, etc., have parents who are ineffective as role models. As a result of these conditions children are at a disadvantage and have difficulties in learning. The environment in which the child is born and brought up makes a difference in the development of the child. The environment, exposure and experience of each child differs and hence the learning and development. The theory of ecosystem coined by the Bronfrenbenner et al. (1994) is provided below to understand the concept. The contextual view of development given by Urie Bronfenbrenner's (as cited in Ormrod, 2012) emphasises on the role of environmental factors in the development of an individual. Bronfrenbrenner gave four system viz microsystem, Mesosystem, exosystem, macrosystem and chronosystem. The following Figure 1.2 provides the information on ecosyatem and its importance for development of child.

20 Figure 1.3 Ecosystem Source: Ormrod el al. (2017) The microsystem is the immediate environment in which the individual child lives and directly interacts with social agents that is the family, peers, teachers, and neighbourhood. The mesosystem consists of relations between these contexts the way how a child's parents relate to the teachers, or how the parents view the adolescent's friends, are experiences likely to influence an individual's relationships with others. The exosystem includes events in social settings where the child does not participate directly, but the experiences of child are influenced in the immediate context. For example, the transfer of father or mother may cause tension among the parents which might affect their interactions with the child or the general amenities available to the child like quality of schooling, libraries, medical care, means of entertainment, etc. Macrosystem includes the culture in which the individual lives. The Chronosystem involves events in the individual's life course and socio-historical circumstances of the time such as, divorce of parents or parents' economic setback, and their effect on the child. In summary, Bronfenbrenner views that the development of the child is significantly affected by the complex world that envelops her/him. It can be the conversations that the child has with her/his playmates, or the social and economic life circumstances into which the child is born. 1.5 Differential curricular needs of early and late intervened children with hearing impairment 1.5.1 Early Identification and early intervention Hearing screening programmes for infants and young children can identify hearing loss at very young ages. For children with congenital hearing loss, this condition can be

21 detected within the first few days after birth. Research suggests that children who are born deaf or acquire hearing loss very early in life and who receive appropriate interventions within six months of age are at par with their hearing peers in terms of language development by the time they are five years old (in the absence of other impairments). Those children who develop hearing loss at a later age, regular pre-school and school-based hearing screening can effectively identify hearing loss soon after its onset, thereby limiting its adverse impact. Hence early identification of hearing loss in children and when it is followed by timely and appropriate interventions minimizes developmental delays and facilitate communication, education and social development. Early Intervention is a foundation to improve not only the life of the child but also to offer greater opportunities for the development. According to research, birth to five years is more crucial for the child as learning and development are at their highest rate in the preschool years. Some children, due to conditions noticed at birth, special needs, or developmental delays which occur in the early years, risk of missing some of the most important learning and developmental milestones. Early intervention helps keep these children on a path to making the most of abilities and skills developed during the early years. Early intervention services support the parents and siblings of children with special needs. Families having children with special needs repeatedly experience frustration, stress, disappointment, and helplessness. This can have impact not only on the well-being of the family but it further affects the development of the children with special needs. Hence early intervention helps the entire family to build a nurturing and supportive environment. 1.5.2 Curricular needs of Early and late intervened children with hearing impairment The way humans perceive their world is mediated through sensory experiences. Among all the senses, hearing fundamentally facilitates communication and fosters social interaction, allowing individual to form relationships, participate in daily activities, be alerted to danger, and experience life events. Cole & Flexer (2015) coined the term 'Developmental Synchrony' which means that when the brain is "developmentally" ready, a child develops certain skills and abilities at the specific moment. The goal is for all developmental domains of the skill that a child can develop at the same time and at the same rate (Mellon, Ouellette, Greer, & Gates-Ulanet, 2009). The research

22 highlighted that the critical opportunity for language learning starts from birth to approximately 3 years of age when brain neuroplasticity is the greatest (Sharma, Dorman, & Spahr, 2002). When a child learns language during this critical period, learning capitalizes on the flexible neuroplasticity of the growing brain. When the child is early intervened the pedagogical practices must include activities and experiencesfor the development of all domains such as-physical-motor and creativity, cognitive, socio-emotional,language and literacy. To develop these domains, the stakeholder that is teachers and parents must provide opportunities to explore, understand, experiment, experience and transform information into meaningful content. The aim of education of early intervened children with hearing impairment is to facilitate optimumdevelopment of child's full potential. This lay the foundation for all rounddevelopment of the child and lifelong learning. The early years are of the children are very important years for motor development. Motor development refers to elements related to gross motor, fine motor and bilateral coordination including spatial awareness. It includes body image, health and nutrition. When these children are given the right opportunities and encouragement, it will not only strengthen their larger and finer bones and muscles but also their eye hand coordination. This is one of the prerequisites for being able to write. Children can be given different activities like making different shapes out of play dough, playing with colors and painting. Cognitive domain refers to a range ofelements related tothinking and makingsense of the world. It includes lateral thinking,problem solving, planning, predicting, investigating, processing information, deductive thinking, reasoning, questioning, relationships betweenfactors and concepts of time. Language domain refers to elements ofexpression and articulationin communication which includes clarity of articulation, grammar, vocabulary, speech, volume of voice, intonation, expression throughlanguage, oral language experiences. These are important for expression and communication. The sense of identity and social skills are important domain. Children ofteninitiate others and also engage in more and more play based activities with other children. Initiallychildren play in pairs. Gradually they mix with smaller and then larger groups. They also work and live with others in harmonious ways. They start begin to appreciate each one of them is different and how these differences need to be not only accepted but respected. Emotional domain refers to a range of elementsof maturity centered onthe individual relates intentions withingeneral stages ofdevelopment expectations. It is an ability to question, ability to reflect on self,strengths and challenges, self-concept, self-esteem, self-competence.

23 On other hand the curricular need of late intervene children may demand different mode of communication. Students with hearing loss find difficulties to hear the conversation speech at a prescribed level. As a result of which they find it difficult to keep pace with others in the inclusive class with respect to their content knowledge and learning (Marschark & Waulters, 2008). The late intervened children with hearing impairment have difficulties in the development of receptive and expressive communication skills. Hence the communication difficulty leads to the poor social skills and self concept which impact on vocational choices. Children who are late intervened develop vocabulary slowly as compare to their counter parts. Children with hearing loss and intervened late have difficulties in understanding with multiple meanings. The sentence structure of these children is simpler and shorter and also has problems with comprehension. Children face problem in understanding and writing complex sentences. Children with hearing loss find difficulties in hearing words ending with's' and 'ed'. This leads to misuse of words, verbs, and tenses etc. Children with hearing loss who are late intervened have difficulties in the areas of reading and mathematical concepts. The children who are late intervened need more exposure to visual clues along with auditory mode. Sometimes some children may need sign language as a mode of communication to develop language along with the development of above mentioned domains. 1.6 Curricular framework for Early intervention & Early Childhood Education Early intervention and early childhood education represent early years in a young child's life. The period from birth to 6 years is especially important because the development progresses at a faster rate than any other period in life. During early years, the critical periods of development enable the child to acquire the skills at a faster rate and the baby is most receptive to learning encounters during these periods. Mundkur (2005) highlights the importance of early years and states that the brain is most receptive during first 3 & ½ years of life. This period is characterized by rapid brain development and is characterized by plasticity or flexibility during the early years. Greater the quality and quantity of experiences the child gets, the faster is the neural networking and hence the development.

24 Loss of a vital sense may lead to a disability and handicapping conditions as it may interfere with the developing of brain and the subsequent learning. This is because lack of stimulations gives rise to secondary and tertiary handicaps. For example the primary impaired sense of hearing if not early identified may lead to a secondary handicapping condition of language and communication issues and this if not taken cognizance of may lead to further sub normal achievement of literacy and educational attainments. Research shows that starting the intervention at an early age for developmentally delayed children is also cost effective as it produces effectiveresults and leads to improvement in a wide range of skills. Mauro (2018) states that early intervention is highly beneficial as it addresses the delays in development at a much younger age and so a lot of efforts and resources spent at a later age are saved. Nobel Laureate Heckman also observes that there is a high return on investment at a young age So for children with sensory disabilities like hearing impairment, early intervention holds the key. With the use of amplification devices, their hearing can be restored and the neurons in the brain will be stimulated there by strengthening the neural wiring. This will enhance their development and narrow the gap between them and the typical children and this will ultimately help them in enrolling and sustaining in a mainstream inclusive school environment and progress like all other children to achieve greater educational levels. It is also to be noted that early intervention and early childhood care and education of children with disabilities is essential because it leads to family empowerment and societal benefits. It develops to develop a positive attitude in all stakeholders. Therefore considering the importance of child development during the early years, the Indian Government's Ministry of Women and Child Development has launched the National Early Childhood Care and Education (ECCE) Policy (2013). It consists of the National Curriculum Framework and Quality Standards for ECCE. 1.6.1 Need of curriculum framework for Early intervention & Early Childhood Education The curriculum designed for the period of early childhood growth and development plays a very important role because it provides opportunities for overall growth and development. As every child is unique, ECCE program also needs to be designed as per the individual needs of the students. Every child is born in a different culture and family environment and grows up in a different background. There are many factors which 25 affect the child's development. Hence, one cannot develop a single or common curriculum for early intervention and early childhood education. However there has to be a minimum level of achievement which is common for all children across various developmental domains. So the curriculum framework needs to be contextualised. The same is suggested in the Early Childhood Education Framework Draft (2012) that although the early intervention programmes need to cater to the individualistic needs of young children, yet they need to be following the developmentally appropriate for young children and should not be just a downward extension of primary stage curriculum or inadequate curricula focusing on only few developmental aspects thereby ignoring majority of the factors. Another important point that mentioned is that the Curriculum Framework provided in the ECCE Policy (2013) needs to be open ended. So that local contextual and culture specific aspects could be added. Taking into account the variation in the child rearing practices and the contextual needs of children, the Curriculum Framework thus broadly mentions the basic principles and developmentaltasks that will work for all children in a unique way making use of the local resources, language used and socio-cultural background of the community. 1.6.2 The important domains in Curriculum Framework The following domains of holistic development should be included in the curriculum of ECCE programs. Since, ECCE deals with children, these domains should be addressed using play based approaches which make learning an exciting experience for children. The skills that need to be targeted under each domain are given below: Physical-motor development: It covers skills like Gross and fine motor skills, coordination of muscular movements, balancing, eye-hand coordination, special knowledge and knowing directions, health and nutrition. Language development: Receptive and expressive communication skills, development of vocabulary, a range of emergent literacy skills like phonemic awareness, print awareness, letter-sound association, letter recognition, spellings and sentence- structure construction, emergent writing skills. It marks transition to kindergarten. Cognitive development: Basically, involves concept formation which includes skills like classification, comparison, serration, counting numbers, numerical operations like addition, subtraction, conservation of space and quantity, memory, thinking and reasoning, problem solving, perception, development of age-appropriate language, knowledge about one's own environment. Socio-emotional development: Social skills like empathy, compassion, social interaction, accepting and expressing feelings, development of self-concept. Sensory Development: Development of senses through visual, auditory and kinaesthetic experiences.

26 Development of Aesthetic and Creativity: Skills in music, performance arts like dance, vocal, playing instruments, fine arts like painting, etc. 1.6.3. Activities for ECCE Curriculum Framework ● Activities for children below 3 years: Activities need to focus on food, health, eating habits, disciplining children, scope for socio-emotional skills through play-based activities and lot of support and interaction with adults, especially parents. Plan activities in big spacious rooms with less furniture and under adult supervision. E.g. games, nursery rhymes, group games, toys big in size, games involving individual attention from parents. ● Activities for children between 3-4 years: It is the period of language explosion. Hence, children should be involved in play activities which involve social interaction and language development. They go hand in hand. Children in this age-group love to listen to stories, poems, play interaction games in pairs, small groups, and large groups. They should develop confidence that world is a better place to live in and this will help to create positive self-image. ● Activities for children between 4-6 years: As the children grow older and reach 6 years, they become toddlers and take interest in doing activities with age-appropriate peers.The ECCE program curriculum framework should focus primarily on developing school readiness skills among children which are discussed in greater detail in next unit (1.5). 1.6.4 Teaching approaches as per Curriculum Framework for ECCE The curriculum framework for ECCE programs strongly believes that children learn the best through play way methods. Children are able to construct their own knowledge through the range of experiences they get in their daily life. Adults play role of a facilitator rather than instructor. A variety of methods can be used for delivering the ECCE program curriculum. They are presented below: Montessori Method: This method was given by Maria Montesori. It focuses on making children independent. They learn new skills through hands-on training and

27 collaborative play. It gives scope for child's natural psycho-social development and emphasizes on sensory training. Hence, it is useful for children with hearing loss too. Regio Emillia: Based on the work of Loris Mallaguzi, this is a constructivist approach which focuses on creation of a learning environment that enhances and facilitates children'sconstruction of their own thinking through the combination of communicative, expressive and cognitive languages as they engage actively with people, material and environment. This method follows constructivist approach. It was based on the work of Loris Mallaguzi. The aim is to create learning environments with will stimulate creativity in children and help them to think through a combination of three factors: development of language and communication, skill of making materials and social interaction. Thematic curriculum: This method uses iintegrated themes and projects to transact the curriculum. These themes are the building blocks which allow the child to form meaningful links among different concepts and develop a broader understanding of the world around them. This curriculum is flexible and can be modified to suit the needs of the children belonging to different social, linguistic, cultural, contexts in the society. 1.6.5. List of materials for play Indoor play material: ● Blocks ● Toys ● Material for imaginative play like dolls ● Material for language development like books and pictures ● Material for cognitive development like visual discrimination cards, items for sensory stimulation, mazes, puzzles, jigsaw, etc ● Musical instruments ● Art material for creative expression Outdoor play material: ● Play equipment for balancing, climbing, jumping, etc. ● Different types of balls, rings for throwing and catching, ● Sand play ● Water play

28 1.6.5 Role of Assessment in Curriculum Framework for ECCE programs Assessment is an important component in the process of teaching and learning. It is actually the starting point of teaching. Teachers first assess the child's current or existing level of performance before introducing a new concept or a skill. On the basis of this baseline assessment data, the teacher plans the new activities. Assessment is also done during the teaching and done later towards the end of teaching session. It helps the teacher in determining the extent to which the teaching was successful and how much content needs to be revised again. The main purpose of conducting assessment is to give important information about the child's progress in different domains of development to the family members. Based on the assessment, the professionals refer the child to appropriate support services and also guide and counsel the parents about the rehabilitation measures. The following are the main areas of assessment in ECCE programs: ● Interests of child ● Extent of child's participation in social activities ● Skills ● Abilities It is important to assess children in ECCE programs on a regular basis. Formative assessment is always better than summative assessment as far as young children are concerned. Because formative assessment gives continuous feedback and has greater scope for improvement. Formative assessment is 'assessment for learning' to take place. However, the aim of summative assessment is to make a judgement about whether a student has cleared an exam or has failed. It has limited or no scope for improvement. Hence, summative assessment is 'assessment of learning' that has already taken place. Fig. 1.6.1. Types of assessment List of activities for Formative Assessment:

29 ● Routine classtests ● Surprise tests ● Open Book tests ● Quiz competitions ● Semester exams ● Group projects ● Teacher made tests (TMT) which are based on a specific content taught in the class. This includes fill in the blanks, true or false, match the following, answer in brief, give reasons, oral tests, other forms of paper pencil tests made by the class-teacher on a periodic basis. List of activities for Summative Assessment: ● Final year exam ● Competitive exams like UGC-NET, SET, CSIR, etc ● Online tests with multiple choice questions ● Entrance exams for different courses ● Written tests taken for a particular job 1.6.6. Role of stakeholders: Teachers in ECCE programs: ● Observe the child's behaviour and help to identify any behaviour problems and disabilities. ● Plan age-appropriate developmental activities. ● Create environments for stimulating social interaction and development of social skills of young children. ● Facilitate friendships among peers. ● Help in early identification and intervention of children with special needs ● Establish partnerships with parents

30 Parents in ECCE programs: ● Parents are the real-life teachers for children. Child spends most of the time with parents. Hence, it is essential to discuss the role of parents in ECCE programs. The curriculum framework values the participation of parents in ECCE activities and suggests that parental involvement has produced enhanced learning for children. When the children are young, the responsibility of taking decisions on child's behalf lies on parents. Hence, need to be empowered about the domains of child-development and activities that promote growth and development. ● Parents create conducive home environment for children. ● Provide numerous opportunities of learning in day to day life. ● Work in collaboration with the teachers ● Participate in the range of school-activities for the children. 1.7 Domains of development facilitating the school readiness for inclusive education The transition from preschool to formal school is one of the most important events in the life of a young child. This transition is often especially challenging for families of children with special needs (Hanson et al., 2000; Janus, Lefort, Cameron, & Kopechanski, 2007). When the child in question is deaf or hard of hearing (D/HH), the transition may have additional or unique complexities and challenges. Due to incomplete or absent access to reciprocal language, D/HH children are at high risk for delayed language development, which can permanently affect communication, academic, and social skills in early childhood and later in school (Marschark & Spencer, 2011). All of these factors demand school readiness. 1.7.1 School readiness: The concept School readiness is the foundation of equity and quality education (UNICEF, 2012). In majority of the countries, including India, the chronological age is the single most criterion used for starting school for inclusion. But the question that arises is – are the

31 children ready for school when they are enrolled in the school simply because they have crossed a particular age? Most probably they are not. Globally, the concept of school readiness has a wider scope. The concept of school readiness has 2 dimensions. Child being made ready for school and vice-versa. The same is represented in the figure given below: Dimensions of school readiness: 1.7.2 Child being made ready for school : School readiness typically refers to the child's attainment of a certain skills needed to learn, work, and function successfully in a formal school. These skills may include a wide range of domains like communicative, self help, emotional, behavioural, cognitive, etc. However, it burdens the children by expecting them to learn the skills for which they are not biologically ready. Thus, readying children for school is almost similar to integration. We try to provide early intervention to minimize the negative impact on development so that the children are 'readied' for school at par with the age mates without disabilities. 1.7.3. School being made ready for children : This dimension of school readiness highlights that schools are to be 'readied' for all children with diverse needs. This implies the concept of inclusion wherein the school systems provide for access, equity and participation under one roof. This is an underlying premise of RTE (2010) as well which emphasizes that irrespective of the fact whether or not the child is ready, all children are entitled to go to a neighbourhood school which should make provisions so that educational needs of all children are addressed. The same is represented in the figure given below: Child being made ready for school School readiness School being made ready for children

32 Source: Guralnick (2011). The Developmental Systems Approach The neighbourhood schools need to make preparations in 3 areas to facilitate smooth transition of children with hearing impairment to regular mainstream schools. 1.7.4. School readiness of children with hearing impairment We are aware about the difficulties faced by children with hearing loss with respect to language, literacy and communication skills. Hence, special educators and parents

33 need to work on these skills for making the children ready for an inclusive school. Research by Gathoo (2009) indicated that a center based approach of early intervention is followed in the ECCE centres for children with hearing impairment in India. Each centre has its own unique curriculum-framework for children with hearing loss. Although parental involvement in early intervention is highlighted, yet, there is no uniformity in the curricular activities selected for empowering young deaf children and their parents. As a result, when these deaf children enter an inclusive school, all are not able to sustain in the new educational set up for a long period of time. This is because most of the children do not possess the school readiness skills essential to sustain in the mainstream school set up. Hence, it very important to get detailed information about the domains of development that will lead to school readiness for inclusive education among children with hearing loss. National School Readiness Indicators Initiative (2005) specifies five domains of school readiness namely -,-,-,- and -. In the Indian context Gathoo (2009) designed a curricular framework of school readiness for children having hearing loss that would facilitate their inclusive education. This curricular framework provided guidelines for teachers of the deaf to develop, implement and assess the school readiness curricula. It consists of a total number of 10 domain areas of school readiness. Some of these are congregate and given below: 1. Physical-motor development: This domain focuses on health and safety measures, identification of disabilities, functioning of muscle movements, gross and fine motor skills, and conditions which affect physical development during the pre- natal, natal and post natal period. While discussing this domain Gathoo (2009) indicated that since the children with hearing impairment face serious limitations in language and communication as a result of their sensory handicap, teachers should take good care of their other senses and physique. They should be provided opportunities for regular Physical exercises and also good physical health and hygiene. Outdoor activities like running, cycling, swimming, increases stamina of children and indoor activities such walking on a straight line etc helps in balancing. 2. Socio-emotional development: This domain incorporates two aspects. First aspect is the child's capacity to interact with people around them. Second aspect is the child's ability to control his/her own

34 emotions. This is also known as self-regulation. It involves whether the child is able to maintain a balance of his emotions and is able to express right emotions in right place. This includes child's self-concept. How good he / she is in forming social relationships, are they able to give and receive affection are few features covered under this domain. Gathoo (2009) had included this as one of the domains of school readiness in her curriculum framework for school readiness. She indicated that hearing children learn social behaviour and appropriate language structures through listening. Because children with hearing loss miss this opportunity, special attention needs to be given to the development of their social skills and communication. Communication is the link which connects an individual to the society. Majority of the children or adults with hearing loss face isolation because they find it difficult to establish communication link with the hearing individuals around them. Hence, teachers and parents of deaf children should emphasize of on development of socio-emotional skills like turn taking, initiating communication, participating in group activities, conflict resolution, forming and maintaining relationships. 3. Approaches to learning This domain highlights on the learning preferences, use of knowledge and skills demonstrated by the children, and their involvement in learning. It states that curiosity, generating enthusiasm and persistence are the three keys to good learning. Gathoo (2009) names this domain as 'dispositions' in her curriculum for school readiness. According to her dispositions are mental tendencies, or preferences indicated by children for doing certain things. These dispositions are thought to be inborn. Children are born with the disposition to learn certain things. Inability to hear actually makes children with hearing impairment more curious. Because they are not distracted by noise, they are able to concentrate a lot on the task at hand. However, hearing loss has a negative impact on child's disposition towards social interaction and communication with others. Hence, activities need to be planned on the domain of disposition. 4. Development of language: As per the National School Readiness Initiative (2005), this domain includes development of communication skills and emergent literacy. Communication includes receptive and expressive language skills. Emergent literacy is one step ahead of conventional literacy skills which includes reading and writing in script form. The emergent literacy behaviours include scribbling, drawing on walls, trying to hold a newspaper, etc. Such rudimentary literacy skills gradually held the child in learning formal literacy skills. In case of children with hearing impairment, early intervention for language should begin early in life. Immediately after the child is diagnosed with hearing loss, the next step has to be early intervention. Intervention before the age of 2 years is called as early intervention

35 while that which starts after 2 years is called as late intervention. Early years are characterized by neural plasticity. The critical period of language acquisition like between birth to 3 years. If the child receives appropriate amplification device during this period, then there are greater chances that the milestones of language development may be achieved and one can predict entry into a mainstream school. In a mainstream school, reading, writing, lecture, taking notes, all tasks revolve around comprehension of language. Hence, this is one of the most essential domains of development that needs attention as far as school readiness of children with hearing loss are concerned. As you are aware, for young children natural environment is child's home and the familiar adult. Hence, the parents should be empowered with simple techniques of developing language in every day routines of the child. 5. Cognitive development: This domain involves a range of mental processes like thinking and reasoning, memory, problem solving, perception, language development, concept formation. All these cognitive processes are linked with one another. Hence, inadequate functioning in one mental process has a negative effect on all other related mental processes. For children with hearing loss, inadequate language further affects the child's ability to remember things, form concepts and perceive the world as it is. Teachers of the deaf need to repeat the activities, avoid distractions, associate newly learnt concepts with the child's previous knowledge for better retention, and use such other techniques for the cognitive development of children with hearing loss. 6. Mathematics This domain in the curricular framework for school readiness among children with hearing loss emphasises mathematical language and concepts besides numerical abilities and opertaions. As compared to other subjects, mathematics consists of language which is more abstract. Symbols are used that stand for something else. There are two types of symbols. The symbols like '+', '-', 'x' etc are iconic. The child is able to comprehend the type of mathematical operation that he / she is supposed to perform just by looking at the symbol. However, mathematics also involves another type of symbols which are not iconic. These are the word problems. Mathematics has its own language. Children have to comprehend the words ie, the code or symbols like remainder, gross, estimate, value, mean, how many left ?, etc for solving the sums. Children with hearing impairment find it very difficult to deal with the mathematical language. It is important to expose children with hearing loss to these complex language structures of mathematics when they are young. During the critical period of language acquisition, learning is faster. Hence, this domain needs to be included in the curricular framework for school readiness of children with hearing loss. 7. General Knowledge: This domain is closely associated with the domain of language development. Once, efforts towards development of language are on its way, general knowledge of children

36 with hearing loss will develop automatically. This is because with developed language base children with hearing loss will be able to communicate, express their needs, form healthy social relationships and thereby increase their general knowledge about people, events and things around them. 8. Arts and Creativity For young children with hearing impairment, every activity becomes a language learning experience. If the language concepts are introduced through play based activities, then children learn it faster. Different types of arts like fine arts, dance, dramatics provide greater scope for involvement of children and hence, language learning becomes natural and meaningful. These activities stimulate creativity. Creativity involves creating something new and unique. These activities make the children think and perform differently. They realize that there are multiple ways of self-expression. Hence, this domain should receive attention while planning school readiness activities for young children with hearing impairment. 1.8 Let us Sum Up The paradigm shift has been seen in the education of children with hearing impairment. The segregated education in which children with disabilities are taught in different or special settings specifically designed for the children. The integrated education where the children with disabilities were trained toacquired a certain level of expertise of communication and literacy in special schools and then would be integrated to the normal schools. The philosophy of inclusive education emphasized on equal opportunities, equity and full participation in the class irrespective of disabilities. Whether the child with hearing impairment intervened early or late has difficulties in learning due to various reasons. Therefore it becomes important to provide curriculum which facilitate the developmental domains of cognitive, socio-emotional,language and literacy, physical-motor and creative and aesthetic. ● Now let us review our learning. First, we studied the importance of early intervention and ECCE programs. During early years, the critical periods of development enable the child to acquire the skills at a faster rate and the baby is most receptive to learning encounters during these periods. Human brain is characterized by plasticity or flexibility during the early years. The greater the

37 number of experiences the child gets, the faster is the neural networking. Hence, the curriculum framework for early intervention and early childhood care and education programs of children with special needs need to be designed with lot of care. Considering the importance of child development during the early years, Indian Government's Ministry of Women and Child Development has launched the National Early Childhood Care and Education (ECCE) Policy (2013). It consists of the National Curriculum Framework and Quality Standards for ECCE. ● After this, we went through the need of having a curriculum framework for developing school readiness among children with hearing impairment It is not possible to develop a common and uniform curriculum for all children because of their unique diverse needs. Hence, there is a need to develop a broad curricular framework which will act a guideline for developing school readiness skills for children with hearing impairment facilitating inclusive education. ● We discussed the important domains in curriculum framework given below: Physical-motor Language Cognitive development Socio-emotional Sensory development Aesthetic and Creativity ● Then we studied about the activities for children in ECCE programs provided in three groups: For children below 3 years 3 - 4 years Children between 4-6 years ● Montessori Method, Regio Emillia (a constructivist approach) and thematic curriculum were the few types of methods of teaching provided by Curriculum Framework for facilitating school readiness of children with hearing impairment. ● This was followed by the list of indoor and outdoor play material to be made available for children in ECCE programs.

38 ● The main purpose of conducting assessment in ECCE programs is to give important information about the child's progress in different domains of development to the family members. Based on the assessment, the professionals refer the child to appropriate support services and also guide and counsel the parents about the rehabilitation measures. ● Then we discussed the role of parents and teachers in ECCE programs. ● After discussing the old and modern concept of school readiness, we studied the domains of development for facilitating the school readiness for inclusive education. They are given below: ✓ Physical-motor development ✓ Socio-emotional development ✓ Approaches to learning ✓ Language development ✓ Cognitive development ✓ Mathematics ✓ General knowledge ✓ Arts and creativity 1.9 Unit End Exercises 1. What do you mean by 'paradigm?' 2. How education of disability evolved? 3. State the international mandates that lead to foundation of inclusive education. 4. State various legislations and mandates that lead to inclusion movement in India. 5. Write a note on 21 st century curriculum 6. State various degree of hearing loss 7. What do you mean by critical period? Why is it important in the intervention? 8. What is Speech Perception Ability? 9. Importance of parental support in the development and learning of children with disability.

39 10. Write down the causes of learning difficulties in children with hearing impairment. 11. What do you mean by early intervention? 12. What is early identification? 13. Write down curricular need of early and late intervenedchildren with hearing impairment. 14. What do you understand by Curriculum Framework? Discuss the role of parents, teachers and assessment prescribed by Curriculum Framework for facilitating inclusive education. 15. Discuss the concept of school readiness. Explain the domains of development for facilitating school readiness for inclusive education. 1.10 References Amos, L. W., Purkey, W. W. & Tobias, N. (1984). Invitational teaching survey. Unpublished Instrument. University of Carolina at Greensboro, Greensboro, NC ASHA (2012). In effects of hearing loss on development. Retrieved from http://www.asha.org/public/hearing/disorders/effects.htm Ausubel, D. P. (1968). Educational psychology: A cognitive view. New York: Holt, Rinehard, and Winston, Inc. Balasundaram, P. (2005). The Journey towards Inclusive Education in India.Presented at Seisa University, Ashibetsu Shi, Hokkaido, Japan. Bronfrenbrenner, U., & Ceci, S. J., (1994). Nature and nurture re-conceptualized in developmental perspective. A bio-ecological model. Psychological Review, 101,58- 586 Carney, A. E. & Moeller, M. P. (1998). Treatment efficacy: Hearing loss in children. Journal of Speech, Language, and Hearing Research, 4(1), pp. S61-S84. Chakraborti-Ghosh, K., Orellan, K. M. & Jones, J. (2014). A cross-cultural comparison of teachers' perspectives on inclusive education through a study abroad program in Brazil and in the U. S. International Journal of Special Education, 29 (1), 4-14. Cole, E., & Flexer, C. (2015). Children with hearing loss: Developing listening and talking, birth to 6 (3rd edition). San Diego, CA: Plural Publishing, Inc.

40 Delors, J. (1996). Learning: The Treasure Within. Report to UNESCO of the International Commission on Education for the Twenty-first Century. Paris: UNESCO. Goldberg and Richburg (2004). Minimal hearing impairment: Major myths with more than minimal implications. Communication disorders quarterly, 25:152- 60. Hochbery, I. L. (1983). Speech of the Hearing impaired. Obberger M. J. UniversityPark Press Hossein, M., Asadzadeh, H., Shabani, H., Ahghar, G., Ahadl, H., and Seadatee , A.Shamir, S. (2011). The Role of Invitational Education and Intelligence Beliefsin Academic Performance, Retrieved online https://files.eric.ed.gov › full text. Hull, D. (1995). Who Are You Calling Stupid?: The Revolution That's ChangingEducation: Cord Communications. IEDSS, (2009). Inclusive Education of the Disabled at Secondary Stage. Retrieved on 5/5/2019 fromhttp://mhrd.gov.in/iedss McMaster, C. (2012) Ingredients for Inclusion: Lessons from the Literature. Kairaranga, 13(2), 11-22.

Marschark, M. & Wauters, L. (2008). Language Comprehension and Learning by Deaf Students.

In book Deaf Cognition. Oxford University Press, Inc. DOI: 10.1093/acprof:oso/9780195368673.003.0012 Marschark, M., & Knoors H. (2012). Educating Deaf Children: Language, Cognitionand Learning. Deafness & Education International, 14(3). Mellon, N. K., Ouellette, M., Greer, T., & Gates-Ulanet, P. (2009). Achieving developmental synchrony in young children with hearing loss. Trends in Amplification, 12(4), 223-240. https://doi:10.1177/1084713809356701 Moeller, M.P., Tomblin, J.B., Yoshinaga-Itano, C., Connor, C.M., &

Jerger, S. (2007).

Current state of knowledge: language and literacy of children with hearing impairment.

Ear

Hear. 28(6), 740-753.

Moeller, M. P. (2000). Early intervention and language development in children who are deaf and hard of hearing. Pediatrics, 106(3), e43-

e43. Retrieved from https://doi.org/10.1542/peds.106.3.e43

41 Moeller M. P., & Tomblin J. B. (2015). An introduction to the Outcomes of Children with Hearing Loss study. Ear and Hearing, 36, 4S–13S. doi:10.1097/AUD0000000000000210 Ormrod, J., Anderson, E., & Anderson, L. (2017). Educational psychology. Developing learners (9 th ed.). Pearson Education Limited. England. Position paper NCERT (2006). Retrieved from

http://www.ncert.nic.in/new_ncert/ncert/rightside/links/pdf/focus_group/ special_ed_final1.pdf

Pandey, R. S., and Advani, L. (1995). Perspectives in Disability and Rehabilitation.New Delhi: Vikas Publishing House Pvt. Ltd. Purkey, W. (1992). An introduction to Invitational Theory. Journal of InvitationalTheory and Practice, 1(1), 5-14.

Rights of Persons with Disabilities Act xRights of Persons with Disabilities Act. (RPWD. 2016).Retrieved from

http://www.disabilityaffairs.gov.in/upload/uploadfiles/files/ RPWD%20ACT%202016.Pdf

Right to Education, (2009). (27 October, 2017) Retrieved from

http://mhrd.gov.in/sites/upload_files/mhrd/files/upload_document/

RTE_2nd.pdf Sarva Siksha Abhiyan, (2000). Manual for District- Level Functionaries - Level Functionaries. Retrieved from https://darpg.gov.in/sites/default/ files /Sarva%20Siksha%20Abhiyan.pdf

Sharma, A., Dorman, M. F., & Spahr, A. J. (2002). A sensitive period for the development of the central auditorysystem in children with cochlear implants: Implications for age of implantation. Ear and hearing, 23(6), 532-539.

Stein & Walter. (2012). Understanding theory of change. Retrieved online from http:/ /www.theoryofchange.org /wpcontent/uploads/toco_library/pdf/UNDERSTANDING THEORYOFChangeSteinValtersPN.pdf Status of Disability in India, (2000). Rehabilitation council of India. Retrieved from http://www.rehabcouncil.nic.in/writereaddata /Cover_Page.pdf

42 Tomblin, J.B, Oleson, J. J, Ambrose, S.E. (2014). The influence of hearing aids on the speech and language development of children with hearing loss. JAMA Otolaryngology – Head & Neck Surgery. 140:403–409.

UNESCO. (1994). "

The Salamanca Statement and Framework for Action on Special Needs

Education."

In World Conference on Special Needs Education: Access and Quality, Salamanca, June 7–10. Paris: UNESCO UNCRPD, (2007). Convention on the Rights of Persons with Disabilities (CRPD). United Nations. Retrieved from https://www.un.org /development/desa/disabilities/ convention-on-the-rights-ofpersons- with-disabilities.html Witkin, H. A. & Goodenough, D. R. (1981). Cognitive styles: Essence and Origins. New York: International Universities Press. Early Childhood Education Framework Draft (2012). Ministry of Women and Child Development. Government of India. Retrieved online on 1/12/2019 from http:// 14.139.60.153/bitstream/123456789/130/1/EARLY%20CHILDHOOD%20 EDUCATION%20CURRICULUM%20FRAMEWORK%20%28DRAFT%29.pdf Gathoo,V.S (2009). Curriculum and Teaching Strategies for Children with Hearing Impairment. (MMDE 076).IGNOU: New Delhi. ISBN- 978-81-266-5274-7 Guralnick, M. (2011). Why Early Intervention Works. Infants & Young Children, 24(1), 6-28. doi:10.1097/iyc.0b013e3182002cfe Hanson, M. J., Beckman, P. J., Horn, E., Marquart, J., Sandall, S. R., Greig, D., & Brennan, E. (2000). Entering preschool: family and professional experiences in this transition process. Journal of school for deaf and hard-of-hearing children. In M. Marschark, V. Lampropoulou & E. Skordilis (Eds.), Diversity in deaf education (pp. 49–75). New York, NY: Oxford University Press Janus, M., Lefort, J., Cameron, R., & Kopechanski, L. (2007). Starting kindergarten: transition issues for children with special needs. Canadian Journal of Education, 30(3), 628–648. doi:10. 2307/20466656 Mauro .T .(2018). Early Intervention in Special Education. Retrieved online on 7/7/ 2019 from https://www.verywellfamily.com/what-is-early-intervention-3105699
43 Marschark, M., Spencer, P. E., Adams, J., & Sapere, P. (2011).
Evidence based practice in educating deaf and hard of hearing
children: teaching to their cognitive strengths and needs. European Journal of Special Needs Education, 26(1), 3–16. doi:10. 1080/ 08856257.2011.543540 Mundkur, N. (2005). Neuroplasticity in Children. Symposium on Developmental and Behavioral Disorders.Indian Journal of Pediatrics, volume 72 (10) : 855-857 National School Readiness Indicators Initiative (2005). Five Domains of School Readiness. Retrieved online on 30/11/2019 online from http://old.uwbec.org /documents/ school_readiness/Five%20Domains%20of%20Social%20Readiness.pdf National ECCE Policy (2013). National Early Childhood Care and Education Policy and Curriculum Framework. Retrieved online on 1/12/2019 from https://wcd.nic.in/ sites/default/files/national_ecce_curr_framework_final_03022014%20%282%29.pdf RTE Act (2010). Right to Education Act. Retrieved online on 25/9/18 from http:// mhrd.gov.in/rte UNICEF(2012). School Readiness: a conceptual framework.Retrieved online on 1/ 12/2018 fromhttps://www.unicef.org/earlychildhood/files /Child2Child_Conceptual Framework_FINAL(1).pdf

44 Unit 2 ❏ Curricular Adaptations Structure 2.1 Introduction: 2.1.1 Shifting trends towards Inclusion 2.1.2 Meaning of Inclusive education: 2.1.3 Need of Curricular Adaptation 2.2 Objectives: 2.3 Bases of curricular adaptations & decision making 2.3.1 The concept of curriculum adaptation 2.3.2 Understanding the bases of curriculum adaptations 2.3.3 Steps in decision making 2.4 The Step wise curricular approach and its adaptation 2.5 Types of accommodations, modifications and its applications 2.5.1 Difference between Accomodation and Modifications 2.5.2 Types of adaptations in the curriculum 2.6 Strategies of adaptation of textbooks of different school subjects 2.6.1 Need of Textbook adaptation 2.6.2 Strategies of textbook adaptation 2.7 Adaptation in assessments and evaluation 2.7.1 Do's and Dont's in evaluation 2.7.2 Strategies for formative
evaluation: 2.8 Let us sum up 2.9 Unit End Exercises 2.10 References
45 2.1 Introduction 2.1.1
Shifting trends towards Inclusion The service delivery of education for children with special needs in India has seen shifting trends from segregation to integration and then to recent inclusive education. Until 1970s Government policies supported segregation. Many special schools were established for children with disabilities. As the time passed by, there was growing awareness that students with special needs who can be educated in general schools should be educated in general schools and those studying in special schools should be transferred to general schools once they are ready to make the shift (MHRD, Programme of Action, 1992). In 1970s India witnessed shift in the trend from segregation to integration. The government launched the Centrally Sponsored Scheme of Integrated Education for Disabled Children (IEDC).The constant use of the medical model of assessment in integration, wherein educational difficulties are explained solely in terms of defects in the child, led to a re-conceptualisation of the special needs (SN) task as requiring school reforms and improved pedagogy. This re-conceptualisation at the both the international and national level helped in the emergence of an orientation towards inclusive education. In the 1990s, inclusion captured the field after the World Conference on Special Needs Education in Salamanca in 1994, with the adoption of
the Salamanca Statement and Framework for Action on Special Needs

Education.

Since then many international frameworks supporting inclusion like Biwako Millennium Framework (BMF) (2002), Incheon Strategies (2012) and UNCRPD (2006) were passed. India has signed and ratified UNCRPD (2006). As a result of this Persons with disabilities Act (1995) was replaced by Rights of Persons with Disabilities (RPWD) Act (2016) which supports inclusion. The provisions regarding inclusion find place in Article 16, Chapter III of this Act. Article 17 represents the measures to facilitate inclusive education. Right to Education (RTE Act, 2009) states that every child in the age group of 6-14 years, including children with disabilities will be provided free and compulsory elementary education of 8 years in the vicinity of his/her neighborhood. RTE (2009) which is implemented through Sarva Shiksha Abhiyan (SSA) and Rashtriya Madhyamik Shiksha Abhiyan (RMSA) provides a base for making Inclusive Education a reality. The following sub-unit explains the meaning of inclusive education. 2.1.2 Meaning of Inclusive education: As per Advani and Chadha (2003) inclusive education aims to provide a favourable setting for achieving equal opportunity and full participation for all, thus bringing children

46 with special needs well within purview of mainstream education. It recognizes the diverse needs of the students and ensures equal education to all through appropriate curricula, teaching strategies, support services and partnership with the community and parents. In simple words it means that all children with or without disability learn together. The focus is on restructuring the school both physically and attitudinally to accept and provide for the needs of all students. In inclusive program specialized instruction and support are provided to any student who is in need to support their learning without being labelled. Schools welcome all children and they are treated with dignity. Arrangements as per each one's requirement will be made in the existing schools. In inclusion there is commitment to educate each child, to the maximum extent possible, in the school and classroom the child would otherwise attend. It involves bringing the support services to the child (rather than moving the child to the services) and expects that the child will benefit from being in the class (rather than having to keep up with other students). (Gowramma ,2014). Inclusive education can be summarized as under: ● The main principle is placing all children in the education system ● Non-discrimination on the basis of disability for admission to school ● General education classroom in the neighbourhood school is the placement option for a child. ● Inclusive education provides a right to the children with disability for being educated with the non-disabled children without any differentiation. ● All children in the school will participate in the school programme. ● It brings desired educational opportunities at the doorstep of the exceptional children rather than expecting them to move for themselves to avail these opportunities. Inclusive education recommends the education of children with disability in overall general educational structure by adapting the entire education system which includes the following: ● School structure ● Building ● Furniture ● Teaching ● Classroom management ● The curriculum-adaptation of text book, instructional strategies and also the evaluation process. Let us study the need of curriculum adaption given below.

47 2.1.3 Need of Curricular Adaptation National Curriculum Framework NCF (2005) which is continuously involved in development and reforming curriculum stated that it very important that curriculum is "an inclusive and Meaningful experience for children". This can be achieved only if there is a fundamental change in our perception of learners and the entire learning- process. Although the theory of inclusion may sound easy and familiar, it is indeed a very challenging task in practice not only for the teachers but also for the parents and students with disabilities themselves. Shetty & Gathoo (2019), studied the perspectives of stakeholders namely parents, teachers, school principals and students with disabilities towards inclusive education. The results indicated that all the stakeholders were not satisfied with the services offered in the inclusive schools. The mainstream teachers expressed their inability in teaching children with disabilities because they were not trained and felt that special teachers need to be appointed to deal with these students. Parents were disappointed with the lack of resource support provided in resource room. They indicated that the children did not show much academic improvement and were only promoted to further grades with very less marks. The children with disabilities themselves also gave a negative feedback about the services they received in an inclusive school. Especially, they highlighted that they were not satisfied with the teaching learning material and teaching process in the class. According to the school heads running an inclusive school was very expensive as it needed appointing many additional staff like special educators, para-professionals like psychologists, physiotherapists, speech therapists, counsellors, etc and modifications in infrastructure as per the needs of the diverse students. This study pinpoints the need to bring about appropriate curricular modifications in the inclusive class. Curricular adaptation will benefit not only children with special needs but also the stakeholders associated with them. The need for curricular adaptation has also been voiced by Jhulka (2016). She pointed out that rote memorization is the highly preferred way of classroom practice in regular school even today. 'Marks' or 'percentage' are the two criteria of measuring outcomes in regular schools. Generally regular teachers present information from different subjects in classroom and students are supposed to remember it by way of rote learning from the text books. Sometimes other activities and tasks may be used but the emphasis is on memorizing the content. At the end assessments are planned to check how much students have understood. This system is very rigid and there is very less scope to incorporate differential learning

48 needs of children with hearing loss. Children with hearing loss are physically present in class. They use the textbooks which are actually developed for hearing students. Deaf children lack the language base which the hearing counterparts have. Hence, they are not able to cope up with the language complexity present in the text books that are developed for hearing students. As such they are prone to academic failure. As a result children with hearing loss remain out of the system because they do not fit within the existing system. Not only the students, Jhulka (2016) has indicated that even the teachers in regular schools are not ware about the teaching strategies that would lead to improved learning of students. Hence, teachers usually have very low expectations from the children with hearing loss and they tend to remain out of the loop of teaching learning process. Evidence based strategies which will work and prove to be beneficial for all students are now available.Hence, as students of special education, it is essential to understand the concept of 'curricular adaption' in greater detail and use these strategies for classroom teaching. You must have studied about 'curricular-adaptation' during your B.Ed (Special Education) program. The aim of the present unit is to give you in-depth information about the concept so that you are in a position to design an adapt curriculum set-up for any institution working in the field of special education. Let us look at the objectives of the unit given below. 2.2 Objectives After studying this unit on curriculum adaptation, you will be able to : ● Explain the Bases of curricular adaptations & decision making ● Discuss the Step wise curricular approach and its adaptation ● Define the Types of accommodations, modifications and its applications ● Use the Strategies of adaptation of textbooks of different school subjects ● Plan Adaptation in evaluation 2.3 Bases of curricular adaptations & decision making Now let us have a look at the concept of curriculum adaptation. 2.3.1 The concept of curriculum adaptation The aim of curriculum adaptation is not to remove difficult content or dilute the standards of the curriculum. It is developed to meet the needs of diverse learners like

49 students with hearing impairment, autism, learning disability studying together along with the non-disabled students in a mainstream school. Thus, curriculum adaptation facilitates learning of all students and provides opportunity to learn and exhibit their learnt skills. There are a range of strategies which are beneficial to the children with hearing impairment and these can assist all students in an inclusive class to learn. As indicated by Gathoo (2016), successful classroom teaching depends upon three factors: Input, process and output. Adaptation is required in each of these factors. These factors are shown below. Source: Gathoo (2016) Fig. 1.1 Factors that need adaption 1. The Input Variables: Conducive Environment in and around the Classroom ● Classroom environment: Unwanted sound is called noise. This noise disturbs children, creates obstruction in hearing, distracts attention and makes it difficult to have conversation with people in classroom. Hearing aids are a kind of machine. They amplify even 'noise' along with other speech sounds making it difficult for the students with hearing loss to hear teacher's

50 voice. Hence, it is important that the classrooms containing children with hearing loss be placed in a quiet place away from noise. Not only outside the classroom, noise is produced also within the class. The voice of students, screaming and noise from banging the furniture are the potential sources of noise within the class. The noise within the classroom can be reduced by spreading a carpet on the floor, having thick curtains on the windows, fixing rubber covers on the furniture to avoid the screeching noise that is produced while shifting the furniture. Sometimes electronic items like air conditioners, fans also create noise in classroom. They need to be fixed and maintained properly. It is important that the deaf child is seated on first bench in-front of the teacher so that the teacher's facial expressions and speech reading is visible. Some children with hearing impairment are sign language users. If an interpreter is available then the seating arrangement may be such that the child sees the interpreter, the teacherand also the black board. Generally a semi circular arrangement makes children with hearing impairment more participative. ● Adapting Instructional materials: A wide range of materials like textbooks, reference books, guides, supplementary reading material which involves rapid-readers or workbooks, exercise books are primarily developed and written for children without disabilities. Children with hearing impairment may find to read and understand these due to the language load of vocabulary and complex sentence structures. They may fail to comprehend the instructional material and hence it will be beneficial to adapt it so that they get an equal opportunity to read and learn from it. Adapting teaching materials involves making changes to the text and lay out so that the student has access to information during the course of instruction. Instead of having long sentences the same could be some times broken down into small meaningful sentences. Presenting information diagrammatically or in a tabular format could also be tried out for Science and Geography. History has a lot of written text. There could be more illustrations and could also be supported by videos. As suggested by Gathoo (2016) it is important that the textbooks that are developed for deaf children with hearing contain glossary or foot notes and reading material for pre-school deaf children should have speech balloons and think clouds. Content could also be adapted by using flow charts or by presenting some information in the form of bullets. The instructional material should be carefully designed so that it is interesting for the children and suits their level. ● Adaptation of the content: As per Jhulka (2016), this includes various methods of adapting the content of the textbooks. It involves use of a variety of supplementary material like artifacts, calculators/

51 talking calculators, taylor frame, abacus, Brailler, geometrical kit, Geo – board, Tactile board, Geometric shape board (for circle, graph, representation), Tactile graph sheet (for bar-graph, histograph etc), 3-d blocksand figures, manipulatives, flash cards or pictures on paper, posters, chalkboard, projection screens, computers, books on tape and computerized text reader, screen readers, voice synthesis, scanners, daisy books, multimedia gadgets like CDs, MP3s, talking watches and talking clocks,videos/movies, modeling material like clay, textured objects/raised line paper, games and puzzles, etc, can help all children learn. 2. The Process Variables: ● Adapting Instructional methods: Method of teaching needs to be adapted. For regular children the teacher teaches in the class before and then informs parents to take revision at home. For children with hearing impairment the teachers should request parents to pre-teach the main concepts at home well in advance. When the teacher teaches the same concepts in the class, it will be a good repetition for students and it will facilitate their memory. As far as possible the teachers should try to give direct instructions in precise language. The important words should be repeated. Giving day to day examples and using new words in varied contexts helps to concretize the concept. The more the information is presented visually, the better is the comprehension of deaf students. Hence, try to present the content with diagrams, charts, line drawings, PPTs, captioning. This will make the material meaningful for children with hearing loss. Try to teach concepts by connecting them with different subjects. E.g. the Concepts of vaporization of Science could be taught along with the chapter of weather in Geography. Use of Demonstrations will facilitate understanding of concepts in Science and Geography. For history and Language, role playing or dramatization help a lot in making the subject interesting for students. Few others tips for adapting instructional methods are given below: ● Ask students from back rows to repeat the comments and questions of other students, ● Reinforce or provide immediate feedback to the students who gave an answer so that students with hearing loss pay attention to the speaker. ● Assign a buddy or a hearing peer with every deaf student in the class who will help the deaf child in taking notes and completing assignments in the class. Other specific adaptations for instructional strategies may include the following: During a lecture, the students with hearing loss may lose significant part of the information. To overcome this loss, they may be provided with transcripts of lecute or audio information. 52 They may be allowed to use audiovisual material like computers independently for a longer duration. ● Provide extra time for oral and written responses for a child with hearing impairment in the class discussions and assignments. Give several short breaks while completing assignments. These include strategies like verbal, visual, kinesthetically, written, proceeding from simple to complex, concrete to abstract, step by step, scaffolding, concept maps, projects, group work, peer tutoring, using prior knowledge, brainstorming, dramatization, giving extra time, giving alternative activities, drill activities, shortening assignments, organizing excursions/ trips, using large fonts, Braille or tacitly coded material, toys or blocks, carbon or xerox copy of notes, hand puppets, real life experiences, real objects, multiple choice questions, children's literature, magazines and journals, etc. 3. The Output Variables: ● Adapting the assessment procedures: As per Gathoo (2016), evaluating children with hearing impairment is a challenging task for the teachers. This is especially true while conducting the Continuous Comprehensive Evaluation i.e. the CCE. Many of the assessments in CCE are either oral tests or written exams. Hence, children with hearing loss are unable to attempt it. Paper pencil exams should be substituted by performance based measures like projects. Many children with hearing impairment actually attempt descriptive questions through rote learning and face serious challenges in framing sentence structure. Multiple choice questions can be used instead of descriptive type questions. The aim is not to simplify the matter, but to stimulate deeper thinking in children. The Rights of Persons With Disabilities Act (2016) provides for language exemption to deaf children. At SSC and HSC, they are expected to study one language. In place of other two languages, they can opt for other vocational. There are also concessions for Math and Science offered by State Boards. It is advisable to check these policies so that alternate evaluations could be planned. Additionally some children may need one to one instructions even for evaluation and may require extra time which is permissible under the law. 2.3.2 Understanding the bases of curriculum adaptations The bases of adaptation represent the justification in support of curriculum adaptation. The bases are also an answer to the question 'Why adaptation?'. The following are the main principles of curriculum adaptation which justifies the need of having adaptations:

53 (1) Learning requires active participation of the student: Gathoo (2016) suggested that 'learning' takes place not only in schools but also outside the school. For students with hearing loss every interaction with the environment which involves the use of language is a new learning experience. Although schools are not the only place where children learn, yet attending and participating in school helps to promote learning. TheNational Research Council (1992) stated that children are the real problem solvers and, they generate questions and problems through their curiosity.Teachers can engage the students in meaningful experiences, by playing, by representing in a variety of ways, and by reflecting on their own learning.This will facilitate active classroom participation. Some children may be able to participate in classr0om tasks because of their disability. Their interested can be re-generated and their participation can be increased by introducing small changes in routine classroom activities. Generally it is observed that, in an inclusive class, children with hearing impairment are remain silent and aloof as compared to other regular children. They try to avoid oral conversation and verbal interactions as far as possible. The teachers may use some strategies to increase their participation like the use of visual information like pictorial material or symbol cards, repeating and highlighting instructions, pairing the pupil with a hearing student, giving more time to listen to what the child is trying to tell you. Use of simple strategies like these is making adaptations for participation which will help all children in class. (2) Students learn in a variety of ways and at different pace. Intelligence is not uni-dimensional. It has many dimensions and a single ability is not enough to catch hold of the entire range of these dimensions. A mainstream class consists of students who have different abilities, preferences and learning styles. Basically there are three types of learning styles. Auditory, Visual and Kinesthetic. They influence learning process to a great extent. Teachers need to identify the learning styles present in their students and use teaching styles which match and satisfy the learning needs of all students especially students with disabilities. Children with hearing impairment also exhibit variety in learning styles. Marschark et al. (2013) stated that often we assume that because the children have hearing loss, these children will be visual learners. To an extent it is true. Hence, most of the deaf students are inclined towards using sign language

54 instead of verbal language. Those who are early intervened are inclined towards oralism and use speech, however, those who have deaf parents prefer to use visual manual mode as the most preferred learning style. (3) Learning is both an individual and group process. 'Practice makes man perfect' well bring about the importance of repetition in learning. This repetition strengthens the bond between the previously learnt information and the new information. Learners are not explicitly aware about this process and it happens rather naturally. In this way learning is said to be individual in nature. However. Social learning theory by Bandura (1978) claims that students learn through observation and imitation of people in the environment. This theory adds the social aspect to learning process and states that working in groups and actively engaging learners in activities stimulates learning. Cooperative learning stimulates social learning. It increases motivation, time on task, memory, improves reasoning ability and the empathetic behaviour among students. Benefits from small-group learning in a collaborative environment include: ✓ Welcoming diversity ✓ Reinforcing individual differences ✓ Development of interpersonal and social skills ✓ Importance to personal feed-backs and self reflections. 2.3.3 Steps in decision making In Inclusive classrooms, teachers are confused while dealing with students having disabilities. They are not aware about the special techniques used for teaching deaf children. Hence, they are not able to take decision about curriculum adaptation. The teachers widely assume that each child with a disability needs some form of adaptations. They also seek advice on which is the best way to adapt a curricula. It needs to be understood. One should understand that not all children with disabilities need adaptations. The goal should be based on a funnel approach. Try the general curricula first. If that is not working try small steps at a time and use the backtracking approaches for adaptations. It also needs to be remembered that each child and the classroom situation is unique and so is the child's needs arising out of disability is unique and hence

there is no single recipe for adapting general education curriculum

for all students. Fisher and Frey (2001) stated that it is essential to remember that curriculum does not always need to be modified. Adaptation is not the solution to all the problems. One can use multi-level instruction in class. Using different adapted instructions and assessment methods provides more flexibility to the students to express themselves in

the class. At other times, the curriculum can be made more accessible through

55 accommodations.

In addition, supports for one student may not

work for all other students

in all situations. e.g., a student who needs full time support from a paraprofessional for math may only need natural supports from peers for English, and no support for art. Disability label should not be

used to determine the type of supports needed by the child. They should be provided depending upon the student's needs and preferences. Thus, which supports need to be included while adapting the curriculum is a complex decision. You may refer to the

decision-making flowchart provided below to conceptualize the process of selecting and implementing curricular adaptations. It should be used as a tool by a team in determining an individual student's

need. A curricular adaptation and

decision making process: This decision-making flowchart can be used to conceptualize the process of selecting and implementing curricular adaptations. It should be used as a tool for a team in determining an individual student's

need . The decision making process is presented in Fig 1.1 below: Identify the student's individual educational goals and objectives to be emphasized during general education activities Articulate the expectations for the student's performance in general education activities Determine what to teach? As a team, determine the content of the general education activity, theme or unit study Determine how to teach? As a team, determine if, without modification, the student can actively participate and achieve the same essential outcomes as non-disabled classmates. If the student cannot achieve the same outcomes

56 Select design appropriate adaptations Select Select lesson Employ Select Engineer the Design Select natural instructional format student- curricular physical and modified supports and arrangement specific goals social material supervision teaching specific to classroom arrangements strategies the lesson environment If the above adaptation strategies are not effective, design an alternative activity Evaluate effectiveness of adaptations Source: Gathoo (2018) Fig 1.2: Steps in the decision making of curriculum adaptation 2.4 The Step wise curricular approach and its adaptation Different authors have presented different steps of approaching the general education curriculum and adapting it. Hooer (1990) presented a curriculum adaptation model consisting of 5 steps: 1. determining why curricular adaptation is needed 2. identifying the factors that need adaptation. 3. selecting appropriate behaviour management and instructional techniques 4. Implementing the selected curricular adaptation 5. monitoring how the adaptations work in practice. King-Sears (2001) has presented a process which will enable the children with disabilities to access the general education curriculum. This process has three steps. Apart from accessing the curriculum, this process also provides scope for suggesting changes into the general education curriculum so that the same curriculum and infrastructure will be accessible for majority of the students. The three steps are actually the guidelines for giving access and making curriculum adaptations. They are presented below: 1. Analysis of the general education curriculum. 2. Enhancing the areas in this curriculum which are not designed to suit the needs of children with disabilities.

57 3. Develop ways to access the curriculum and initiating minor and major modifications of outcomes. Step 1: Analysis of the general education curriculum First step is to analyse the curriculum and make it accessible to students with disabilities. One needs to ask the following questions: ● What is the extent to which curriculum describes the amount of knowledge and skills the students have acquired by the end of the program? ● Does the curriculum consists of resources that will help the teachers with materials and evidence based practices for bringing about variation in the curriculum included in the curriculum itself? ● How many factors of universal design are a part of the curriculum? ● Curriculum goals: General educators are aware about the goals of the content from the curriculum they are supposed to teach. Special educators should also take efforts to understand the goals set by general educators while teaching a particular content. Knowledge of goals will also enable special educators to frame IEPs with greater accuracy. Following are the expected characteristics which should be considered while forming goals: ● Goals should be clearly written and jargon free. ● Goals should specifically mention the list of knowledge and skills that will be learnt by the students. ● Goals should be balanced. They should not allow students to get inclined towards any particular idea/value. ● Strong verbs should be applied while forming goals like to apply, to analyze, to identify, to explain, to use, to demonstrate. ● Goals need to mention some benchmark which would allow students to demonstrate the mastery they have achieved in a particular skill. ● Goals are beneficial for teachers while developing teaching activities, teaching learning material, and instructional methods. Special educators should not only understand the goals of general education curriculum, but they should be in a position to critique the draw-backs in the curriculum. This will enable to identify the areas that need to be modified for children with disabilities.

58 ● Curriculum resources: In India, the schools are governed by either of the three boards: state boards, central board of education and international boards. The schools follow the curriculum which is determined by the respective boards of education. Some boards have developed teacher manuals or teacher guides. They are for teachers. They help in developing lesson plans, planning activities for students, assessment activities, teaching methods for general and diverse group of learners. McLaughlin (1993) developed a curriculum evaluation guide that teachers can use to rate the general adequacy and content for how well the curriculum meets the needs of students with disabilities. Such resources help the teachers in modifying the curriculum as per the needs of the students with disabilities. ● Universal design features: The idea of universal design has been borrowed from the field of architecture. This type of design consists of features which incorporate the needs of all the individuals including persons with disabilities. It consists of slopes, escalators, talking elevators, etc for persons with loco-motor disabilities, visual impairment and such other challenges. As a result, a vast majority of people can access such environments. The features of universal design are also applied to the field of education of children with disabilities. The curriculum is designed in such a way that it will be beneficial to all types of learners including children with disabilities. Step 2: Enhance general education curriculum: The curriculum that are developed do not contain all the features which the educators desire for. Sometimes it may happen that the general education curriculum is not well- designed and it is not fit to be used by children with disabilities. We cannot call such a curriculum as 'inaccessible'. It other words such a curriculum has features which can be further enhanced by the efforts put in by the teachers. Teachers may not use regular curriculum for students with disabilities because they do not fit into its standards. Such teachers are inadvertently undermining or degrading the potential of students to pursue the education in regular school set-up. The teachers need to identify areas in the curriculum which are poorly designed and reconstruct these areas for students with disabilities. It can be anything starting from content to be taught to the teaching methods and assessments which requires modification. Holding a dialogue on 'what' and 'how' of curriculum among general and special educators helps a lot. General educators may be good in teaching geography. They may be familiar with concepts of location, maps, names of places, etc. On the other hand special educators are experts in teaching these
59 concepts using diverse methods. If they join hands, it will certainly enhance the curriculum and learning of all students. Step 3: Accessibility through minor and major changes: With the enhancements described in the steps one and two above, some students with disabilities will be able to manage in the general education class. However, some students with disabilities may find it difficult to sustain in a general education class with these supports. King Sears (1997) indicated that for such type of students four types of changes in the curriculum may be considered: 1. Accomodations 2. Adaptation 3. Parallel construction 4. Overlapping curriculum. The extent of modification required in the curriculum depends upon a variety of factors like student characteristics, IEP, teaching experience of teachers. Let us look at each in greater detail: 1. Accommodations: An accommodation to the curriculum neither changes the content nor the difficulty of concepts within it. It only changes the input or the output method used by the teacher and or the student related to the intended instructional outcome. Eg: A student with challenges in reading skills accommodation in input would be that he / she listens to the text played on tape recorder and teacher used a visuals, graphic and organizers for explaining concepts to such learners. An output accommodation for students would be that a student uses pictorial representations that are verbally explained. The student follows the same curricular standards that other students follow, only show the knowledge in a variety of ways. Eg : Some student with challenges in eye hand coordination may not solve all the sums which other non-disabled students are asked to complete. They may solve few sums. But, the difficulty level of the math sums is similar to the sums solved by the regular children. All students may not require the accommodations such as less number of maths problems or extra time in exam. It needs to be availed by only those students who need it.

60 Adaptations: In adaptation, the content is the same. However, the difficulty level of the concepts changes to some extent. E.g all the students may be asked to define 20 definitions from the memory. However, students with disabilities may be asked to match the terms and the definitions from their memory. A student has accomodation when he solving maths sums less than other students. However, he also has the same level of mastery on solving sums like other students. A student with adaptation is not demonstrating same level of mastery on solving sums. He/she is solving sums which are less difficult or conceptually easy to solve. Adaptation is always made based on the outcomes set for the typical students. Teachers need to have a clear picture of the set outcomes before going further with their adaptation. Another example of adaptation includes most of the regular children solving division sums with unlike denominators, whereas a student with special needs is working on gaining mastery over division of mixed fractions with like denominators. Parallel Curriculum: In a parallel curriculum, the content for a child with disability is the same as that of the other students. However, major changes are made in the outcome of that content. E.g. When most of the non-disabled students are writing a lengthy essay on the analysis of a novel, a student having mild intellectual disability is only describing the actions of main characters in the novel. Like accommodation and adaptation, the outcome of parallel curriculum designed for children with disabilities is also based on the outcome that is defined for students without disabilities. The teachers must be very clear with what they expect from the regular children, in order to apply differentiated outcomes for learners with special needs. The parallel curriculum outcomes are often used for students who are gifted. E.g. when all other students are working on analysis of a novel, a gifted and talented child may be working on a parallel outcome which involves analysis of the same novel and bringing about the similarities and differences among two or more novels. Now a days many teachers are consider parallel curriculum a equivalent to curriculum enrichment. The goals of the parallel curriculum are set on the basis of current performance of students. Teachers take efforts to bring about growth and development of each student. Whether the curriculum outcome is adaptation (minor change) or parallel curriculum (major change) is determined by the teacher and range of differentiation within the classroom. The eg of parallel curriculum in case of children with disabilities is presented below: 61 When all non-disabled children are solving word problems involving whole numbers, child with hearing impairment may be working on identification of numbers and one to one correspondence. Most of the regular children are going to have an oral test on the content taught by the class-teacher. However, the deaf child will be asked to point out the correct alternatives based on the content. Over Lapping curriculum Parallel curriculum is not based on general education curriculum as such. The aim of overlapping curriculum is only to involve children with disabilities in the activities of the general education class. The curriculum goals of overall-lapping curriculum are very different from that of the regular curriculum. Generally the decision for developing outcomes of over-lapping curriculum is taken by IEP team. This type of curriculum is used in case of children with severe to profound disabilities. The e.g is presented below: E.g. The curriculum for most of the students will be science, but the overlapping curriculum goal for a child with profound hearing loss may be learning some concept from environmental studies which contains more amount of graphics and visuals. Majority of the students may be appearing for second language theory exam. However, student with hearing loss may have exam in sign language. Many over-lapping curricula are very specialized and involve direct instruction from the special educator. The child gets opportunity to practice these skills with the peers in a regular class. The primary aim of overlapping curriculum goals is to provide an opportunity to the children with disabilities to be a part of general education class and learn with non-disabled peers. 2.5 Types of accommodations, modifications and its applications In the earlier unit we studied about the concept of adaptation, its principles, different degrees of adaptations that can be made in the curriculum as per the needs of the children with disabilities. It has been observed that people often tend to use the terms

62 accomodations and modifications interchangeably. Whether these terms are one and the same or they represent two separate concepts? In this unit we will study the difference between the terms accomodations and modifications. The concept is represented in the fig 2 below: ADAPTATION ACCOMODATIONS MODIFICATIONS Fig 1.3: Components of adaptation 2.5.1 Difference between Accomodation and Modifications Read the case studies below: Case study 1: A fourth standard regular class had two students with disabilities. Reema was deaf girl while Pappu was a slow learner. Reshma teacher was worried about the progress made by these two students and hence had approached special educator for making curriculum adaptation for these two children. IEP was formulated for both the children. The IEP of Reema mentioned the need for preferential seating arrangement in the class infront of the teacher. This will enable her to hear the teacher's instruction clearly as well as speech read the teacher's face. No changes were introduced in the existing curriculum. IEP of Pappu recommended the need to provide him with simpler reading material and adapted text-books. There were no suggestions with respect to change in place or preference in seating arrangement. Can you find out the difference between the two terms 'Accomodation' and 'Modification'? What do you Think !! In both the cases above, some amount of adaptations were made in the existing curriculum. Reshma's IEP did not involve changes in the curriculum content. This is

63 accomodation. She is expected to follow the same curriculum as that of the hearing peers. While the IEP for Pappu, represents substantial changes in the curricular content. This is an example of modification. According to Wright (2003) Accommodations and modifications both refer to the changes in the

course content, teaching strategies, standards, test presentation, location, timing, scheduling, expectations, student responses, environmental structuring, and/or other attributes which provide access for a student with a disability to participate in a course/standard/test.

In Accommodation these

DO NOT fundamentally alter or lower the standard or expectations of the course/standard/ test. While the changes made for Modifications DO fundamentally alter or lower

the standard or expectations of the course/standard/test.The difference between the two terms is presented in the Table 1 given below: Table 1.1: Difference between Accomodation and Modification Sr. Accommodations Modifications No. 1. Do not fundamentally alter Do fundamentally alter expectations expectations or standards in or standards in instructional level, instructional level, content content or performance criteria or performance criteria 2. Changes are made to provide Changes are made in order to equal access to learning and provide student meaningful and equal opportunity to demonstrate

productive learning experiences based what is known on individual needs and abilities 3. Grading is same for all learners Grading is different according to the levels in the class of functioning of learners in the class 4. Examples: Providing more visual Examples: Spelling support from a aids or large size print, alternate computer spell check, word bank choice, forms of assignments, peer supportreworded questions using simpler language, for note taking, tape recorded projects substituted for a written report, lectures, highlighting key points, outline for writing an essay etc. use of computer for writing etc. The difference between Accomodations and modifications was well brought about by Wood (1998) through his Rubber Band Theory of adaptations. The concepts of accommodation and modification are represented in the Fig 1 given below:

64 Benchmark .... Accomodations Benchmark... Modification Students Source: Gathoo (2018) Fig 1.4: Interventions including accommodations and modifications Schools set up objectives, ie, expected level of learning outcomes for the students. However, all the students are not able to meet the expected level of criteria. Some students find it very difficult to read the set level. The same is represented in the fig 1 above. Different figures represent different students. Majority of the students are able to pass exams after direct instruction, ie, they are able to meet the set benchmark (represented by square) in the figure 1. There are few students (represented by circle), who not only meet the expected level but are able to achieve beyond it. There are a few students (represented by a triangle) who cannot meet the benchmark. The rubber band of benchmark needs to stretched for them so that they can meet the expected criteria. One important point to be remembered is that the benchmark although stretched is the same as that of the regular children. Apart from these types, another category of students (represented by pentagon) may not be able to reach the benchmarks. Hence, benchmark needs to be pulled down to their level, so that they can learn it. This is an example of modification. In this case the an altogether different benchmark is set for those students who are not able to reach the original set benchmark. Johnson, Seaton & Benson (1997) gave a sample of accommodations and modifications for children with hearing loss. The table 2 below represents it:

65 Table 1.2 : Sample accommodations & modifications for children with hearing loss Amplification Communication Physical Instructional Curricular and assistive accomodations environment accomodations modifications devices option accomodations Personal devicesSpecialized Use of carpet Use of visuals Modifying the like hearing aids sitting and sound and graphics length, or cochlear arrangement reducing like charts, complexity of implants with preference material for vocabulary lists, the content in for first bench reducing the lecture outlines, the reading noise etc. assignment 2.5.2 Types of adaptations in the curriculum Wright (2005) presented nine types of curriculum adaptation for children with disabilities. You may use any one or a combination of these types as per the needs of the individual child. Table below explains the types of curriculum adaptation: Table 1.3: Types of curriculum adaptations Sr. No. 1. 2. 3. Type of Adaptation Quantity Time Level of support Explanation Adaptation is introduced in the number of items or activities the student is expected to complete or perform before the assessment. As per the need of the student, the time required for completing an activity can be either increased or decreased. This involves provision of extra support to the students Example If majority of hearing children have to finish entire chapter of Balbharti in 20 mins, then a deaf child may have to finish reading only two paragraph in the same time. If other students are completing a theory paper in 3 hours, then children with hearing loss are given extra time to finish the same question paper. Use of peer-tutoring wherein the regular students help children with hearing loss in

66 4. 5. 6. Input Difficulty Output in activities. This acts as a reinforcement, and models enhance development of expected skills. The method of teaching or the way instruction is presented is adapted. The level of skill, the rules of activity or the problem-type is adapted. Adaptation is introduced in the way students respond to the questions. understanding activities, instructions, completing home- work and providing much needed feedback. This can be same-age or cross age peer tutoring. Apart from peer tutoring, one can use teacher- assistants to support student- learning. The models of teaching like parallel teaching, station teaching, etc also provide greater support to students with hearing impairment in inclusive class. Use of more visual aids, graphics, sign language, hands on activities, visits, conversation, directed activity to introduce language concepts Allowing the use of calculators while solving maths sums. Children with hearing loss may attempt 7 th standard maths and science subjects in SSC board exams because it is comparatively easier. When other students are writing brief answers, deaf child is circling one correct alternative from the options. When other students are giving oral exam, deaf student is allowed to answer using sign language. When other students are writing brief answers, deaf

67 2.6 Strategies of adaptation of textbooks of different school subjects The entire teaching learning process in India is Book-centered. In the age of technology when all of us are using 4G mobile phones and knowledge is available through screen- touch, yet, textbooks remain the most important source of knowledge for students at school and college level. However techno-savy the world may appear to be, textbooks help to retain knowledge in lasting form. They are commonly prescribed for all the students studying in a school. This is because they provide the basic minimum information which is of utmost importance to live independently in a society as responsible citizens. Textbook plays an important role not only for the students, but also for the teachers. They are a guiding light for the teachers. The question 'what to teach' is often answered by the textbooks. Textbooks are widely used for teaching across rural and urban areas. Hummel(1998) 7. 8. 9. Participation Alternate goals Substitute curriculum The aim to enhance participation of students with hearing loss in the classroom activities. Hence, extent to which learner is actively involved in the activity is adapted. This is used for students with moderate to severe disabilities. The content/ material remains the same. However, the expected outcomes are adapted. This is also useful for students with moderate to severe disabilities. It is also known as functional curriculum. A totally different material and instructions are used to meet individual goals. child explaining answers using sign language. When other students are pointing out places on the map, ask child with hearing loss to highlight those places on the map. All the hearing students are asked to point out the capital of states in India, while the deaf student is asked to colour the state which is his native place. When hearing students are learning Sanskrit, child with hearing loss is learning vocational skill of screen printing.

68 indicated that textbooks are the primary tool which deliver content knowledge and determine the activities and teaching learning process in classrooms. Heyneman et.al (1998) stated that textbooks play a very important role in predicting the academic achievement in the class. Thus, we can conclude that textbooks still have a great role to play in our classrooms and shaping the futures of our students. Their presence is as indispensable as the classroom teacher. 2.6.1 Need of Textbook adaptation The important fact in the development of textbooks is that they are developed considering all children. This 'all' also refers to the 'majority' children which constitutes regular hearing children. All the students belonging to a particular class, e.g. 5 th standard have to use the uniform textbooks that are developed and prescribed by a particular board of study. The students do not have a choice but to study the prescribed textbook. In some of the western countries, students have a choice. They have the freedom to select the textbooks as per their reading level. Unfortunately such a facility is not available for children in India and all children including children with special needs are supposed to read and study the same textbooks. In a study by Wadekar & Mathew (2002) on text-book adaptation, the teachers indicated that children with hearing impairment find it difficulty to read textbooks because these textbooks are developed for hearing children of similar age. The deaf students with their inherent challenges in language, find it difficulty to comprehend the language present in these textbooks. These teachers further recommended that adapted textbooks should be used for teaching subjects to children with hearing impairment. They strongly opined that the language presented in the textbooks is very complex in terms of grammar, vocabulary and sentence structures. In the special schools, the children with hearing impairment are exposed to simple language structures. They find it difficulty to apply the vocabulary acquired in one context to other different contexts. E.g. the word 'pupil' means student, but, the same word 'pupil' is also used to refer to the ones part on an eye. The 'bookish language' or the language from the textbooks is far away from the language structures which the deaf children use in their day to day life. This is because the textbook language is attuned to the language of hearing children. The organization of content in the form of paragraphs in the textbooks does not provide conceptual clarity to the children with hearing impairment because of the following factors: ● Vocabulary explosion: Deaf students are exposed to thousands of new words when they read a small passage from the textbook. Hence, they are unable to process the meaning of the sentences. As such they get bored and confused and refrain from reading textbooks. ● Sentence structure is complex: The sentences in textbooks are very lengthy and complex in terms of vocabulary. The children with hearing impairment by default

69 communicate using small and short sentences. Hence, textbook reading is a complex task for them. ● Exposure to many abstract words: In social sciences like History, Geography, civics, they are exposed to many abstract words like 'struggle', 'freedom', 'satyagraha', etc. It is very difficult to represent these words using concrete examples. ● Use of idiomatic language: Textbook content includes use of lot phrases and idioms such as 'caught between the devil and deep sea'. The children with hearing loss read it in literal sense. They will visualize a man standing between a monster on one hand and a deep sea on the other and fail to catch the underlying meaning. Wadekar & Mathew (2002) opined that as a result of the above factors children with hearing loss lose interest in reading conventional textbooks. They try to say aloud words from the textbooks without understanding the meaning. While writing answers, they simply match the target words from the question, pick up a sentence from the text which contains those words and write it as an answer. This tendency is called as superficial visual matching. Not only children with hearing loss, even hearing children may find comprehension of vocabulary, idioms and phrases a complex task. Adaptation of textbooks will prove to be beneficial not only to the children with hearing loss but all students. By adaptation we do not mean removing complex vocabulary from the text. It involves a couple of strategies which are explained the next sub-unit. 2.6.2 Strategies of textbook adaptation Specifically considering the needs of children with hearing impairment, the textbooks need to be adapted in following 5 areas. They are represented in the fig given below: Areas of textbook adaptation Language Knowledge Presentation Illustration Evaluation Fig 1.5: Areas of Textbook Adaptation ● Language: While adapting the content of textbook for children with hearing impairment, lot of attention needs to be given to the parameter of language. Language level needs to be simple.

70 How to do it? Ø Instead of writing one long sentence, break it up into two small sentence. Ø One should use simple conjunctions. Ø Avoid using difficult vocabulary. Ø Use only those technical words which are essential. Ø Guiding questions should be used for highlighting facts, stimulating previous knowledge and connecting it with real life experience. Ø Cause and effect needs to presented in simple form. Ø Use passive sentences, positive and negative sentences, idioms in a context of a visual aid or a graphic. It aids comprehension. Ø The use of Rhetorical language should be minimum. Sample text is given below. It covers the above points. Un-adapted text Adapted text Source: Gathoo & More (1990)

71 ● Knowledge How to do it? Ø Limit the density of concepts in a chapter. Classify the concepts into several units. Ø Knowledge needs to be presented step by step instead of passages. Ø Direct information should be presented first, followed by indirect and general information at the end. Ø Do not delete the content from the original text. Sample text is give below. It covers the above points. ORIGINAL TEXT (Un-adapted) Agricultural practices Crops: The problem of food production is one of the innumerable problems the country is facing. Growing more crops play an important role in solving the food problem. The life of every one depends upon the crops the farmers grow. Farm crops: The food producing crops are called farm crops. They can be classified into four major groups. They are cereals,pulses, oilseeds and fodder crops. Paddy, wheat, ragi, barley, and maize are the main cereals grown in our country. Other than cereals many commercial crops are grown in our country for monetory benefit. E.g. coffee, tea, sugarcane, cotton, silk, cashew nut and areca nut. These are called commercial crops. Vegetables, fruits and flowers are grown in large proportions in gardens. These are called Horticultural crops. Source: Gowramma & Nair (2011)

72 Adapted Text Agricultural practices Crops: Growing more crops plays an important role in solving the food problem as it is one of the innumerable (many) problems. Classification of crops (a) (b) (c) Farm crops Commercial crops Horticultural crops (a) Farm crops: The food producing crops are called Farm crops Four major farm crops Cereals Pulses Oilseeds Fodder crops Main cereals grown in our country: ● Paddy ● Wheat ● Ragi ● Barley ● Maize (b) Commercial crops: Many commercial (marketable) crops are grown in our country for monetory (money) benefit. They are also called Cash crops. Some examples of cash yielding crops are as follows: ● Coffee ● Tea ● Sugarcane ● Cotton ● Silk ● Cashew nut Cash Yielding crops- The farmers earn profit from these crops. Hence, they are called cash yielding crops. (c) Horticulture crops: Vegetables, fruits, nuts and flowers grown in gardens belong to this group Source: Gowramma & Nair (2011)

02-05-2023, 15:27

73 ● Presentation : Organization of the content in the text also plays a very important. How the content is presented in the text determines the level of comprehension of the readers. As we are aware, children with hearing loss face challenges in processing language. They are not able to comprehend the meanings of new words. Hence, reading paragraphs one after the other in a running text is a time consuming and tedious task for them. This calls for adaptation in the presentation of the textbook matter: How to do it? Ø Add tables and flowcharts Ø Use bullets instead of paragraphs Ø In the margins, write footnotes and explanations Ø Put important terms or definitions in separate boxes or use color coding for highlighting Ø At the end of the chapter, provide a word bank which gives meanings of all the difficult words in the text. Sample text is give below. It covers the above points. Un-adapted text Adapted text Source: Palkar (2019)

74 Adapted text Un-adapted text Source: Palkar(2019) ● Illustration: Illustration as the name suggests involves use of images, graphics which help to elaborate the content presented in the textbook. Many of the times it is observed that the pictures in the textbooks are not printed properly, the diagrams are not clear or the picture represents only few nouns in the passage but not the central theme. Hence, there is need to adapt illustrations. How to do it? Ø Add illustrations such as picture, sketches and graphs in the content Ø The illustrations need to be simple and clear Ø Illustrations need to be placed near the relevant text Ø Use pictures which are expressive Ø Use pictures to represent the overall concept rather than few nouns. Sample text is give below. It covers the above points.

75 Un-adapted text Adapted text Source: Palkar(2019) 2.7 Adaptation in assessments and evaluation Teaching learning process has three main components: Planning, teaching and evaluation. Evaluation is a mid-point between planning and teaching. It is a part of planning. Teachers evaluate the previous knowledge of students about a particular new concept that is to be taught. The complexity of the concept is based on the results of evaluation. Not only before teaching, teachers use evaluation during teaching and also at the end of the teaching session. The aim of evaluating students during teaching is to grab their attention and provide them continuous feedback. The evaluation at the end is a kind of a summative evaluation. Apart from feedback to the students, it helps the teachers to determine whether the students have understood the concepts explained in class or there is a need to use some alternative teaching methods.

76 The Right to Education (RTE Act, 2009) introduced no detention policy till 8 th standard. As such Continuous Comprehensive Evaluation (CCE) has been used in schools to evaluate student-progress. CCE aims to keep check on students' learning and makes them study throughout the academic year. The same evaluation system is applicable to children with hearing loss too. However, presence of hearing loss and corresponding effects on language and literacy skills makes CCE a challenging task for these students. Hence, there is a need for adapting the evaluation process for children with hearing loss. Now let us look at Do's and Don'ts in evaluation. 2.7.1. Do's and Dont's in evaluation Evaluation is an essential component of teaching learning process. The is a set pattern of evaluating hearing children involves writing answers and oral tests. However, children with hearing loss due to the inadequate language and communication skills find it very difficult to follow this set pattern. Hence, there is a need to adapt the evaluation process while dealing with deaf students. Given below are a few strategies which one should use while evaluating children with hearing loss: Do's in evaluation: ● While conducting exam, make sure that the classroom selected is having adequate amount of light, so that sign language and facial expressions and facial expressions are visible. ● While giving instruction to students with hearing loss, light should always fall on teacher's face. ● It is very important to ensure whether students have understood the instructions given by the teacher. Many a times it is observed that students are not clear with the instructions and hence they make errors in exam. Teachers need to repeat the instructions not only verbally but also by writing on blackboard and also using sign language if possible. ● Oral texts should be accompanied with additional strategies like role playing, action songs, because children with hearing loss may not have issues in verbal communication, speech intelligibility and clarity. ● Performance tests rather than paper-pencil tests should be used for evaluating children with hearing loss. The student may get less marks on a question not because he is not

77 ● having correct knowledge, but because he/she has not understood the question in the written format. ● While children with hearing loss are attempting exam, the teachers should also observe their behaviour and confidence level. ● Along with traditional assessment techniques, one should try to use modern assessment methods like portfolio, open book exams, and presentations. Don't do the following while evaluating children with hearing impairment: ● Don't use double negatives in a question. Children with hearing impairment find it to be very confusing. E.g. Which one of the following choices is not a correct option and is not

a factor that causes pollution? ● Oxygen ● Smoke ● Asbestos This question could be re-framed as under: Select one option from those given below which is not a factor that causes pollution. ● Oxygen ● Smoke ● Asbestos ● Don't use idiomatic phrases like 'Take to heart' in exam questions. This only creates confusion among children with hearing impairment as they take each word in literal sense. ● Don't use incorrect word order. E.g. Dinosaurs were an example of which kind of animals? The more appropriate order would be What type of animals were Dinosaurs? ● Don't use words with multiple meanings and embedded clauses with same meaning while forming questions. 2.7.2. Strategies for formative evaluation: As you are aware, evaluation is of two types. Formative evaluation and summative evaluation. Formative evaluation as the name suggests represents the 'form'. This type 78 of evaluation consists of periodic tests which helps to provide feedback to the learners on a regular basis. There is another type of evaluation known as summative evaluation which is held at the end. It has less scope for student-feedback. The main aim is to declare whether the students are successful or they have failed to perform a particular task. In this unit we are going to focus on adapting strategies of formative evaluation for children with hearing impairment as per Gathoo (2016). They are presented below: ● Seminar: A teacher can hold a seminar within the class. It is a group of 8-10 students which also includes children with hearing loss. The group is asked to work on a particular topic e.g internal organs and at the end they have to present it in the class.
Students with hearing loss may be asked to make the material, enter data, explain few concepts using sign language. The areas of assessment are: ability to
search information, public speaking/signing, use of ICT skills and leadership qualities. ● Symposium: Students of a class can be asked to present papers on topics of their choice. The same activity can be performed by
students with hearing loss using sign language with the help of sign language interpreters. The areas of assessment are: depth of the content, confidence level, comprehension of the
topic, communication skills, presentation skills, etc. ● Group activities: While planning group activities in class, teachers should see to it that children with hearing impairment get the opportunity to participate in majority of the activities with their hearing peers. In such a group, teachers need to allot tasks to children with hearing loss as per their individual capacities. The teacher can plan a wide variety of activities like projects, action plans, surveys for facilitating the participation of children with hearing loss in classroom activities. ● Rubrics: Rubrics is a performance assessment tool which is widely used today across all field. It involves two aspects. The first parameter is performance descriptions and the second parameter is marking scheme. Each performance description is assigned a defiant score as per the marking scheme. It makes the performance quantifiable. Thus, rubrics represents the level of skill achieved by each student. Since, for children with hearing impairment, emphasis is on performance based evaluation rubrics can serve as a effective tool for evaluation.
79 Subject specific evaluation strategies as per Gathoo (2016): ● Languages: Most of the students with hearing impairment have issues in language and communication skills. Hence, teachers can use performance based measures in assessment activities like signing, pointing, writing, sketching, for expressing themselves. ● Communication boards: Communication boards are usually used with children having severe to profound disabilities. When a teacher introduces new content, children with hearing impairment are not familiar with the vocabulary of the content. Such vocabulary items may be represented on a communication boards with the help of pictures or symbols. These visual clues help children with hearing impairment in responding. ● Marking: While conducting assessment of children with hearing impairment, teachers need to mark the content or passages in the textbook on which assessment will be conducted. This reduces the detractor items and students can arrive at the answers rather quickly. It also acts as a visual clue during assessment. It reduces the time involved in searching items and keeps children with hearing impairment within the communication loop. ● Sign language: Although sign language is the mother tongue of deaf individuals, even children with normal hearing can learn it and use it while communicating in the class. During oral tests, quizz, story telling, etc, students with hearing loss may be allowed to use sign language provided sign language interpreter is available in the class. The interpreter will translate the student's sign into speech and teacher's speech into sign language for deaf children . ● Open book tests: As a result of inadequate language base and stereotyped sentence structure, children with hearing impairment may find questions like answer in brief, give reasons, short notes, essay-writing a difficult task. These are descriptive answers which require lot of command on grammar skills. If children with hearing loss are allowed to keep the textbooks open while writing answers, then it will be beneficial for these children. ● Multiple choice questions: In order to overcome the challenge of writing descriptive answers, multiple choice questions may be used for evaluating children with hearing loss. The aim of this

80 assessment is crystal clear. The aim is to find out the exact level of knowledge among the students. They are asked to select one correct option from among the many given in the question. ● Computer based assessment: Computer based assessment (CBA) is a kind of an alternative to traditional assessment techniques. The questions appear on the computer screen and the students are supposed to attempt it over the computer. The assessment items can be made more attractive by inserting pictures, graphics, diagrams, signing avatars, etc. CBA provides instant feedback and this is the feature which makes it quick and interesting for the students. It also provides the much needed flexibility to the students during the assessment process. ● Mathematics: Maths is full of abstract calculations and concepts. Further language issues faced by children with hearing loss make even more complex. The class can be divided into two groups. One group consisting of hearing children and other consisting of deaf students. While other children are solving sums on a worksheet, children

with hearing loss may be asked to solve the same sums using visual

material like objects, an abacus, or with the help of calculators, role play of a buyer and seller for teaching profit and loss, etc. They may be sent to market with money to buy certain things for revising the concepts of addition and subtraction. 2.8 Let us sum up Meaning of Inclusion ● This module discusses curriculum adaptation in inclusive set ups for children with hearing impairment. The service delivery of education for children with special needs in India has seen shifting trends from segregation to integration and then to recent inclusive education. In keeping with the changes in the international legislation like UNCRPD (2006), even legislation in India have supported the policy of inclusive education. In inclusive program specialized instruction and support are provided to any student who is in need to support their learning without being labeled. Schools welcome all children and they are treated with dignity. Arrangements as per each one's requirement are made in the existing schools. Need of curriculum adaptation for children with hearing loss: ● National Curriculum Framework NCF (2005) which is continuously involved in development and reforming curriculum stated that it very important that curriculum

81 is "an inclusive and Meaningful experience for children". This can be achieved only if there is a fundamental change in our perception of learners and the entire learning-process. Although the theory of inclusion may sound easy and familiar, it is indeed a very challenging task in practice not only for the teachers but also for the parents and students with disabilities themselves. ● Children with hearing loss are physically present in class. They use the textbooks which are actually developed for hearing students. Deaf children lack the language base which the hearing counterparts have. Hence, they are not able to cope up with the language complexity present in the text books that are developed for hearing students. As such they are prone to academic failure. As a result children with hearing loss remain out of the system because they do not fit within the existing system. ● Factors that need curriculum adaptation: ● As indicated by Gathoo (2016), successful classroom teaching depends upon three factors: Input, process and output. Adaptation is required in each of these factors. These factors are shown below. ● The following are the main principles of curriculum adaptation: Ø Learning requires active participation of the student Ø Students learn in a variety of ways and at different pace Ø Learning is both an individual and group process ● Curricular adaptation and decision making process The curriculum adaptations that are made for one student in any one subject cannot be used for other students for all other subjects. The process of decision making regarding curriculum adaptations involves 8 stages. ● Step wise curricular approach and its adaptation The following are steps in the adaptation of curriculum Step 1: Analysis of the general education curriculum Step 2: Enhance general education curriculum Step 3: Accessibility through minor and major changes ● Then we studied the major different between the terms accomodation and modification. In accomodation the content of the student with disability remains

82 the same as that of the regular non-disabled peers. Changes are introduced in the time allotted to complete the task or expression of response or the method of instruction. However, in modification, the content of the student with disability is modified to a small extent. It involves simplifying the concepts for children with disabilities. ● There are nine areas in which curriculum adaptation can be made. They include adaptation in quantity, time, level of support, input, difficulty level, output, participation, alternate goals and substitute curriculum. ● Then we studied that it is important to adapt the textbooks for children with hearing impairment. Since, they have inadequate language, they find it difficult to comprehend the language from the textbooks. Hence, aspects of the textbook like the language, knowledge, presentation, illustration, and evaluation need to be adapted for children with hearing impairment. ● At the end, we studied different strategies for adapting the assessment and evaluation process. As teachers we should be aware about certain Do's and Don'ts while adapting the evaluation process for children with hearing impairment. 2.9 Unit End Exercises 1. Why there is a need to adapt curriculum for children with hearing impairment? 2. Discuss the steps involved in decision making about curriculum adaptation. 3. Explain the step-wise curriculum approach and its adaptation. 4. How is accomodation different from modification? Explain with suitable examples. 5. How will you adapt the textbooks for children with hearing impairment. Give examples. 6. Discuss the Do's and Don'ts to be followed while adapting the assessments and evaluation for children with hearing impairment. 2.10 References Advani. L & Chadha. A (2003). You and your special child. New Delhi: UBS Publishers.

83 Bandura, A. (1978). Self-efficacy: Toward a unifying theory of behavioral change. Advances In Behaviour Research And Therapy, 1(4), 139-161. doi:10.1016/ 0146-6402(78)90002-4 BMF(2002). Biwako Millennium Framework. Retrieved online on 22/9/2018 from http://punarbhava.in/index.php/legal-instruments/international-instruments/united-nations/bmf.html Fisher,D & Frey.N (2001). Scaffolds for Learning: The Key to Guided Instruction. Retrieved online on 1/12/2019 from http://www.ascd.org/publications/ books/111017/chapters/Scaffolds-for-Learning@-The-Key-to-Guided- Instruction.aspx Gathoo,V.S (2016). Adaptations for teaching children with hearing impairment in mainstream schools. Confluence. Vol. 18. Retrieved online on 1/12/2019 from https:// mhrd.gov.in/sites/upload_files/mhrd/files /document-reports/Confluence.pdf Gathoo & Shetty (2019). Perspectives of stakeholders towards inclusive education. (Unpublished Doctoral Thesis). University of Mumbai. Mumbai: India. Gathoo.V.S & More,R (1990). Making Inclusion Work. Retrieved online on 1/12/ 2019 from https://seshagun.gov.in/sites/default/files/publication/module5.pdf Gathoo,V.S (Ed.) (2018). Diploma in Inclusive and Special Education- DISE. (Training Manuals). MauritiusInstitute of Education (MIE). Available online onhttp:// miemoodle.southindia.cloudapp.azure.com/ Gowrama I,p & Nair.P (2011). Curriculum and teaching strategies for children with hearing impairment. IGNOU: New Delhi . ISBN No:978-81-266-5274-7 Gowrama .I.P (2014). Status of Integrated/ Inclusive Education & Evaluation for Readiness for Inclusive Education in India. Curriculum and Teaching Strategies for children with hearing impairment. (MMDE-076). Published by IGNOU: New Delhi. ISBN- 978-81-266-5277-8 Incheon Strategies (2012). Incheon Strategy to "Make the Right Real" for Persons with Disabilities in Asia and the Pacific. Retrieved online on 23/9/2018 from https:/ /www.unescap.org/resources/incheon-strategy-%E2%80%9Cmake-right- real%E2%80%9D-persons-disabilities-asia-and-pacific Jhulka.A (2016). Concept of Curricular Adaptations. Confluence. Vol 18. Retrieved online on 1/12/2019 from https://mhrd.gov.in/sites/upload_files /mhrd/files/document- reports/Confluence.pdf
84 King-Sears,M.E. (2001). Three Steps for Gaining Access to the General Education Curriculum for Learners with Disabilities. Intervention in school and clinic. 37(2):67-76. Retrieved online on 1/12/2019 from https:// www.researchgate.net/publication/ 249832830_Three_Steps_for_Gaining_Access_to_the_General_Education_Curriculum_for_Learners_with_Disabilities Ministry of Human Resource Development (1992). Revised Programme of Action, 1992. New Delhi: GOI NCF(2005). National Curriculum Framework. Retrieved online on 1/12/2-19 fromhttp://www.ncert.nic.in/rightside/links /pdf/framework/english/nf2005.pdf UNCRPD (2006). Convention on the Rights of Persons with Disabilities (CRPD). Retrieved online on23/9/2018 from https://www.un.org/development/desa/disabilities/ convention-on-the-rights-of-persons-with-disabilities.html RPWD Act (2016). Retrieved online on 9/6/2018 from (http://www.disabilityaffairs.gov.in/upload/uploadfiles/files/RPWD%20ACT%202016.pdf
RMSA(2009). Rashtriya Madhyamik Shiksha Abhiyan. Retrieved online on 9/6/2018 from http://mhrd.gov.in/rmsa RTE Act (2010). Right to Education Act. Retrieved online on 25/9/18 fromhttp:// mhrd.gov.in/rte Sarva Shiksha Abhiyan(2000). SSA Shagun. Retrieved online on 9/6/2018 from http://www.ssa.nic.in/about_ssa.html Wadekar,G & Mathew,S. (2002). Curriculum and teaching strategies for children with hearing impairment. IGNOU: New Delhi . ISBN No:978-81-266-5274-7

85 Unit 3 ❑ Differentiated Instructions Structure 3.1 Introduction 3.2 Objectives 3.3 Relevance and Concept of DI 3.3.1 Differentiated Instructions is based on the principles 3.3.2 Definition 3.3.3 Theoretical foundation of DI 3.4 Elements of Differentiated Instructions 3.4.1 Differentiation can be done on the basis of 3.4.2 DI and Universal Design for Learning 3.4.3 Strategies of Implementation of DI in the Classroom 3.5 Need Assessment and Dicision making 3.5.1 Need Assessment 3.5.2 What is Decision Making 3.5.3 Process of Decision Making 3.6 Let us sum up 3.7 Unit end exercises 3.8 References 3.1 Introduction Inclusive Education is a drive where all children are welcomed in a school to get access to equal opportunities of education. When it is said 'all children' it implies children with diverse interest, abilities, styles, modalities, culture and socio-economic background. This demands for refining inputs, processes and environments as per the learner's requirement for better learning.

86 UNESCO promotes inclusive education systems that remove the barriers limiting the participation and achievement of all learners, respect diverse needs, abilities and characteristics and that eliminate all forms of discrimination in the learning environment.Education for All envisaged the need for differentiated instruction. So differentiation is a part of inclusion schema.Differentiated instruction helps that the needs of all students with different background knowledge, language skills, and learning styles can be met regardless of the diversity. Starting from the fact that not all students learn in the same way, Anderson (2007). Inclusion involves respecting the diversity amongst children and also meeting there learning or special needs to help them to learn. Thus in broadest sense, inclusion, differentiation and special educational needs are interrelated. Before moving ahead let's contemplate a typical class which has students with varying abilities, interest... Pause and think.... Let's peep in a class where teacher is teaching lesson of geography by lecture method by holding a textbook in her hand and reading out and explaining the concept of 'Biosphere'. Do you think all learners must have learnt the concept just by listening the explanation given by the teacher? If yes how and if no why? You will be able to draw the answer to above question after reading the whole unit.

87 3.2 Objectives After reading this unit you will be able to: 1. Understand and explain differentiation, and need of differentiated instruction 2. Explain elements of differentiated instructions and how this differentiated instructions can be implemented in the classroom. 3. Explain need assessment for differentiated instruction. 4. Explain techniques of assessment and process of decision making. 3.3 Relevance and Concept of DI Activity List down the words that comes to your mind related to Differentiated instruction. As it is said 'One size fit all' but it is not the reality when we go to any classroom, so how can one type of teaching approach be suitable for all. Thus, differentiated instruction is an approach which makes students available multiple options of learning new information. As the term suggests DI means different instructions so the teacher differentiates the classroom instructions according to learners need. It could be said that same content in a same classroom is taught using varied teaching strategies. Tomlinson (2014), the leader in the area of DI suggests, DI is a teaching theory based on the premise that instructional approaches should vary and be adapted in relation to individual and diverse students in classroom. This approach demands teachers to be flexible in her teaching by adjusting the curriculum, using various presentation and evaluation strategies so that no student is left behind and all are allowed to learn together. Thus teachers are expected to modify the curriculum and not expecting the students to modify themselves for the curriculum. Differentiation has it's roots in inception of education where all children are taught in classroom irrespective of age or level. Then grading system was practiced where students were grouped as per their age which also revealed that the gaps in achievement of children in same group. Then the children were sieved as per special educational need and were provided instructions as per their need. IDEA act (2004) promoted equal access to education and then in 2000 with 'NO child left behind' policy inclusion was promoted. ssa So taking review of gaps in achievement as per the ability, interest, styles and socio-economic background stimulated the differentiated instructions.

88 DI is labeled as student centred or differentiation, and is also conceptualized as 'individualized instructions' (Hattie.2009), 'adaptive instructions', 'personalized learning' (Waxman, Alford & Brown, 2013), 'response to intervention' (Dalhouse et al., 2009; Fox and Hoffman,2011) and 'Universal Design of Learning'(Hall, Strangman & Meyer. 2014). Though it is labeled or conceptualized in different ways it shares a same idea of helping the differentiated learners to cope with the curriculum which includes adopting specific teaching strategies, invoke variety in presentation and learning activities, address individual's leaning needs and monitoring the outcome. 3.3.1 Differentiated Instructions is based on the principles of: Principles Description Flexibility In differentiated instructions flexibility is the key. It can be incorporated in modes of teaching, ways of presentation, teaching learning material, grouping and assessment. Grouping for instructionsAs per this principle groups should not be permanent. They could be flexibly arranged or re-arranged depending upon the skill sets or level of functioning of students in a particular subject. Ongoing assessment Ongoing assessment is a part of differentiated instruction, wherein the learners are assessed for participation, information processing, outcomes which is further used for instructional planning. Collaboration In differentiated instructions collaboration is beneficial to bring learning outcomes amongst students. Engagement Engaging children in a challenging task is an important goal of the teachers. Teacher are expected to engage students in interesting challenging activities which allows students to learn and move to next task. To sum up differentiation is responsive teaching rather than one size fits all teaching (Tomlinson, 2005). This means that teachers proactively plan varied approaches to what students need to learn, how they will learn it, and/or how they will show what they have learned. By doing so they increase the likelihood that each student will learn as much as he or she can learn, as efficiently as possible (Tomlinson, 2003). 89 3.3.2 Definition Differentiated instruction is defined as a flexible, equitable and intelligent way to approach teaching learning. -Fox and Hoffman, 2011 Differentiation refers to a wide variety of teaching techniques and lesson adaptions that educators use to instruct a diverse group of students, with diverse learning needs, in the same course, classroom or learning environment. -The Glossary of Education Reforms, 2013 To draw out from definition differentiation is a democratic form of education where every learner matter. It is a SMART (specific, measureable, attainable, realistic, timely) educational approach. 3.2.3 Theoretical foundation of DI 1. Social Constructivist Theory: Social Constructivist theory proposed by Vygotsky (1962) which has three themes i.e. social interaction, more knowledgable others and zone of proximal distance. According to Vygotsky learning happens through social interaction, from more knowledgeable others which
refers to one who has better understanding or higher ability level than the learner
about particular content and it could be adult or peer whereas zone of proximal development (ZPD) refers to the zone where the learners under guidance learn to perform task or solve problem independently. It is a zone where learners move from known to unknown. Associated with this theory differentiated instructions allows students learning to move from known to unkown through social interactions with the support of more knowledgeable others. 2. Multiple Intelligences Theory: The Theory of multiple intelligences proposed by Howard Gardner(1983) theorized that individuals do not have just an intellectual capacity but they have 9 intelligences namely 1. Verbal-linguistic intelligence (well-developed verbal skills and sensitivity to the sounds, meanings and rhythms of words) 2. Logical-mathematical intelligence (ability to think conceptually and abstractly, and capacity to discern logical and numerical patterns)

90 3. Spatial-visual intelligence (capacity to think in images and pictures, to visualize accurately and abstractly) 4. Bodily-kinesthetic intelligence (ability to control one's body movements and to handle objects skillfully) 5. Musical intelligences (ability to produce and appreciate rhythm, pitch and timber) 6. Interpersonal intelligence (capacity to detect and respond appropriately to the moods, motivations and desires of others) 7. Intrapersonal (capacity to be self-aware and in tune with inner feelings, values, beliefs and thinking processes) 8. Naturalist intelligence (ability to recognize and categorize plants, animals and other objects in nature) 9. Existential intelligence (sensitivity and capacity to tackle deep questions about human existence such as, What is the meaning of life? Why do we die? How did we get here?) These intelligences are the unique aptitude of an individuals, if instructions are presented as per their preferences better learning can happen resulting in better outcomes. Associated with the theory differentiated instructions also creates opportunities for learning by offering various techniques and strategies addressing the individual learner's need 3.4 Elements of Differentiated Instructions: Tomlinson have suggested 4 elements of DI which indicates 4 ways of by which teachers can differentiate instructions. 1) Content: Content is the knowledge and information that the students are supposed to learn or gather as per their grade level requirements. Content means the knowledge, understanding, and skills that students need to learn (Tomlinson & Imbeau, 2010). But time and again we realize that not all students master the content. This is because all students differ in the way the receive and process the information due to their differing ways i.e. styles, abilities, readiness, interest in the content matter. So teacher needs to modify the content at different levels as per the learner's needs.

91 Content can be differentiated by: ● Readable resource material with highlighted vocabulary which can be done by using different ink markers or by underlining the words. ● Provision of audio and video recordings of the content. ● Use of illustrations of the or in the content. ● Provision of peer or adult mentors. ● Use of manipulatives and models to explain the concept. 2) Process: Process is actually delivering the information so as to help students understand and learn. Tomlinson and Imbeau (2010) define process as "how students come to understand and make sense of the content". As specified earlier each child is unique and so may differ in the process of learning. Differentiated instructions provides opportunities to bring in variations in the process of delivering the content. This the teacher can do so by providing opportunities such as asking questions, learn from mistakes and improvise, work at different speeds, access support, and adjust themselves in different groups. Undertake leveled or tiered activities ● Create interest centers ● Develop hands-on materials ● Vary the pace according to readiness ● Allow for working alone, in partners and small groups ● Allow choice in strategies for processing and for expressing results of processing 3) Product: It is the final outcome and hence indicates accountability of learning. It happens at the end of the lesson which reflects mastery of the content learned. According to Carol Ann Tomlinson, "a synonym for a product is authentic assessment". This provides teachers real picture of what they have understood from the content.

92 Differentiation in product can be done by expecting children: ● To develop a graphic or diagrammatic representation of the learnt information. ● Give an oral report ● Prepare written report ● Make a model or use a manipulatives to demonstrate the learnings 4) Learning Environment: Learning environment includes the environment conducive for learning, it has two components physical and psychological environment. Physical environment includes comfortable seating for both individual or group instructions, classroom equipped with technological equipment's for audio visual learnings, hands-on resource materials, well-lit and noise free classrooms. Psychological aspects involve maintaining the comfort zone of children and their self-esteem while grouping. A conducive learning environment as an essential element that motivates the children to learn and participate in the process of learning. 3.4.1 Differentiation can be done on the basis of: a) Readiness: Though children are learning in the same class but some-times their previous or background knowledge about some concept is not complete which makes them unready to learn the concept so differentiation is required. Readiness is not the ability; it is more related to content knowledge which may differ from individual to individual. b) Interest: It refers to the child's engagement in the content, process or product that helps the child to become participative by being attentive, curious and productive. Interest enhances motivation which in turn enhances learning outcomes. The interest of students is related more to their strengths, cultural background, experiences and needs. c) Learning Profile: It refers to the ability, style, culture, socio-economic background which has impact on learning. Differentiation in learning profile offers students a choice in which they can learn best.

93 Figure. A Concept Map for Differentiating Instruction 3.4.2 DI and Universal Design for Learning: DI and UDL are both are designed for inclusive education with a vision of EFA (Education for All) under one roof. Though DI and UDL complement each other their aim differs. UDL aims towards accessible education for all students irrespective of abilities and needs. Whereas DI aims towards addressing the individual student's needs as per their interest, readiness and learning profile. So while UDL suggests a common approach beneficial for all, DI on the other hand is more individualized catering to learners needs. For better understanding of DI and UDL, Novak (2017), explains these with example of 'dinner party analogy'. As per the dinner party analogy DI is something which offers guest meals as per their choices (sweet, spicy, less spicy etc), preferences (veg, non- veg, jain food etc) so the guest eat food which is customized 'JUST FOR THEM'. For explaining UDL framework, Novak (2017) uses the same dinner party analogy but in this case the host has a buffet or what Gathoo (2019) suggests a cafeteria approach with a wide variety of food which allows guests to choose food of their own choice and need.

94 In educational context DI offers individualized lessons for each students which are directed by teachers whereas UDL offers a platter of strategies where students are allowed to choose the strategy best suits them. It encourages self-learning and monitoring. 3.4.3 Strategies of implementation of DI in the classroom Differentiated instruction doesn't mean cutting down the content for low level learners or giving more information to high level learners. Each heterogenous classroom comprises of various level of learners and teachers have to provide the challenges as per their requirement. Various strategies that can be used in the differentiated classrooms are: 1) Tiered instruction : Tiering the instructions means designing the instructions that challenges students of various levels. The aim remains the same i.e. mastering the same content by varying process and reporting it through various product. The process may differ in complexity, depth or level of abstractions.Tiered instruction is a method that varies the level of assignments, so all students have a chance to find success and make progress. The table below outlines features for a tiered lesson with three groups that target struggling, average and advanced learners, this tiering is done keeping in mind the ability and readiness of the learner. Group 1 : Students who are struggling with a topic ● Requires less difficult independent reading. ● Has materials based on the average reading level of the participants, which is usually below grade level. ● Has spare text and lots of graphic aids. ● Has a low level of abstraction (i.e., is as concrete as possible). ● Requires fewer steps to complete the assignment ● Converges on "right answers" to solve problems. ● Requires only knowledge and comprehension levels of thinking for independent work. ● Includes supportive strategies, such as graphic organizers or teacher prompting to help students infer and draw conclusions. (i.e., use higher level thinking skills)

95 Group 2: Average learners ● Includes independent reading materials from the textbook or other on-grade level sources. ● Uses concrete concepts to help students transition to more abstract concepts. ● Includes questions or problems that are a mix of open-ended and "right answers." Can have more steps. ● Expects students to infer and draw conclusions with less teacher support. Teacher should count on being on hand if necessary to prompt students in this area. Ensures that students can be successful with knowledge, comprehension, and application on their own, and that with help they can address some of the high levels of thinking. Group 3: Advanced learners ● Includes reading materials from sources more complex than the textbook, if possible. ● Requires more lengthy sources because students can read faster than lower or average students. ● Focuses on abstract concepts as much as possible and uses open-ended questions exclusively. ● Requires students to infer and evaluate. ● Assumes students have knowledge, comprehension, and application abilities, and that they will be challenged only if you ask them to analyze, synthesize, and evaluate. Source: https://iris.peabody.vanderbilt.edu/module/di/cresource/q2/p06/ di_06_link_tiered_ activities/ Instructions can also be tiered as per the styles of learning, Grouping will be done as per learner's preferences

96 Content Process Product Key concept: Developing understanding about scientific concept Magnetic field Group 1: Auditory learner Group 2:Visual Learner Group 3: Kinesthetic learner W atching vide Reading out the concept Visually highlighted Experiment it Listen to the explanation content Illustrations in and about the content Listening to the Demonstration of the Experimentation with explanation experiment magnet Listening to the audio clips Provide oral report Sequencing Graphical representation 2) Compacting instruction: Compacting the curriculum means assessing a student's knowledge and skills, and providing alternative activities for the student who has already mastered curriculum content. This can be achieved by pre-testing basic concepts or using performance assessment methods. Students demonstrating they do not require instruction move on to tiered problem solving activities while others receive instruction. 3) Learning centres: These are the corners or stations created in the classrooms or in other rooms which contain a various material where students learn by exploring the topics, practicing the skills. These centers are flexible and teachers canmodify as per the students need. 4)Adjusting questions: Teachers can help student's achieve the set goals by adjustingthe discussion questions as per their readiness or ability or style. T eachers adjust question's complexity as per the particular child. T eacher's here use Bloom's taxonomy to develop queries to prepare questions from basic to more advanced levels. This motivates students in learning process. 4) Choice Activities: Choice activities is a strategy in which students choose activities to learn. Here teachers provide options to the students to choose what they want to learn

97 and how they want to learn. Options includes independent study, grouping, activity based learning centres etc. Choice based activities improves participation and motivation of the students. 3.5 Need Assessment and Decision Making Assessment is a critical and essential part of teaching learning process. Assessment is ongoing and individualized which happens at various stages with different goals. Like, assessment is done before planning the instructions to know about the current level of functioning, their readiness, interest. This kind of assessment may be called as 'assessment for learning'. Assessment for learning helps teachers to set individualized goals, choose teaching learning material and plan instructional and evaluation strategies for the classroom.Another kind of assessment is 'assessment of learning' which could be formative or summative type of assessment. It happens during the instructions which gives feedback about whether the students are leaning the content or teacher needs to modify the instructions. Assessment of learning can also happen at the end of the instruction or unit or semester. It helps to monitor the progress and gives feedback about achievement of goals set. Assessment as learning is a kind of self-assessment where students themselves monitor their own leaning. It is a high level assessment where students need to be trained to assess themselves find out there gaps in learning and report about it to the teacher. It enables students to acquire skills such as critical thinking and problem solving. Thus assessment is just not gradingas it gives little information about student's success disregarding the process of learning, individual's performance and learning outcomes. 3.5.1 Need assessment and Decision making: Need assessment is an assessment for learning. It is a process which determines and addresses the gaps between present status and the desired requirement or want. The goal of a need assessment is to plan learning objectives and strategies. If learning objectives are planned according the need assessment it helps to close the gap between present condition and desired conditions. Need assessment is followed by decision making, which means finding an alternative solution to achieve the goal. Need assessment and decision making is a systematic process which proceeds through 3 phases:

98 Phase I: Explore 'What is': At this phase assessment is done to know the current level of functioning of each individual student. Phase II: Planning: This phase requires planning is done about the instructional strategies by finding alternative strategies, prioritizing the goals and identifying the possible solutions. Phase III: Making decisions: At this point as per the priority a solution is to be selected and a plan of action is implemented. 3.5.2 What is Decision Making? Decision making is a systematic and continuous process in instructions. In this process teachers actively address to academic diversity in the classroom for better learning outcomes. It involves ongoing analysis by teachers to make the decision. Teacher can do this making a checklist or a questionnaire to analyses the outcomes and accordingly make a report to take decision about modification, recapitulations, repetitions, and drill and practice Features of Decision Making: ● It focuses at student level. ● On the basis of decisions plans are developed appropriate for all students. ● Decisions made for instructions are most of the time customized. ● It allows immediate feedback regarding effects.

99 3.5.3 Process of decision making: 3.6 Let us sum up For implementation of inclusive education successfully various instructional practices are instigated to address diversity in the classrooms. Differentiated instruction is one of the instructional practices initiated to address differential needs of the children. Differentiated instruction is based on the principle of flexibility, ongoing assessment, engagement, collaboration, and grouping for instruction. Differentiation can be done on the basis of student's interest, readiness, learning profile. Differentiation can be done in the information that students' need to learn (content), process of teaching and the evaluation(product). For implementation of differentiated instruction assessment of need of students is required which is followed by decision towards instructional practice. 100 Thus differentiation and need assessment, decision making is a crucial practice but is very specific in serving the individual needs of the students. 3.7 Unit end exercises 1. Explain the concept and relevance of differentiated instruction. 2. Plan differentiated instruction to teach grammar lesson(tense) for std Ist. 3. What strategies you can use to implement differentiate instruction? 4. Explain process of decision making. 3.8 References Algozzine, Bob & Anderson, Kelly. (2007). Tips for Teaching: Differentiating Instruction to Include All Students. Preventing School Failure. 51. 49-54. 10.3200/ PSFL.51.3.49-54. Tomlinson, C. A. (2014). Differentiatedclassroom: Responding to the needs of all learners. Alexandria, VA: ASCD. Individuals with Disabilities Education Improvement Act of 2004, P.L. 108-446

Tomlinson, C. A. (2005). Grading and differentiation: Paradox or good practice?. Theory into practice, 44(3), 262-269. Tomlinson, C. A. (2003). Fulfilling the promise of the differentiated classroom: Strategies and tools for responsive teaching. Association for Supervision and Curriculum Development. Novak, 2017, UDL VS DI-Dinner Party Analogy

101 Unit 4 ❏ Literacy Development & Teaching Strategies Structure 4.1 Introduction 4.2 Objectives 4.3 Literacy issues of deaf as per the parameters of literacy 4.3.1 Pre- requisites for acquiring literacy skills 4.3.2 Processes involved in reading comprehension: 4.3.3 Impact of deafness on language and literacy development and Issues related to reading: 4.3.4 Issues related to writing 4.4 Theories of literacy development and their applications 4.4.1 The Top-down theory 4.4.2 Traditional or bottom-up theory 4.4.3 Constructivist or schema theory 4.4.4 Piaget's theory of cognitive development 4.4.5 Social learning theory and Bruner's scaffolding theory. 4.4.6 Behaviouristic theory 4.4.7 Cognitive Theory 4.4.8 Transactionalist theory 4.5 Process involved in reading 4.5.1 Process model 4.5 Models of reading: 4.5.1 Process model: 4.5.2 Componental model: 4.6 Meta cognitive strategies and Instruction Practices 4.7 Let us sum up 4.8 Unit end exercises

102 4.9 References 4.8 Let us sum up 4.9 References: 4.1 Introduction Language and literacy are major domains of early childhood development. These are connected areas, but refer to different things. There are four basic skills which a human being develops as per the age. In those skills two skills are primary skills on which the language development occurs, i.e. listening and speaking. Language development involves the development of the skills used to communicate with others through languages. Language development occurs in two dimensions i.e. receptive and expressive language. The literacy skills which we are going to study in this chapter are secondary skills as these skills are learnt skills. Literacy development involves the ability to read and write. In the current chapter our focus is on literacy skills, in which we will study about how the literacy development takes place in early years. What are the pre-requisites and processes are involved in acquiring literacy skills. The other core aspect of the chapter is the impact of deafness on the language as well as literacy development. We will study on how the various frames of language affect reading. It will make you understand the issues related to literacy in children with hearing impairment. It is very important to understand that every aspect of learning has its own principals and theories and processes, on that basis we can understand how the skill can be acquired. Same way reading is a skill and there are various theories and models on reading through which what are the various theoretical perspectives or views of various psychologists and linguists. In this part we will learn about behaviourism, cognitivism, social theory of reading development, constructivist approach of reading and transactionalism. In models of reading you will learn about top-down, bottom-up, interactional and transactional model of reading. After knowing the basis of literacy development you will learn about the processes involved in reading and writing. for understanding reading we have first seen the pre- requisites and now we will learn about what exactly happens when we read and understand any text, means we will learn about how our brain process the text and what

103 are the processes takes place at metacognitive level which leads to actual comprehension of the text. when we are working in the field of hearing impairment you should know the processes involved in the speaking, listening and signing, as these skills are the basic skills for communication for children with hearing impairment. As we are going to learn about how the metacognition is essential for comprehension then as an expert you should know about how to enhance these metacognitive skills of children with and without hearing impairment. In this area of learning we will learn about what are the various strategies which teachers can be used in the classrooms with children to enhance their literacy skills from early years. 4.2 Objectives: After reading this unit you will be able to explain about 1. Literacy issues of deaf as per the parameters of literacy 2. Theories of literacy development and their applications in the process of reading and writing 3. Various processes involved in reading and writing 4. Processes involved in speaking, listening and signing 5. Various meta-cognitive strategies and instructional practices for teaching literacy skills 4.3 Literacy issues of deaf as per the parameters of literacy 4.3.1 Pre- requisites for acquiring literacy skills Literacy is the key to success for life. For acquiring these literacy skills there are some pre requisites which are essential for the development of reading and writing. We will first learn about the pre requisites of reading and afterwards the prerequisites of writing. A. Pre requisites of reading : 1. Motivation for Reading in early years: In early years children tend to be very curious about everything especially colourful objects, pictures, etc. In order to

104 learn reading, children need to be ready and have the motivation to read. Show an interest in books and reading, read aloud and they should pretend to read the same. It will increase their interest in the reading. For developing interest in reading books parents or teachers can read to their children every-day with enthusiasm, they should allow children to explore the books which they want to see. As writing skill comes after reading it should also have motivation. For developing interest and motivation for 2. Language Skills: Children need to have language skills before learning how to read so they can describe things and share their knowledge and ideas, answer simple questions about a story, Retell a story in their words, and describe elements in a story such as the characters and setting. For developing language skills there are lot of activities which can enhance receptive as well as expressive language of children. Talking with children about anything which they are curious to know about. Asking them open-ended questions like "what do you think will happen next?" or encouraging them to retell the story using the toys or puppets by using their own language structures. 3. Concepts of Print: In order to learn how to read, children must understand how books work or concepts of print. For understanding the print children should hold a book correctly, should turn pages in the right direction and read from left to right in most of the languages and top to bottom, children also should know that words represent a spoken word and convey a message. The reader should understand the correlation between the written symbol and spoken letter. for enhancing these skills teacher should use the parallel strategy like they should use their finger along with the child to track or trace the letters and words, teacher or instructor should focus on the points to the parts of a book such as the front cover, title, and author, and let the child hold the book, turn the pages, and point to the words as you read. 4. Letter Knowledge: Every written languages have unique symbols to represent the sounds called phonemes or letters. Letter knowledge means understanding about the letters of the alphabet have different names and sounds. The main points in recognizing letters are naming the letters of the alphabet, recognizing lowercase and capital letters and naming each letter's sound. To enhance or encourage children about letter knowledge the instructor o parents should first introduce letters of the child's own name, reading of a big alphabet book, Ask children to identify letters on things in the grocery store or on signs around town. This will help children to understand and correlate with the letter knowledge.

105 5. Phonemic Awareness: Phonemic awareness is hearing and understanding that words are made up of smaller sounds. Phonemic awareness can be developed through small play way activities. like in kindergarten or at pre-school level with the help of rhymes, counting the syllables in the words, blending various sounds together, segmenting or breaking the words down in to individual sounds and substituting one letter sound for another one to make a new word from it. These fun activities will enhance the phonic sense of children in a play way manner. After children develop these pre-reading skills, they will continue to learn and grow as a reader. They will learn about phonics, sight words, and much more as they establish the building blocks for reading success. B) pre-requisites of writing : 1.
Hand and finger strength: An ability to exert force against resistance using the hands and fingers that allows the necessary muscle power for controlled movement of the pencil. 2.
Crossing the mid-line: The ability to cross the imaginary line running from a person's nose to pelvis that divides the body into left and right sides. 3. Pencil grasp: The efficiency of how the pencil is held, allowing age appropriate pencil movement generation. 4.

Hand-eye coordination: The ability to process information received from the eyes to control, guide and direct the hands in the performance of a task such as handwriting. 5. Bilateral integration: Using two hands together with one hand leading (e.g. holding and moving the pencil with the dominant hand while the other hand helps by holding the writing paper). 6. Upper body strength: The strength and stability provided by the shoulder to allow controlled hand movement for good pencil control. 7.

Object manipulation: The ability to skillfully manipulate tools (including holding and moving pencils and scissors) and controlled use of everyday tools (such as a toothbrush, hairbrush, cutlery). 8. Visual perception: The brain's ability to interpret and make sense of visual images seen by the eyes, such as letters and numbers.

106 9. Hand dominance: The consistent use of one (usually the same) hand for task performance, which allows refined skills to develop. 10. Hand division: Using just the thumb, index and middle finger for manipulation, leaving the fourth and little finger tucked into the palm stabilizing the other fingers but not participating.

What activities can help improve writing readiness (pre-writing) skills? ●

Threading and lacing with a variety of sized laces. ● Play-doh (playdough) activities that may involve rolling with hands or a rolling pin, hiding objects such as coins in the play dough or just creative construction. ● Scissor projects that may involve cutting out geometric shapes to then paste them together to make pictures such as robots, trains or houses. ● Making paper balls with crumpling of paper with fingers and pasting them on the particular pictures mostly big - small. ● Scribbling or drawing or writing on a vertical surface. ● Coloring pictures with big crayons for development of finger grasp. ●

Every day activities that require finger strength such as opening containers and jars. ● Pre writing shapes: Practice drawing the pre-writing shapes (l, —, O, +, /, square, \, X, and Δ). ● Finger games: that practice specific finger movements such as 'Incy wincy Spider'. ●

Craft: Make things using old boxes, egg cartons, wool, paper and sticky or masking tape. ● Construction: Building with, lego or other construction toys. 4.3.2 Processes involved in reading comprehension: What is meant by comprehension exactly? 'Reading comprehension is a complex cognitive ability requiring the capacity to integrate text information with the knowledge of the listener/reader and resulting in the elaboration of a mental representation'. Comprehension is the key to literacy learning. Although vocabulary or word knowledge is a critical and basic component of reading comprehension, the process of understanding text consists of complex sets of interrelated tasks that have yet to be clearly defined. Pearson and Johnson (1978) define the comprehension process as

107 "building bridges between the new and the known". Comprehending the text depends on the individual, the purpose or motivation for the reading task, and the individual's ability to think and feel with the author—that is, the "readers knowledge of the world interacts with the message conveyed directly or indirectly by the text. The result is fully developed communication between the reader and the author. (Durkin,1989) and Carpenter(1987) defined comprehension as active cognitive process that begins with information in the text, proceeds to the type of information applied during the process, and ends with information the reader has acquired from the process. When the reader reads a text he/she uses problem solving skills intentionally. The skills are critical thinking and problem solving which occur during the reading of the text. The content of meaning is influenced by the prior knowledge and experiences. Reading comprehension is the construction of meaning through the interchanging of ideas between reader and text. Thus reading comprehension is a very complex process which involves understanding the word meaning and consequent verbal reasoning. While reading any text for comprehending there are some cognitive processes occur simultaneously during comprehension. 1. Micro-processes 2. Integrative processes 3. Macro processes 4. Elaborative processes 5. Metacognitive processes 1) Micro processes: The initial chunking and selective recall of individual idea units within individual sentences can be called micro-processes. Micro-processes is combination of two sub-processes i.e. chunking. It means grouping of words in to meaningful phrases. It requires basic understanding of syntax and its use. The other process is selection of idea units to remember. When we read any long sentence we try to break it in to small parts for understanding it easily. At the same time we comprehend the main idea of the sentence like we may try to remember the nouns, verbs, adjectives, of the sentences rather than the grammar. We do take help of grammatical aspects for comprehension but we try to select idea of units to remember. 2) Integrative processes: Readers can recall what they read only if the individual ideas are connected into a coherent whole (Kintsh and Van dijk 1978, Thorndyke 1976 and others). Relationship between clauses and sentences must also be comprehended. This process is called integrative process. Integrative processing

108 requires the ability to identify pronoun, referents, inter-causation and sequence and make other relevant inferences about the total situation being described. 3) Macro-processes: Ideas are connected and retained in memory more effectively if they are organized around overall organizational patterns. The process of synthesizing and organizing individual idea units into a summary or organized series of related general ideas can be called macro processes. Sub processes included in macro processes are summarizing the reading material and author's general organizational pattern to organize one's own memory representation. 4) Elaborative processes: We may make a prediction about what might happen, we may form a vivid mental picture or we may think about how the information relates to something similar we have experienced. The process of making inferences necessarily intended by the author can be called elaborative processing. 5) Metacognitive processes: Metacognition may be loosely defined as conscious awareness and control of one's own cognitive processes. The process of selecting evaluating or regulating one's strategies to control comprehension and long term recall can be called metacognitive processes. 4.3.3 Impact of deafness on language and literacy development and Issues related to reading: Levels of languages Figure 4.1 levels of language The loss of acoustic perception impacts all the five essential levels referred to as language frames vital for reading. The first frame i.e. phonology in reading refers to

109 the children's understanding of phonics which means having letter-sound association (ASHA, 2019). According to Barca et al. (2013) adequate phonological abilities are essential for developing reading skills at all stages; hence it is an important area of language that is predictive of literacy development. Gruber (2003) emphasises that theoretically phonological awareness is a precursor, a co-requisite, or a consequence of reading acquisition. Fraser & Conti-Ramsden (2008) also accentuate that the phonological skills and reading ability are co-related. With reference to hearing capabilities and phonology, Grube et al. (2014) opine that any impairment in the auditory process creates obstacles in acoustic perception leading to atypical phonological representations of written words and letters, and this affects reading proficiency in children. Morphology is the next level of language. Morphemes are the smallest unit of meaning which includes base words as well as the affixes and suffixes, hence is critical for understanding and using language. According to ASHA (2019) Morphology is vital for understanding grammar while reading. Fraser and Conti-Ramsden (2008) have brought in a vital observation that the word knowledge crucial to the language development of young children, later it directly affects child's capacity to read in a timely manner. Morphology also plays vital role in this as it helps in deriving words from the phonemes. So morphemes are referred to as the tools to measure the language quantity, and is said to be essential to be a successful reader. Deaf students experience delayed morphological knowledge which negatively impacts their morpho-graphic analysis and hence the decoding skills required for reading (Trussell and Eastbrooks, 2015). Further to phonological and morphological skills, it becomes essential that the words in a sentence are appropriately grouped together in order so that meaning of language becomes clear and this in turn would facilitate communication. Hence the rules of grammar of the pertinent language, termed as syntax is to be understood. Along with this the description and core meaning of words and phrases including the figurative language that adds to the nuance to our communication termed as semantics is also critical to reading. According to Sauerland and von Stechow (2001) the two abilities i.e. syntax and semantics are inter-dependant. While the syntax incorporates generating sentences, the semantics helps in interpreting them. According to Schirmer (1985) a research concerned with analysing language of hearing-impaired children has led to the conclusion that the language of these children is deviant because of difficulties of syntax

110 and semantics. Similarly Kallioinen et al. (2016) also opine that since reading is mostly based on a spoken language environment, the loss or diminished hearing limits the development of words and concepts leading to an underdeveloped syntax and semantics. Another important language frame that assists students in reading especially the stories or the narrative texts is the pragmatics. Pragmatic language refers to how language is used socially to achieve some purpose in communication and is based on the socio- cultural background. Children with hearing impairment show less clear pragmatic communication functions due to their limitations in understanding the spoken language which is not found age appropriate and hence they have difficulty in comprehending reading (Pershey, 1997). Fluency in reading and impediments due to hearing loss: Fluency is just like prosody of a language. However as we have seen how hearing impairment affects language and further affects the fluency of language. Now we will see how the hearing impairment affects the fluency. According to National Reading Panel (2000), fluency which is closely associated with comprehension determines the success of reading. Fluency is the cement which binds the two concepts namely word-reading and word-comprehension together (Trezek, Wang & Paul, 2010). Earlier researchers have highlighted that reading fluency consists of 3 factors: 1.Speed which involves quantity of words a reader is able to read in a specified time, 2. Accuracy which includes reading without errors, 3. Expression which consists of supra-segmental aspects like stress, rate of speech (Easterbrooks, 2010; Bursuck & Damer, 2011). Figure 4.2 Fluency Frames Source: Miller (2010).

111 As per Evanchan (2010), accuracy means correctness i.e. the ability to read words correctly. With this skill children are able name words without many efforts. Hudson, Lane, & Pullen (2005); Pikulski & Chard (2005) are of the opinion that phonemic awareness, sound symbol correspondence, sight vocabulary and high-frequency words helps students to become accurate readers. The other aspect of fluency is automaticity which helps students in word recognition in the text automatically without decoding them. National Early Literacy Panel reported as cited in Lonigan, & Shanahan, (2009), the third factor essential for fluency is prosody which encompasses reading with proper use of intonation, phrasing, and expression. Evanchan (2010) states that Prosody means reading with expression almost sounding like speaking. This crucial aspect of fluency actually helps students in reading comprehension. Most typical children eventually become fluent readers and process the text effortlessly. This provides their working memory with free spaces so that the cognitive resources can focus on higher level reading skills such as using previous knowledge, analyzing grammar or make links for comprehension. As opposed to this, the children who encounter fluency problems such as those with hearing impairment, struggle with the text and spend a lot of mental resources on understanding meaning of words in a text. These are considered to be lower order skills of reading (Kelly, 2003). They also tend to read the text slowly, word by word and hence they are not able to figure out what the text actually means. Thus hearing loss affecting reading fluency is one of the key determinants of their overall lower reading ability. Though fluency's role is very important in teaching reading-skills, still it is under investigated according to Luckner and Urbhach (2012) and further needs to be investigated fully in case of children having hearing loss. This is especially vital for providing them opportunities for developing reading comprehension. Many studies have noted that reading and writing are very hard, annoying activities for many deaf individuals, and they are thus often reluctant to engage in those activities for recreational purpose and consider reading as the biggest villain (Marschark, Lang, & Albertini, as cited in Marschark & Hauser 2008). The reading skills of deaf children at secondary level are not satisfactory and do not qualify the criteria to be called as literate. (Mayberry, 2002). This situation has not changed for deaf students since many years (Chamberlain and Mayberry, 2000). These statistics indicate that more than fifty percent of the deaf children studying at the secondary level show reading skills that are below the reading skills acquired by children belonging to 4th standard. Results of the study by Traxler (2000) indicates the same results that about 50 percent of 18-year-old students across USA who have hearing impairment read below the fourth grade level.

112 In the Indian context the ASER (2018) reports data from elementary school children collected from five hundred and ninety six districts. A survey of five lakh forty six thousand five hundred and twenty seven students indicates that only half i.e. about 50.3% fifth graders are able to read content developed for second graders. With this as the state of typical students the reading levels of students with hearing impairment though unreported cannot be expected to be better. The results focus on the fact that many students need assistance in learning even the basic literacy skills. This is vital and hence may have been set as a national goal. The draft National Policy on Education [NPE] (2019) has specified that sustained efforts need to be undertaken for developing foundational literacy and numeracy skills in children. As per Kyle & Harris (2011) fundamental issues that are most importantly documented for developing reading skills is that it affects the word recognition, that primarily affects phonemics and understanding as well as comprehension of sentences including grammar. However, according to Kyle and Cain (2015) besides these fundamental skills, reading comprehension requires many deeper facets of cognitive abilities. This is because almost all the information that the reader needs to comprehend the given content is provided in the text-book. However, many times the reader has to infer from the text and needs to possess the ability to read between the lines. The ability to infer along with its types, the executive-functioning such as working memory and its limitations due to lack of acoustics, the concentration fatigue due to over exposure to the visuals, and the resultant attention deficits in deaf students are constituent factors of successful comprehension. 4.4 Theories of literacy development and their applications Pearson and Kamil (1978) provide a fundamental description of the concept of the term 'theory'. According to them a theory is an abstract representation of an explanation for a particular set of phenomena. Realizing how important reading is for education as well as for acquiring knowledge of the world, one should consider the importance of developing reading ability. For improving the reading skills of children, it is essential that the teacher should first understand the theories of developing reading. The results of the investigation about how individuals learn to process textual information are put forth by contrasting theories. The process through which one learns reading has been explained by three theories. These three views can be seen in two perspectives as theories and as models of reading

113 too. First is the top-down model of learning to read which is based on cognitive theory. As per this theory while learning to read, not only the written text but also the background information plays an important role. Second most important view, the bottom-up model for 'learning to read' is focuses on the printed text in the book. It states that reading process starts with the text in the book or the material that the reader is reading and ends in the reader's head. Third theory of reading explains the metacognitive view of reading. It emphasizes on the way the reader thinks while approaching reading. This model highlights the techniques the reader may use while manipulating the textual information. 4.4.1 The Top-down theory: 1960s saw a drastic shift in the field of cognitive sciences. As new cognitive theory was invented in the field of studies pertaining to learning the old behaviourism theory became discredited. As per the cognitive view-point, human mind has an innate capability of learning language naturally. This new view had an incredible impact in the field of teaching reading comprehension. Admirer of the cognitive psychology explained how one's internal representation of the language develops within the learner's mind (Omaggio, 1993). The distinction between meaningful and rote learning was made clear by the theory proposed by Asubel (cited in Omaggio, 1993). Asubel stated that role learning involves simply by learning the word-lists or rules in isolation. As a result of this, the information which is memorized, becomes temporary and can be forgotten after certain time period. An example of rote learning is simply memorizing lists of isolated words or rules in a new language, where the information becomes temporary and subject to loss. On the other hand receiving or acquiring new information in association of relevant context and readers' previous knowledge is meaningful learning. Same goes well with the reading process. This is the way where the information can be easily absorbed into a person's cognitive framework that already exists. For learning to become perpetual, it is important that the leant matter should be meaningful. On the basis of meaningful learning Human being can develop long time memories in very well structured manner. Smith (1994) stated that these novel subjective and top-down theories changed the way in which children learn reading skills. This view-point highlights that, reading is not limited to pulling out the meaning from the content, but it's a procedure of association between unknown knowledge and the known facts. According to Tierney and Pearson, (1994) reading is a dialogue between the reader and the content which he or she reading. It involves an active cognitive process where in background knowledge of the reader plays an essential role in extracting meaning.

114 4.4.2 Traditional or bottom-up theory Origin of this theory or approach to reading is rooted in to behaviourist psychology in late 1950s. According to it learning was considered as a 'habit formation'. It can be enhanced by repetition and forming associations between stimulus and response. Omaggio (1993) characterized language as the "response system that humans acquire through automatic conditioning processes, where some patterns of language are reinforced (rewarded) and others are not. Only those patterns which reinforced by the community of language users will persist. Audio-lingual method was invented and further called as a behaviour which is important to form the language habits of any new language. This involves the use of drill, repeated practice and correction of errors. The reading- method called as 'phonics'. Phonics requires letter sound correspondence matching in sequential manner which prominently used in this audio-lingual method. As cited in Kucer, (1987) Gray and Rogers, stated that, reading is a linear-process where reader decodes the entire text first starting with the words, then few words together which makes the phrases and few phrases together that makes the sentences. Lower level skills such as visual stimulus or printed text are accordingly concerned with recalling and recognizing. Phonics is also focuses on repetition, drills using sounds which make the words. Processing of visually received information begins with smallest sound units, and ends on the sentences or discourse. Hence beginner readers attain a group of sequentially planned sub-skills that is hierarchically built for improving the comprehension-ability. The second is the bottom-up theory that emphasizes on the printed text. (Stanovich, 1980). The process of the reading can be explained in a different way. If language is viewed as a code, then identifying graphemes and converting them into phonemes is the main task of the reader. There are several criticisms against this model. It is considered to be incomplete and defective because it depends upon the basic and structured language- features, mainly sounds and words. But it must be accepted that the basic features and knowledge of the language are also equally important for basic comprehension process. This model is useful at early literacy stage for developing foundation of reading any new language. In order to overcome the dependency on the traditional models of reading, the new cognitive perspective was highlighted. This is explained in the next section. 4.4.3 Constructivist or schema theory: Constructivist theories such as the schema theory, the metacognitive theory, mastery level learning and scaffolding theory are the part of constructivism. The features from

115 schema theory where the brain forms new information on the basis of previous knowledge and integrates into existing schemas was found very apt for developing reading comprehension strategies. The other theories of metacognition which explains the ways in which individuals create internal understanding and are aware about it, has an important learning. Problem based learning and developing background knowledge are the applications to this theory. The Schema theory also belongs to the family of top-down processing and has greatly influenced the research on how to teach reading skills to children. It explains the association between background knowledge of the reader and the text, and point-outs the importance of previous experience with the world for making sense of the text. Background knowledge connotes as ability to use schemata has a prominent role to play in the comprehension of the text (Pardede, 2006). Schema theory is based on the belief that past experiences which create the mental frameworks are the important factor in making sense of the text to the reader. Schemes are the broad representations of more common patterns or regularities that occur in our experience. For example one's common scheme of the car will allow him or her in making sense of the car which he or she has not driven previously Smith (1994). The knowledge of situations, things, events, knowledge of procedures for retrieving, organizing and interpreting information are the procedures which involved in relating past experiences to the new (Kucer, 1987). According to the study of Anderson (1994) schemata of the reader is one of the influencing factors to the information in the text. It explains that, a reader can comprehend a message only when he is able to connect his previous schema to the objects and events given in the text. On the basis of these results Anderson (1994) defined comprehension as the process of activating or constructing a schema that provides a logical explanation of objects and events mentioned in a discourse. Understanding the text involves interplay between both, previous and recent knowledge (Anderson and Pearson, 1988). Therefore, schemata are restructured and modified to accommodate new information as that information is added to the system (Omaggio, 1993). Schemata are of two types i.e. 'formal schemata' and 'content schemata'. the first type of schemata i.e. formal schemata are schemata referred to the knowledge about the text structure and organizational pattern of the text and content schemata is all about knowing the subject matter of the text. Example of formal schemata is, reading text like fiction, a letter to the editor, or a scientific essay, the text can be expository or narrative, informal or formal. Each of these categories will have a different organizational structure. Information of these structures will help in comprehending reading. This is because, it gives readers a reason for foreseeing what a content will resemble (Smith 1994).

116 On the other hand the second type of schemata i.e. content schemata are related to the previous knowledge and experiences of the reader regarding the particular text which s/he is reading. For example if a reader is reading about the information about pollution and if he had already experienced the concept he will definitely comprehend it in a better manner. Hence prior knowledge of both schemata of the reader enables him to predict, meaning, events and as well as inferring meaning through wider context (Anderson, 1994). As per the aforesaid theories, reading comprehension is deeply rooted in to the psychological theories. Apart from these some other theories which are also can be associated with the process of reading. 4.4.4 Piaget's theory of cognitive development and reading Piaget explains how a child builds a mental model of the world. There are three basic components of his theory. The first stage of the cognitive development is sensory- motor stage where children explore the world knowledge through the senses and motor activities. The second stage of Piaget's theory it is called as pre-operational stage (2-7 yrs), where children begin to understand the concepts of past, future and sequencing. The third stage of Piaget's theory talks about the age group of 7-12 which named as a concrete operational stage. In this stage children begin to acquire the skill for logical and abstract thought. Piaget's three stages of cognitive development also are related to reading comprehension. According to this theory children begin reading and language acquisition parallelly by gathering sensory and motor information in the age of 0-2 yrs. By using attractive and approachable reading material is always beneficial for increasing interest and understanding importance of the reading in early years. The second stage the importance of prior knowledge and drawing contextual meaning for reading comprehension. These skills are very important to form the foundation for reading comprehension. It means child needs to be able to read something and imagine of what it means. For achieving this, reading aloud to children proved beneficial for enhancing reading comprehension at the third stage. 4.4.5 The Social learning theory and Bruner's scaffolding theory (1976) The social learning theories such as those of Bandura or Vygotsky emphasize the central role of social interaction in the development of knowledge and learning. The role of MKO (more knowledgeable others) provide supports for developing and enhancing the reading comprehension skills. Differentiated instructions are the applications of the social learning theories.

117 Bruner's theory of scaffolding was influenced by the Vygotsky's social constructivist theory. Vygotsky had a strong viewpoint that learning happens in social environment in which the learners through the interactions of others construct meaning. The Zone of proximal Development (ZPD) propagated by Vygotsky was the main frame work of Bruner's model which emphasised that supports are needed and that we learn with temporary supports. Based on the concept of ZPD of Vygotsky, Bruner also believed that when children learn new words or build concepts, they need adult help constantly and vigorously. Later on as they become proficient and independent in their reasoning these supports are less required. Slowly then afterwards the supports start fading. Therefore the young child focuses only on acquiring the new skill and knowledge. Bruner's overall idea of scaffolding is applicable to all fields and all areas of learning. 4.4.6 Behavioristic theory: Behaviorists believe that learning to read is an observed change in behavior. In conventional teaching methods the learners are conditioned to read and respond in a particular way. The pedagogy of teaching reading comprehension based on behaviorism includes a bottom-up approach from part to whole. The conventional approach which roots in behaviorism uses direct instructions and line by line explanations. The applicability is generally seen in the drill and practice and sequencing. 4.4.7 Cognitivist theory The information processing theories have provided yet another strong framework to understand reading. The learning that seek to describe the underlying mental processes inherent in the act of reading and higher patterns of brain functioning are the features of cognitivism theories. The applications of these theories that forms the framework is the use of diagnosis and interactions at various stages so also the guided reading. 4.4.8 sTransactionalist theory This theory is based on the view that all literacy activities are a transaction between the writer and the reader in which both change and influence each other. The stance i.e. stand taken by each is the key to the transaction which is either efferent or aesthetic. Efferent means that the reader's expectations are that the text will inform and provide details, hence expository in nature. Aesthetic means the reader's expectation is that the text will deal with feelings, emotions and hence is usually narrative.

118 4.5. Processes involved in reading According to Urquhart and Weir (1998), models of reading can be classified into two major classes: The 'Process' models and 'Componential models'. Componential models describe what factors are involved in the reading activity, whereas process models try to describe how factors operate and interact during reading. 4.5.1. Process model: Process models classified in to three types of models namely bottom-up, top-down and integrated model. 1. The Bottom-up model of reading: It was recognized by the work of Philip Gough (1972). Reading skills are treated as a sequential process in bottom-up approach. For using this model students first need to learn the phonics and decoding words before mastering reading comprehension. He theorized that reading is a sequential process which starts from reading letters, decoding, assembling them into sounds, and those sounds form words and phrases. Hence while using this approach for reading, Students must first learn the basics of phonics and how to decode words before more complex skills such as reading comprehension can be mastered. If using this approach for teaching reading then teacher should teach reading by the sequence and teach from letters to meaningful words, grammar, and eventually reading comprehension (Tustin, 2014). Figure 4.4 Bottom-up models

119 2. Top-down model of reading: The term 'top-down' implies the opposite of the term 'bottom-up'. Top-down processing of language occurs when reader uses background knowledge to predict the meaning of language they are going to read. They rely first on the actual words or sounds (bottom up), they develop expectations about what they will read, while reading they confirm or reject these predictions. Top-down processing is considered to be an effective medium of language processing; it makes the most of what the person brings to the situation. The top-down approaches are usually associated with Goodman (1967). 3. Interactive model: this model of reading is the combination of both the models. According to this model reading process is simultaneous. While using this approach all the patterns and components from different sources interact simultaneously to synthesize meaningful comprehension. This approach was accredited to Rumelhart (1977) and Stanovich (1980) 4.5.2. Componential model : As described above the process models describes about actual reading process, how it occurs. On the other hand componential model describes the components which are involved in the reading process. The componential model classified in to three sub models. Those are two components model by Hoover and Tunmer (1993) where they described about two components namely word recognition and linguistic comprehension. Another model of reading is three component model by Coady (1979) and Bernhardt (1991) who considered three variables involved in the reading process namely Conceptual Abilities, Process Strategies and Background Knowledge. 1. Mastery learning model: Bloom (1968) invented an instructional strategy for using feedback and corrective procedures and named it as 'learning for mastery'. Later this concept was replaced by its short name i.e. 'mastery learning' (1971). This is an instructional model where teachers organize the concepts and skills of teaching in to learning units and then following brief instructional session they administers a short assessment based on the unit's learning goal. The purpose of this assessment is to provide feedback to the students about their current level of learning and to understand what they need to learn better (Bloom et al., 1971). Wherever children need to learn better, specific 'corrective' activities is planned by teacher. These activities used for correcting learning of a student. Most teachers match these 'correctives' as per the

120 individual's needs means the correctives are 'individualized'. These 'correctives' work as scaffolds or supports for the learner to achieve mastery on the task. These 'correctives' includes additional sources of information on a particular concept, for example page numbers in the workbook or textbook in which the concept is discussed. The other correctives can be alternative learning resources. Those are special textbooks, extra learning activities, alternative materials, digital lessons, CDs, or web-based teaching (DeWeese and Randolph, 2011). Hence in Blooms 'Mastery learning model' the concept given by Bruner (1978) was used as 'correctives' which emphasizes on the use of supportive material for better learning. Figure 4.2 Original and adapted model of mastery learning 2. Transactional model of reading: Transactional theory is given by Rosenblatt (1986). This model talks about the equal, and reciprocal relationship between the reader and the text. Transactional theory proposes that the relationship between reader and the text is much likely is it between the river and its banks, each working its effects upon the other. The theory emphasizes on the role of a teacher while using it with children. He argues that the meaning of any text is depends upon the transactions between the reader and the text and not on the text. The theory explains the important concept of 'stance' for discussing the act of reading. attention to the words, attention to the readers and what purpose brought them to the text, their expectations about the text, and the choices they make as they read etc. are comes under the concept of stance. Stance was described in a two ways by Rossenblatt (1986). In these acts of stance the reader is

121 primarily concerned with what he will carry away as information from the text which is efferent stance, and where in the reader focuses primarily upon the experience lived through during the reading is aesthetic stance. In other words efferent stance deals with the information of the text and aesthetic stance deals with the emotions, feelings of the texts. 4.6 Meta-cognitive strategies and instructional practices Teaching reading is very intensive job for the teachers. Singleton (2009) emphasizes the need for 'instruction that is systematic and intensive'. Singleton goes on to define systematic teaching more closely as, 'structured, cumulative and sequential'. Lingard (2005) also argues for 'clearly focused intervention' and demonstrates how this can be done for students starting post-primary school with low attainments. For teaching reading is regarding the teaching comprehension of reading which should be structured, cumulative and sequential. Reading comprehension can be enhanced through the metacognitive strategies which are essential to develop metacognitive skills of the reader and so the comprehension. In the following section we will learn about what is meant by metacognitive skills or processes and then will move on to various strategies for development of these skills for development of reading comprehension. Metacognitive processes are related to metacognitive skills. Meta-cognitive skills include Examining, Assimilating, Previewing, Predicting, Monitoring, and Summarizing. These meta-cognitive skills are important for the successful comprehension process. It occurs before, during and after reading as explained earlier. These skills are the application activity for meta-cognition. These higher level processes are essential for reading comprehension. The application of metacognitive processes called 'Metacognition'. 'Metacognition' is about 'thinking about thinking'. Meta-cognition forms the basis for the reading comprehension strategies. Fluent readers who are continually able to monitor their own reading, connecting and controlling their experience with the content which they are reading and adjust their understanding are said to posses metacognitive skills. The concept given by Flavell (1979) about metacognition comprising of two major components i.e metacognitive knowledge and metacognitive experiences, it is hence deduced that metacognition pertaining to reading comprehension is associated with the reader's prior knowledge and experiences and also to the mental representation of the text in memory of the reader. In the model of cognitive monitoring

122 of Flavell (1979) the metacognitive knowledge is considered as a combination of three knowledge variables namely the self, the task, and the strategies that will be effective in achieving the goal of reading. Metacognitive experiences on the other hand are said to be items of metacognitive knowledge that have entered consciousness of the reader. The use of reading strategies in language learning has a vital role to improve reading skills and comprehension (Anderson, 2003; Cohen, 1998). There are various strategies or approaches which teachers use to enhance the reading comprehension skill of children with and without hearing impairment. Some of the strategies are given below. These all strategies teachers use before, during and after reading session Teaching methods: Teaching and learning process must be an easy and enjoyable task in the classroom which makes the students not feel bored and depressed in the classroom. The students should be interested and enthusiastic in learning process. A visionary teacher creates the best classroom atmosphere and interesting teaching process. Therefore, a good teacher must have a suitable strategy in teaching reading comprehension. Wang (2007) also reported that explicit instruction in comprehension strategies to third and fourth graders enhanced their comprehension for both narrative and expository text. In another study, Dube, Dorval, and Bessette (2013) also reported statistically significant improvements in reading comprehension following explicit strategy instruction to third and fourth grade students with learning difficulties. There are various strategies which are used by the teachers at various levels for teaching reading. Following strategies are the strategies for teaching expository as well as narrative texts. Strategy 1: Question Answer Relationship (QAR) (Rapheal, 1982) The Question Answer relationship strategy encourage students to use different kinds of information in their reading to help them comprehend narrative texts. While involving students in this strategy, teacher uses small units or passages and focuses on four levels of questioning. (1) Right there: questions that can be answered simply locating the words in a sentence (Direct questions) (2) Think and search: questions that can be found in the passage but not in one sentence.(Indirect questions) (3) On my own: questions that must be answered in reader's head (Inferential questions)

123 (4) The author and me: students need to think about what they know, what they have learned from the author, and how these pieces of information fit together. Skills covered in the thesis application, analysis, synthesis, Evaluation. These skills are the higher level thinking skills which can be developed through QAR method. Strategy 2: Reciprocal Teaching /Questioning (Re Questing) This strategy is more effective with narrative texts than expository texts. In this strategy teachers serve as a models for good questioning and answering by explaining how they arrived at the answer they give to the children's questions. Re quest involves the Students and teacher in silently reading portions of a text and then taking turns asking and answering questions. Steps followed in the strategy: ● The teacher and the students read the first line silently. ● Then they take turns asking questions about the sentence. First the students ask questions and teacher close the book and give answers. ● Then students close their books and the teacher asks questions ● Students may not answer with 'I don't know' they must at least try to explain why they cannot answer. ● If any question is not cleared; then it must be rephrased or clarified. ● The person who answers a question should be ready to justify the answer by returning to the book or explaining the background knowledge that was used. Strategy 3: Oral Comprehension Strategy This strategy is used with familiar /unfamiliar stories, poems, songs etc. it includes Read and Re-tell step in which Children read a section of a story and they then re-tell it to the class or to a buddy if working in pairs/groups .it also includes Non-verbal Interpretation of a Text where Children read a story and then draw the key points in that story. After completing the story it comes to the sequencing step where children have to re arrange the sections to re make the story. While involved in the strategy children also involved in the skimming and scanning of the text. In this children have to identify the key words in the passage. Skills covered in this strategy are before reading, during reading and post reading skills. These skills are previewing, text analysis, and eliciting

124 prior knowledge, skill of questioning, prediction, Skills of updating questions and predictions, Visualization skill, Connecting skills, Skill of monitoring comprehension, Skill of applying fix –it-up reading strategies, Skill of summarizing the text, Skill of understanding Organizational patterns to recognize one's own memory representation. Strategy 4. Survey, Question, Read, Recite And Review (SQ3R) SQ3R is a strategy for studying expository text that can be used with middle school and high school students .the procedure includes five steps and is designed to help students monitor their own comprehension and learning. ● Survey: Student surveys assignment, headings, skimming and reading ● Question: Students turn each heading into a question ● Read: Students read to find the answers ● Recite: say the answers aloud ● Review: Write notes to answer the questions. Review what they have read Skills covered in this method are Analyzing, Previewing, Skimming. Strategy 5: Directed Reading Thinking Activity (DRTA) Stuffer (1969) DRTA is a strategy that involves previewing, predicting, monitoring comprehension, and revising predictions. This strategy improves comprehension and promotes active and critical thinking. It can be used with students at all levels with narrative texts and conducted as follows ● Introduce story ● Ask students to make predictions ● Reject or confirm predictions ● Reflect upon their predictions ● Write key phrases on separate cards ● Students can compare/contrast the story with their own versions This strategy covers the skills like Assimilation, Predicting, Judgment making, Decision making, Critically thinking, finding purpose for reading and examining study material.

125 Strategy 6: K-W-L This strategy can be used with non-fiction texts. Can be used across the curriculum i.e. History, Geography, Religion. It can be completed individually, in a group or on a whole-class basis. Occasionally can be helpful for children with poor reading skills. It incorporates before, during and post-reading comprehension skills like making predictions, integration of prior knowledge, mental imagery, application, analysis, synthesis, evaluation. K -What I know, W- What I want to know, L – What I learned Strategy 7: Anticipation Guides This activity is suitable for older students and incorporates before, during and post- reading comprehension skills. This includes metacognitive skills like comprehension monitoring, study skills, skill of adjusting strategy. The steps followed in this strategy are as follows Teacher identifies several major concepts related to reading assignment/unit ● He/she develops 4 – 6 statements that are general enough to stimulate discussion and can be used to clarify misconceptions ● The list can be placed upon a chart or individual sheets ● Students respond (i.e. agree/disagree) to the statement, working in groups, pairs or individually ● This is followed by whole-class discussion ● Students read text and compare their responses to what is stated in the reading material This is followed by further discussion. Students cite information in text that supports/ defends their position. Strategy 8. Scaffolding Strategy for enhancing reading comprehension: Scaffolding is asserted as new method of supporting students' learning and development (Bedrova & Leong, 1998). Vygotsky (1978) proposed the concept of the ZPD which he defined as the distance between the actual development level and the level of potential development of child it is said that this difference can be minimize through problem solving under the guidance of adult or guidance of MKO. Time spent

126 in this area is best for children's learning. It is the area between what children can do independently and what they can do with assistance. While using scaffolding method teachers become activator, facilitator for children's learning. Scaffolding enhances children's academic achievement, social skills and self esteem. Scaffolding is very flexible strategy because it can be used for every child as per their need and level of achievement. How to scaffold a reading lesson? Scaffolding is breaking up the learning into small chunks and then providing a tool, or structure, or support with each chunk as a support. Just like the under constructed building need the support till the completion, reader need to get the support or scaffolds till he/she achieves the mastery on the task. Various researchers had defined scaffolding as follows Reiser (2004) points out that if learners receive support and assistance, they will successfully perform certain tasks and move to more complex ones. Without any support, or prop, they will not achieve the task as it will be beyond their ability. Vacca (2008) gave supportive statement about giving support to children for better learning, that students become more responsible, motivated and successful in their learning, when guidance and support has been provided with the task. According to Collins as cited in Yu, (2004) Scaffolding is used to bridge between what students

can do on their own and what they can do with

the assistance which was explained by the Vygotsky's concept of Scaffolding is temporarily provided support and it is gradually removed bit as the learners become more independent (Cameron, 2001). If scaffolding is administered properly, it will help students and act as an enabler, and not as a disabler (Benson, 1997). In Vygotsky's words, what the child is able to do in collaboration today, he will be able to do independently tomorrow (Vygotsky, 1987) because of the collaboration child will learn how to do the task, hence masters the skills and will do it independently. According to Safadi & Rababah (2012) ZPD provides educational experts a clear and simple guideline about how to support learners at each learning stage. It suggests that the teacher should provide tasks that are at a level just higher than the learners are currently able to do, and teach rules that will help them to make the next stage without help. Like training wheels, scaffolding enables learners to

127 do more advanced activities and to engage in more advanced thinking and problem solving than they could without such help (NRC, 2000). Pearson (1996) points out that scaffolding allows teachers to provide cueing, questioning, coaching, corroboration, and plain old information to help students complete a task before tackling it independently. Sawyer (2006) defines instructional scaffolding as a learning process designed to promote a deeper level of learning. Scaffolding is the support given during the learning process which is tailored to the needs of the student with the intention of helping the student achieves his/her learning goals Puntambekar and Hubscher (2005) identified four features of scaffolds. 1) Inter-subjectivity: The first component necessary for instructional scaffolds to be effective involves the joint ownership of the task between the student(s) and teacher. This requires that the task be defined and redefined by the student(s) and teacher such that the student(s) begin to understand the task from the perspective of the more knowledgeable other. As Wood and colleagues (1976) note, this involves making it worthwhile for the learner to risk the next step. 2) Ongoing diagnosis: The teacher must be continually aware of what the learner understands and still needs to learn. This requires a deep understanding of the task at hand, including the subtasks required for mastery, and a keen level of knowledge about the individual learner. 3) Dialogic and interactive: A third feature of learning scaffolds relates to the conversation that the student(s) and teacher have as part of the learning situation. The teacher, by dialogue, monitors student understanding and progress. It requires a fairly feedback system in which the teacher is regularly checking for understanding and collecting assessment information. 4) Fading: The final theoretical feature requires that the teacher fade the support provided to the learner(s). In Vygotskian terms, this occurs when the learner has reached internalization. Vygotsky (1978) hypothesized that cognition first occurs between people (inter psychological) before moving to intra-psychological (within one's own self). Without fading, this process of internalization cannot happen; students become "prompt-dependent," not independent.

128 Scaffolding is a key feature of effective teaching and can include modeling a skill, providing hints or cues, and adapting material or activity (Copple & Bredekamp, 2009). According to Rewards Plus (2010) scaffolding reading comprehension has different techniques which are clarified in Techniques for scaffolding reading comprehension Pre passage reading The scaffolding approach (from Billett, S. (1993). Cited in Athra (2010). Mentor's Guide. Generic version. P. 6.) "Scaffolding Reading Experience/s SRE" is an approach introduced by many researchers (Graves & Fitzgerald, 2004; Graves & Graves, 2003; Tierney & Readence, 2000). It is considered as a comprehensive reading program, that helps the children

129 understand what they read, enjoy the experience of reading, and learn from what they read. Archer (2008) divides scaffolding reading comprehension into three phases: Before Reading Teach the pronunciation of difficult words. Teach the meaning of critical, unknown vocabulary words. Teach or activate any necessary background knowledge. Preview the story or the article. During Reading Utilize passage reading procedures that provide adequate reading practice. Ask appropriate questions during passage reading. Teach strategies that can be applied to passage reading. Use graphic organizers to enhance comprehension. After Reading Engage students in a discussion. Have students answer written questions. Provide explicit instruction on comprehension skills. Provide engaging vocabulary practice. Have students write summaries of what they have read. Many researchers (Pea, 2004; Lajoie, 2005) suggested three main characteristics that are required for scaffolding: Contingency, Fading, and Transfer of Responsibility. Contingency refers to the adjustments that must be made while the student is being supported. Fading refers to the process of slowly decreasing the amount of scaffolding provided by the expert. Transfer of Responsibility requires that, over time, the learner gradually assumes responsibility for the task, so that the responsibility of learning completely transfers from the expert to the student (Van de Pol, 2010). Types of scaffolds Alibali (2006) suggests that while achieving the goals of instructions and as students perform well in the tasks teachers can use a variety of scaffolds to accommodate different levels of knowledge of the students so also scaffolds can be based on the complexity of the content. Frequency of using scaffolds in the instruction is depends upon the affecting factors. Following are some of the commonly used types of the scaffolds which can be used as per the need of the child as well as content.

130 Type of scaffold Use of scaffolds for teaching reading Advance organizers This is used to acquaint new content and tasks to learn about the topic It include Venn diagrams for comparing and contrasting information;Flow charts for illustrating any processes; Organizational charts for illustrating the sequential content;Outlines for representing the content; mnemonics to assist recall; Statements to situate the task or content Concept and mind Maps that show relationships: completed or incomplete maps maps, mazes for students to complete: Students develop or complete this task by applying current knowledge of the task or concept. Examples and Samples, specimens, illustrations, problems: Real objects; explanations illustrative problems used to represent something examples can be used for activating prior knowledge. These type of scaffolds are of two types human and non-human. Using examples illustrations for explanation of concept or verbal explanation of how a process works are human scaffold and using written instructions for a task, direct samples, specimen, objects for explanations are non-human scaffolds. Hints Suggestions and clues to move students along: these are again as a hints or orders to follow for given task. For the exami- nation giving one solved question can be used as a hint for solving other questions. Multiple choice questions are of the same type of scaffolds, where student can choose the correct answer from the given options which acts as scaffolds. Prompts A physical or verbal cue to recall previous knowledge or experience. Physical: Body movements such as pointing, nodding the head, eye blinking, foot tapping. Changing intonation patterns, gestures, hand movements, acting the task,Verbal: Words, statements and questions such as Go, Stop, It's right there, Tell me now, Wh questions.

131 Type of scaffold Use of scaffolds for teaching reading Glossary page Glossary page is developed for each new reading assignment for using and improving monitoring or dictionary skills. It include New concepts, words, phrases, and their meaning to use during reading sessions for understanding meaning or comprehending better. Question Stems Incomplete sentences which students complete: Encourages deep thinking by using higher level comprehension skills such as What if....., what will happen next.... questions. Visual Scaffolds Pointing, representational gestures, charts and graphs; methods of highlighting visual or new information, puppets, direct objects, actual procedure, Stories Stories relate complex and abstract material to situations more familiar with students: Recite stories to inspire and motivate learners The classroom is a vibrant environment where all students are together but from different backgrounds and with different capabilities, personalities. To be a good teacher s/he one should be implements creative and innovative strategies in order to fulfill all students' needs. These teaching strategies are the important tool for every teacher working at any level.

Teaching strategies refer to the structure, system, methods, techniques, procedures and processes that a teacher uses during instruction. These are strategies the teacher employs to assist student learning. It is clear that students who learn about reading strategies can use the knowledge to become fluent and skilled, to monitor and make efficient their own reading, and to teach skills and strategies to others. This thoughtful and deliberate use of the strategies may also provide a motivational advantage for students. General Tips for teachers while teaching reading to children with hearing impairment: 1. Speak slowly, clearly, and with adequate volume. Don't use exaggerated lip- movements and loud volume or very slow speed of talking.

132 2. Emphasize on silent reading. 3. Maximize the use of residual hearing whenever and wherever possible while reading. 4. Provide text material that has clearly written instructions. 5. After pronouncing new words please provide written deposit of in through various examples. 6. Use whole-word approach to word recognition rather than a phonics approach. 7. Pay special attention to teaching figurative expression as children with hearing impairment tend to comprehend literally. 8. Use reading material as per the reading age of the children and not as the chronological age of children. 9. Create narrative and expository texts to read by children with interest. 10. Check comprehension frequently by asking questions about reading material. 4.7 Let us sum up After reading this chapter as teacher trainee you all have come to know the importance of literacy skills in the whole educational system. We have learnt various areas of literacy. we have learnt about the prerequisites for literacy development in children., processes involved in reading and writing with examples. As reading theories and models of reading we have come to know the psychological basis and what various theorists explained about the reading and comprehension process and how we develop the reading. lastly we have learnt the various instructional practices for developing reading in classrooms. 4.8 Unit end exercises 1. Discuss briefly the pre-requisites skill for acqjuiring litteracy. 2. Write some activities which can help improve writing readiness skills. 3. Narratge the processes involved in reading comprehension. 4. Write a short note on fluency in reading and impediments due to hearing loss. 5. What do you understand by tradional on bottom-up theory of reading?

133 4.9 References: Alber, R. (Ed.). (2014, January 24). 6 Scaffolding Strategies to Use With Your Students. Retrieved from https://teachreadingstrategies.weebly.com/reading- comprehension-strategies.html Aldridge, j. & R. L. Goldman (2007). Current Issues and Trends in Education. Boston: Pearson/Allyn and Bacon. Alibali, M. (2006). Does visual scaffolding facilitate students' mathematics learning? Evidence from early algebra.

Ambrose S. E., Fey M. E., Eisenberg L. S. (2012). Phonological awareness and print knowledge of preschool children with cochlear implants. Journal of Speech, Language, and Hearing Research, 55, 811–823. 10.1044/1092-4388(2011/11-0086) ASHA(2019) https://www.asha.org/Practice-Portal/Clinical-Topics/Spoken- Language-Disorders/Language-In—Brief/ https://abcsofliteracy.com/pre-reading-skills-successful-readers/ Pardede, P. (2006). A Review on Reading Theories and its Implication to the Teaching of Reading. UKI: ELT'n Edu. A cyber ELT & Edu service from Universitas Kristen Indonesia [online].

134 Unit 5 ❑ Research And Development In Literacy Structure 5.1 Introduction 5.2 Objectives 5.3 Research in literacy: An overview 5.3.1 Reading Achievement 5.3.2 Patterns of Reading Development 5.3.3 Trends in Literacy Skill Level 5.3.4 Higher Level Functioning in Literacy 5.3.5 Cochlear Implant and Literacy Development 5.4 Priority areas of research 5.5 Identifying the gaps in literacy research 5.6 Readings in Researches on literacy development at different levels in the past two decades 5.7 Evidence based practices in literacy development 5.8 Let us Sum up 5.9 Unit end exercises 5.10 References 5.1 Introduction As an educator, we have several questions for our class with learners with deafness like; a. How do children with deafness learn to read? b. What is the best strategy or technique to teach children with deafness to read? c. Can children with deafness learn the alphabetic principle?

135 d. What are the roles of signed language and spoken languages in literacy acquisition in the classroom? e. How do we improve literacy outcomes for children with deafness? f. What should I as an educator do to improve these outcomes? Educators of the deaf all across the country have been asking themselves these questions for many years. Before answering these questions, let us first understand the meaning of literacy. Census of 2011 defines literate as, "every person above the age of 7 years who can read and write with understanding in any language is said to be literate". According to this criteria, the Census 2011 survey holds the National Literacy Rate to be 74.07 % in India. The youth literacy rate, measured by this census is explained, within the age group of 15 to 24, is 81.1% (84.4% among males and 74.4% among females), while in the age group of 10-19 , 86% of boys and 72% of girls are literate. Within the Indian states, Kerala state has the highest literacy rate of 94.65% whereas Bihar state averaged 63.8% literacy. The Census 2001 statistics indicated that the total number of 'absolute non-literates' in our country was 304 million. As of 2011 statistics, enrolment rates are 58% for pre-primary, 93% for primary, 69% for secondary, and 25% for tertiary education. The present unit on research on literacy is designed to provide reader as an educator of deaf a conceptual understanding of the above statement pertaining to the student with deafness (henceforth, SwDs) and ways to systematically address the literacy issues. We know that literacy which means the ability to read and write forms an essential component of our educational system. Without well-developed literacy skills, students find it difficult to participate in the classroom teaching learning process. This is because besides enhancement of language comprehension, reading from the textbooks also helps in acquisition of content knowledge of school subjects such as History, Geography, Environmental studies and so on. 5.2

Objectives After completing the course teacher educators will be able to; a. understand the scope of
literacy development among the children with deafness b. review the gaps in the research conducted in the literacy
domain c. discuss the patterns of reading development among children with deafness

136 5.3 Research In Literacy: An Overview As we have understood from the previous units of this paper, essential factor
contributing to literacy is 'Language'. SwDs having deficient language find reading and writing extremely challenging.
However, early intervention hold the key and children who undergo training in emergent literacy skills and are less likely
to experience letdowns in school. Reading as you know, is a linguistic activity i.e. it is language based and needs a good
understanding of language in order to read, this is required to comprehend and write as well as to express. Reading
simply means text comprehension and is different from pronunciationwhich is loud articulation with or without
understanding. For example, when we learn alphabets of a foreign language, we associate the sound symbol
correspondence and later we may also try to articulate or sign certain words. However, to make meaning of the words
pronounced, we should know or understand the language that we are reading. Only when we make sense of the print, it
will be termed as a true reading comprehension activity. According to Dorn (2011),
the performance of writing is a cognitive process that involves comprehension of ideas, expressive language, and
mechanical skills.
Writing integrates both cognitive and motor capabilities occurring simultaneously. According to
the educationist,Gunning (2008) writing evolves from pre-speech gestures that
children make and from the language they hear and later use
it in different settings. SwDs
have differing access to sound, which depends on many different factors.
As access to language (spoken/sign) is delayed so the development of written language is also impacted in some
way.However most SwDs would have the basic mechanical skills of writing that includes scribbling and drawing. Tracing
and copying would also not be
aconcern for them;
however activities such as dictation or creative and independent writing always poses a challenge
forSwDs. Literacy is a language based activity, as discussed earlier in the previous units of this paper. Hearing loss hinders
language development and this further creates reading and writing difficulties in SwDs. However if intervened early, the
language rooted reading and writing techniques can help SwDsacquire age appropriate literacy skills. It is suggestive that
apart from the standard emergent literacy activities such as phonics, sight vocabulary or spell games etc., and experience
based literacy activities may be undertaken in classroom. This may include reading and writing exercises based on
conversation, directed activities or visits (read techniques of teaching language).

137 Activity to do: Visit a special school and observe teacher teaching literacy skills to children with deafness varying in
standards. As is known from the previous sections of this paper, hearing loss at a young age severely affects language
development, hence children with severe and profound hearing loss lacks language. These children find it difficult to
associate sounds to written symbols so reading becomes difficult and sometimes tortuously slow and frustrating for
them. In the sub section, we will review researches in literacy in the areas like; Let us understand and discuss each sub
section now. 5.3.1 Reading Achievement In this section, we will discuss few researches in reading achievement domain.
There are various research studies and frequently documented difficulty of learning to read may result from the
requirement of pre-existing language for literacy. To succeed at learning to read, the SwDsmust have a strong language
foundation to base it upon. Moreover, communication difficulties with the educator him/herself can impair reading.
Children who begin language acquisition at older ages and/or have limited language (oral/sign) input during early
childhood have underdeveloped language skill, which, in turn, affects their short-term memory development. However,
with the linguistic element covered, SwDs performance is equivalent to age-appropriate hearing children on short term
memory tasks.
Literacy is often viewed as emerging from a child's (oral/
sign)

language development. The linguistics approach to language development is formed on the notion that children do not need to be taught directly how to speak; language development and its pragmatics are learned from conversations near children indirectly. Expressive language acquisition then forms the foundation for written language comprehension as the ability to decipher the common phonemic sound system of language is enhanced. This underlying principle of connecting sound to print relies upon the established knowledge of the spoken language in order to aid in the reading process. Unfortunately, SwDs are placed at a disadvantage by not having complete access in developing the ability to deduce the phonemic sound system.

According to National deaf children's (2004),

with 90% of children with severe-profound hearing impairment being born to adults with normal hearing, the majority of children do not develop adequate understanding of any language modality (oral/sign) to assist in the process of comprehending written language.

138

As highlighted by Kyle and Harris (2010), learners

born with severe-profound hearing impairment may fail to develop a fluent system of communication as well as fail to develop phonemic decoding abilities necessary to become proficient readers.

They found that children with normal hearing sensitivity and children

with severe-profound hearing impairment utilize slightly different reading strategies over the first 2 years of schooling. Despite both groups of children exhibiting similar levels of reading progress in the early stages of reading development, their reading trajectories diverged after the second year of reading instruction. Reading delays in beginning readers with severe profound hearing

impairment were not as severe as that typically observed with older

learners with

severe-profound hearing impairment; however, the severity of delay increased with age.

Many researchers proclaim that,

students with severe-profound hearing impairment have consistently displayed poor reading comprehension abilities. The average student with

severe-profound

hearing impairment leaves high school scoring the same reading level as that of third or fourth grade student. Researchers and educators consider what factors contribute to the let-down ofchildren with severe-profound hearing impairment to advance in reading comprehension.

Pause and think; Investigation of current literature in literacy research

reveals conflicting reports as to how literacy skills are developed in children who are both deaf and hard of hearing. What is your say on this? Researchers like Goff, Pratt & Ong (2005)

suggests that readers with normal hearing decode words in two ways. Decoding depends upon the sound-based relationship between the letters of a word and the sound that corresponds with each letter. Basis being the phonological skills alsoreferred to as sounding out a word. This approach allows children to read words that they havenot seen in print before. The second approach, or lexical approach, depends on whole word recognition. Also known as print-based reading, this approach

works with

words that do not follow phonological rules but require that the child has had previous exposure to the word in its printed form. The general assumption is that children with normal hearing use the phonological approach for unfamiliar words and the lexical approach for

familiar words. 5.3.2 Patterns

of Reading Development Research supports memory, spelling, vocabulary, grammatical knowledge, and other cognitive and language based skills as evidence for reading predictors in children

as

139 highlighted in the research conducted by

Goff, Pratt & Ong (2005). Research is inconsistent in determining predictors of reading success in SwDs. However, research studies have contributed information toward the understanding of the reading acquisition process by identifying factors that appear to impact reading success.

In the research study conducted by Harris & Beech (1998) ,

the most prominent of these is phonological awareness or the ability to access and manipulate speech sounds. Phonological awareness has been shown to be a strong predictor of reading outcomes
in various research studies (
Weinrich& Fay 2007). Another factor is a student's orthographic processing skill, there is increasing research evidence of a relationship between orthographic processing skill and reading ability (Deacon, Benere, & Castles, 2012). Orthographic knowledge is a key area that many researchers propose
as
a foundational skill and predictor of reading ability in students who are deaf or hard of hearing (Miller, 2005). According to the American Speech-Language Hearing Association (ASHA, 2011), orthographic knowledge refers to, "the information that is stored in memory that informs us of how to represent spoken language in written form".
As described by the researcher Apel,(2011),
orthographic knowledge depends upon the understanding of both mental grapheme representations and orthographic rules of a language.
He further explains that,
mental grapheme representation applies stored mental representations of specific written words or word parts
and
orthographic rules are the laws that govern how speech must be represented in writing . Paul Miller (2006)
have conducted various research studies in the filed on deafness, one such study was
to determine the nature and efficiency of the strategies used by learners with pre-lingual deafness for the recognition of written words with reference to an orthographic self-teaching concept. Each
student
was asked to make categorical judgments for real words and pseudo homophones of the real words. Pseudo homophones (phonetically identical to a word)
are considered words that are phonetically identical to a word. Participants were native signers between
the grade of 7 th and 10 th . Students
met the criterion of hereditary deafness and had parents who were deaf (DCDP). Due to the low prevalence of hereditary deafness, students were chosen from different grade levels. The findings of the study showed that the participants with deafness were impaired in their phonological decoding abilities; however, their efficiency in recognizing and categorizing written words was similar to that of their peers with normal hearing. The
research
finding suggests that these students developed strategies for the acquisition
of
orthographic knowledge which does not rely on phonology (Miller, 2006). These findings areconsistent with the author's previous study in 1997. In studying
the effects of
140 communication mode on the development of phonemic awareness in
learners with pre- lingual deafness, Miller (1997) found that older children performed above chance level on a picture rhyme-matching task involving both orthographically congruent and incongruent items. Their performance was similar to that of their
peer group with normal hearing sensitivity only when items were orthographically corresponding. Many other researchers,
suggested that adolescents and learners with deafness are heavily influenced by or rely upon orthography when making judgments of phonological similarity. 5.3.3
Trends in Literacy Skill Level According to Martin &Clark (2012),
the language and learning impairments found in children with normal hearing are also common in SwDs. One factor to these impairments is the child's degree of hearing loss. Depending on the degree of loss and benefit from amplification, certain features of the speech signal may be unidentifiable to the listener with hearing impairment.
As we know that
speech is generated when air is forced between the vocal folds causing them to vibrate and in turn transforming the vibrations into a fundamental frequency which is then filtered through the vocal tract to produce the speech we hear It is the intensity, frequency, and duration (

segmental, non- segmental and supra segmental aspects of speech) of this air flow that shapes the articulators that produces the phonemes of speech. A significant phonetic identifier is the separation of vowels, which are a lower frequency, and consonants, which are high frequency (Halliday& Bishop, 2005). The strongest sounds in speech are the central vowels which resonate at low frequencies.

We as special educators should know that these vowels are responsible for the sound volume of speech. Vowels cycle at a frequency range between 250-2,000 Hz. In contrast, the weakest sounds are those that restrict the breath flow or the consonants (for example, fricatives, stops, affricates). These high frequency phonemes are responsible for carrying the information of speech which vowels cannot. Voiced consonants cycle at a frequency range of 250-4,000Hz, while unvoiced consonants cycle around 2,0008,000Hz (Halliday& Bishop, 2005). Researchers Kyle and Harris (2010) conducted a threeyear longitudinal study to identify predictors of reading development in children with deafness. At the beginning of 7-8 years of age, learners in the study were given a battery of literacy, cognitive, and language tasks every 12 months. The authors determined that children who had the most age-appropriate reading skills had less severe hearing losses, earlier diagnoses of hearing impairment, and also preferred to communicate through speech. These research findings were consistent with earlier research studies of Paul & Quigley (1990) in which

141 writing and reading achievements were significantly and negatively correlated with the degree of hearing loss. Even the research study of Aram, and Andom (2006) found that negative relations emerged between learners' degree of hearing loss and performance on general knowledge tasks in kindergartners who were transitioning to first grade. Not all research studies agree regarding the relationship between degree of hearing impairment and reading ability, you will also agree the same and must have experienced the same while doing practice teaching in special schools. Even researchers like Tymms, Brien, Merrell, Collins, and Jones (2003) did not find a correspondence between hearing thresholds and composite reading scores among children of 5 and 6 year olds. Tymms et al. (2003) even assessed learners with deafness (sample size 962) upon entry to school between 4-5 years of age. Learners were assessed using the Performance Indicators in Primary Schools Broad Baseline Assessment and were retested one year later in mathematics and reading to develop data for the prediction of academic achievement of learners with varying degrees of hearing loss. The researchers concluded that learners with mild to profound hearing impairment and learners with normal hearing (with the same levels of language-free attainment on starting school) generally made the similarimprovement in reading and mathematics during their first year of school. 5.3.4

Higher Level Functioning in Literacy Many SwDs continue to struggle with lower-level literacy skills. Consequently, reading techniques such as self-questioning, activating prior knowledge, summarizing the main idea, constructing representational images, predicting what text will follow, drawing inferences, monitoring for misunderstanding, and re-reading difficult passages of text are missing (Andrews & Mason, 1991; Strassman, 1992). Researchers like Marschark and Wauters (2008) debated that one reason for the lack of progress in this domain might be that the reading challenges are not specifically related to reading. The researchers suggest that an overall deficit in general language comprehension and cognitive factors are the source of poor literacy achievement. Marschark and Wauters (2008) observed that weaknesses shown by SwDsin many of the sub-skills involved in reading are paralleled by similar weaknesses in understanding sign language. In their view, SwDswould benefit from a focus on reader variables and considering differences in higher-level language and cognitive processes, lexical knowledge, metacognition, and information-processing strategies and habits in the context of language.

142 Now let us understand the concept of function of reading level from the perspective of Brown and Brewer (1996). They investigated whether implications about predictable events aredrawn in similar ways by readers who are hearing and readers who are deaf, and whether this drawing of inferences varied as a function of reading level. Despite the research finding no qualitative differences in inference processes or in the encoding of information for hearing and deaf skilled and less skilled readers, a quantitative difference was found in both the speed and accuracy of the task focusing on lexical decision. The skilled readers (deaf) were not differentiated from readers (hearing) and were in fact faster and more accurate in rejecting non-words. Less skilled (deaf) readers were slower and made more errors. This researchfinding supports that SwDsare capable of becoming skilled readers. It also highlights on the differences in cognitive processing between those who are quick, fluent, and accurate readers and those who are not. Researchers summarized their research by statingthat good readers who were deaf were quicker and more correct than readers who were hearing and that their somewhat effortless word recognition may serve to free up cognitive resources for higher level processing. In contrast, the less skilled readers place a higher demand upon resources toward text-driven processing as opposed to pre existing conceptual processes. In turn, these learners allot less attention toward tasks such as handling difficult linguistic contexts or integrating a text with world knowledge. These research studies support the idea that the root issue surrounding the poor literacy skills of SwDs may not be the direct result of reading itself. Other factors such as higher level language and cognitive processing play a dominant role in early literacy development prior to school age. 5.3.5 Cochlear Implant and Literacy Development There are many contributing factors that influence both language acquisition and literacy development in children who are deaf. Amplification device is a traditional option for individuals who are deaf. The cochlear implant provides access to the speech signal for those who are severe to profoundly deaf. Geers and Hayes (2011) conducted a study with aim to study the outcomes of implanting children early in life. These researcherswanted to a. document the literacy skills of early implanted deafadolescents, b. determine whether students who demonstrated age-appropriate reading skills in elementary school were able to keep up with their hearing peersin high school, and c. determine the degree to which phonological processing skills and demographic characteristics play a role in literacy achievement among high school students withcochlear implants.Students with cochlear implant of

143 the high school scored within or above the average range for hearing peers on two tests of reading (Between 47% and 66%). 36 % of the students read at the 9th grade level or above on the test named - Peabody Individual Achievement Test-Revised (PIATR) with only 17% reading below the 4th grade barrier that characterized the performance of SwDs before the advent of the CI. The researchers stated that the students with cochlear implants performed better on literacy measures while phonological processing tasks were not as high. They concluded that there are various strategies (extraneous variables) provided an alternate route to successful reading acquisition. Research study conducted by Geers, (2002) showed that students with cochlear implants had higher levels of phonological awareness than peers who were deaf without cochlear implants, but they remained lower than that of peers with normal hearing sensitivity. He concluded by stating that some factors affecting the reading of cochlear implant users were important to children with normal hearing sensitivity as well, such as general knowledge, parent education, and family income. Whereas researchers like Marschark, Rhoten, and Fabich (2007) restraints that while cochlear implants have improved the reading ability of SwDs, their skills are not proportionate with their peers where in the United States of America a 10th -11th grade reading ability to be a functional participant in society. 5.4 Priority Areas of Research According to the National Association of Educational Progress and

National assessment report (2014) to be a proficient reader, a learner must be able to read at grade level and also be able to synthesize, explain, and analyse what s/he read (i.e., comprehend and make reasonable inferences of written material). As you must have understood by now after reading all the four units,

reading is related to cognitive development, language development, and emotional development. Reading is a fundamental skill necessary to

function successfully in today's society, this has been highlighted in various researches by researchers namely Kirsch, Jungeblut, Jenkins &Kolstad, (2002). Reading comprehension helps

in the development of ideas, exploration of new knowledge, and

the exchange of information. In one of the research conducted by Goff, Pratt & Ong, (2005),

the ability to comprehend written language is a greater framework

that stems

from the development of literacy skills by the time learners reach their school age years.

The purpose of this
144 research was to identify the problematic areas surrounding reading comprehension within the school (age range 6-11 year old) population of
SwDs and to explore the aspects of literacy that are the most challenging for this group of learners. The patterns of reading development for SwDs were reviewed and compared with peers with normal hearing sensitivity. In this research various factors which predict reading include: phonological awareness, cognitive ability, and the primary mode of communication and its level of complexity were indicated. It is important to note that in their research phonological skills did not hinder overall reading achievement as deficits can be overcome by other cognitive processes. Furthermore, phonological skills can be developed as a byproduct of improved reading, and thus cannot be considered a reading prerequisite as they are in learners with normal hearing sensitivity. This research is also supported by Koo, Crain, LaSasso, and Eden, (2008) that some learners with deafness rely upon phonological awareness, while others use an alternate method. Orthography(conventional spelling system of language) is a strategy that some SwDs use to make judgments of phonological similarity. Other
findings suggest that learner's ability to perform orthographic processing tasks is acquired through their reading experiences rather than
it being an underlying skill for reading development (Deacon, Benere, & Castles, 2012). Phonologic or orthographic, processing may be preferential, use driven by the learner's language and educationalhistory and the instruction provided for reading skills. No significant relationship was found between hearing thresholds and reading performance in the research studies conducted by Tymms, Brien, Merrell, Collins, and Jones (2003) even similar results were found in researchers conducted by Convertino, Marschark, Sapere, Sarchet and Zupan(2009). Instead, few researches suggests an overall deficit in general language comprehension and cognitive factors to be the reason for poor literacy achievement (Marschark and Wauters 2008). Brown and Brewer (1996) considered higher level language and cognitive processing as the main influencers in early literacy development prior to school age. The lack of complex language and cognitive skills places a higher demand upon resources toward text-driven processing as opposed to pre-existing conceptual processes. This textdriven process may result in learners allotting less attention and cognitive resources toward handling difficult linguistic contexts or integrating a text with world knowledge. A key area that distinguished skilled readers from poor readers is the strength of their primary language (Mayberry, delGiudice, and Lieberman 2011). When there is a 145 mismatch between parent and child primary language it can be difficult for the child to develop fluent language (DCDP and DCHP). Even when children receive amplification phonological awareness and reading profiles may still fall below that of peers with normal hearing sensitivity (Geers, 2002). Deaf children of Deaf parents who were raised in an sign language environment and develop ASL as a native language were found to possess stronger reading skills than children who are deaf with parents who are hearing (DCHP) and who do not develop ASL as a native language (Freel, Clark, Anderson, Gilbert, Musyoka& Hauser, 2011). These findings emphasize the need to appropriately match a child's communication modality and educational program to suit the child's needs and family's resources, as a master trainer one may consider need based assessment to be performed to choose the best possible communication option for the child. As a whole, these research findings suggest the need for openness to instruction and intervention for SwDs. An underlying theme that emerged from the research was that other strategies provide an alternate route to successful reading acquisition, and that there may be multiple ways to achieve these fundamental reading skills. Understanding that the course of literacy development for SwDs is altered from that of children with normal hearing sensitivity will support the transition from traditional intervention that is phonology based to other alternate interventions. Research evidence supports that higher-level language and cognitive processes as well as information processing strategies strengthen reading and reading comprehension skills in students who are deaf or hard of hearing. As a master trainer, one can think on various research domains. Future research investigating literacy abilities in SwDs could be geared toward intervention strengthening these alternate routes to reading comprehension. In addition, developing a fluent, primary mode of communication(oral or manual), could support the bridge to written language. Identifying cognitive influences could possibly provide strategies or techniques for students to decode and code multiple features of written language. 5.5 Identifying The Gaps In Literacy Research This can be done in accordance with priorities in research area highlighting literacy development. As a researcher and years of experience in the field of deaf education, author feels that there are still gaps in literacy research in India. In this sub unit, we will be discussing on few gaps in the area of literacy research.

146 The gaps are as follows 1. Level of literacy a. reading and writing 2. Intellectual functioning and world knowledge a. verbal b. Performance 3. Academic achievement 4. Knowledge of language proficiency 5. Taking into consideration the background variables like student characteristics and family characterises The research evidence in literacy suggests that the problems that children with deafness face in mastering written language are more challenging than those they encounter in developing reading skills. An individual with deafness can resort to compensatory strategies to understand a message when grammar and vocabulary skills are limited. It is much more difficult to express oneself clearly in writing in the face of such limitations. Although its benefit may not be as immediately obvious as that of a compensatory approach to reading, a compensatory approach to writing is called for. One concern is that research on writing in children with deafness has lagged significantly behind research on reading. Much of the research work in literacy has been conducted, reflects a primarily a concern with grammar and vocabulary much as the traditional research on reading did. Whereas recent research has addressed meaning and comprehension of narrative there is still a paucity of work investigating how deaf writers express meaning. The development of holistic, meaning based approaches has been somewhat slower in the field of writing than in speech and reading so some of our projections will have to be tentative. In the past generation however most research conducted on the teaching of writing to children with deafness has had functional, semantic orientation suggesting that in all aspects of communication both written and person to person the trend in education of the deaf is clearly towards an acceptance of the primacy of meaning and away from the importance of mechanics per se. Many research studies on the reading skills of children with deafness have focussed on these children's low reading achievement relative to hearing children. Unfortunately, researchers in the field of education of the deaf offer no insight into what children with deafness can do but instead present an unbroken and perhaps invalid picture of failure and underachievement. Their still lies a gap in research in appreciating learners with deafness skills which had not been identified previously.

147 5.6 Readings in Researches on Literacy Development at Different Levels in the Past Two Decades For most of us, learning to read and write seems to be a relatively straightforward process, although writing might seem to be more difficult than reading. Fluent writing seem to follow fluent reading. Remember;Reading has been characterised as simply training the eye (visual mode) to do the work of ear. Writing simply means training the hands to do the work of tongue. We know that most children acquire the basics of their native language by three years and that they have impressive conversational capabilities. By the time children with deafness start formal reading instructions they have developed pre reading skills. Typically they know that language print proceeds from left to right and top to bottom (refer to initial four units of this Paper). They can decode environmental signs (McDonald .....) at an early age. Adults have read to themand they know that print can tell stories. Despite this learning to read a language that one has already mastered conversationally is a relatively long process. Strategies for children who are deaf given by various researchers:

Perhaps the most significant difference between the use of literacy skills in children who are hearing and SwDs is the reliance by children who are deaf on literacy skills, such as writing, as a mode of social communication (Maxwell 1985; Rottenberg and Searfoss 1992). Evidence from

the researchers

Rottenberg and Searfoss (1992) indicated that SwDs use literacy as a way to learn about and gain access to a world where the majority of individual use a verbal mode of communication. When attempts at signed communication fail, children rely on drawing

or writing to express themselves (Maxwell 1985; RottenbergSearfoss 1992). For

children who are not yet able to write or draw a clear message, environmental print—such as name tags, charts, signs, and labels—

is shown to a communication partner to convey a message (Rottenberg and Searfoss 1992). This is a cultural phenomenon that continues throughout the life of adults who are deaf. Despite the frequent use of written communication by children who are deaf, the reliance on letter-sound relationships in written language provides a significant challenge for emerging writers with hearing impairments (Williams 1994).

Without the ability to

148 hear

initial consonants in words, using the strategy of sounding out a word is not a useful approach.

Seemingly, however, children who are deaf do make generalizations about beginning sounds based on the

visual cues provided by the hand shape of the sign for the word (Ruiz 1995; Williams 1994). While this works for some words, such as names, the strategy has been observed to be overgeneralized by children to include other words without sign–initial consonant correspondence (

Ruiz 1995). A similar, more developed strategy is observed as children use finger spelling to record words in print (Padden and Ramsey 1993; Ruiz 1995; Williams 1994). As children make the connection between the finger spellings used in daily communication and the written English language, select, high frequency, personally important words begin to appear in their writing (Padden and Ramsey 1993; Ruiz 1995). Because some finger spelling is part of daily communication using ASL, many children are exposed to a variety of such words from birth. Using these words in written format shows a more developed understanding of the relationship between signed and written language (Padden and Ramsey 1993). Linking language (ASL) with printed text (English) creates a connection that is useful in reading and writing new or unfamiliar words (Padden and Ramsey 1993). Finger spelling, therefore,

should be encouraged as a viable strategy when presenting new words in the classroom. Hearing peers also find this technique helpful for remembering difficult spellings and words. 5.7

Evidence Based Practices In Literacy Development Let us first review the characteristics of readers with deafness; 1. Less aware of misunderstandings 2. Rely more on pictures 3. "Passive" readers 4. Spend less than 12 minutes a day 5. Actively engaged in print 6. Distinctly different DHH populations (diverse group) (Marschark, M., Sapere, P., Convertino, C., Seewagen, R., &Maltzen H. (2004).,Schirmer, B. (2003), Schirmer, B., Bailey, J., &Lockman, A. , (2004), Donne &Zigmond, (2008), Easterbrooks, et al, (2008)).

149 Figure #1 Musselman, C. (2000) We will review few researches under the domain of literacy and understand the concept of evidence based practices. This will assist in developing literacy in children with deafness. Domain Researchers Findings Vocabulary Luckner& Cooke, 2010 Use computers (ICT) for vocabulary instruction Fung, Chow, & McBride-Chang, Dialogic Reading 2005; Trussell&Easterbrooks, 2013 Cannon, Fredrick,&Easterbrooks, Repeated readings or 2009; Guardino, Cannon, &Eberst, viewings 2014 Beck &McKweon, 2007; Repetition Easterbrooks& Beal-Alvarez, 2013 Meaningful use in natural contextual situations Reading Stauffer, 1969 Modified Directed Reading Comprehension Thinking Activity- DRTA Luckner, J., & Handley, M. (2008) Use of well-written, high interest texts Easter brooks& Beal-Alvarez, 2013 Bi-Bi Approach Read Aloud Writing to Read

150 Domain Researchers Findings Narrative Story Grammar Technology Fluency Luckner & Urback, 2011 Repeated readings of word lists Repeated readings of passages Repeated readings of word lists and passages Decoding Tucci, Trussell, &Easter Grapheme-Phoneme brooks (2014) Correspondence With Visual Phonics, Lexicalized Fingerspelling and Chaining, Iconic/Semantic and Representation CommunicationHermans, et al 2008 Children whose teachers are better communicators learn more. Kelly, 1996 Vocabulary and grammar worktogether as a team. As a master trainer, we should keep in mind that a good teaching practice, (not intervention, method, material or strategy) that leads to positive student outcomes. Children who are identified and served early acquire language and literacy skills at a level high to those who are not identified and served early. "Early" means 6 months or as early as possible.

Parallels to children who are hearing Literacy development in SwDs is a multifaceted issue. There are many parallels to literacy development in hearing children, as well as some elements unique to SwDs (Ewoldt 1985; Padden and Ramsey 1993; Rottenberg 2001; Rottenberg and Searfoss 1992, 1993). Understanding these commonalities and differences allows educators to plan more appropriate, meaningful literacy activities

in their classrooms activities. SwDs will benefit from many of the literacy activities already in place within the regular education classroom. For younger learners, time to explore writing, drawing,

151 books, and environmental print is crucial. Story time (translated into sign –

depending upon the method of communication undertaken) and

journal writing using "invented spelling" are appropriate activities for young

SwDs. SwDs,

like their peers with full hearing, participate in literacy events and use written language in many typical ways. SwDs demonstrate

the following uses of

language (signed or spoken): a.

to interact socially with peers and adults while writing; b. to provide information about written text, to label written creations,

and to monitor the construction of text (Williams 1994); c.

to request assistance with writing tasks from adults and peers;

d. to challenge others' knowledge of literacy; and

e.

to evaluate literary works (Williams 1994). Similar parallel results can be drawn for early literacy experiences with reading (Rottenberg 2001; Williams 1994). Like their hearing peers, learners who are deaf show an interest in print and drawings (Rottenberg 2001; Williams 1994). Within print-rich classrooms and supportive homes, deafness do not significantly differentiate the process of literacy development (Ewoldt1985;) Padden and Ramsey 1993; Rottenberg 2001; Rottenberg and Searfoss 1992, 1993). However, educatorsto remember that learners also use literacy in ways unique
and variety to their deafness.

Families who are Hearing (DCHP) Some interconnections exist in language development between learners who are deaf and learners who are hearing. Language development is dependent on frequent, consistent, and accessible communication (verbal /manual). These factors are the same for children of parents who are able to hear, as well as children of parents who are not able to hear (DCDP/DCHP). The mode of communication (manual or spoken language) is not a factor (Marschark, 2001). However, SwDs and born to hearing parents generally start learning language later, and with less consistent and less useful experiences. Such students do not share a native language with their family.
Students

hearing loss, on average, is not identified until their first birthday (Marschark, 2001). These children are exposed to less linguistically rich environments than

deaf children of deaf parents (DCDP) or hearing children of hearing parents (

HPHC). As there is difference in language exposure, learners who are deaf in families with hearing caregivers commence their language learning at a later age than their

peer group (

Marschark 2001).

152 In families where parents are learning a new language, such as Sign Language or Signed English (SE) or Signing System (SS), with which to communicate with their child, children have a tendency to acquire inconsistent linguistic input (Kuntze, 1998 and Marschark, 2001).

This early language deprivation explains the troublesome statistic that 90 percent of

children

with deafness

born into families with only hearing caregivers experience delays in language acquisition compared to hearing children in hearing families and deaf children in deaf families (

understand with respect to commonalities of language) (Kuntze, 1998 & Meier and Newport 1990). Katasse (1997) has suggested a variety of strategies and techniques to provide meaningful language experiences in classroom situation, educators may

share these suggestions with families, as well as remember them in their own teaching

learning process: a.

Model social and public encounters as an adult who is deaf would. Using notes while communicating in restaurants and stores is an important way to model successful, nonverbal communications. b. Use written language to communicate within the family and classroom

if the child doesnot have verbal language. c.

Keep up-to-date on learning sign language. This includes enrolment in refresher and more advanced classes (

AYJNIHSD (D) conducts such training program) Students who are deaf will have an interpreter if they use manual communication,

but teachers can create a feeling of belonging by learning sign themselves and teaching sign

in

their classes.

Educators should not be fearful to ask learners, interpreters, and parents for assistance with signing

or any assitance they require. Classroom practice for Student with Deafness

When considering the learning environment for students with deafness, keep in mind the commonalities and differences discussed in this unit. Opportunities to read and enjoy books alone, with peer group, with teachers and with parents are important learning experiences for all students.

Make sure that students with deafness

have time to discuss their literacy experiences amongst themselves and with others (

teachers or parents). If your student uses sign language and is

just learning to sign, use written notes combined with signing to communicate. If your student is unable to come up with

a sign for an object, assist him/her in finding the written word or an actual example, and then look up the sign together.

Provide written, as well as sign/

speech

labels for classroom objects. This will help connect sign to

spoken language.

153 Organize your classroom for learners with deafness to maximize visual input. The following suggestions help ensure

that students with deafness receive information in a clear, and effective manner: a.

Write key words, phrases, and assignments on the board. b. Use visual aids whenever possible to provide additional

access to information presented in class.

c. Use an LCD / overhead projector rather than a chalkboard. Projector

allows teacher to face the students rather than have your back to them.

Digitalization helps in teaching learning process. d. Arrange seating arrangement so that students with deafness

can see and hear the majority of what is happening during class. Make sure that the light source (window or open door)

is behind the

student;

visual cues are difficult to see when looking into the light. e. Use closed-captioned videos. f. New vocabulary to be

presented to students with deafness prior to the lesson. This allows students to recognize the words and signs/speech

during the lesson and thus maximize comprehension. g. Teach students to

raise hands and be identified before speaking/ signing or responding in class. This allows students who are deaf to know

who is speaking

and

learn communication skills.

By making some modifications in your daily teaching, you can create a more visual classroom

environment.

Visual input may be considered when planning lessons and activities. Modify your story time so that you can sign/speak

as you read, or have

asign language interpreter the story as you read it aloud. If using a sign language

interpreter, make sure that s/he is signing

near the book. This shows the connection between the written words, the oral story, the pictures, and the signs

s/he is doing. As a master trainer, you can design a reading program for students with deafness by considering five

domains like; 1. Phonemic awareness: Relying on research stated above in the unit which indicates that successful deaf

readers make use of phonological information, a system to be developed to teach basic phonemic awareness.

154 2. Bridging lists and bridging: Lists (vocabulary) may be developed to bridge some of the differences between print

and sign/verbal language and the training to be provided to children. 3. Reading series: A commercially available series

(check Amazon) , multiple skills series may be used. 4. ISL development / language experiences stories: Language

experience approaches may be used, with the children signing/verbal stories and the teacher telling stories Andprovide

Appropriate Language Models Resigning, Writing And Videotaping May Be Followed. 5.8 Let Us Sum Up

To ensure that SwDs receive the

quality education they deserve, educators must understand the learning needs of

these children. Students with pre-lingually deafness (

either born deaf or became deaf before acquiring language), with no other disabilities, are a diverse group of students.

Though a multitude of factors should be considered when teaching these students, a primary one is language

development. SwDs acquire language in different ways, depending on the home environment

and teaching strategies incorporated by teacher. As you must have understood from the unit, language development plays an important role in a student's literacy learning. Literacy as we know, consist of two highly interrelated components; reading and writing. Literacy itself is a subcomponent of a higher order category that also includes direct person to person oral and manual communication. Traditionally research on the reading and writing of children with deafness has focussed on areas of perceived weakness, especially grammar and has concentrated on the word, phrase or sentence level. More recent investigations of developed countries in the field of special education of the deaf suggest that the functional reading ability of SwDs is much higher than the standardized achievement test. In the area of writing, some research developments suggest that approaches emphasizing function (meaning) over form (syntax) may be more beneficial, this may be considered as priority in research area. Some clear trends in the development of literacy skills are still emerging. A shift appears to be taking place form an elemental, step by step process toward more holistic, functional, semantic based instruction manner. The final outcome of this unit suggest that pragmatic blend of analytic and holistic techniques should be employed to develop literacy , somewhat akin to the interactive compensatory model which was advocated by Stanovich (1980).

155

Overall, having a SwDs in your classroom should not dramatically change the way you teach. Providing a developmentally appropriate, print

as well as language-

rich environment is fundamental to literacy success. Exposure to competent language models, whether sign language interpreters, educators, or peers, encourages language development. Opportunities to respond and ask questions in class also help

in language development. 5.9 Unit end exercises A. Answer in detail 1. As a master trainer, suggest strategies to improve literacy in children with deafness. 2. As a master trainer, how you will enhance emergent literacy in Preschool for Deaf and Hard-of-Hearing Children through interactive reading? 3. Discuss on "Literacy and the role of parents of children with deafness". B. Short Notes Impact of Hearing loss on ...... 1. Reading Achievement 2. Patterns of Reading Development 3. Trends in Literacy Skill Level 4. Higher Level Functioning in Literacy 5. Cochlear Implant and Literacy Development C. Experiential Learning 1. Interview five deaf adults using sign language for communication to understand the "Importance of Fingerspelling for Reading" 2. Discuss a research paper on "Reading, Writing, and Phonological Processing Skills of Children with deafness" in a group. 5.10 References Akamatsu, C. T., & Andrews, J. F. (1993). It takes two to be literate: Literacy interactions between parent and child. Sign Language Studies, 81, 333-360.

156 Clay, M. M. (1979). The early detection of reading difficulties (3rd ed.).Portsmouth, NH: Heinemann Educational Books.

Evans, M. A., Shaw, D., & Bell, M. (2000). Home literacy activities and their influence on early literacy skills. Canadian Journal of Experimental Psychology, 54, 65-75.

Gioia, B. (2001). The emergent language and literacy experiences of three deaf preschoolers. International Journal of Disability, 48, 411-428.

Goswami, U. (2001). Early phonological development and the acquisition of literacy. In S. B. Neuman& D. K. Dickinson (Eds.), Handbook of early literacy research (pp. 111-124).

New York: Guilford Press. Marschark, M., Lang, H. G., &

Albertini, J. A. (2002).

Educating deaf students: From research to practice.

New York: Oxford University Press.

Sénéchal, M., &

LeFevre, J. L. (2002). Parental involvement in the development of children's reading skill: A five-year longitudinal study. Child Development, 73, 445- 460.

Sénéchal, M., LeFevre, J., Hudson, E., & Lawson, P. E. (1996). Knowledge of storybooks as a predictor of young children's vocabulary. Journal of Educational Psychology, 88, 520-536. Sulzby, E., &Teale, W. (1996). Emergent literacy. In R. Barr, M. L. Kamil, P. B. Mosenthal, & P. D. Pearson (Eds.), Handbook of reading research (Vol. II, pp. 727- 757). Mahwah, NJ: Erlbaum. Swanwick, R., & Watson, L. (2007). Parents sharing books with young deafchildren in spoken English and in BSL: The common and diverse features ofdifferent language settings. Journal of Deaf Studies and Deaf Education, 12, 385-405. Whitehurst, G. J., &Lonigan, C. J. (1998). Child development and emergentliteracy. Child Development, 69, 848-872.

Hit and source - focused comparison, Side by Side

Submitted text	As student entered the text in the submitted document.
Matching text	As the text appears in the source.

Document Information

Analyzed document	B10_HI.pdf (D165322327)
Submitted	4/28/2023 9:07:00 AM
Submitted by	Library NSOU
Submitter email	dylibrarian.plagchek@wbnsou.ac.in
Similarity	0%
Analysis address	dylibrarian.plagchek.wbnsou@analysis.urkund.com

Sources included in the report

Entire Document

9 Unit 1 ❑ Transition From Adolescence To Adulthood. Structure 1.1 Introduction 1.2 Objectives 1.3 Transition: Concept and challenges as perceived by D/deaf adolescents and their families 1.3.1 Transition: What Is It? 1.3.2 Transition: Is It Different For Deaf Adolescents? 1.3.3 Transition: Challenges Faced By Deaf Adolescents And Their Families 1.4 Domains of Transition: Educational, Independent Living, Social-cultural And Employment 1.4.1 Education domain 1.4.2 Independent Living domain 1.4.3 Socio cultural domain 1.4.4 Employment domain 1.5 Factors influencing transition 1.5.1 Academic and personal achievement 1.5.2 Aspiration & motivation 1.5.3 Interaction & complexities 1.5.4 Environmental barriers 1.5.5 Late deafened adults 1.5.6 Concept of self and self-efficacy

10 1.6 Role of support and facilitators 1.6.1 Family 1.6.2 Peers & Community 1.6.3 Environmental support 1.7 Planning and implementing transition services 1.8 Let us sum up 1.9 Unit end exercises 1.10 References 1.1 Introduction Transition means change, it is said to be a process when individuals change from one state to another over the time. People undergo transition when they need to adapt to new situations or circumstances or developmentally change as they grow. Hence, some transitions happen unanticipated while some happen anticipated as is the case of growth and human development. You may have also undergone such transitions and realised that each one of us goes through the different transitional phases in a very unassuming way. However, in case of persons with hearing impairment (PwHI) or deafness, these transitional phases sometimes become challenging. There are various factors that influence transition for a PwHI or deafness. One of the most challenging stage with regard to transition is the transition from adolescence to adulthood. While this phase is challenging for all individuals, it is more so for PwHI as they grow to establish themselves as adults. 1.2 Objectives After completing this unit teacher educators will be able to: ● Understand the concept of transition. ● Appreciate the importance of planning and implementing transition services for preparing adolescents towards adulthood.

11 ● Explain strategies of developing independent living skills and preparing them for gainful employment. ● Describe communication, cultural and family issues to reflect in planning of services. 1.3 Transition: Concept and challenges as perceived by D/deaf adolescents and their families Transition as is mentioned above is a phase of change. We realize that change is not an easy state to adapt to, but it is essential for progress. The process of moving from adolescence into adulthood is one of the most difficult for the young people. It is the transition into adulthood that has the most far reaching consequence for most people as the state moves from a dependant to a more position of a more responsibility. Transition into adulthood brings with it lots of alterations such as leaving school or moving away from home. It can mean a huge accountability with less or no adult supervision around. Hence, the process is likely to get even more difficult for persons with disabilities and more so for PwHI owing to their dependency for communication and the resulting challenges. 1.3.1 Transition: What Is It? Transition implies shift and a variation is somewhere a source of difference between people at any one moment in time and over time, because it is the only thing in life that is constant. Transition is defined as the movement from adolescence to adulthood in all areas. A great deal of change is influenced by the minute by minute existence alongside others in a changing environment. It is during this stage that the individual is expected to pick up
skills, go through physical and psychological maturation and assume a self- identity that will
help the individual tackle the various tasks and responsibilities of adulthood. Apart from this, there are lot of changes in terms of role and responsibilities that the individual plays in the family or community at large. These transitions happen as a matter of fact for the neurotypicals unlike persons with disabilities. Transition should not be an event and should be treated like a process. Therefore, a child, his or her family, and the practitioner should be preparing for transition right from childhood onwards and throughout adolescence.

12 1.3.2 Transition: Is It Different For Deaf Adolescents? Transition can have multiple and complex impact on deaf adolescents. There can be issues pertaining to further education, occupation and social context that could arise. These can be issues that are intertwined with the individual's self-esteem, self- concept and hope. Hence the complexity of such a process would be multitude. Since this phase involves getting into university for higher education, getting employed and also that of establishing foundation to relationships in future. Deaf adolescents may find some of these issues difficult to deal with. Transition can affect both deaf adolescents and their families. Parents may experience the stress of this stage as a launching stage for future endeavors of their children. Parents also experience emotional difficulties in case the expectations of their children are not met with. Parents themselves find lack of resources to help their children with adjusting to this transition phase. If this is the case, then no wonder the transitional problems of the Deaf adolescents can be humongous in nature. Hence both the Deaf adolescents and their families have to both be in involved in an effective transitional planning process. To reiterate, transition is not an event but a process; therefore, it can be meticulously planned so as to help the Deaf adolescents deal with the transition phase. 1.3.3 Transition : Challenges Faced By Deaf Adolescents And Their Families Families of Deaf adolescents play a major role at transition. Family involvement leaves an impact on the process of transition to make it an effective transition. However, literature on transitional process indicates that family involvement is often absent from transitional planning process. Deaf adolescents report
that they have similar aspirations as their neurotypical counterparts however there are more obstacles during the transition to adult life.
It is often reported that Deaf adolescents have
limited opportunity to participate in assessment and planning services, in relation to educational and career planning. Some of the challenges faced by deaf adolescents and their families, as reported in different literature are pertaining to lack of easily accessible, comprehensive, up-to- date information about options, choices and possibilities. They lack experience of an independent social life and spend most of their time with family.
Deaf adolescents
13
reach adulthood without proper assessment of their communication needs or any concerted action to meet these needs.
Most of the further education, training and work experience placements is carried out more in terms of "care" placements, rather than a way of gaining qualification. Availability of supported employment also varies from place to place. Availability of resources pertaining to

assessment, funding and provision of equipment and support make it difficult for young people to get equipment and support as and when they need it. 1.4

Domains Of Transition : Educational, Independent Living, Social-cultural And Employment Transition from adolescence to adulthood happens across various domains, mainly in educational domain, independent living, social cultural and employment. These domains are discussed in brief as follows: 1.4.1

Education domain This domain includes both secondary and post-secondary systems.

Recent studies also challenge educators and others to focus more on transition planning and career development than just job finding skills. The importance of post-secondary education for successful adult outcomes and the need for careful transition planning

is identified and emphasized upon to ensure success. It is in the domain of education that one finds the major transitional changes as one moves from school to college to university. As far as Indian scenario is concerned, appropriate structured transitional services are lacking. This adds to the woes of Deaf adolescents who finds themselves at cross roads when it comes to decision making regarding future educational opportunities. Recent studies also reveal that deaf adolescents tend to not complete the educational programs they have enrolled in, which could be attributed to inadequate preparation by the educational system and also due to ineffective infrastructure in these educational institutions that could be accessible in nature for the deaf adolescents. Yet another factor that could be problematic is that this transition involves movement from school-initiated services to student-initiated services. It is also noticed that some of the deaf adolescents lack the essential pre requisite of self-advocacy. This is further challenged by lack of accessibility to support services for Deaf adolescents.

14 1.4.2 Independent Living domain Research

about the transition out of the parents' home is focused on 'independent living' services and supports. Several studies support the need for more research in this area, and the need to identify a range of options for young people (and their parents) who want to live away from the family home.

Life skills and independent living are interrelated. Life skill training aimed towards Independent living is facilitated only during adolescence. Hence the deaf adolescents may be under prepared as compared to their hearing friends. Yet another factor is that there is less expectations from deaf adolescents as compared to their hearing peers. So, less expectations would translate into lesser responsibility being given to them. This would further translate into dependency rather than independency. Dependent, disempowered adolescents may enter a state of learnt helplessness. Another factor that may interfere in the process of transition with regard to independent living is lack of opportunity for incidental learning. By incidental learning, it is understood as learning by being exposed to various situations that help the person pick up life skills. Deaf adolescents born to hearing parents experience this mostly. This is also the case if the deaf adolescent does not have an access to adult to adult conversation, i.e. in cases where teachers speak rather than sign or in cases where they speak in a range beyond the limit which hearing aids can decipher. In addition to this, lack of proper communication in the family adds to the complication further. 1.4.3 Socio cultural

domain Under this domain, a broad range of transition outcomes and activities, including community recreation and leisure activities, social relationships, marriage and parenting is covered. Literature reviews address this domain while examining transition to adulthood broadly and they identify this domain as essential to successful and satisfying adult living. In many cases this domain is acknowledged as one that does not receive enough attention.

Adolescence is a time when individuals are faced with the task of figuring out who they are and how they fit into the world as they go through many physical and emotional changes. Healthy social and emotional development is invaluable to life success, but there are challenges to this goal specific to deaf adolescents. Key components of social and emotional development include: (a) effective and positive communication (b) building social networks (c) independent and evaluative thinking (d) Emotional and motivational understanding of self

15 (e) Emotional and motivational understanding of others (f) Self-control and self-direction (g) Tolerance and flexibility to accommodate change (h) Empathy (i) Relationship skills that promote positive growth in others and self (j) Ability to cope with stereotyping and stigma. A developmental perspective for attaining these skills takes into consideration the differential development for deaf adolescents. The role of family in promoting healthy social and emotional development also needs special address particularly for: (a) supporting the family to support the child (b) keeping families involved across time (c) Engaging families' broader community (Deaf community) involvement. Along with families, professionals in school settings are also instrumental in promoting healthy social and emotional development by; (a) prioritizing goals (b) planning for success (c) emphasizing a comprehensive and generalized approach. It is clear that there is the need for parents and professionals working together for the current and future needs to facilitate healthy adaptation in deaf adolescents. 1.4.4

Employment domain Within the employment domain, most literature is focussed on " education to employment ". For example, education-to-labour market pathways indicate that the presence of a long-term condition is a 'hindrance' to further education and thus to future employment. Some young people with disabilities have reported choosing the type of employment based on the ability of the employer to provide equity and accommodations. Strategies to address education- employment

transitions are also described in the literature. They include the need for interprofessional and inter-system efforts; real-life experiences and opportunities for work through situated education; and the development of student-focused strategies such as collaboration and data-driven decision-making for service providers.

Transition to work is a challenging area as there is lot of preparation to be carried out on part of the deaf adolescent. Deaf adolescents need to gather information about various occupations so as gear themselves up for choosing one among them. They also need to appraise themselves or be appraised by other about the roles and responsibilities 16 that an occupation would entail and necessary accommodations accompanying it. If no accommodations are provided, then Deaf adolescents should be assertive enough to ask for them a successful employment. Families of deaf adolescents could also be encouraged to communicate their high expectations of career outcomes to the adolescents. In order to improve their career maturity, deaf adolescents could also take up part time jobs or some supported employment before actually getting into a proper vocation. 1.5 Factors influencing transition: Academic and personal achievement, aspiration & motivation, interaction & complexities, environmental barriers, late deafened adults; concept of self and self- efficacy There are various factors influencing transition. Some of them are as follows: Academic and personal achievement, aspiration & motivation, interaction & complexities, environmental barriers, late deafened adults; concept of self and self- efficacy. These are being discussed below: 1.5.1 Academic and personal achievement Academic achievement is essential for individual's well-being. It is during primary- to-secondary transition in which many children are particularly vulnerable to lower levels of academic achievement. Low achievement during this period tends to be succeeded by school dropout and other issues. Academic self-concept or perception regarding academic topics and learning has various components including a cognitive component and an affective-motivational component. Research indicate that academic self-concept decreases between the end of primary and the beginning of secondary education. Student feelings about school and how much they enjoy school may also be impacted by school transitions and affect child achievement. Because intervention research suggests that a positive school climate can benefit children' mental health and academic outcomes, several studies have investigated whether changes in the school climate between primary and secondary education contributes to decline in academic outcomes post-transition. 1.5.2 Aspiration & motivation Aspiration and motivation do play a significant role in transitional process. Aspirations are cognitive representations of a goal that help direct and organize behaviours and can include educational or occupational hopes, desires, ambitions and inspirations. Research

17 has found that students who maintain a clear sense of purpose and direction (and who have appropriate support systems) are likely to make adaptive transitions into adulthood. In addition, research on motivation and youth has highlighted the important role that perceived competence and instrumentality/value have on school completion and post- secondary plans. Educational and occupational aspirations are important indicators of successful developmental outcomes. Aspiration of young deaf adolescent is somewhere influenced by parents educational and social background. Young deaf adolescents own motivation and outlook is crucial to influencing him or her to aim high. Parental support and motivation influences the young deaf adolescents to complete their education and also choose an appropriate vocation, thus ensuring a successful transition into adulthood. Hence, aspirations influence later educational and occupational attainment and successful adaptation from adolescence into adulthood. 1.5.3 Interaction & complexities By interaction, we mean associated conditions that a young deaf adolescent has to deal with, along with his or her disability. Deaf adolescents

may become involved in criminal behavior and substance abuse which may increase the complexity of their situation.
It may result in negative outcomes as far as their education and employment is considered. There are other forms of disadvantages that they have to interact with, like ethnicity, poverty etc. In some cultures, gender too becomes a complex interaction with disability. Knowledge about these complexities and interactions among deaf adolescents is limited; hence the deaf adolescent lack information on how to deal with them.
Studies have shown that having a disability and completing secondary education positively influences future employment outcomes. 1.5.4
Environmental barriers Environmental barriers described in the literature are the people's attitude towards youth with different types of disabilities.
Apart from this,
lack of knowledge about options and understanding of disability-related needs of youth by service providers, educators, parents and community members affects a young person's transition process negatively.
Lack of opportunities, choices and experiences in childhood through adolescence and the transition also has a profound impact on adult outcomes.
Socioeconomic status can also be another barrier that the environment of the family can pose.
Other family factors include parents' low expectations for the future
and their lack of knowledge and information to help their young adult.
18 1.5.5
Late deafened adults When it comes to late deafened adults, the fact that they had an unexpected hearing loss itself causes complications for them like lower levels of adjustment, decreased sense of happiness that does not ameliorate over time and of course, greater belief that they have disability since they have had a sudden onset. Some of them experience depression and tend to feel isolated and helplessness. These can affect their academic achievement. They tend to have adjustment issues on office front and it becomes imperative to educate employers on effective communication strategies and to maintain incidental professional learning experiences so as to enable successful transition into adulthood. 1.5.6 Concept of self and self-efficacy Self-efficacy refers to the individual's capacity to deliver his best. Correspondingly, self-efficacy beliefs are the beliefs about what means is to goals and about possessing the private capacity to use these means. Purposive actions also as positive self-esteem preceeds corresponding self-efficacy beliefs. The individual development of self-efficacy beliefs has its roots in youth experiences, within the use of degrees of freedom and within the experience of success and failure counting on appropriate causal attributions. Individuals with high self-efficacy beliefs also report strong feelings of well-being and high self-esteem generally. Self-efficacy beliefs influence motivation, perseverance, social attitude, health, recovering from illness, learning efficiency, and so on. It feels good to be good. Such persons are willing to require initiatives in related domains, to use effort if needed, and persevere in efforts as long as they believe their efficacy. Clearly, such initiatives may sometimes be unsuccessful but more often they supply learning chances and cause new experiences opening up new perspectives of the planet and of the private development. Optimistic persons with a high sense of self-efficacy don't hand over easily and are ready to overcome difficulties that others don't. Hence it matters how the young deaf adolescent views himself and what self-efficacy beliefs he holds. it's reported that deaf adolescent may experience poor self-esteem which can hamper a successful transitional process. 1.6 Role of support and facilitators Family, peers, community; agencies and environmental support Transition is a difficult process and has its impact on the deaf adolescents. If these adolescents have very supportive environment, then transition becomes easy and

19 successful. Supportive environment can be in form of family, peers, community agencies and any other environmental support. 1.6.1 Family Family is the basic and primary unit in the life of an individual. Child develops through the complex interweave of nature and nurture and family plays very crucial role in the development of the child. The family provides for the child's physical needs and fosters the development of an integrated person capable of living society and transmitting culture.

A family must generate income, protect, and maintain its members and residence, nurture, and love one another and see to it that children are taught social norms and educated. When a person is handicapped, these responsibilities become more crucial. There is the expense, the time, the energy needed to care

of the disabled member and his/her safety. Deaf person needs help at each stage of life like early childhood, school entry, adolescence and adulthood. Families play significant and multiple role in raising deaf child though the role at each stage may differ. It becomes imperative of the family to pick up proper advocacy skills so as to be a strong support for their adolescents. If the families keep themselves informed of the various choices pertaining to education as well as career.

20 1.6.2 Peers & Community

Physical and emotional changes that are part and parcel of adolescence, growing up also involves changes in roles, relationships, expectations and status - within family, amongst friends and within the wider community of home, school and work.

Social experiences have a crucial impact on a person's well-being in the short and long term. In early adolescence, the school—in particular; the classroom are important contexts for social experiences with peers who spend increasing amount of time together especially after the transition to junior high school. It is important to first realize that in early adolescence (ages 10–14) the nature of personal relationships changes. Relations become more important, deep and dyadic in nature and increase the sense of well-being. For early adolescents, the classroom is a very important context in which they spend a large part of their daily life and is a critical context for feelings of well-being. Hearing children indeed mention communication difficulties as a serious problem in forming friendships with deaf children. 1.6.3 Environmental support

People's attitudes towards youth with different types of disabilities and ethnic status in general influences all aspects of transition and also interacts with many of the other environmental factors; -

Lack of knowledge about options and understanding of disability-related needs of youth by service providers, educators, parents and community members affects a young person's transition process negatively -

Lack of opportunities, choices and experiences in childhood through adolescence and the transition itself has a profound impact on adult outcomes. -

The narrow focus of transition services, especially within schools, on preparation for post-secondary education instead of addressing the 'life course' needs of youth in all domains of transition. - The positive influence of peer networks and mentoring/personal advisor/navigator relationships to provide the support to youth and parents to access opportunities and experiences. - Flexibility and individualized supports can benefit youth entering employment. Technology can be a great support if used appropriately.

21 1.7 Planning and implementing transition services Adolescents with disabilities and their families face challenges, especially at critical transition points in their lives. Such transitions include moving from middle school to high school, moving from high school to employment, entering a post-secondary education program and deciding to live independently in the community. The success of each transition is contingent upon the coordination of several factors such as services, experience and programs that assist individuals in selecting and achieving goals. The student with disability should be at the core of transition planning. The development of a concrete transition plan is an important and tangible outcome, it is not the most critical outcome. When a transition plan is successful, students may experience changes in the way they view themselves as well as the way in which they interact with others. Students during the transition process should experience a variety of opportunities in which they are able to take charge of important life decisions in a manner reinforced by their teachers and parents. These opportunities facilitate a growing sense of empowerment and a reduction in feelings of helplessness. This sense of empowerment is fortified by a new set of skills; students learn planning and problem solving processes that can be used throughout heir lives. Some of the themes around transition that could be considered while planning transition services are as follows: 1. Student participation is crucial 2. Efforts must be made to involve families in the transition process 3. Teachers need to be aware of the feelings of parents of deaf children 4. Transition planning should start in middle school 5. Transition planning must be sensitive to cultural factors 6. Transition planning must be comprehensive Having looked at the themes around transition, the process of transition could be further enhanced if teachers could contribute to the process of transition. Here are few things that could be carried out:

22 1. Teachers should help deaf students explain the purpose of transition planning in their own words and discuss expectations that will occur during this process. 2. Teachers should teach students how to participate in the transitional process. 3. Teachers should create opportunities for deaf students to prepare for the goals they have set for themselves. 4. Teachers should teach deaf students life skills which they could use in real life situations. 1.8 Let us sum up ● Transition implies change and change is somewhere a source of difference between people at any one moment in time and over time, because it is the only thing in life that is constant. ● Transition is defined as the movement from adolescence to adulthood in all areas, including home, health care, education and community. ● Transition from adolescence to adulthood happens across various domains, mainly in educational domain, independent living, social cultural and employment. ● Academic achievement is essential for individual well-being across the lifespan. The primary-to-secondary transition is a critical period of development in which many children are particularly vulnerable to lower levels of academic achievement. ● Aspiration and motivation do play a significant role in transitional process. Aspirations are cognitive representations of a goal that help direct and organize behaviours and can include educational or occupational hopes, desires, ambitions and inspirations. ●
Environmental barriers described in the literature are the people's attitude towards youth with different types of disabilities.
Apart from this,
lack of knowledge about options and understanding of disability-related needs of youth by service providers, educators, parents and community members affects a young person's transition process negatively. ●
Optimistic persons with a high sense of self-efficacy do not give up easily and are able to overcome difficulties that others do not. Hence it matters how the young deaf adolescent views himself and what self-efficacy beliefs he holds.
23 ● Transition is a difficult process and has its impact on the deaf adolescents. If these adolescents have very supportive environment, then transition becomes easy and successful. Supportive environment can be in form of family, peers, community agencies and any other environmental support. ● Families play significant and multiple role in raising deaf child though the role at each stage may differ. It becomes imperative of the family to pick up proper advocacy skills so as to be a strong support for their adolescents. ● In early adolescence, the school—in particular; the classroom are important contexts for social experiences with peers who spend increasing amount of time together especially after the transition to junior high school. ●
People's attitudes towards youth with different types of disabilities and ethnic status in general influences all aspects of transition and also interacts with many of the other environmental factors. ●

The student with disability should be at the core of transition planning. The development of a concrete transition plan is an important and tangible outcome, it is not the most critical outcome. ● The success of each transition is contingent upon the coordination of several factors such as services, experience and programs that assist individuals in selecting and achieving goals. 1.9 Unit end exercises - What do you understand by transition? - What are the challenges faced by deaf adolescents and their families due to transition? - Explain about the domains of transition. - Explain in brief about the social- cultural and employment domain of transition. - What are the factors influencing transition? - Explain about the role of support group and facilitators in transition. - What are the steps for planning transition services? - What factors need to be considered for implementing transition services? - Explain about the environmental barriers that affect transition.

24 1.10 References 1. Corker, M. (1996) Deaf transitions: images and origins of Deaf families, Deaf communities and Deaf identities. Wiltshire, Cromwell press. 2. Hardy, R.E. & Cull, J.G. (1979) Educational and Psychosocial aspects of Deafness. Illinios, Charles C Thomas publishers. 3. Pandey, S. & Agarwal, S. (2013)
Transition to adulthood for youth with Disability: Issues for the disabled child and family,
IOSR Journal of Humanities and social science, 17(3), 41-45 4. Garay, S. (2000) Transition Planning Process: Giving Deaf students a voice. Unpublished doctoral dissertation, University of Kansas, Lawrence.

25 Unit 2 ❏ Independent Living Structure 2.1 Introduction 2.2 Objectives 2.3 Concept and its Importance 2.3.1 Concept of Independent Living 2.3.2 Concept of Activity of Daily Living 2.3.3 Importance of Independent Living 2.4 Money Management and related Financial Skills 2.4.1 Concept of Money Management and Financial skills 2.4.2 Financial Literacy for IwDs 2.4.3 Financial Wellness 2.5 Health and physical fitness skills 2.5.1 Concept of Physical Fitness Skill 2.5.2 Benefits of Physical Activity for Individuals with Deafness 2.5.3 Adaptation in Physical Education 2.5.4 Concept of Health Skills 2.6 Life Skills: Social-etiquette and Mannerism 2.6.1 Concept of Core Life Skills 2.6.2 Importance of Life Skills Education 2.6.3 Need, Importance and Scope of Life Skills Training 2.7 Leisure Time, Hobbies and Recreational Activities 2.7.1 Concept of Leisure Time, Hobbies and Recreational Activities 2.7.2 Benefits of Recreation Participation for IwDs 2.7 Leisure Time, Hobbies and Recreational Activities 2.7.1 Concept of Leisure Time, Hobbies and Recreational Activities 2.7.2 Benefits of Recreation Participation for IWDS Activities

26 2.8
Let us Sum up 2.9 Unit end exercisess 2.10 References 2.1 Introduction As an educator,
you must have heard the word "independent living" very often. Do the words "Independent Living" mean anything specific to you? The answer is simple, yet hard for many individuals to be understood. Independent Living (henceforth, IL) is the name of a movement, of a philosophy which is a prerequisite for an equal andinclusive society.The IL Movement was launched in 1960s by a group of Individual with Disabilities (henceforth, IwDs)in the USA, who had the purpose to change the paradigm with regards to the concept of disability at that time. The term 'special education' was predominant then, a concept that some might think is what children with disabilities need, but in reality it is a form of segregation. IwDs are not special because of their physical, sensory or mental conditions. They can be special because of their personal characteristics, needs, talents, achievements and interests. They have a right to live life like anyordinary people as well in a society. However, the medical model of disability perceives the person first and foremost as a person with a concern on diagnosis. The emphasis is to focus on the problems(concerns) that arise from the disability, the things that one cannot do due to their disability. This is what experts like Ed Roberts and Judy Heumann in the USA and Adolf Ratzka in Europe struggled to change the concept. As IL ideologists, they understood the importance of the values of self-determination, self-representation and de-institutionalisation, if we are to live in a world of equality with respect and dignity. AdolfRatzka a ideologist gave a precise definition of IL as, "IL is having the same range of options and same degree of self-determination taken for granted by non-disabled people". IL is simply based on the principle of right to live life in society, "nothing more, nothing less".This is what the social model of disability also declares, it sees the person first in its essence, character, personality, individuality and abilities. Everybody is good at something, as long as s/he is given the appropriate environment to develop their potential. The 'disability' does not come from the impairment (be it physical, sensory, intellectual or psychological). It is created by the inaccessible environment (read the definition of disability under UNCRPD). The origins of the approach can be

27 traced again to the 1960s. However, there is still long way to go until all countries and societies fully implement it. For an equal and dignified life, everybody should have access to society. Too often this is not in the case for IwDs who live an isolated life, because they cannot go out of their homes, or even reach the places where everybody else goes, or even in some cases because they are locked in institutions, the issue being related to accessibility. For a true access to society, the need of social services, personal assistance, barrier free environment (rather least restrictive environment), housing options and technical aids/appliances has to be satisfied. This means that political will is required for these factors to be provided in a country, no matter whether one lives in a rural or urban area. One of the main tools which the IL Movement uses is the UNCRPD, and in particular it's Article 19. It sets out the right to choose where, with whom and how to live one's life in a society. This convention focusses on the aspect of self-determination.UNCRPD was intended as a human rights tool with an explicit, social development dimension. We will be able to see its goals achieved only when the ideas of human rights and equality standing behind the UNCRPD are fully understood by societies and there is a political will to change it. This unit on ILaimsin raising awareness on a significantly important topic for all societies, if we want to live in a world of equal opportunities and respect of differences, a world of inclusion, we need to learn how to accept the differences. As an educator, how you can impart the life skills, money management skills, health skills to IwDs so as to realise the beauty of life is in its diversity and work on independent living. 2.2

Objectives After completing the course, teacher educators will be able to ●

Appreciate the concept and importance of independent living. ● Discuss the transition from Activities of Daily living to Independent Living. ● Explain various strategies of developing independent living skills and preparing them for gainful employment. 2.3 Concept and its Importance Let us first understand, the concept of independent living. IL is living just like you and me (everyone else) having access to opportunities and to make decisions that may have an impacton one's life, able to pursue activities of one's own choice, restricted

28 only in the same way that one's non-disabled neighbours in society are restricted. The definition is not restricted in terms of living on one's own, being employed in a job that is suitable as per one's capabilities and interests. These are the major domains of living independently. IL is based on the philosophy of 'self-determination', this means having the right and the opportunity to pursue a course of action that is available to others in the society. It focusses on having the freedom to fail and to learn from one's failures, just as everyone else have (non-disabled individuals). There are, individuals in our society who have certain impairments, which may affect their abilities to make complex decisions or even pursue complex activities in society or daily living. For IwDs,IL means having every and equal opportunity to be as self- sufficient as possible. IL isn't easy, and it can be risky for many IwDs. But millions of IwDs in our country rate it as higher than a life dependency and narrow opportunities and unfulfilled expectations. 2.3.1 Concept of Independent Living Most of us, take for granted the opportunities that we have regarding living arrangements, employment situations, means of transportation, social activities, cultural associations and recreational activities, and other aspects of everyday life. For many IwDs, however, barriers in communities severely limit their choices and accessibility. These barriers may be obvious, such as lack ramped entrances for individuals who use wheelchairs, lack of interpreters or captioning for individuals with hearing impairments, lack of Braille or taped copies of printed material for individuals who have visual impairments. These barriers result in low expectations about things around environment thatIwDs can achieve. Quick Recap: IL simply means the capability to examine alternatives and make informed decisions and direct one's own life in society. This ability requires the availability of information, financial resources and support systems. It is a dynamic process, it can never be static. 2.3.2 Concept of Activity of Daily Living Activity of Daily Living (henceforth, ADL) are those occupational performance tasks that an individual does on every day basis to prepare for/or as adjunct to role task.ADL are tasks of self, maintenance, mobility, communication and home management enables

29 an individual to achieve personal independence in his/her environment.ADL comprises of the basic actions that involve caring for one's self and body, including personal care, mobility, and eating. ADLs are often termed as physical ADLs or basic ADLs that include the fundamental skills typically needed to manage basic physical needs, comprised the following areas: a. grooming/personal hygiene, b. dressing, c. toileting/continence, d. transferring/ambulating, and e. eating. These functional skills are learntduring early days of life and are relatively more preserved in light of declined cognitive functioning when compared to higher level tasks. Instrumental Activities of Daily Living (IADLs), includes more complex activities related to IL in the community (example; managing finances and medications). IADL is sensitive to earlydecline in cognitive abilities, whereas physical functioning is often a vital driver of basic ADL ability (Cahn-Weiner et al., 2007). Let us understand the concept of Activities of Daily living by flow chart; The ability to perform BADLs and IADLs is dependent upon cognitive (example- reasoning, planning), motor (example- balance), and perceptual (including sensory) abilities. There is also the important distinction of the individual's ability to complete the task (physical and/or cognitive ability) versus the ability to recognize that the task needs to be done without prompting (cognitive ability). ADLs are directly assessed by occupational, physical or speech therapists, or by other members of the medical team to guide day-to-day care and/or as part of discharge

30 planning. Referral for evaluation of ADL ability may include a question of cognitive, emotional, or behavioral factors that may be interfering with functioning in these basic skills, and how these barriers may be overcome to enhance independence. DSM-5 diagnostic criteria for Major Neurocognitive Disorder also give specification on functional impairment with IADLs that must be present for the diagnosis (American Psychiatric Association, 2013). ADL assessment may also occur as part of a broader capacity evaluation for independent living or guardianship. Let us now classify ADL with suitable examples:- Self-care Mobility and Home Personal Activities transfer management Hygiene Examples Examples Examples Examples a. Personal Hygiene a. Transfer in bed a. Meal a. Hair care – b. Grooming – b. Ambulation and preparation Combing, planting, dressing/under Transportation b. Meal service tying, washing dressing c. Driving (if c. Cleaning b. Teeth care – c. Feeding applicable) activities brushing, gargling d. Communication (sweeping, c. Shaving – swapping, manual/electric razor dusting etc.) d. Blowing nose d. Laundry e. Applying make-up activities f. Toileting activities e. Sewing – squatting and activities getting up Indian toilet f. Marketing g. Western style – activities cleaning with water g. Childcare or paper activities h. Washing h. Operating i. Bathing – pouring Household water and applying appliances soap, washing upper limbs, washing lower limbs & other parts of body. j. Drying self

31 As an educator, we should make transition plans from ADL to IL (Please refer to transition unit of Paper B10). 2.3.3 Importance of Independent Living IwDs can take the initiative in directing their lives and act as experts on their particular needs. The IL approach affords IwDs the opportunities for personal choices and the benefits of technology that can assist in their independence. The philosophy holds as its maxim that IwDs are themselves better at assessing their needs than anyone else. This is a form of disability empowerment. To be able to direct their lives, such IwDs must organize so that they will have the political power to promote solutions for their dignity and voice. Among the ways that IwDs can be empowered are with three main domains namely With the empowerment that more independence affords them, IwDs can attain a sense of independence and self- sufficiency. If provided the ability to participate in society on equal basis without the barriers these individuals can have normalcy, a condition that allows them to attain a sense of pride and freedom and control over their lives. Often, assistive technology or even AAC (alternative augmentative communication) is extremely helpful in supplementing ability. The IL approach affords IwDs the opportunities for personal choices and the benefits of technology that can assist in their independence. With this independence, such IwDs have an enhanced pride and dignity in themselves. For, they can live more independently as they direct the course of their lives without the imposition of a government agency. Like others, they are individuals with personal desires, and by having more independence, they can better fulfil these desires. Most importantly, with the IL approach, IwDs have

32 many of the same opportunities that non-disabled people do. This approach allows these IwDs to live with equal opportunities and thrive within their own terms and conditions. 2.4 Money Management and related Financial Skills In this sub unit, we will discuss the domain of money management and financial skills under IL and as an educator how we can develop these skills in IwDs. Self-sufficient adults need money management skills as well as financial wellbeing skills. This sub unit is about the very basics of money management and financial skills, and would apply to IwDs who are just beginning to be responsible for themselves, someone who is new to the Indian currency (Rupee) and working within our banking system, or someone who has not had to manage on a fixed income before, such as those receiving social security disability benefits under various government schemes. 2.4.1 Concept of Money Management and Financial skills Money Management refers to how to handle all aspects of finances, from making a budget for where each pay cheque goes to setting long term goals to picking investments that will help to reach the financial goals. Any amount of money can always prove to be too little if one doesn't haveeffective money management skills. Financial skills refer to the capability to use relevant knowledge and understanding to manage an expected or an unpredictable situation in order to solve a financial problem and convert it to a benefit and opportunity to one's advantage. These skills can be acquired or can be learned through a financial education background. Since budgeting allows one to create a spending plan for money, it ensures that you will always have enough money for the things you need and the things that are important to you.As an educator we need to teach these skills to our students. Becoming disabled later in life requires acceptance of many changes, including a change in mindset and in his/her financial plans going forward. Money may now need to be allocated for making adjustments to in their home, and budgeting needs to include medications and regular doctor visits or therapy. It is important to incorporate these changes into their ongoing budgeting plans and to acquire sound financial habits for student's future. 2.4.2 Financial Literacy for IwDs The ability to make informed financial decisions is essential for basic functioning in Indian society. These decisions range from simple daily spending like food, clothing, 33 stationary and budgeting, to choices of insurance, banking or investment products, to saving for retirement, and higher education. They have profound implications on the financial security, financial well-being and the prosperity of individuals and families. Financial knowledge and confidence may also be linked to financial behaviours already identified as priorities for policy-makers including use of electronic funds transfers, credit and debt management, participating in disclosure processes, access to basic banking or use of fringe financial services, use of credit counselling services, and participating in public programs intended to increase financial security (such as education savings or retirement income supplements). Even the 21 st century new literacy skills includes traditional literacy skills, such as reading, writing, and writing, but more importantly, it includes literacy skills, such as critical thinking, financial skills, financial reasoning, and multi-cultural awareness on monetary exchange (NCTE, 2008; Wagner, 2008). Financial literacy includes the following three-dimensional construct; a. Financial knowledge and understanding: The ability to make sense of and manipulate money in its different forms, uses, and functions, including the ability to deal with everyday financial matters and make the right choices for one's own needs. b. Financial skills and competence: The ability to apply knowledge and understanding across a range of contexts including both predictable and unexpected situations and also including the ability to manage and resolve any financial problems or opportunities. c. Financial responsibility: The ability to appreciate the wider impact of financial decisions on personal circumstances, the family, and the broader community and to understand rights, responsibilities, and sources of advice or guidance. Although the concept of financial literacy is a range along which all consumers may move, market structures may be creating particularly vulnerable groups, including persons with physical, sensory or cognitive challenges that constitute a disability. Financial and government services and schemes are evolving quickly and in ways that place a greater burden of responsibility for informed decision making on individuals(please refer to Paper B11 unit 1). We should expect that financial skills, understanding and confidence will only continue to increase in importance for all Indians. 2.4.3 Financial Wellness Financial wellness includes not only understanding how to manage money but also how to make wise financial decisions that can improve your overall well-being. Figuring

34 out how to maximize these benefits in your life requires information and skills. Whether you have handled finances for yourself or your family or aids and appliances for years or have recently taken charge of your money, here is a quick overview of basic money management to guide your habits, actions, and choices. Skill No.1: Understanding Forms of Money: Cash is probably the easiest form of money to recognize or spend. Any amount of money can be written in the form of a cheque to be deposited as money in your bank account or cashed for bills and rupees. And any amount of money (cash, cheque, or payments) can also be deposited in a bank account either in person, at an ATM or electronically. Some people have gold or silver coins that are worth a certain amount (that can vary daily) and considered legal tender (in some countries not all) but these coins must be exchanged for currency in order to be used for purchases. While not considered cash, other items that may be used for purchases or exchange, which we as an educator should explain IwDs like; a. Money Orders (this is available at various businesses, banks, the post office or check cashing establishments), b. Certified Cheques (signed by you but the bank certifies that you have the money in an account to cover the cheque), c. Cashier's cheques (issued directly from the bank and considered more secure than a certified cheque), d. Traveller'scheque (most often used as a safe alternative to cash or credit cards when traveling outside the India but can also be used in the India), Electronic transfers of money are used extensively now through such systems as ACH (Automated Clearing House) and EFT (Electronic Funds Transfer). Both terms can be used interchangeably and refer to a transfer of funds from one bank account to another electronically. As an educator, these concepts can be first taught in class and then by taking them to Bank. Skill No. 2: Setting a BudgetPlan :This is oneskill related to money management that as an educator you can conduct by various activities. Money management skill can make or break individual or family finances, 'Budgeting'. When individuals don't know where all their money goes or they don't have enough money to take care of their expenses, the fault often lies in ignoring the budget process, which includes spending and saving. 35 There is probably more information on the Internet and in finance books about creating a budget on money-related topic. Simply to put, a budget is a record of money coming in and money spent. As an educator, you can create a budget for students for each month, each week, each day or even over a year or longer. When a budget works, one can feel more secure in knowing that you can take care of yourself and plan for the future instead of worrying constantly about finances. First, teach students to have an accurate picture (concept) of the money you have and how you spend it. Here are two simple ways that might work for you if you are new to budgeting or if your current plan is not working. 1. Keep a daily log by writing down every item you purchase and any bills that are paid by cash, check, or electronic transfer. You can teach students, how to estimate what you spend on food, for example, by keeping track of grocery receipts. But once you write down each trip to a coffee shop or every pizza delivery from Dominos or Pizza Hut, you begin to get a better idea of what you spend on food and drink. For example, in two weeks or even a month, you may not spend money on clothing. But at some point you or someone in your family may need new shoes that you have to buy. For one month it might look like you don't need to budget much for clothing but over time, you will. The same thing can happen to utility bills that can vary wildly depending on the weather or need a repair of aids and appliances. A simple daily log can be valuable information in figuring out what expenses you can expect, bearing in mind that unplanned expenses can always be on the prospect. 2. Set up a monthly budget for students that you may plan. Monthly budget simply means writing down all expected expenses into various categories such as rent, utilities, food, personal care, health care, transportation, recreation, aids and appliances and others. Example;For some categories, such as rent, you know exactly what the amount is. For others, you can estimate an amount, either based on analysis of your daily log or past experience of expenditure incurred on aids and appliances. Of course, percentage of saving may vary greatly depending on one's personal needs in each of categories. One's health care needs may also be a bigger expense than most people although there are several programs available in communities and states to help with costs related to your health and disability (example; aids and appliances, therapy). Example : Teach students to review the monthly budget amounts you have written down next to each category and under the figure put the exact amount spent in that

36 category until the end of the month. At the end of the month, review how close your estimates came to covering your expenses. You can even teach students to make adjustments for amounts budgeted for the upcoming month and repeat the review for at least two month so as to understand the concept of budgeting. Did you notice that Skill No. 2 is Setting a Budget for Spending and Saving? The easy part is coming up with what you are spending. Sometimes you might feel you have little control over what you have to spend for something, such as housing or your monthly transportation costs. Here is where you can really get creative by teaching how to spend less and save more. Once you teach students to have the basics of money and budgeting, you are ready to tackle a few more advanced skills to build your expertise on students. Here in this sub unit, we will focus on credit and debt, planning for unexpected expenditure, adding to income, and continually improving finance knowledge and skills. Here are few Examples which you as an educator can teach to students in classroom; 3. Expense tracking Name_____ Date_____ Expense Tracking Date Expense Description Amount Category 4. Purchase Decisions As an educator, you can have snack time purchase decision activity in class; ✓ Use snack time in the classroom as a shopping decision activity. ✓ Have food choices for snack time (for example, it can be Poha, Upma, Bread Butter or two types of fruit) ✓ Give each child 30 rupees in play money. ✓ Tell the students that they are shopping for their food snacks today.

37 ✓ Have each child select one snack and pay for it with his/her play money. ✓ Collect the price of the snack from each child. ✓ Different snacks could be of different prices. For example, Bread butter can be Rs 10/-, Poha can be for Rs 20/- and so on. Now fill in the table Item Money you had (+) Money spent (-) Savings Bread butter / Rs 20/- Poha/Fruits/ Upma Skill No. 3: Handling Income and Expenditure (Credit and Debit) :Some information about the use of credit cards was covered in the above section on understanding forms of money. But here in skill no.3 ,we will focus more on credit itself as the ability to purchase goods and services with a promise to pay in the future. Remember back in school where you were graded on spelling tests or projects all resulting in a final grade for a class that when all grades are calculated resulted in a cumulative GPA (grade point average).What is the concept of credit score? A credit score simply refers to grade point average. Everyone who has any history of purchases at all on credit, from buying a car, paying electric bills, or taking out a student loan has a credit score. Skill No.4: Planning For Emergencies:What would you do if you were suddenly confronted with a Rs40,000/- repair bill on your aids and appliances or you have medical problem? But as we just discussed previously in this sub unit, having money saved for unplanned events is one of the best ways to avoid debt and meet your goals of financial wellness.Now,think of activities that you can plan in classroom focussing on unexpected expenditure. Skill No. 5: Adding To Your Income : Once you set up a budget, you have to carefully watch your spending to make sure you don't spend more than you have each month. At some point, you might wonder if there is some way you can boost your income beyond your disability payment. You might want to investigate as possibilities for adding income to your monthly or yearly budget to help with expenses or setting up a healthy emergency fund. Reduce spending : Are there any items in budget planned that can be eliminated or lowered? For example, one can save money on food by paying attention to specials, buying only items that are on sale, using coupons, or buying in bulk? It will take some

38 time to re-organize your expenditure accounted on grocery shopping and menu planning but the rewards of money management can be significant in future. Pause and think of activities related to; 1. Teaching budget in class .... 2. Savings that can be taken as a class activity .... 3. Bank transaction .... 2.5 Health And Physical Fitness Skills 2.5.1 Concept of Physical Fitness Skill An ideal physical education program would be one that focuses on aspects leading to lifelong participation in and enjoyment of physical activity accompanied by appropriate and suitable fitness levels. Often, physical education classes are the only physical activity that many students receive throughout the day, and without them, an even greater number of students, including those who are deaf, would be likely tobe associated with aspects associated with inactive lifestyles. Schools need to involve their students in daily physical education classes so as to enable overall wellbeing. The emphasis of such a program should be placed on promoting physical fitness and developing skills that lead to a lifelong enjoyment of physical activity and healthy lifestyles. This sub unit discusses on the state of physical fitness among students withdeafness and describes how as an educator, one can implement at a school level for students with deafness. Not everyone agrees that physical education (PE) classes are an important aspect of a student's overall education plan. In many countries, elementary schools have de- emphasized the role of PE by reducing the amount of time required for PE classes and downplaying the need for structured environments that promote adequate levels of physical activity (Sammann, 1998). Moreover, fitness activities such as running, football and doing sit-ups, push-ups, and other physically demanding exercises are often non-existent in many of these classes (Sammann, 1998). This trend is particularly upsetting for IwDs, given that they tend to be more prone to lower fitness levels associated with low-activity lifestyles (Jansma& French, 1992).

39 Although evidence of the involvement of students with deafness in PE is lacking, we do know that approximately 70 percent or more of all students who are deaf are educated in government school programs. Thus, in most of the schools if we observe, the PE programs will be similar to those of their hearing peers. According to Chen (2018), Physical education (PE) is a very important discipline since it helps on the development of students' cognitive abilities and motor skills, also affecting students' decisions and behaviour about their own health. Most of teaching and learning process regarding this discipline focus on a perspective of physical aptitude, while others replicate the social framework. The terms "body culture", "body movement culture" and "movement culture" were formed to support a new view of physical education. On that new perspective, the concept of culture gains more (Bracht, 2005) importance and redefine the relationship among physical education, body nature and knowledge. Human development is linked to various factors such as: genetics, ethnicity, hormones, among othersalso including exogenous or environmental factors such as nutrition and physical activity as pointed by Lima, (2001). Currently, the Dynamic Systems Theory (DST)stated by Gorla (2007) is used to study human development. Dynamic systems are systems of elements that change constantly. This theory states that through self-organization, it is possible to understand the emergence of new behaviours within motor development through dynamic relationships between humans and the environment. The areas of application include motor development, perceptive and cognitive development, and social development. As pointed by Manoel, (1996), the motor development limitsthe involvement of the dynamic relationships among environment, person and motor task, being relevant to understand the development itself. Literature on IL describes that the continuous process of motor development goes from simple and unorganized movements to complex abilities, from birth to death. Organisms in development are complex as they are constituted of many components, which are in continuous interaction among them and with the environment. These interactions may cause changes in components and in the whole system, which is called multi-causality. According to Smith &Thelen (1993), the development can be described as a series of evolving and dissolving patterns of varying dynamic stability, and are not an inevitable march toward maturity. 2.5.2 Benefits of Physical Activity for Individuals with Deafness The definition of physical activity stated by WHO (2019) , may vary and one of them is that physical activity is the body movement produced by skeletal muscle that

40 increases energy expenditure. It is linked to the improvement of human psychic, affective, social, cognitive and motor development. Many research studies have shown that moderate-intensity physical activities have significant health benefits. Physical activity reduces the risk of cardiovascular disease, diabetes, depression, obesity; while the lack of physical activity increases it. Even in case of patients with specific disorders (example; cancer or diabetes) physical activity may bring beneficial effects such as reducing fatigue, improving physical condition, mood and quality of life, helping with cardiovascular integrity, insulin sensitivity, and others (Squires, 2018). Thus these activities may bring psychological and physiological benefits (example; health promotion, feelings expression, formation of critical awareness, autonomy development, and motivation for study, among others) as stated by Mavilidi, 2018. Physical activity can be performed without any restriction by the individuals with deafness. A student with deafness cannot hear and thus, is not able to spontaneously learn how to talk and comprehend speech(Hoffman, 2010) or can communicate in sign language. Even the research conducted by Barboza (2015), states that commonly deafness is related only to hearing loss, and does not affect the capacity for practicing physical activity. Balance-related motor development is different in the student with deafness and teenagers regarding the static equilibrium. In the absence of visual cues (i.e. closed eyes), the balance becomes even more compromised and the dynamic balance will present deficits in these individuals. According to some authors like Azevedo and Samelli, 2009, the recovered balance (180Ú turn) also appears better in hearing than in the individuals with deafness. Students with deafness may have concerns in performing some motor tasks as: maintaining balance on chosen leg, jumping and clapping one's hands over the head and walking linear foot by foot . Thus, research studies have detached the importance of early intervention to address the balance deficit in children with deaf. These differences can be minimized by practicing physical activities that lead studentswith deafness learning to compensate the vestibular deficit, adapting to it with the information received by other senses(Almeida, 2000). Since balance domain is a trainable or learnable skill, physical experiences through PE classes can minimize the differences between deaf and hearing 'body' response. Even the strategies related to 'posture' are developed by the individuals with deafness as a way to compensate their inabilityto balance. On that purpose, specific training should also be added to the classes, providing an improvement in their motor development and quality of life (Samelli, 2009).

41 Lewis, 1985 evaluated the effects of an exercise program following 6-week in improving balance and equilibrium in hearing-impaired children. The improvement in the balance of the experimental group demonstrates the beneficial effect of this program. Majlesi et al. (2014) evaluated the effects of an interventional proprioceptive training and concluded that the exercise program increased somatosensory ability and improved balance in deaf students. Research studies like Munster, (2011)recommended some strategies for the physical education teacher to communicate with the students with deafness as: to speak face to face to stimulate lip reading; to use facial expressions and gestures; to be positioned in a place to guarantee visual contact. But it is not clear if only these strategies will make the deaf students participate and learn from the same activities than the students without disabilities. Speech reading for example, depends on the conditions of visibility and luminosity; and demands the understanding of the context by the deaf. According to Samuelsson, 1991, only 5% of words in phrases are correctly identified by lip reading (Ortiz, 2008). This is stated here so that you as an educator can adapt the activities accordingly. According to research conducted by Quadros 1997 and Kurkova 2010, the presence of a bilingual teacher which may represent the better scenario is rare, not only in physical education area, but also in other educational areas and sometimes students with deafness were limited to copy teacher demonstration in physical education classes. A research study some challenges for physical education classes as the ratio of students-teachers, and the potential risks involved in several activities during the classes. The research conducted by Fiorini 2015, also used a questionnaire to evaluate the conceptual of physical education teachers about inclusion of the student with disability. In teachers' opinion, the students with deafness were not considered by the teachers as the most difficult students to include in the classes; those with visual disabilities were cited as the most difficult to include. Besides, the majority of the participants believe the strategies and materials used in the classes should not be the same for students with or without disabilities. Research conducted by Filho (2018), who evaluated the attitudes of Brazilian physical education teachers about inclusion and found that they accept students with disabilities in their classes. Despite they were undecided about inclusion; they think that more professional training is necessary in case of attending students with deafness. After going through few researches, now let us understand how one can adapt the activities for students for deafness.

42 2.5.3 Adaptation in Physical Education Physical Education (PE) can contribute to promote inclusion in schools. An inclusive school set up must accept rather welcome and educate all students, including those with special educational needs. It is necessary to understand the participation of each student. In this aspect, teachers must understand the limitations, the difficulties, as well as the qualities and capacities of each of IwDs in the various activities applied . The PE environment is the one where teachers help and assist students to enjoy physical activity, promoting a healthy life style and fitness. For many IwDS the PE classes are the only moment of physical activity during the day. In case of students with deafness, the benefits from physical education could be improved with some adaptations. The strategies for teaching students withdeafness should also consider the instruction of the activities and communication with the students withdeaf. As highlighted by Cowart (1996) in some cases the teacher should change the rules of the activity to avoid the exclusion of these students. According toFiorini (2018) the better strategies to promote the participation of the students with deafness in the same activities as the others are those simple activities with a teaching purpose and that respected the characteristics, needs and potentialities of these students. Adaptations in the physical education can improve the benefits for students with deafness in many aspects, as for example Lieberman reported a case of a student with deafnessthat despite the instructions of an interpreter, always waits for the other students do the activity to follow them. The teacher understood that she has never asked to be a captain. So, they planned leadership opportunities for her as leading the stretching class, being a squad leader of the game for the obstacle course. The opportunity to develop leadership improved her self-esteem, and self-perception of these students. Physical education classes for students with deafness should be differentiated, oriented and supervised. Instead of sound tracks, such as instrument like the whistle, or even some instruments that provide visual cues should be used, such as images, flags, and demonstration materials for better understanding of directions or rules. The theory of dynamic systems is interesting in the sense of the individuals with deafnessin interaction with the visual environment in which they are located, thus respecting their auditory limitations.According to Connolly (1970), there are two fundamental changes that characterize motor development: increased diversification and complexity. As stated by Zaghetto (2013), rhythmic coordination activities can be planned for students with deafness, with or without using music. Music is always related to the sounds perception and,seems to be incompatible to hearing impairment (depending on
43 aids and appliances). Despite of that, the individual with deafness feel music perceiving the sound vibrations. Thus, a substitute notion of music can be created mainly based on the visual domain and the tactile perception of sounds vibrations. There is a current need for educators that work with diversity and inclusion perspectives in physical education area. Educators those use appropriate and suitable mode of communication maintain a direct communication with students with deafness, with clear communication, which allow these students to have more confidence. These educators can facilitate the student with deaf-hearing interaction by obtaining a true inclusion in the class through the use of tools and strategies oriented to the specific needs of the student with deafness. A sense of belonging to a community, of being accepted and accepting the others, of recognizing and being fully recognized generally involves language.Students with deafness enrolled in regular classes feel valued when teacher and other colleagues know or want to learn sign language. Thus, the social interaction must be arranged by all teachers, creating an inclusive environment in all possible domains. Motivated teachers (with knowledge and skills to teach students with deafness) are also essential. As well as in case of other students with disabilities to guarantee the quality of the classes, health and safety and very important well-being aspect. In case of missing signs, the problem is vast for teaching physical education. It is important to develop signs and symbols for each sport activity involving the iconic and symbolic aspect of the movement of each sport, thus, allowing accessibility to the students with deafness.As a special educator, we should consider the safety issue while planning any activity. Some students with deafness have hearing aids and cochlear implants, thus they should be careful not to break them. In sports activity, there may be a situation that may impact near the ear, slips and falls may damage the implant. If it happens, a new implant and surgery will be needed and it is unknown if the new implant will function as the previous one. Student with deafness can and should practice physical activities, and many benefits had been described in the literature such as locomotor, cognitive, psychic and social development. High quality physical exercises may contribute to the better functioning of the respiratory system as well as rhythm and balance development. However, as far as authors experience states, when faced with the reality of inclusion in the school in India, there is a lack of physical education teaching materials as well as educators trained in physical education to work with the student with deafness, especially those that consider their language concerns (oral or sign language).

44 There are many concerns that still need to be addressed and studied in the future, such as the efficacy of some proposed strategies of adapted physical education for inclusion, the evaluation of larger groups of students with deafness in more schools, in more countries with different cultures and sign languages, the analysis of the activity considering the feedback from the students with deafness, as many research studies were done with the physical education teacher. In parallel more training for physical education teachers to acquire knowledgeand skills in mode of communication, besides the motivation to follow in inclusion is also needed. Adapted physical education can be used to motivate and stimulate students withdeafness to perform social interaction with other students and vice-versa. Thus, physical education classes for these students should allow a differentiated instruction(refer to differentiated unit in Paper of Curriculum), and the knowledge of language (oral or sign language) by their teachers is essential to achieve a direct communication for creating a true inclusive environment. 2.5.4 Concept of Health Skills Key Facts …. a. Over a billion people, about 15% of the world's population, have some form of disability.

b. Between 110 million and 190 million adults have significant difficulties in functioning. c. Rates of disability are increasing due to population ageing and increases in chronic health conditions, among other causes. d. Individual with disability have less access to health care services and therefore experience unmet health care needs. The ICF defines disability as an umbrella term for impairments, activity limitations and participation restrictions, this simply refers to disability as an interaction between individuals with a health condition (example; cerebral palsy or depression) and personal and environmental aspects (example; negative attitudes, inaccessible transportation and limited social supports). Disability is extremely diverse and heterogeneous concept. While some health conditions associated with disability result in poor health and extensive health care needs, or therapy others do not. However all IwDs have the same

45 general health care needs as everyone else, and therefore need access to mainstream health care services. Article 25 of UNCRPD emphasiseson the right of IwDs to attain the highest standard of health care, without discrimination. Health and wellness are not the same as the presence or absence of a disability; they are broader concepts that directly affect the quality of a person's life experience. Research and clinical experience have shown that IwDs can be both healthy and well (Krahn, 2003). And good health opens the door to employment and education for per sons with disabilities, just as it does for individuals who do not have disabilities. IwDs are particularly vulnerable to deficiencies in health care services. Depending on the group and setting, IwDs may experience greater vulnerability to secondary conditions, co-morbid conditions, age-related conditions, engaging in health risk behaviours and higher rates of premature death. Barriers to health care: IwDs encounter a range of barriers when they attempt to access health care including the following. a. Prohibitive costs: Affordability of health services, therapeutic services and transportation are two main reasons why IwDs do not receive needed health care in our country. b. Limited availability of services: The lack of appropriate and suitable services for IwDs is a significant barrier to health care. c. Physical barriers: Uneven access to buildings (hospitals, health centres, therapy centres), inaccessible medical equipment, aids and appliances, poor signage, narrow doorways, internal steps, inadequate bathroom facilities create barriers to health care facilities. d. Inadequate skills and knowledge of health workers: we still need to conduct awareness programs on PHC workers on issues related to identification and intervention of disability. Addressing barriers to health care: As an educator, one may work on the addressing the barriers to provide health care for IwDs. In India, Governments has planned various policies to improve health outcomes for IwDs by improving access to quality, affordable health care services, which make the best use of available resources. As several factors interact to prevent access to health care, reforms in all the interacting domains of the health care system are required.

46 1. Policy and legislation: Though RPwD Act 2016 have come up in place of UNCRPD, still changes are required to comply with the UNCRPD. Establishing health care standards related to care of IwDs with enforcement mechanisms are required. 2. Financing: Ensure that IwDs benefit equally from public health care programmes. Use financial incentives or government schemes to encourage health-care providers to make services accessible and provide comprehensive screening, assessments, treatment, and follow-ups. 3. Service delivery: Provide a broad range of modifications and adjustments (reasonable accommodation) to facilitate access to health care services. Promote community-based rehabilitation (CBR) to facilitate access for IwDs to existing services. Identify groups that require alternative service delivery models, for example, targeted services or care coordination to improve access to health care in community. 4. Human resources: Integrate disability education into undergraduate and continuing education for all health-care professionals. Train community workers, ASHA workers, Anganwadi workers, so that they can play a role in preventive health care services. Provide evidence-based guidelines for assessment and treatment. Living a healthy lifestyle is a vital part of ourquality of life. Life skills such as healthy eating, exercise and personal hygiene, enable IwDs can make you feel better, look better and enhance long-term health and quality of life. Let's take a look at the key areas of healthy living, which we as an educator can incorporate in classroom: 1. Personal Hygiene: Personal appearance and hygiene can often help boost confidence in social situations. In fact, looking and smelling good will help nurture a sense of personal pride, help your student feel more accepted and can result in praise from others.The key to maintain a healthy personal hygiene level is all about daily habits. While many of these activities focussing on personal hygiene may already be in place in school or at home, sometimes small modifications or additions can make a big difference. Daily habits such as showering, brushing teeth, getting dressed and combing hair, may seem simple, but can significantly improve personal hygiene and confidence. Perhaps you as an educator may start to involve students in these daily habits with family members or peer groups, in order to do modelling for the behaviours in them.

47 2. Eating and Cooking Healthy Food: It's common for IwDs, especially multiple disabilities or deafblindness, to maintain a fairly unhealthy diet. Often this is due to lack of education in nutrition. A healthy nutrition has many obvious, and several not-so-obvious, benefits, this can be taught is EVS class or science class. From a physical perspective, you can teach students the benefits of health foods like; it creates more energy, helps maintain a healthy weight and prevents the increased risk of illness or disease later in life. Even with the perspective of psychology, healthy eating can make student feel more confident in the way they look and interact with others. A good way to start a healthy diet and eating routine is to take a cooking class as a directed activity. Not only will this help your student start to understand what foods can go together to make for a tasty and healthier meal, but it will also build up new cooking skills that may even inspire them to take it up as a hobby. Get involved with your students, start eating healthy food and discuss this during lunch break. 3. Exercise: Everyone has a different level of ability when it comes to exercise, so as an educator don't need to encourage your student one to get up and run a marathon tomorrow. Daily exercise can start with something as simple of suggesting Parents to take their children for a walk to the shop or bazar.To make sure your student one has the most appropriate exercise program for their ability, contact an occupational therapist or Physical trainer or educator who can help you put together a plan in your co –curricular activity. 4. Lifestyle :Healthy living is the starting point for the fun things that can come from day-to-day life. Because in the end that's what we are all striving for; a happy and fulfilling lifestyle. When your students are healthy, it enables them to make the most of other activities such as curricular activities, household responsibilities and community hobbies. 5. Shopping: Shopping is a great way to interact in the community, improve communication and social skills, as well as learning important life skills such as money handling or money management or financial wellness. Perhaps as an educator one could combine a visit to the shops with a bit of exercise, by choosing to walk to the bus stop or local store or combine with your student. 6. Household activities: Activities like washing, ironing, cleaning or gardening may be the type of life skills your student can start to build around the school or house. The real benefit of household activities are that they can learn new things.

48 In addition to this, you never know as an educator, they may actually enjoy doing some of these activities around the house! 7. Hobbies and Sport: What type of hobbies does your student enjoy doing? Have they considered playing sport? In lwDs, sport may assist them in a great way to develop friends, social interactions, and communication skills and stay fit and healthy. Hobbies are a huge part of a fulfilled lifestyle and something any adult should partake in. Maybe they love playing indoor games, or maybe they just like spending time at the garden. Think about what they are passionate or interested about and encourage them to do more of it. 2.6 Life Skills: Social-etiquette and Mannerism Research establishes the considerable effects of hearing loss on development as well as negative social, psychological, cognitive and health effects of untreated hearing loss. Each can have far reaching suggestions that go well beyond hearing alone. In fact, those who have hearing lossmay experience such distorted communication that may impact their professional and personal lives, at times leading to isolation and withdrawal. There are several research surveys that link hearing loss with decreased social and psychological consequences. The effects of hearing loss are different for each individual, but most individuals with deafnesshave limitations in some social, psychological and physical problems as a result of their hearing loss which in turn affect their performance of life skills. Everybody including lwDsfacing the life's challenges, problems and their inability in confronting daily problems has made them susceptible. The ever-increasing social changes and the expansion of social relations makes it necessary to prepare individuals to face difficult situations. To prevent psychological problems and social dysfunctions, psychologists have engaged in life skills training throughout the world in various important situations and places including schools by the recommendation of WHO. Life skills are the capabilities that pave the way for positive and useful behaviour, and these capabilities enable the person to assume his/her social responsibilities, and cope with daily problems and interpersonal relations without hurting himself/herself and the others. Typically developed children are finding difficult to cope up with the problematic situations, decision making in the day to day life, being hearing impaired the students encounter with different difficulties in the classroom, school and in the society. They required some sort of training such as social skills, life skills to adjust with the situation and lead a successful life in the society.

49 Remember : Life skills include psychosocial competencies and interpersonal skills that help people make informed decisions, solve problems, think critically and creatively, communicate effectively, build healthy relationships, empathize with others, and cope with managing their lives in a healthy manner. Life skills are those skills that we need to deal with the tasks in everyday life, whether at home, at school, at work or in our personal lives. Life Skills is a term used to explain a set of skills acquired through learning or direct life experience that are used to help lwDs to handle concerns those are commonly encountered in their daily life. In practice, many skills may be used simultaneously in activity. Therefore, life skills are a large group of psycho-social and interpersonal skills, which can help individuals including students with hearing impairment to make informed decisions, communicate effectively and develop management skills that may help an individual to lead a healthy life in society. Basic skills that enable us to effectively manage the challenges that we face in our daily lives, includes confidence, decision-making, and the ability to stay safe and healthy. Schools should play a key role in promoting life skills and mental health for sustainability of the young lwDs emotional and social health, as part of their role in providing a rounded quality education which helps students to gain the confidence they need to develop into successful adults. UNICEF has defined life skills as, "a behaviour change or behaviour development approach designed to address a balance of three major areas, like -knowledge, attitude and skills". Life skills have been also defined by the WHO
as "abilities for
adaptive and positive behaviour that enable individuals to deal effectively with the demands and challenges of everyday life". 2.6.1
Concept of Core Life Skills Core Life Skills include mainly three major skills namely; Core Life Skills Examples Social Skills Self-Awareness, Effective Communication, Interpersonal Relationship and Empathy Thinking Skills Creative Thinking, Critical Thinking, Decision Making and Problem Solving Emotional Skills Coping with Stress and Coping with Emotions

50 Life skills learning is enables the use of participatory learning methods and is based on a social learning process that includes; a. hearing an explanation of the skill in question; b. observation of the skill (modelling); c. practice of the skill in selected situations in a supportive learning environment; and d. feedback about individual performance of skills. Life skills education should be designed and formulated to enable children and adolescents to practice skills in progressively more demanding situations for example, by starting with skills learning in non-threatening situations (think of daily activity that can be non-threatening) and relatively progressively moving on to the implementation of skills in risk situations. Other important methods used to facilitate life skills learning include group work, discussion, debate, story-telling and peer-supported learning.

Life Skills-Based Education has a long history of supporting child development and health promotion
in many parts of
the world. The 1989, Convention on the Rights of the Child (CRC)
also linked life skills to education by stating that education should be directed towards the development of the child's fullest potential. The Jomtien Declaration on Education for All,1990 took this vision further and included life skills among essential learning tools for survival, capacity development and quality of life. Even the 2000 Dakar World Education Conference states that, everyone
have the human right to benefit from "an education that
includes learning to know,
to do, to live together and to be". 2.6.2

Importance of Life Skills Education Government of India has initiated program to develop and implement life skills education in schools have been undertaken in many countries around the world. The same is also being implemented in many schools of India. The need for life skills education is highlighted, directly and indirectly in the number of international recommendations, conventions and forum. Life skills education is aimed at facilitating and enabling the development of psychosocial skills that are required to deal with the demands and challenges of everyday life. Many countries are now considering the implementation of life skills education program in response to the need of restructuring traditional education systems.

51 From the moment children are born they are on a journey to independence. But to live independently without us (teacher, parents) one day, as adults, we need to teach them essential life skills in school days itself. These are things they learn from their parents or teachers and from other important adults and role models in their lives. To be ready for school involves mastering certain life skills so that they can happily and confidently manage being at school without parents. Sending a child to school without life skills is like driving a brand new car without an engine. Life skills involve a number of practical things. a. Life skills help adolescents to transit successfully from childhood to adulthood by healthy development of social and emotional skills. b. It helps in the development of social competence and problem solving skills, which in turn help adolescents to form their own identity. c. It helps to weigh pros and cons of the situation, hence, act as a mediator to problem behaviour. d. It promotes positive social, norms that an impact the adolescent health services, schools and family. e. It helps adolescents to differentiate between hearing and listening and thus, ensuring less development misconceptions or miscommunications. f. It promotes the development of positive self-esteem, self-confidence, emotional balance, mental balance, mental health and teaches anger management. g. This in turn enables adults to grow into well-functioning adults, andit is critical that youth learn key life skills at school level. Quick Recap; Life skills refers to the domains related to critical and creative thinking, decision- making, effective communication, as well as skills for developing healthy relationships in a positive self-concepts. Life skills make people responsible as well as informed choices and can promote healthy lifestyles as well as career skills. Every school should enable lwDs at all levels to learn critical health and life skills

52 2.6.3 Need, Importance and Scope of Life Skills Training Life skills and independent living as they relate to IwDs is an under-researched area in India. Literature from deaf education research tends to focus on transitions to adulthood, concentrating on young IwDs who are still in school. This is likely due to the fact that independent living skills should be addressed during secondary education. Beyond the literature on transitions to independent living, there is evidence of a number of contributing and inter-related factors that can result in poorer life skills among some IwDs. As we know, life skills and the transition to adulthood are usually facilitated during the adolescent years. A number of issues arising for IwDsat this time mean they are often underprepared for independent living compared with their hearing peers. Another issue impacting young IwDs is the lack of opportunities presented for incidental learning. This can be defined as "the process by which information is learned by virtue of passive exposure to events witnessed or overheard". It is the process by which non-disabled children learn many, if not most, of their life skills. For IwDs, access to such incidental learning is compromised or minimized. Some educators are aware about the relevance of life skill education in handling the issues faced by students but hesitate to apply this because of time constraint as completing the curricula is equally important, but there is sometimes lack of support from school and parents. There are certain section of teachers, who consider it as non-academic activity with less importance and not willing to change from the approach of teacher centred classroom teaching to child centred activities. School Principals are worried about the discipline of school while engaging in participatory learning approach and due to excess consumption of time they cannot finish their syllabus on stipulated time, thatmay have an effect their academic achievement. We can conclude that before integrating life skill education we have to handle the perception of teachers and school authorities regarding the benefits of this type of teaching. Several researches in the field of special education, have been done on assessment and effectiveness of life skills training program in India and abroad among typically developed children. Some of the summary of these researches shows that there is an effect of life skills on self-esteem and some other studies revealed the effect anger control, mental health and behaviour disorders. However, limited studies have examined the impact of life skills training program.

53 Please visit the youtube video https://www.youtube.com/watch?v=WHnz p3_o2Gc on Life Skill File Folders For Special Education Classrooms. After going through the video, make a life skills folder for children with deafness. 2.7 Leisure Time, Hobbies and Recreational Activities 2.7.1 Concept of Leisure Time, Hobbies and Recreational Activities First answer the questions; a. How you as a teacher choose an activity for your class? b. Do you ask parents as to howstudents invest their time and energy for leisure time at home? As you will agree that leisure is that time free from demands of school homework, study time or required activities of daily living at home. Everyone needs regular recreation or leisure time that develops skills, promotes good health, relieves stress and facilitates social interactions. For recreation, at school level we may choose activities at which we can be successful, identify your students hobbies or interest area first and then choose the activity for example; Good readers read, Athletes seek sports' activities, Visual artists paint or draw, Craftspeople create, Social individuals engage in group activitiesand appreciate the efforts of others - whether a cricket or dance. IwDs may find themselves with restricted opportunities to fully enjoy leisure time. A lack of perceptual, motor, memory, linguistic, or organizational skills may cause them as much difficulty for leisure as they have at school or home. Thought of failure may limit IwDs reaching out to access recreational or leisure activities. When skills are not as well developed as necessary and compensations are not made, therapist, instructors, and even coaches can be taken for help to make necessary accommodations and modifications. Satisfying leisure time for IwDs is as important as accomplishments at home and school. 2.7.2 Benefits of Recreation Participation for IwDs Why should anIwDs engage in recreation activities? As they can derive many benefits from recreation participation. One benefit is learning from the experience of being involved in the activity. When the recreation activity experience has captivated the student, this in turn brings particular personality styles of learning, motivation, and

54 expectations about the experience to the setting. These learning experiences can be motor learning, understanding game directions, functional communication, or performing a skill, all to meet the demands of that particular setting. These experiences may come from involvement in a structured recreation program (step wise step or tailored) and may be demonstrated as part of the information outcomes of participation. Educational psychologist have found a variety of learning outcomes, that can be achieved because of participation in recreation activities (Roggenbuck, Loomis, &Dagostino, 1991): a. behavior change and skill learning, b. direct visual memory, c. information (factual) learning, d. concept learning, e. schemata learning, f. metacognition learning and attitude, and g. value learning The physiological benefits of recreation participation were derived from studies where individuals engage in physical activity of some kind (example; exercise, cycling, swimming,walking, jogging, running, weight lifting, etc). Benefits arising from involvement in a physical recreation activity are an increased lung capacity, reduced resting heart rates, lower blood pressure levels, decreased body fat mass, increased lean body mass, increased muscle strength, and improved structure and function of connective tissues (ligaments,tendons,cartilage) and joints. According to Hyde (1990), weight-bearing and strength-building activities help sustain bone mass and reduce the incidence of trauma-induced fractures. Moderate physical recreation activities are known to reduce the symptoms of mild or moderate depression and anxiety through improved self-image, social skills, and mental health (Taylor, Sallis, & Needle, 1985). Psychological benefits arising out of recreation activities are as follows: a. perceived sense of freedom, independence, and autonomy, b. enhanced self-competence through improved sense of self-worth, self-reliance, and self-confidence,

55 c. better ability to socialize with others, including greater tolerance and understanding, d. enriched capabilities for team membership, e. heightened creative ability, f. improved expressions of and reflection on personal spiritual ideals, g. greater adaptability and resiliency, h. enhanced perception quality of life, i. balanced competitiveness and a more positive outlook on life (Academy of Leisure Sciences & Driver, 1994). Recreation activities also releases stress and tension from the threats of society. Braum (1991) recalls the findings of researchers that state,"relaxation tends to alleviate many of the symptoms of stress. Activities that fill leisure or recreational time, performed within a group, strengthen social support ties known to minimize stress". Social integration of IwDs into community recreation programs offers the chance to develop a positive self-image through successful experiences and satisfying relationships with peers. McGill (1984), reports that integrated play opportunities are stimulating and highly motivating experiences for IwDs, offering them opportunities to imitate and model the play behaviour of nondisabled peers. Social integration enhances relationships between family members, peer groups and among other stakeholders in the society. As stated by Orthner (1991) benefits to the family are as follows: a. Leisure experiences promote opportunities for developing equity. Unlike many other environments within which individual interact, leisure experiences promote opportunities for each individual to maximize his/her own interests and minimize competition. Shared leisure and recreational experiences encourage opportunities to negotiations and improve the comparisons upon which subsequent negotiations are based. b. Benefits of leisure in social integration are also noted in IwDs. The chance to learn from and to socialize with non-disabled peers has been cited as one benefit for IwDs participating in integrated and fully inclusive programs. Research has determined that positive attitudes of children not having disabilities toward peers having disabilities were cultivated or increased when involved with an integrated recreation activity (Schleien& Ray, 1988).

56 c. The IwDs, upon disclosure, thus needs to educate the professional about what accommodations and/or program modifications should be arranged to enable full participation in recreation programs. This social interaction not only contributes awareness of this situation to another person but also demonstrates how important it is for IwDs to participate in a particular recreation activity like everyone else. As an educator you can employ any of the following strategies; 1. Learn from doing 2. Observe what others do 3. Develop a buddy system 4. Awareness of instructors' expectations As an educator, one must remember the following; 1. What Activities will you consider as Age Appropriate? Let us understand what age appropriate activities mean. Those activities normally found in the individual's culture, community and geographic location that are geared to the individual's chronological age. Observe other children of the same chronological age to determine what activities are appropriate but also keep in mind their hearing age, social age, intelligent quotient, needs of the child . Some examples of age-appropriate activities enjoyed by teenagers in our Indian culture are singing, dancing, swimming, and playing video games. Activities which are not appropriate for this age are riding children's tricycles, or interacting with preschool toys. Some children may choose an inappropriate activity. Our goal as educator, is to broaden their experience and move them on to choices that are appropriate as per our culture and society pragmatics.As you research what is available in the community, be sure the activities you suggest as an educator, are available for the age of the individual you are helping. 2. What Is Safe? If the individual is engaging in a new fitness program, the physician should be informed about his/her impairment. Example; if there is a heart condition, a potential for retinal detachment, tubes in the ears, or a shunt, the physician will then inform the parents of any cautions that must be taken. But remember, almost any activity can be adapted as per the individual needs.Depending upon the individual's type of communication (oral / sign language) it is also vital to set up clear communication goals during the recreational activities (Arndt, Lieberman, &Pucci, 2004).

57 Steps to create clear communication 1. Experience the activity first by yourself so you know what to communicate and how to communicate. For example, if you are teaching swimming, doing it first will give you clear ideas about how to explain and direct the activity. 2. Allow students time for exploration, of the people, space, equipment and environment. While teaching students with disabilities, as a teacher always include terminology associated with that task and describe the rules of the task. 3. Make continuous activities in a step wise form or discrete form. Short or discrete skills such as bowling, or shot put have built in time for feedback, but activities such as swimming, biking, and running do not. 4. Ensure that receptive and expressive communication is available during the whole activity. This must be set up and planned ahead of time. For example, if a child is swimming, how will they communicate to the instructor or educator? 3. Develop a Plan:Once the above steps have been taken, you can develop a recreation plan. This plan should include short and long-term objectives that have been developed, if possible, by a team consisting of the individual, the family, and the therapist. Remember that the overall goal is to find an activity (or activities) that will be fun and will provide relaxation to the IwDs. Be sure to set the forum for successful recreation. 4. Establish a Time Period :Establish a period of time that is appropriate for trying out a new activity. At the end of the period, let each student evaluate the pleasure derived from the activity. S/he can then decide whether or not to continue the said activity. Use of a time period helps prevent feelings of failure; it also ensures that enough time is given to the activity to provide adequate information for making a good decision. For example: 17-year-old Raj chooses to learn Tae Kwon Do in the community club in his residential society. The parents suggested the trainer a 6-week session to decide if he enjoys the activity. At the end of the 6 weeks, Raj may choose to continue, or he may end the session and choose some another activity. 5. Select the Proper Time of Day for the Activity: Try to schedule the recreational activity for the time it is most needed to meet individual needs. This can be done with the help of the parents and therapist. 6. Modify or Adapt the Activity When Necessary: Most recreational activities were developed with hearing individuals in mind. In many students, an adaptation

58 that is relatively minor can make these activities enjoyable and safe for those who are deaf (Lieberman, 2007). Ask each student if s/he prefers the help of a guide or parent or assistance from peers. However, be aware that some students may prefer activities that promote personal independence. The following teaching strategies may help each student and make the learning process more effective. 1. Orient the Individual to the Playing Area: Give each student the opportunity to explore and become familiar with the equipment involved in an activity, other people in the room, and the physical site. The absence of reliable visual and auditory input makes this a timeconsuming process, but it is essential for completing the task or achieving the goal (McInnes&Treffry, 1993). 2. Explain the task: Select language (oral, sign, or augmentative systems) appropriate to the students functioning level and communicate the key points of the skill required for the task. 3. Demonstrate:Practical teaching strategy for IwDs to have better understanding of the task (Lieberman & Cowart, 1996). 4. Physical Guidance/Hand Over Hand :Assist the student physically through the movement. Teacher may make a checklist which skills require physical assistance, including how much and where on the student body assistance is needed. If asked, the teacher can explain when, where, and why the teacher touched a student. To avoid startling the student, forewarn him/her before giving physical assistance. Start minimizing the assistance to minimal physical prompts as soon as possible. 5. Enable Choice Making: Many IwDs go through their days with someone else making decisions for them (Parents, Teachers, Therapist). When students with deafness get involved in recreational activities, they must use choice-making skills. Begin with simple choices. First, offer two activities and allow him/her to choose the order in which they will be done. Next, given a choice of two or three activities and let him/ her choose which one to perform. As IwDs increase in ability to make choices, remove prompting and allow more independence in decision making (Jackson, 2006).

59 6. Use Additional Strategies a. Begin with the amount of assistance that will ensure desired performance. b. Combine teaching techniques and methods to ensure the individual is learning as much as possible with proper pace. c. Be aware of the responses. d. Try to diminish assistance as soon as you feel the student is learning the skill in the appropriate and suitable manner. e. Provide immediate and accurate feedback so that s/he can make necessary adjustments before the next attempt (Pucci, 2004). f. Allow each person to practice the skill in an environment that is as normal as possible. This will allow the transfer of skills to occur from ADL to IL much more easily. g. Be patient. Progress may be slow due to learning the new skill as well as learning new terminology to go with it. h. Decrease physical cues to cues that are natural or typical to initiate desired performance. i. Be sure hearing aids are on and functioning (unless, of course, you are in the pool). j. Be sure to select leisure activities that are chronologically age appropriate and also are utilized by the general population of the society. 2.8 Let Us Sum Up The IL philosophy is based on the belief that IwDs have the same basic human rights as individual without disabilities to participate in and contribute to society life. It is about IwDs having the right and seeking the opportunity to be self-determined in matters such as living arrangements, transportation, social life, employment, and physical care.IL is a radical shift away from the view that disabled is equivalent to sick and dependent (charity model), that IwDs need to be looked after, cared for, or pitied because they're disabled. IL's fundamental principal is based on empowerment rather than "care and pity". It is about choice and not a chance. And, it respects each person's understanding of what independence is for them depending upon the society pragmatics.

60 IL is controlling and directing your own life and taking responsibility for your own actions. It is simply knowing what choices are available and selecting what is right and appropriate for one in a particular society. IL means being as self-sufficient as possible for everyone. IL means being able to exercise the greatest degree of choice about where you live, with whom you live, how you live, where you work, and how you use your time. It means participating and contributing in community life and pursuing activities of one's own choosing. 2.9 Unit end exercises Answer in Brief 1. Why is independent living important? 2. What is independent living in health and social care? 3. What are the life skills for the students with special needs? 4. Define financial literacy? Long Answers 1. Discuss various barriers to independent living for individuals with disabilities? 2. Explain independent living skills for individuals with disabilities? 3. Enumerate BADL and IADL with suitable examples. 4. Describe the history of Independent living movement? 5. As an educator, how you can assist your student increase their level of independence? Experiential Learning 1. Make a life skills checklist forstudents with special needs. 2. Visit a special school for hearing impairment and do the following task. Use the Activities of Daily Living and Instrumental Activities of Daily Living lists below and check the level of function as it relates to each activity. a. Activity of Daily Living – Pre-school children

61 ADL Function Independent Needs Help Dependent Cannot Do Bathing Grooming Toileting Mouth care Transferring bed/chair Walking Dressing Climbing stairs Eating b. Instrumental Activities of Daily Living (IADL) : Deaf Adolescents IADL Function Independent Needs Help Dependent Cannot Do Shopping Cooking Managing medications Using the phone and looking up numbers Managing finances Driving or using public transportation Doing laundry Doing housework

62 2.10 References Arndt, K.L., Lieberman, L. J. &Pucci, G. (2004). Communication during physical activity for youth who are deafblind. Teaching Exceptional Children Plus, 1(2), Article 1. Hamre-Nietupski, S., Nietupski, S., Sandvig, R., Sandvig, M. B., & Ayres, B. (1984). Leisure skills instruction in a community residential setting with young adults who are deaf/blind severely handicapped. TASH Journal, 9, Spring. Kappen, B. (1992). Independent living: Presentation.
In J. Reiman& P. Johnson (Eds.), Proceedings of the National Symposium on Children and Youth who are Deaf- Blind (pp. 187-196). Monmouth, OR: Teaching Research Publications.
LaWare, F., & Wiley, D. (2003). What's your pleasure: Teaching leisure skills. Vibrations, Spring.. Lieberman, L.J. (2007). Recreational Activities for Children and Youth Who Are Deafblind. Deaf-Blind Perspectives, Spring 2007. Lieberman, L.J., &Pecorella, M. (2006). Activity at home for children and youth who are deafblind. Deaf-Blind Perspectives. Lieberman, L.J. (2005). Visual impairments. in J.P. Winnick (ed.). Adapted Physical Education and Sport (4th ed.), Champaign, IL: Human Kinetics. Lieberman, L.J. (2005). Deafness and Deafblindness in J.P. Winnick (ed.). Adapted Physical Education and Sport (4th ed.), Champaign, IL: Human Kinetics. Lieberman, L., & Cowart, J. (1996). Games for people with sensory impairments: strategies for including individuals of all ages. Champaigne, IL: Human Kinetics Publishers.

63 Unit - 3 ppppp Higher Education, Vocational Education & Employment Structure 3.1 Introduction 3.2 Objecstives 3.3 Higher Education: Need, Scope , Status 3.3.1 Need of Higher Education 3.3.2 Situation in Indian Context 3.3.3 Policy/scheme for Higher Education 3.3.4 Barriers faced by deaf people in higher education 3.3.5 Supports to Deaf students 3.4 Vocational Education: Need, Scope and status 3.4.1 Government Initiatives 3.4.2. Skill Development 3.4.3 Challenges Faced by Deaf people related to Vocational Training 3.5 Selecting suitable higher education and vocational streams 3.6 Career Choice: Job seeking skills and Facing interviews 3.7 Work adjustment skills, Job related social skills 3.8 Let us sum up 3.9 Unit end exercises 3.10 References 3.1 Introduction Economic rehabilitation of deaf people refers to a process aimed at enabling them to attain and maintain maximum independence, inclusion and participation in all various aspects of life. Thus, higher education, vocational rehabilitation is an

64 important component of the total rehabilitation package. This helps deaf people to prepare for, find or keep regular employment or engage in any income generating activities. The delivery of vocational rehabilitation services to deaf people is not a simple or routine task, but a challenging and highly professional endeavor. Deaf people have a right to get higher education and not making adequate provisions to facilitate their proper education would amount to "discrimination". However, social and personal factors play critical roles in the success of deaf students in higher education as well as in subsequent success in workforce. 3.2 Objectives 1. Tounderstand the nature and scope of Higher education, vocational education for the deaf people 2. To analyze the broad range of issues faced by deaf population 3. To suggest various strategies in helping deaf people regarding career choice, work adjustment and social skills for successful economic rehabilitation 3.3 Higher Education: Need, scope, status of higher education Higher education accelerates the growth and affirms dignified life for a person with disabilities. In our society, very less attention is giving to the rights of person with disability. They often considered as unproductive, dependent and passive. This misconception and prejudices by society affect their educational, economical needs and deprive them from all areas of social domain of life. In thischapter, the focus is given to higher education and participation of student with hearing impairment.The purpose of this chapter has been to highlight issues involved in making provision for deaf students in higher education and to illustrate some of the steps being taken in practice. 3.3.1. Need of Higher Education According to UNESCO, the term 'higher education' includes all types of studies, training, and training for research at the post-secondary level, provided as institutions of higher education by the competent State Authorities. Higher education is a crucial need of today's time however it cannot be completed unless an individual takes an initiative about and decides to pursue. Knowledge is indeed an increasing need of today's time, as education is the hope for a better future. Seidel (1991) highlighted five important functions of higher education institutions in his study.

65 They: (i) provide
training and education; (ii) provide professional training in professions including medicine, law and teaching; (iii) provide regional development, (iv)develop international contacts; and (v) conduct research and social function in fostering the intellectual and social development of society (

cited in El-Ghali, 2011).Higher education provides an opportunity for individuals to develop their potential. It fulfils the needs for high-level manpower in a society. Its objectives include cultural and material development.Deaf people are able to get benefit from the technology by increasing their knowledge and improving their skills and can get good job. The successful transition to the higher educational institution is possible if deaf person gets inclusive friendly qualitative education, peer support and guidance from teacher and parents. But in reality, students with hearing impairments in the school get isolated, discriminated and are not able to meet their educational requirements and lagged behind their peers. This make them dropped out after SSC board exam with poor social adjustment. Stinson and Walter (1997) identified three social issues to be addressed for deaf students to adjust effectively to higher education (1) developing social skills (2) establishing an identity and (3) acquiring independence and interdependence.Brelje (1999) identified the lack of quality elementary and secondary educational opportunities as a major reason to have few deaf students in higher education. 3.3.2 Situation in Indian Context In India, there is a lot of problem in the education sector for the deaf. There is hardly anything they learn in deaf school from class 1st-12th as the teachers focus on oralism. When deaf children insist on learning throught sign language, they are ignored, and oralism continues around 98% of them illiterate and hardly 2% of them gain little knowledge even though they manage to pass class 12th, they further face problems in finding jobs. National Centre for Promotion of Employment for Disabled People (NCPEDP 2005)

conducted a

survey on a large scale where it had selected 119 Universities, where 52 universities were able to provide data on the total number of students enrolled with them. Only about 0.1% of the students were found to be those with different disabilities as per the data from 52 respondent universities. 3% seats are reserved for the students with disabilities, this shows that these students are not able to reach the higher levels of education.The survey also gives the number of students with different disabilities that were enrolled in the universities. There were1203 students with orthopaedic impairment, 311 students with visual impairment,

66 38 students with hearing impairment and 22 students with mental disability. This study reflected less no. of participation of deaf population in higher education. The ministry of statistics and programme implementation have conducted statistical survey on people with disability based on the findings from census 2011. The data shows that nearly 55% (1.46 Cr) are literates, 13% of the disability population has matric/ secondary education whereas only 5% people with disability are graduate (Disabled Person in India, 2016). 'Youth in India 2017' is publication by National statistical commission attempt to identify major issues concerning youth in India under Ministry of statistic and programme implementation department under National Statistic Commission. The whole report did not mention the population of youth with disability and their concern. It clears the picture that in 2017, after the passing of RPWD Act 2016, Government is not considering the youth with disability as the citizen of India. The representation of youth with disability in the report is completely excluded by the government and so, their right to take higher education. Communication is major barrier for the deaf people in participating social activities, therefore society underestimate them on their capacity to function effectively. Due to inaccessible school infrastructure, lack of special education, lack of information and stigma attached to the disability, many students dropped out from school education. Out of 2.9 million children with disabilities in India 9,90,000 children in age group 6 to 14years(34%) are out of school.(NCEPDP, 2005). That is why, very few children gets opportunity to explore the world of higher education. All India survey on higher education by Ministry of human resources and development found that there are only 74,435 students with disability are enrolled in the higher education institute. Out of the, only 39718 are male and 34717 are females. There is lack of clear data of student with disability especially deaf students in the higher education because until now, efforts were directed to find out the literacy level of the PWD based on the completion of school education. 3.3.3 Policy/scheme for Higher Education Since independence, Government of India initiated many policies for student with disability in higher education based on various committee recommendations such as Kothari Commission (194-66), the National Policy on Education (NPE) (1986), RTE, National educational policy (2019). 86). However, it covers the expansion of education from the elementary to college level in urban area and mention the

67 policy for children with disabilities in school for their smooth education but no measures for students with disabilities in university level. The following measures are taken by the Government of India to promote the higher education for the student with disability including hearing impairment. I) University Grant Commission: Higher education sector has received throughout support from universities and colleges in the country from the University Grants Commission. Guidelines for Persons with Disabilities Scheme in Colleges were marked in the 11th five year plan (2012-2017). Several initiatives have been taken by departments of UGC. Here are some provisions and schemes explained in the regards of the research: a) Saksham Scholarship Scheme: All India Council of Technical Education implemented the scheme by the objective to provide encouragement and support to 1000 students with hearing disability to pursue technical education in a year, fulfilling the eligibility criteria mentioned in the scheme. b) Rajiv Gandhi Fellowship scheme :The scheme offers scholarships to individuals with disabilities to pursue higher education such as M Phil / Ph D for almost 200 fellowships every year and covers all the universities and institutions covered by the University Grants Commission. All students with disabilities admitted to M. Phil / Ph. D programmes of any university or academic institution are eligible for the fellowship provided they meet the requirements of the scheme. The fellowship will be awarded for a maximum of five years. There is no restriction as regards to the minimum marks in the Post -Graduation examination. There is no restriction to the effect that a student with disabilities should have cleared NET/SLET examination for being eligible for receiving the RGN. c) Reservation in admissions: UGC has given instructions to all universities and colleges for providing 3% reservation (horizontally) in admissions for student with disabilities, including hearing impairments. d) Scheme for Establishment of College for deaf in each of the five regions of the country has been launched in January, 2015. The aim is to provide equal educational opportunities to hearing impaired students for pursuing higher studies in order to improve their chances of employability for a better quality of life and standard of living through higher education. In this guidelines by the UGC, they have mentioned about the providing the sign language interpreter.

68 e) Relaxation in upper age limit to Persons with Disabilities in admission: The Commission has considered the affair concerning students with disabilities and agreed to provide relaxation up to a maximum of five years to the students with disabilities in admission in various courses in all the universities and colleges. f) Higher Education for Persons with Special Needs Scheme (HEPSN): The UGC had started the HEPSN (Higher Education for Persons with Special Needs) scheme during the Ninth Five-Year Plan to assist universities and colleges. The HEPSN scheme is basically for creating approachable environment for students with disabilities at higher education institutions to provide better educational and learning facilities and environment which meet their requirements. It has three components to deliver the services to students with disabilities in higher education institutions. These are: g)Enabling Unit The UGC recommended to all universities to introduce an Enabling Unit to create more and more awareness among the functionaries of higher education institutions about the needs of students with disabilities and also to offer them counselling and guidance to students with disabilities II. Ministry of Social Justice Empowerment a) Government of India has initiates the SWAYAM PRABHA and SWAYAM includes curriculum based course content at post-graduate and undergraduate level covering topics such as arts, science, commerce, performing arts. The courses hosted on SWAYAM will be in 4 quadrants – (1) video lecture, (2) specially prepared reading material that can be downloaded/printed (3) self- assessment tests through tests and quizzes and (4) an online discussion forum for clearing the doubts. For students with hearing impairment, necessary steps have been taken to enrich their knowledge experience by using audio-video. These have been helpful for the students with Hearing Impairment as videos have English subtitles and power point presentation. b) Top Class Education Scheme for PwDs:.The scheme will operate in all Institutions notified by the Department of Empowerment of Persons with Disabilities as institutions of excellence. For taking benefit under the scheme, Parental income ceiling is Rs. 6.00 lakh per annum.

69 C) Government of India in 2007, passed the circular called 'National policy for person with disability 2006', which was released by Ministry of social justice and empowerment. This policy ignored the needs of student with disability in higher education. It talked about 'access to university and higher educational institution' and ignored the academic requirement of SWD who are enrolling in the higher educational institution. The national policy also promised it by saying that after every five year comprehensive review will be conducted on the implementation of the policy, but it clearly failed to do so. III. Department of Empowerment of Person with Disability In the higher education spectrum, the 11 th five year plan directed to provide following educational facilities to the student with disability in higher education a) Department of 'disability studies' should set up in the universities which conduct research studies on inclusive practise with the collaboration of other centres. b) To strengthen existing schemes of UGC, provide allocation to universities for barrier free physical infrastructure. c) Provide grant to every university to set up 'Disability Unit' which will guide the PWD as 'one stop facility' d) To ensure easily accessible learning material in Braille, sign language interpreter, audio-visual tapes, books in state, central universities. e) To design barrier free campus for SWD. IV. National Handicapped Finance and Development Corporation (NHFDC) National Handicapped Finance and development Corporation is functioning under the department of empowerment of person with disability. This scheme is providing financial assistance to student with disability for perusing them professional courses and makes the financially independent.Each year 2500 scholarships will be provided to the student with disability and 30% scholarships will be reserved for girls. In such way, financial aid will be offered to student with hearing impairment to pursue degree (Rs. 2500 as maintenance allowance and Rs. 6000 for book) and/ or post graduate level technical and professional courses (Rs. 3000 as maintenance allowance and Rs. 10000 for book from a recognized institution. (http:// www.nhfdc.nic.in/scholarship.html). In addition to maintenance allowance, National Handicapped Finance and Development coordination is entitled to provide facilities to the SWHI for their smooth learning

70 such as Binaural digital programmable hearing aid with annual provision of button cells (estimated cost Rs, 50,000 + Rs, 3600), Cell phone with SMS SIM card (Rs. 5000), Laptop or Desktop with WiFi (Blue tooth) facility (Rs. 70,000). All these scheme and policy for student with disability are combined efforts of the Ministry of social justice and empowerment, university grant commission and department of empowerment of person with disability. Despite of thess provisions, there has been great imbalance between the actual needs of student with hearing impairment and provisions received by them. No particular policy has been made to provide educational assistance for them. There is no practical solution on how student with HI will learn in classrooms? How they will receive equal opportunities of learning like the same as non-disabled peers. They become vulnerable and deprived from their own right to have education in higher institution. They are not fulfilling the educational requirements of student with hearing impairment in higher education sector. Concession in exams are just nominal provision for student with hearing impairment.To increase the enrolment of student with disability, it is necessary to understand their most and basic needs in higher education institution. The policymaker, thus need to be aware of the challenges faced by student with hearing impairment in higher education. 3.3.4 Barriers faced by deaf people in Higher Education Hearing impairment is a type of disability that affects the language development and communication skill. There is high risk for students with Hearing Impairment (SWHI) to get excluded from the learning process at higher educational institution. Lot of research is conducting on participation of deaf people in mainstream, regular school and the relationship between deaf students and teacher but hardly studies on the problem faced by deaf students in higher educational institution especially in Indian context. In this situation, the deaf students have to cope up with the language issue first. Coming from vernacular language, dealing with English language is very stressful for them as they not able to fulfil requirements and academic expectation from professor(Raut, 2018). SonalRaut (2018) undertook qualitative research by examined the institutional and social barriers faced by the students with hearing impairment (SWHI) in an inclusive learning environment in Mumbai. Her study found that the SWHI who have enrolled in the higher education institution have to deal with lots of hurdles like higher level of syllabus, compulsion of English language, lack of support system in form of personal tutor, communication barrier, lack of healthy peer relationship and

71 inadequate parents support. This reveals that inadequate infrastructure and lack of apathy from college administration also put the pressure on students. Interviewing with SWHI also realized that, technology is not only solution to all academic barriers faced by them. There are various educational provisions available but in practise these are not fulfilling the capacity and rights of SWHI. There are inadequate engagements along with the barriers in the higher studies. In such way, for SWHI it became extremely difficult to cope up with the demands of higher education and one's own expectation to prove oneself. The barriers keeping deaf students from accessing and completing higher education are diverse. They include: • Inaccessible teaching or pedagogy: when the way of teaching is not adapted to all the students – or to all the persons who might be students or when a wide variety of needs is not taken into account; • Lack of training of academic staff and other higher education staff members and lack of understanding of deafness; • Stigma from other students and staff members; • Lack of support programmes or the inaccessibility of such programmes; • Lack of accessible student activities.(https://www.esu-online.org/ ?news=disabilities-students-higher-education) • Lack of preparing deaf students for higher education • Large Class size • Curriculam adaptation Overall, the numbers of students with disabilities especially deaf students in higher education remain extremely low. This represents a significant challenge not only to universities but also to schools, support systems and of course the young people themselves and their families.Needless to say, deaf people and their families face challenges too: university and school attitudes will not change overnight, and they are likely to require unswerving determination if they are to secure a university education.The physical or material environment merely provides a context for teaching and learning, and the most potent barriers are those which inhibit the teaching/learning process. These can be embedded in teachers' attitudes or teaching approaches, the structuring of courses or the means whereby they are assessed. Academic support for deaf students is for many a prerequisite for a successful

72 experience of higher education; physical access may be important but personal assistance is what makes the difference between success and failure at learning. Finally, there is an unresolved tension with regard to how support is provided. 3.3.5 Supports to Deaf Students Universities need to scrutinise the barriers, and not just the physical ones, that keep deaf students at bay and take the necessary steps to removing them. Eliminating barriers is merely a first step, however, Universities need to become the sort of teaching and learning institutions where deaf students feel at home and have a sense of belonging to an intellectual and social community as of right. If universities with their concentration of intellect are slow to grapple with these issues, what hope is there for other institutions and workplaces? Schools too must play a part here; in encouraging deaf young people to see higher education as an option and ensuring they are prepared for it as appropriate. Some students will continue to require particular support but the way in which this needs to be provided is likely to be different when they are at university. Besides, the following supports can be provided to deaf students for successful achievement:- a) Special counselling services for deaf students:Responses varied in the amount of detail provided but provision seemed to range from minor adjustments to the general student counselling services to a comprehensive suite of services targeted on deaf students. b) Universities must provide training to prepare of teaching staff in responding to the needs of deaf students and prepare action plan to address the future needs. c) Affirmative action included modified entrance criteria and preferential treatment in choice of subjects. Modified entrance criteria entailed a lower exam score threshold for admission or exemption from certain subjects. d) Environment- Information must sought on the extent to which deaf students had access to study and living environments and what adaptations had been made to facilitate them. e) Academic support i.e. Academic learning is the primary activity of universities and is therefore a key focus for support. Personal assistance can be a very important means of enabling deaf students to have a successful university career. This can entail interpreting for students with hearing impairment, and

73 explain the subject or extra coaching for Oral deaf. Besides, Study adjustments and Flexible content and time frame should be given to deaf students. Regular meetings with students to discuss improvements of their situation at the university will help to cope with academic pressure. If the regular schools work with universities for deaf children for inclusion, it provides more exposure to language, and academics to such children. They tend to do well, if provided with good hearing aids that give them benefit and can graduate like any normal hearing person. f) Self advocacy i.e. deaf students must be encouraged to discuss their issues with higher authorities to make environment disability friendly. 3.4 Vocational Education Being disabled should not be a reason for anyone to be excluded from getting an education. Vocational training is a training that focuses more on practical subjects than the theory.Very few deaf students receive higher education. As long as higher education was the preserve of a privileged minority, the absence of deaf students was little noticed. However, the recent growth in higher education, encompassing one-third or more of the age cohort in many countries, combined with the improved schooling on offer to students with disabilities, focuses attention on the disparity in access to higher education. As for those who do not have much benefit from hearing aids, have centres for vocational training, like in fine arts, book binding, stitching, embroidery, clerical work which is good too. Vocational training hence is a big advantage for the deaf people, as it supplements the initial training to ensure and assist the development of the desired skill set. 3.4.1 Government Initiatives National Policy on Education (NPE) in India has stated and encouraged that 'adequate arrangements should be made for the vocational training of the differently-abled students' in schools. Persons with Disability (PWD) Act (1996), encourages government bodies to promote vocational training for the differently abled all over India. (https://www.deccanherald.com/content/463590/vocational-training-differently- abled.html). RPWD Act 2006 also promotes vocational training for people with disabilities. There are various vocational courses for the deaf in India such as book binding, printing, TV repairs, computer, modern dress making, leather bag manufacturing, and food processing and so on. You can find the details of type of vocational training and the centers all over India through given below weblink.

74 (https://vikaspedia.in/education/career-guidance/career-options/employment-vocational- training/ayjnihh-ngo-collaborated-vocational-training-centres) Besides, many NGOs also provide various vocational training and employment to the deaf people. While a large percentage of deaf people reside in rural areas typically rehabilitation facilities in such areas are few. 3.4.2 Skills development

People with disabilities need skills to engage in livelihood activities.

According to UNDP report (2012), in India, the skills and potential of most people living with disabilities remain untapped, underutilized or under developed. Vocational training is one of the potential determinants of employment for deaf.

Proper skill training should start from the initial vocational education itself.

High quality skill development is one of the pathways that lead to decent work for deaf people and it makes them independent living in their future life.

United Nations Convention on the Rights ofPersons with Disabilities guarantees the right of people with disabilities to mainstream vocational training,employment and social protection. The vocational training is an essential tool for integrating the special peoplein society and making them productive member of community. These people need to be providedwith training to develop their unique capabilities to facilitate access to work and participate in the wider society,Proper and efficient vocational training develops capabilities of deaf people and they can compete in thelabour market with other persons. According to UNDP report(2012), people with disabilities require improved access to basic education,vocational training relevant to labour market needs and jobs suited to their skills, interests and abilities. Anyvocational training is not suited to them rather it may create much more problems for their rehabilitation. Theyneed skill training based on their capabilities. A disabled person can function well as anybody else providedhe/she is given appropriate training, alternative techniques and assistive devices.

Different types of skills are required for successful work. They include foundation skills acquired through education and family life, technical and professional skills which enable a person to undertake a particular activity or task, business skills required to succeed in self-employment and core life skills, including attitudes, knowledge and personal attributes.

75 Vocational

skills examples include: • Work readiness. • Interview and job search skills. • Social and communication skills. • Task analysis. • Career choice. • Safety. 3.4.3 Challenges faced by deaf people related to vocational training 1. Lack of appropriate vocational training- The vocational training and skill development center are placed in big cities, and many deaf people come from rural areas to attend the training and after the training, they try to find the job. But if they fail to get the job then they have no choices but to go back to their villages. They found that this training does not fit in rural areas for them to get livelihood. 2.

They often lack access to basic education, making them unqualified to join skills training courses. These disadvantages frequently result in a lack of skills, as well as low confidence, expectations and achievement. 3.

Poor economic condition prevents the deaf people to attend Vocational Trainingcenter. 4. Lack of counseling- Many deaf people reported that they are confused about selecting particular or appropriate vocation as it is unclear to them about its utility for future and they feel that there is a lack of counseling in discussing various vocations and allow them to select the appropriate courses. 5. Lack of interest in Vocational Training: - Many deaf people reported that they did not understand the purpose of the short course. As a result of imposing to select particular vocations, they never enjoyed the vocational training and therefore, they could not remember what they learnt, and they felt that it was waste of time for them to learn vocational training. 6. No follow up: -Many PWDs informed that there is no follow up mechanism of vocational training center to discuss the various challenges faced by them while trying to utilize their learning. They felt that they need guidance after the course to utilize their learning and they felt that there is no guarantee that skill development will help them to get job.

76 7. Lack of provision of sign language interpreter:- The deaf people who have good educational qualification such as matriculation, do not want to join the vocational course because of lack of provision of sign language interpreters. They felt that they did not understand the course as they need to get repetition of instruction and vocational trainer failed to fulfill their basic need of communication. 8. Vocational training from Govt. Center- Many deaf people reported that they do not want hard labour job and therefore they prefer to select vocational training in govt. center hoping to get job from govt. sector. It seems that they are not concerned about their interest in particular vocation. 9. Lack of parental interest— It was found in few cases that many parents do not show their interest in allowing their deaf youth in learning vocational training. 3.5 Selecting suitable Higher Education and Vocational Stream The deaf people should get proper higher education and

vocational training after a full assessment of training needs and suitability, carried out by a multidisciplinary team of doctors, therapists, social workers, counsellors and other professionals.

Once course is selected, these children need effective special training even within the inclusive education and it is the most important requirement in the process of their rehabilitation. Assessment should take into account the assets and liabilities that are pertinent to the student's choice of career goals. Some factors to consider are: interests, aptitude, temperament, physical limitations, mental and/or educational limitations, work attitudes, behavior previously acquired, and vocational skill competencies. Assessment is an on-going process, aimed at evaluating the student's progress, adjustments, and changing needs at school and, if applicable, at community work experience stations. It should be viewed as something to be done with the student, not for the student. However, the deaf students get many challenges during assessment such as problems in communication, non- availability of appropriate test for deaf, lack of clarity and confusion while engaging in assessment. 3.6 Career Choices and Job Seeking Skills and Facing Interviews The study of Parasnis et al (1996) investigated the expressed attitudes of deaf people in India toward career choices for deaf and hearing people. Deaf adults from Pune, India rated the suitability of 12 professions for deaf and hearing people and gave written comments on the suitability of any other professions they could

77 list. The results, in general, were consistent with those of other studies in the United States, England, Italy, South Africa, and India with hearing teachers and parents of deaf children, which indicated that the hearing status of imagined deaf and hearing advisees selectively influenced attitudes toward the suitability of certain professions. Some differences in profession preferences also emerged indicating that the deaf respondents' criteria for career choice appeared to be primarily based on the use of hearing, speech, and visual skills required for a particular career. There was some suggestion that culturally specific factors played a role in shaping attitudes. These findings underscore the importance of understanding the attitudes of deaf people. This limited knowledge often results in communication difficulties between the parent and the child and low expectations about deaf people' potential. Deaf young adults across the world encounter low expectations of their future achievement, a result that has been replicated cross-culturally, despite varying levels of access and opportunity for deaf people in each country (Parasnis et al. 1996). The difficulties of interpersonal communication and safety issues were reasons given for the less-than-encouraging advice to deaf persons, related to occupations.The impact of parental beliefs and attitudes appear to come into play to a greater extent when deaf youth begin to engage in career planning and occupational development. It is extremely stressful for the hearing impaired to search for and find employment. Specialised education for deaf people is still limited to certain pockets in India and therefore, many basic skills that other children acquire in schools at a young age, like operating computers, basic knowledge of English as well as general knowledge, hearing-impaired persons don't get a chance to acquire. It is important to train the deaf people regarding job seeking skills and face to face interview, The workshop can be conducted for the hearing impaired, which include basic computer skills, English language skills, general knowledge, developing CV, workplace readiness and training in Indian Sign Language. There are various ways for job seeking such as reading newspaper with classified job ad, though someone, go to establishment for interview. The deaf people have to learn how to develop CV that helps them to apply for job and to understand their own strength and weakness. Ask your family, friends, NGOs, special employment exchange to find out the job opportunities. Now today, there is internet based job, online job search engine and the deaf people must be aware of changing trends.

78 The deaf person should prepare how to appear for interview and prepare the answers by mock interview. 3.7 Work Adjustment skills, Job Related Social Skills Assessment in the last two areas, social and work experience, is especially critical. Priorities of employers begin with work habits and attitudes (including apparent motivation to do the job and ability and willingness to follow instructions), then proceed to adequacy in vocational, then academic skills. The social and work experience evaluations of the student might show strong deficiencies in work areas. Regarding work adjustment, it is important to train deaf people such as how to focus and improve performance, how to maintain physical stamina, how to develop positive work attitude and culture, punctuality, reliability, ability to follow instructions, and the ability to get along with job supervisors and co-workers. This evaluation should focus on the following questions: Can the person work alone? Can the person work under authoritative supervision? Can the person adapt to mounting tensions and shifting pressures? Can the person follow directions? Regarding social skills, the deaf people have to understand and learn Interpersonal relationships with others, attitudes toward peers, respect to authority figures, behave in appropriate ways etc.Evaluation in this area is crucial since studies have shown that a lack of appropriate social skills and problems with interpersonal relationships are far more frequently the cause of job losses by the deaf people than is the ability to do the job. 3.8 Let us Sum Up Higher education system in India has grown at a fast pace over two decades. However this expansion has been chaotic and unplanned as it has not been planned by keeping students with disability in mind. Persons with hearing impairment constitute a significant portion of our population who can be contributing citizens.

However, the percentage of deaf students in higher education is less. Many barriers keep deaf students from accessing and completing higher education. Once enrolled in a higher education institution, it is also more difficult for such a student to graduate and many also leave education earlier that hearing person. High quality skill development is one of the pathways that lead to decent work for deaf people and it makes them independent living in their future life.The vocational

79 training is an essential tool for integrating the special people in society and making them productive member of community. Assessment is an on-going process, however, the deaf students get many challenges during assessment such as problems in communication, non- availability of appropriate test for deaf, lack of clarity and confusion while engaging in assessment. It is extremely stressful for the hearing impaired to search for and find employment. Therefore, it is important to train deaf youth in preparing job and develop skills to be successful in job. 3.9 Check Your Progress Q.1: What are the facilities available to deaf people to persue higher education? Q.2: What are the challenges faced by the deaf people in higher education? Q.3: What are the various steps that can be taken to facilitate deaf people to complete higher education successfully? Q.4: Why skill development is important to learn for deaf people? Q.5: What are the challenges faced by deaf people related to vocational training? Q.6: What are the various steps to be taken for deaf people for successful economic rehabilitation? 3.10 References Brelje, H.W. (1999) Postsecondary Opportunities for the Deaf in H. W. Brelje (ed) Global Perspectives on the Education of the Deaf in Selected Countries. Hillsboro, OR: Butte Publication El-Ghali, H (2011)

The Role of Higher Education Institutions in Addressing Youth Unemployment in Lebanon http://d-scholarship.pitt.edu/8312/1/ELGHALI- HANA-4-13-2011.pdf.pdf\ Ministry of Human Resource Development, Annual Report Ministry of Human Resource Development, Government of India 2006-2007

NCPEDP.(2005). National Centre for Promotion of Employment for Disabled People.

Status of mainstream education of disabled students in India. Retrieved 22 December, 2014, from website of National Centre for Promotion of Employment for Disabled People: http://www.ncpedp.org/eductn/ed-resrch.html. Raut, Sonal (2018) Challenges Faced by Students with Hearing Impairment in Higher Education in Mumbai, unpublished MA research, Tiss, Mumbai

80 Parasnis, Ila, Vincent J. Kalyani Samar, Ila Vincent J., Kalyani Mandke (1996) Deaf adults' attitudes toward career choices for deaf and hearing people in India.https://www.semanticscholar.org/paper/Deaf-adults'-attitudes-toward- career- choices-for-in-Parasnis-Samar/2b6357f4975e0b87517317007ee 5a589b79f2738American Annals of Deaf. 1996 Dec;141(5):333-9. Stinson,M. and Walter, G. (1997).Improving Retention for deaf and Hard of Hearing Students: What the Research Tells Us. Journal of American Deafness and rehabilitation Association, 30, 14-23 UNDP India(2012) Livelihood Opportunities for Persons with Disabilities.http:// www.undp.org/content/dam/india/docs/pub-povertyreduction/livelihood- opportunities-for-persons-with-disabilities.pdf

United Nations Educational, Scientific and Cultural Organisation (2006). Education's missing millions: Including disabled children in education through EFA FTI processes and national sector plans. Website http://www.nhfdc.nic.in /scholarship.html. https://www.esu-online.org/?news=disabilities-students-higher-education https://www.deccanherald.com/content/463590/vocational-training-differently- abled.html. https://vikaspedia.in /education/career-guidance/career-options/employment-vocational- training/ayjnihh-ngo-collaborated-vocational-training-centres

81 Unit 4 ❑ Community& Cultural Issues Structure 4.1 Introduction 4.2 Objectives 4.3 Diversity in DEAF WORLD 4.3.1 Definition 4.3.2 Deaf Culture 4.3.3 Membership 4.3.4 Sum Up 4.4 Comparison of Hearing world-Deaf world on culture and group identity and communication options 4.4.1 Comparison between Deaf culture and Hearing culture 4.4.2 Learning 4.5 Legal issues regarding communication accessibility 4.5.1 How to communicate with a Deaf Person 4.5.2 Legislation for Sign Language 4.5.3 Indian Sign Language 4.6 Views of Cochlear Implantees and hearing aid users towards Deaf culture 4.6.1 Cochlear Implant 4.6.2 Views of Deaf people towards Cochlear implantee 4.6.3 Views of Cochlear implantee and hearing aids users towards Deaf culture 4.7 Facilitating societal inclusion of individual with hearing impairment 4.7.1 Barriers towards inclusion 4.7.2 Strategies 4.8 Let us sum up 4.9 Unit end exercises 4.10 References

82 4.1. Introduction Deaf people exist in significant numbers in all countries of the world, yet documentation of this population is extremely limited especially in India. As a result of the lack of substantive data at the local and national level in Indian context, such Deaf people remain a highly invisible population. In India, the focus is more on hearing parents having deaf child for rehabilitation and there are research on various aspects such as issues faced by parents, communication between parents and deaf children and so on. However, the less attention has been paid on Deaf world and culture as Deaf World aims to enable and empower deaf and hard of hearing young people to access challenging opportunities and take ownership of the decisions that affect their lives through education, training, leisure, social and cultural activities. Living with hearing loss or deafness can be a journey. The path to understanding how someone identifies in the Deaf world is determined by the environment they were raised, the challenges they have experienced, the severity of their hearing loss, and the resources and tools they have available.Besides, it is important to understand the choice of language for communication purpose and strategy for social inclusion which pave the way for empowerment. This unit explores the diversity in Deaf world, issues faced by the Deaf people and understands their experiences which are shaped by their impairment (loss of part of body) and disability (social barrier). 4.2. Objectives 1. To understand the diversity in Deaf world 2. To understand the differences between Deaf culture and Hearing culture 3. To study the legal issues regarding communication accessibility 4. To study the facilitation of societal inclusion of deaf people 4.3 Diversity in DEAF WORLD

The deaf and hard of hearing community is diverse. There are variations in how a person becomes deaf or hard of hearing, level of hearing, age of onset, educational background, communication methods, and cultural identity. How people "label" or identify themselves is personal and may reflect identification with the deaf and hard of

83 hearing community, the degree to which they can hear, or the relative age of onset. For example, some people identify themselves as "late-deafened," indicating that they became deaf later in life. "

Hard-of-hearing" (HOH) can denote a person with a mild- to-moderate hearing loss. Or it can denote a deaf person who doesn't have/want any cultural affiliation with the Deaf community.

As for the political dimension: HOH people can be allies of the Deaf community. They can choose to join or to ignore it. They can participate in the social, cultural, political, and legal life of the community along with culturally-Deaf or live their lives completely within the parameters of the "Hearing world." But they may have a more difficult time establishing a satisfying cultural/social identity. 4.3.1

Definition

Although the term "deaf" is often mistakenly used to refer to all individuals with hearing difficulties, the word deaf usually refers to an individual with very little or no functional hearing and who often uses sign language to communicate.

Hard of Hearing refers to an individual who has a mild-to-moderate hearing loss who may communicate through sign language, spoken language, or both. Hearing Impaired, used to describe an individual with any degree of hearing loss, is a term offensive to many deaf and hard-of-hearing individuals. They consider the terms "deaf" and "hard of hearing" to be more positive. Although it is true that their hearing is not perfect, they prefer not to be labeled "impaired" as people. (DeafTEC, https:// www.deaftec.org/content/deaf-definitions, retrieved 30 th November 2016) Besides, the deaf people are divided into several sub groups based on communication mode. Some deaf use oral speech with the help of lip reading or speech while others use Indian sign language whereas some use facial expression with gestures. There is dearth of data on how deaf people use sign language or oral speech as mode of communication. 4.3.2 Deaf Culture Deaf culture as a linguistic minorityis the set of social beliefs,behaviors, art, literary traditions, history, values, and shared institutions of communities that are influenced by deafness and which use sign languages as the main means of communication. It is important to understand Deaf Culture as it

is the heart of the Deaf community everywhere in the world. Language and culture are inseparable. They are intertwined and passed down through generations of Deaf people.

Culture consists of language, values, traditions, norms and identity (Padden, 1980). Deaf culture meets all five sociological criteria for

84 defining a culture. Language refers to the native visual cultural language of Deaf people, with its own syntax (grammar or form), semantics (vocabulary or content) and pragmatics (social rules of use). It is highly valued by the Deaf community because it's visually accessible. Values in the Deaf community include the importance of clear communication for all both in terms of expression and comprehension.

Traditions include the stories kept alive through Deaf generations, Deaf experiences and expected participation in Deaf cultural events. Norms refer to rules of behaviour in the deaf community. All cultures have their own set of behaviours that are deemed acceptable. For Deaf people, it includes getting someone's attention appropriately, using direct eye contact and correct use of shoulder tapping. Norms of behavior often cause cross-cultural conflicts between Deaf and hearing people when the individuals are unaware of how their norms may be affecting their interactions and perceptions of each other's intents. Identity is one of the key components of the whole person. Accepting that one is Deaf and is proud of his/her culture and heritage and a contributing member of that society is

a key to being a member of the cultural group. (Source: https://deafculturecentre.ca/what-is-deaf-culture/) Higgins (1980) explains that failure to sign can be interpreted as an insult to members of the deaf community. When students in his study used speech to communicate instead of sign language, they were acting in direct conflict with the values of deaf culture. 4.3.3 Membership The use of sign language is so important to the Deaf culture that any perceived threat to the use of sign language is seen as a threat to the efficacy of Deaf culture.

Each Deaf community is a cultural group which shares a sign language and a common heritage. Those who use sign language, especially as a first language, are viewed as members of a tightly knit in-group, or "Deaf culture." Members of Deaf communities all around the world therefore identify themselves as members of a cultural and linguistic group. However, any deaf person cannot be a part of Deaf community or culture, if they do not use sign language and not proud to be Deaf.Some family members of deaf people and sign language interpreters can be part of Deaf community. 4.3.4 Sum up Deafhood" is an individual journey. Everyone that is deaf or hard of hearing has a different relationship with how they identify. Some people consider themselves audiologically deaf or hard of hearing, and others consider themselves "capital D" Deaf, which commonly refers to the Deaf community and individuals who largely communicate 85 with sign language.Overall, all those who have hearing problems are not "Deaf" or a part of membership or having strong Deaf identity due to diverse in nature. Today, there is increasing trends of having cochlear implant surgery for deaf child at the early age for better rehabilitation, Deaf world strongly oppose this surgery as they felt that it is planned efforts to destroy their identity. Thus, those who are born deaf but use sign language are members of deaf culture and now deaf population in India are becoming aware of this identity and culture due to internet facilities that bring them closer. They exclude other diverse deaf population such as oral deaf or cochlear implantee deaf or hearing aids users or acquired deaf people. Besides, there are sub group such as deaf children having hearing parents, deaf children having deaf parents. In India, there is lack of documentation on its characteristics, dynamic interaction within group, issues faced by them. Besides, it is important to study the intersection of deaf population based on caste, class, gender, urban/rural, community, language and so on. 4.4 Comparison of Hearing world-Deaf world on culture and group identity and communication options It is interesting to study the differences between deaf culture and hearing culture which is described below:- 4.4.1 Comparison between Deaf culture and hearing culture

Hearing Culture It is common for people to look away and break eye contact while talking to each other. People think more of words than

pictures.

Communicating with others can be done through the use of spoken language

The body language and facial expressions used by people in a hearing culture are subconscious, Deaf Culture

Deaf people must look at each other while communicating. People think more of pictures than they do words

Communicating with others can be done through the use of sign language

These body movements and facial expressions are part of their conscious communication.

86

Source: http://www.softschools.com/difference/deaf_culture_vs_hearing_culture/ 464/

In deaf culture sometimes cultural norms of hearing culture are missed, leaving a gap in information which can lead to limited awareness. For instance deaf people have been known to tip poorly in restaurants sometimes, not because they are cheap but because they do not hear the discussions about tipping and cultural expectations. This can happen in a similar way with hearing culture not understanding aspects of deaf culture because information has not been communicated, or understood.

One of the ways the Deaf distinguish themselves as a culture is by capitalizing the word Deaf as they do not believe that they are disabled. Theyprefer to call themselves as linguistic minority. 4.4.2 Learning Educate yourself about deafness and Deaf culture. Read stories and articles written by people who are deaf, watch Deaf webseries and subscribe to their YouTube channels, follow deaf advocates on social media and amplify their messages to your own audience. Learn a little bit about Deaf history and open your eyes to the contemporary issues that the community faces. The best way to understand the Deaf community is to go right to the source!

Hearing Culture Language refers to the spoken word, along with its social rules, however body language and facial expressions are not included as they are not essential for proper communication. In hearing culture

norms exist that would be considered rude in the deaf culture because they can present cross- cultural differences that are unintentionally hurtful.

Try to hide sign with subtlety, which is common in hearing culture Deaf

Culture

Language refers to sign language combined with the social rules of use, facial expressions and body language, as well as the vocabulary and the grammar and syntax. This language is very visual.

In

deaf culture there are norms and traditions that dictate what is acceptable. For instance it would not be acceptable to try to get someone's attention by waving a hand in front of their face. Acceptable behaviour would be tapping on the shoulder or using eye contact. In deaf culture

it is normal to sign what one is thinking

87 4.5 Legal issues regarding communication accessibility Many deaf people have the ability to speak and are not physically mute. Some deaf people may choose not to talk because it is difficult for them to regulate the volume, pitch, or sound of their voices in a way that most people can understand.

Communication is not a barrier for Deaf people when interacting in the Deaf community because they do not have to depend on an interpreter.

Deaf people have two main ways of communicating with others – lip reading and sign language. Typical communication modes include natural speech, facial expression and gesture. Exceptional communication modes include the use of graphic symbols or synthetic speech. Communication generally draws on multiple modes, such as vocalization, speech, gesture and symbols, and is referred to as multimodal. Communication is not just mere spoken language, as many hearing people think it's just talking. It is sharing ideas.But real communication happens when you understand other people, and they understand you. Communication is more than words. You communicate by smiling, frowning and the expressions on your face. You also do it by the way you stand, and by how you move your body. 4.5.1 How to communicate with a Deaf person According to a tip sheet developed by the Rochester Institute of Technology, one of the US premiere learning institutions for the Deaf, there are five guidelines to remember when communicating with the Deaf. 1. Acknowledge the fact that your first attempts to communicate will feel awkward and uncomfortable. This will pass as your interaction progresses. 2. It's ok to use paper and pen. In fact, the Deaf person will appreciate your efforts even more if you use a combination of communication methods, such as hand gestures, facial expressions and the written word. 3. Take the time to communicate and connect. Deaf people consider communication an investment of time and effort. Slow down, take your time and ask for clarification if you need it. 4. Understand that Deaf people listen with their eyes. Vision is the most useful tool they have to communicate and receive information. For this reason, only speak when you have eye contact, even if they are using an interpreter. Maintaining eye contact is a sign of respect. 88 5. Use the beginning and ending of a conversation as an opportunity to make physical and visual contact with the Deaf person, especially if they have been using an interpreter during your conversation. Smile, shake hands, touch their arm (if appropriate) and make eye contact. However, in the hearing world, the deaf people are denied to choose sign language as their rights. This is because the world is dominated by hearing people and parents having deaf child are concerned about the future of their deaf child in the hearing world. It seems that people are not ready to change their attitude towards mode of communication. However, today it becomes increasing awareness about deafness and sign language but many deaf people have to struggle to communicate with hearing people by speech. 4.5.2 Legislation for Sign language India is home to arguably the largest deaf population in the world. There are approximately 18million people with hearing impairments(https:// www.youthkiawaaz.com/2018/02/come-on-india-lets-sign/). The 2011 Indian census cites roughly 1.3 million people with "hearing impairment." Contrast that to numbers from

India's National Association of the Deaf, which estimates that 18 million people — roughly 1

percent of the Indian population — are deaf. The government of India has recently signed and ratified the United Nations Convention on Rights of People with Disability. This shows the desire to conform to international norms and appear progressive. It is a very positive move and seen by all as a wonderful step in the right direction. However, despite good intentions, the lack of services and facilities continues to plague the Indian deaf community. Since India is a signatory and has also ratified the UNCRPD in 2007, the Convention is binding on Indian state. The article 9 and 21 of CRPD clearly mentioned about the provision for sign language and its accessibility and expected Government on India to take concrete action. Article 24 and 30 of Convention encourages

facilitating the learning of

sign language and the promotion of the linguistic identity of the deaf community,

deaf culture. The PWD Act 1995,

does not recognize ISL as a medium of instruction or communication whereas, the Rights of People with Disabilities Act, 2016, talks about accessible education. It also ensures that persons with hearing impairments can have access to television programmes with sign language interpretation or sub-titles.It also suggests

Persons with Disabilities have access to electronic media through sign

89 language interpretation and close captioning,

as means to ensure accessible information and communication technology. Furthermore, it highlights the need for sign language interpreters and equal opportunities in education and employment.In Chapter 3 on Education, as per the duties of local government authorities to promote inclusive education, training and employing

teachers, including teachers with disabilities, who are qualified in sign language,

is included. In that context, the setting

up of the Indian Sign Language Research and Training Centre (ISLRTC)

by the government has been a step in the right direction. But, without a recognized language, how can all of this turn into reality?Although the functioning and continuation of the Centre is far satisfactory, they have to take more concrete work to improve the status of sign language. 4.5.3 Indian Sign Language The Indian sign language (ISL) is a language in its own right – with its own style, grammar, and syntax, and it should be recognised as one. It should get its rightful linguistic, cultural, educational, social and legal place in the national and global scenario. However, the Indian sign language (ISL) is neither uniformly practised nor taught as a language for communication and education. Most of the schools for children with hearing impairments still follow an 'oralist' approach which further damages the future prospects of these kids because they are not able to learn much. Due to the lack of a recognised language they have no access to proper, basic primary and higher education. As a testimony to this, it's alleged that 99% of people with hearing disabilities in India are not matriculates. They lack information resources of all kind. As a result of this, people with hearing impairments face a lot of problems when it comes to social interaction, language and daily communication, education, mental health, access of financial, legal and medical services, safety measures, entertainment and information and technology. There are only 250 interpreters in a country of 18 million people with hearing impairments. This means that there is only one interpreter for 72,000 people which is not enough to cater the needs of communication of entire deaf population. 4.6 Views of Cochlear Implantees and hearing aid users towards Deaf culture It is said that hearing people have mixed attitude towards deaf culture, some have positive whereas some may have negative attitude. What about the diverse deaf population's view towards deaf culture? There is hardly study on it in Indian context and need to explore more on it.

90 4.6.1 Cochlear Implant Cochlear implants are a technology which attempts to "cure" deafness by bypassing the outer ear through electrical stimulation of the auditory nerve and surgery done on children were born deaf. An increasing number of operations are being undertaken on children as young as two years old to install these implants in order to allow them to begin hearing and learning spoken language (Sparrow, 2005). It provides children who have limited hearing with considerably more auditory information than what was available with hearing aids, facilitating the development of very functional speech- production skills that facilitates to acquire good academic performance.Nine out of 10 Deaf infants are born to hearing parents. Many of those parents choose cochlear implant surgery as soon as they are medically able because it helps their child with speech development. 4.6.2 Views of Deaf people towards Cochlear implantee Some members of the Deaf community are opposed to cochlear implant surgery — especially for infants who are born without hearing. They believe every individual deserves the right to choose for themselves whether they want to remain Deaf and encourage parents to begin teaching sign language as the baby's first language. Some activists believe learning language and cognitive development through sign language is a basic human right that should be protected and that choosing cochlear implants steers families away from learning sign language and embracing Deaf culture.(https:// www.healthyhearing.com/report/52285-The-importance-of-deaf-culture) Some activists talk about audism — an attitude of superiority based on an ability to hear — and oralism — advocacy or use of the oral method of teaching Deaf students to speak. Audism and oralism, activists maintain, degrade ASL and interfere with the Deaf person's ability to develop speech and listening skills.

Deaf children who receive cochlear implants at a young age
will likely be educated in the oralistmethod, they are less likely to learn ASL during their early years, which are the most critical years of language acquisition. Overall, the Deaf community felt that cochlear implant surgery threatened their identity. 4.6.3 Views of Cochlear Implantee and hearing aids users towards Deaf culture It is interesting to find the views of cochlear implantee and hearing aids users towards deaf culture. The oral deaf either by deaf or cochlear implant, who relied on their hearing aids constantly for communication purpose by using oral means to communication and
91 therefore, had limited exposure to sign language and meeting members of the Deaf community on a regular basis.Therefore, they do not have fit with deaf world as they are living with hearing world. They are different from deaf population in terms of speech, language acquisition, mode of communication, academic performance and Social skills in the hearing world. Therefore they claim superior than deaf population and many of them are not comfortable in deaf culture. However, it is found that some oral deaf try to search their roots in the deaf world. 4.7 Facilitating societal inclusion of individual with hearing impairment Social inclusion, the converse of social exclusion, is affirmative action to change the circumstances and habits that lead to (or have led to) social exclusion.

The World Bank defines social inclusion as the process of improving the
ability, opportunity, and dignity of people, disadvantaged on the basis of their identity, to take part in society. 4.7.1 Barriers towards inclusion Deaf People face a wide range of barriers such as attitudinal, physical, and social that affects social inclusion. (a) The attitudinal barrier such as negative attitude of society towards deaf people as there is social stigma about deafness. The society believes that deafness in person occurs due to past sin or karma (fate) and no one can change this situation as it is God's punishment. As a result, many deaf people feel isolated, unwanted and society may feel that they are burden to society. Their families – parents, children and siblings – can also face negative attitudes, poverty and social exclusion. Many feel that they spend far too much time fighting society when they should be receiving the support they need to help themselves. (Limaye, 2016). (b) The social barriers such as due to social stigma and lack of knowledge about deafness can create exclusion for deaf people. Many deaf children do not develop friendship with hearing children due to inadequate communication and it leads poor social skills to interact hearing people in an effective ways. It involves the learning of communication and relationship- building skills by the child through his interactions with the primary social circle (i.e. family) and moving outward to other social circles such as relatives and peer groups. This further leads misunderstanding that lead social exclusion. However, the deaf child has good social skills with other deaf children if they are in deaf schools but lacks social skills with hearing people.

92 (c) The problems in communication with hearing people lead anxiety and isolation that affects self esteem. The low self esteem can leads social exclusion. (d) The language used by society also affects social inclusion. For example the deaf child is labeled as "Mute or Dumb" and society avoids to communicate with deaf child due to label. (e) Regarding physical barriers, it is difficult to find deaf friendly surrounding environment. For example, while travelling in local train deaf people cannot hear railway announcement. 4.7.2 Strategies Limaye (2016) felt that the demands for social inclusion are in fact a protest against the oppression that society has been exercising. Removal of above said various barriers is key to empowering people with disabilities, and giving them the opportunity to exercise their responsibilities as citizens – in the home, in the community and in the workplace Tackling these barriers is not a matter for government alone but people with disabilities themselves, employers, health professionals, educators, local communities, and providers of goods and services all have a key role in improving the life chances and adequate social inclusion for people with disabilities. (Limaye, 2016) It must be carefully planned, according to Limaye,(2016) provided with adequate resources and implemented with vision: 1. Sensitization/Awareness programmes for different stakeholders about diverse nature of deafness, their needs, their capabilities. 2. In service training for different stakeholders including medical professionals, teachers, civil servants, lawyers, employers, employment officers, local community leaders, to increase the knowledge about deafness, to develop skills while working with them and to change their attitudes towards deafness and deaf people. 3. Need to focus on strength perspectives and abilities of deaf people and encourage them to empower themselves. 4. Need to make compulsory course on deafness and pedagogy of teaching for children having different types of disabilities to general B. Ed and M.Ed. teachers training curriculum

93 5. Deaf People's experience of government support and services needs to change. There is need to develop adequate dialogue between them. 6. Need to adopt universal design for barrier free and inclusive environment(Limaye, 2016). 4.8 Let us sum up People within the Deaf community do not view the absence of hearing as a disability. Instead it is considered a difference—something that sets their culture apart from others and makes it stronger.People who are Deaf don't consider themselves "broken," nor do they want to be "fixed." They have a beautiful rich language (SL), along with their own traditions, norms, stories, slang, and social groups.They simply use a different method to access the world around them. Deaf culture is important because it allows individuals to be who they are.

This permits great opportunities for social skills, leadership and self-worth to flourish. It is all about Deaf children mingling together, playing sports and studying and learning together. When interacting in the Deaf community where Deaf culture is the norm, Deaf people are truly in an inclusive environment. At times people believe they can foster culture if they place Deaf children in a mainstream setting by including several Deaf children or periodically taking them to Deaf events. While it is good to make these experiences part of the child's life it is not possible to truly immerse the child in Deaf culture if one is mainstreamed. This is because Deaf culture is not taught either explicitly or implicitly through periodic experiences. Deaf culture is lived on a daily basis – like breathing.

Hearing people must understand that Deaf culture is a linguistic minority group. From Deaf culture, hearing society could learn to be more observant of body language and more direct when communicating. This is best way to create inclusive environment for deaf people. 4.9 Unit end exercisexs 1. What is the difference between "deaf" and "Hard of hearing"? 2. What is salient feature of "Deaf Culture"? 2. What is salient feature of "Deaf Culture"? 3. Compare between Deaf world and Hearing world. 4. What are the tips that you have to consider while communicating with a deaf

94 child? 5. What is the best option of communication for Deaf people according to you? Explain your justification by giving examples. 6. What are strategies to foster social inclusion for deaf people? 4.10 References Higgins P (1980) Outsiders in a Hearing World: A Sociology of Deafness, US: Sage Limaye.Sandhya (2016), Social inclusion of People with Disabilities: Issues and Strategies, Yojana May 2016 by Ministry of Information and Broadcasting, Government of India, New Delhi. Padden, C. (1980). The deaf community and the culture of deaf people.In C. Baker, & R. Pattison (Eds.) Sign language and the deaf community. Silver Spring: National Association of the Deaf.

Sparrow, Robert (2005) Defending Deaf Culture: The Case of Cochlear Implants, The Journal of Political Philosophy: Volume 13, Number 2, 2005, pp. 135–152 Census 2011http://censusindia.gov.in/2011-Common/CensusData2011.html, by Office of the Registrar General & Census Commissioner, India, Ministry Home Affairs, GOI Website: https://www.nad.org/resources/american-sign-language/community-and-culture- frequently-asked-questions/ https://deafculturecentre.ca/what-is-deaf-culture/ https://www.healthyhearing.com/report/52285-The-importance-of-deaf-culture https://www.youthkiawaaz.com/2018/02/come-on-india-lets-sign. https://www.jstor.org/stable/26234689 (DeafTEC, https://www.deaftec.org/content/deaf-definitions, retrieved 30 th November 2016) Source: http://www.softschools.com/difference/deaf_culture_vs_hearing_culture/464/

95 Unit 5 ❑ Family Issues Structure 5.1 Introduction 5.2 Objectives 5.3 Role & challenges of families in fostering adjustment, personality development, independent living employment and marriage 5.3.1 Roles of Family 5.3.2 Adjustment 5.3.3 Personality Development 5.3.4 Independent Living 5.3.5 Employment 5.3.6 Marriage 5.4 Raising of hearing children by Deaf parents: Deaf Child Deaf Parent (DCDP); Deaf Child Hearing Parent (DCHP) issues 5.4.1 Hearing Parents with Deaf child 5.4.2 Deaf Parents with Deaf child 5.4.3 Deaf Parents with Hearing child 5.5 Communication patterns and parenting issues in families with Deaf parents and hearing children 5.6 Identifying family needs and Supporting towards resource mobilization, family networking and facilitating availability of welfare schemes 5.6.1 Family needs 5.6.2 Resource Mobilisation 5.6.3 Family Network 5.6.4 Facilitating availability of welfare scheme 5.7 Advocacy at family and individual levels; Strategies 5.7.1 Types of Advocacy

96 5.7.2 Family Advocacy 5.7.3 Strategy 5.7.4 Effective Advocacy 5.7.5 Principle Action 5.8 Let us sum up 5.9 Unit end exercises 5.10 References 5.1 Introduction Family centred services are intended to promote the well-being and quality of life of Deaf children and their families.According to Bowen, a family is a system in which each member had a role to play and rules to respect. Members of the system are expected to respond to each other in a certain way according to their role, which is determined by relationship agreements.The change in roles may maintain the stability in the relationship, but it may also push the family towards a different equilibrium due to presence of deaf child as family have to make no. of adjustment and readjustment. This new equilibrium may lead to dysfunction if family could not adjust to new environment.It suggests that individuals cannot be understood in isolation from one another, but rather as a part of their family, as the family is an emotional unit. Families are systems of interconnected and interdependent individuals, none of whom can be understood in isolation from the system. Thus, when one study the family, we have to keep in mind about family structure, function and life cycle which are interrelated and the roles, needs, issues changed across the life cycle. It is important to understand how presence of deaf child affects the entire family system within family diversity and what kind of supports the family requires in coping with it. 5.2 Objectives 1. To study the family as a system and family diversity 2. To analyze the broad range of issues faced by diverse family in India which keep them invisible, neglected, oppressed and abused.

97 3. To explore strategies which would empower families having deaf children to access relevant services and to participate in their own development? 5.3 Role & challenges of families in fostering adjustment, personality development, independent living, employment and marriage The family has to make adjustment due to having deaf child across the life span and it is not very easy for some family due to lack of awareness about deafness, lack of knowledge of deafness, lack of supports and victims of stigma. 5.3.1 Roles of Family The family is the most important social group in society. It's also the most important influence in a child's life. The family plays an essential role in a child's education, in providing physical and emotional needs, and in giving moral guidance. One of the family's primary roles within society is to promote an environment where kids can learn positive values, attitudes, behaviors, and lifelong skills. Parents need to teach their children to be accountable for their choices and need to be involved in their children's education, teaching necessary life lessons and taking part in their children's schooling. The values taught and practiced within a family can influence the choices family members make both inside and outside of their family for decades to come. The role of the family is essential in raising and educating children and in giving them the skills they need to build worthwhile relationships within and make meaningful contributions to society. Thus there are many roles that family has to perform such as procreation, economic function, socialisation function, educational guidance, performing gender roles, developing job skills and so on. Thus, the presence of deaf child in the family forced the family to adjust their roles and functions to accommodate the rehabilitation needs of the deaf child. 5.3.2 Adjustment Family adjustment refers to the process undergone when a profound stressor, such as an illness, disability, or injury occurs within the family system. More than 90% of children with severe to profound hearing losses are born to normally hearing families

98 (Moores, 1987). The realization that a child is deaf causes stress in families who have had little contact with deaf persons and know little about the implications of deafness. In addition to coping with the shock of the initial diagnosis, families must acquire an understanding of a substantial and complex body of knowledge. Parents are often swamped with information on amplification devices, sign language, educational methods, school placements, and legal issues, all of which demand comprehension to assure appropriate critical decisions about the deaf child's future (Meadow, 1980). Professionals need to understand how families adjust to a deaf child as planning and implementing educational programming for infants and preschoolers demand an understanding of family processes. Second, research indicates that competence, achievement, and adjustment in both preschool and school-aged children are related to successful family adjustment (Bodner-Johnson, 1986; Greenberg, 1983). The realization that parents of children with disabilities experience grief and that mourning is a normal stage in parents' adjustment to a deaf child. An interactions between deaf children and their families are necessarily complex and everchanging and they adjust family rules as they adapt to the demands of absorbing complex information about hearing loss, learning new communication strategies, and managing the educational and legal bureaucracy. 5.3.3 Personality Development General problems with reference to the study of the development of personality and emotional-social adjustment in hearing impaired children are discussed further. Social and emotional well-being is linked to a sense of self, to feelings about relationships with others and perceived feelings about treatment by other people. It is tied up with notions of what is considered normal or unusual behaviour. Due to language deficiency and poor communication, deaf child's social and emotional skills is affected and this becomes frustrating experiences for parents and deaf children which affect personality development in later life.
It becomes clear that social and emotional development in deaf children is complex and bound up with a number of factors, including attitudes to the child's deafness, approaches to language and communication, conversations about feelings, family attitudes to behaviour, schooling and friendship patterns and how the deaf child comes
99 to perceive him or herself.
However, the future is likely to bring more changes. Developments in early diagnosis, technological developments and changes in society's attitude to deaf people mean that life for deaf people is changing with different attitudes and expectations of social and emotional development.(
Gregory, 2017) 5.3.4. Independent Living It is important for deaf people to acquire independent living skills as it leads successful adjustment in later life. However, due to stigma, negative attitude towards deafness, parents' overprotection, lack of trust to allow their deaf child to do independently, communication problems the deaf person finds difficult to achieve independent living skills. Luckily for some of them who have good parents as well as strong deaf networking, many deaf people can acquire such skills. During this phase, they have to learn how to socialise, how to make new friendship, how to solve problems on their own. Thus, it is challenging job for the parents to train their deaf child during transition of life. 5.3.5 Employment Though the percentage of educated deaf individuals has increased, there are still open ends when it comes to hiring them. What is the reason for such low rate of employment of deaf people? Are there no job roles for them? They have job in the competitive market such as Mirakle courier, Mime and Mirch, Lemon Tree hotel and so on. The problem is due to poor educational qualification and poor quality of vocational training, deaf people find difficult to compete. However, if deaf person is trained then he is capable to do skilful job. Besides, employers and employees' attitude are important to make inclusion for deaf people as provision for job reservation is not enough. The tough job of parents is to prepare their deaf child for competitive market rather than becoming overprotective or deny and imbibe work culture in their child. 5.3.6 Marriage We do know that marriage itself provides couples with needed psychological and material support. Each one has to make marital adjustment related to satisfaction, accepting differences, solving issues, tensions. Parents get confusion about getting their deaf children married. It is possible that deaf person wanted to marry another deaf person whereas parents may oppose it due to fear of having deaf grandchildren or social stigma or unsure about deaf person's capability to adjust the marital relationship. Even

100 many deaf people who use speech as oral communication prefer to marry another hearing person but it becomes difficult to find such partner especially for deaf women. Many deaf people wanted to marry another deaf as they are concerned about communication patterns sharing and understanding with each other. It is found that many deaf people did not have information about the marital role that they have to play including maintaining in laws relationship. Besides, Indian people give emphasis on caste, class, culture, community as criteria for marriage and they prefer not to challenge their custom of marriage. Thus, it becomes challenging job for parents to help their child to get married and continue their guidance to make their marital relationship successful. 5.4 Raising of Hearing child by Deaf Parents, Deaf child by Deaf parents and deaf child by hearing parents Raising a deaf child is a challenging experience for both parents and their child. Making sure that parents get the right help and support as soon as possible will help their child's development so they can reach their full potential. However, it is fact that no two families are alike. There is diverse in family structure such as hearing parents with deaf child, deaf parents with hearing child, deaf parents with deaf child and the issues or challenges faced by each family is different due to its nature. Let us discuss it one by one. 5.4.1 Hearing parents with deaf child Majority of deaf children are born to hearing parents. The parents are shocked to know about the deafness in their child as they are not aware of implication of deafness. They have to collect information on meaning of deafness and rehabilitation needs of the deaf child. They also visit to various doctors hoping to get their child "cured" which is called "shopping syndrome". The second issue about understanding the use of hearing aids and teaching language to their deaf child as they realised that it is not easy job for them to teach their child and frustration occurred which affects parents' mental health. The third issue is that they have to learn to cope with stigma or negative attitude of public towards deafness and deaf child. They become helpless in dealing with stigma that forced them to withdraw from social circle for a while. The social circle is affected due to avoiding stigma or too much time spent for rehabilitation of deaf child. As a 101 result, the deaf child would not wear hearing aids due to realising his being different from others and experiences negative attitude of peers and school. This also affects child's social skills and social relationship. For hearing parents of deaf children, parent-child communication becomes a central issue because parents must actively learn how to communicate with their infants, rather than relying on intuitive communication strategies (Koester, Papoušek, & Smith-Gray, 2000). Regardless of the mode of communication parents adopt with their child (oral language, sign language, or a combination of the two), they face challenges in trying to replace learned habits of communication with new strategies (Jamieson, 1994). This process of adaptation can result in disrupted interactions that strain parents and children which, in turn, may negatively affect parenting roles and responsibilities (Quittner et al., 1990; Tamis-LeMonda, Uzgiris, & Bornstein, 2002). Studies have shown that hearing parents of deaf children are more likely to be directive, even intrusive with their child (Meadow, Greenberg, Erting, & Carmichael, 1981; Nienhuys&Tikotin, 1983; Spencer &Gutfreund, 1990) and may be less "attuned" to the child's need to visually and tactilely explore the environment (Lederberg & Mobley, 1990; Spencer, Bodner-Johnson, &Gutfreund, 1992). Children's language skills may also influence parent-child interactions through one or both of the following pathways: (1) they could directly help children regulate their attention, emotion, and behavior or (2) they could facilitate communication with parents enabling children and parents to coordinate their interactions (Gallagher, 1999). Strong support has recently been found for both pathways in children who are deaf (Barker et al., 2009), suggesting that children's language abilities strongly influence parent-child interactions. The stress that parents of deaf children experiences is likely related to the discrepancy between these developmental demands and their child's ability to meet them (Lederberg &Golbach, 2002). It may also be difficult for parents to adjust their behavior and expectations to better match their children's unique communication needs. These difficulties likely increase as the child gets older because of the increased differences between parents' intuitive expectations of the child's capabilities and the child's actual abilities. To our knowledge, only one study has directly assessed the relation between children's language ability and parenting stress in deaf children (Pipp-Siegel et al., 2002). Parents of children with less language reported higher levels of parenting stress and perceived their children as more difficult.

102 Regarding Behavior problems, Several studies have shown that, compared to hearing children, deaf children have higher rates of behavior problems, such as aggression, non-compliance, and inattention (Barker et al., 2009; Mitchell &Quittner, 1996; van Eldik et al., 2004; Vostanis et al., 1997). These higher rates of behavior problems have yet to be linked to parenting stress in parents of deaf children; however, this link has been established in children with other disabilities (Floyd & Gallagher, 1997). To our knowledge, this is the first study to include child behavior problems as a predictor of parenting stress. In terms of behavior problems in deaf children, children's oral language ability is related to behavior problems, parent-child communication, and attention regulation. Using a large sample of deaf and hearing children, Barker and colleagues (2009) showed that lower language ability was related to poorer attention regulation, less parent-child communication, and increased child behavior problems. Moreover, attention regulation partially mediated the relation between language delays and child behavior difficulties, indicating that internal regulation (i.e., sustained attention) is an important mechanism through which language affects behavior problems. It has also been suggested that poorer parent-child communication may relate to emotional regulation. Children depend, in part, on their parents to learn how to regulate their emotions. Poor communication between parents and children may interfere with this process and may be interpreted by others as negativity or problem behavior (Vaccari&Marschark, 1997). There is increasing trends to have cochlear implant surgery as parents hope that their deaf child will be "normal". It is important for them to understand benefits and limitation of cochlear implant surgery as deaf children need therapy for intervention and child has to use hearing aids. This surgery helps the deaf child to hear sounds much better but it is costly. The deaf child requires having intervention for at least 2 years post-surgery and many parents did not realise the consequences of stopping such therapeutic intervention. As a result, child may not get benefits as expected. The Ministry of Social Justice Empowerment provides assistance for surgery but does not provide further help for post-surgery therapeutic intervention which is costly and many families find difficult to manage it with limited finance. To sum up, Hearing parents of deaf children face stresses and demands related to parenting a deaf child, including difficult choices about language, technologies, education and identity for their children (Marschark, 1997). To date, few researchers have discussed the unique challenges faced by this group. Through a series of semistructured, in-depth

103 interviews with 18 parents, this study investigated the experiences of hearing parents of deaf children spanning various life stages. A phenomenological approach identified 5 themes most pertinent to understanding their experiences. Each theme offers insight, particularly for professionals, into the distinctive issues that might arise at the time of diagnosis of deafness and reveals the challenges hearing parents face when confronted with a barrage of decisions, including choice of oral or sign language, mainstream or special deaf education, and identity with the hearing or Deaf community. The central message from this work is to inform hearing parents of deaf children and professionals working with these parents of the likely challenges that they may face.

These include communication issues, educational concerns, hearing technology challenges, as well as difficulties related to finances and concerns about the safety of their children.

Once the deaf child grows up, the parents face different challenges such as sexuality, vocational training, job, marriage, and parenting. Thus, the problems faced by the parents having deaf child in childhood years are different from the parents having adult deaf. If the basic developmental tasks during childhood could not achieve at the right time, it affects next developmental tasks in later life. For example, if deaf child could not acquire language and speech it will affect to get good job and develop communication skills in later life. 5.4.2 Deaf Parents with Deaf child Society including professional organizations, and the family and friends of the parents with disabilities themselves, think that a woman with a disability cannot be a good mother. It is hard enough to deal with one's disability, but even harder to be a parent with disability and care for children while dealing with that disability. Even today, parents with disabilities are still sometimes met with discriminatory attitudes, inaccessible environments and inappropriate support. The role of disabled parenting today, therefore, involves not only the usual challenges of raising children, but also the fight for adequate support services and preparing their children to face discriminatory attitudes(Limaye, 2015). The Deaf parents were ready to accept their children if they are deaf. They felt that bringing their child with their own disability is a good thing because the family can share the culture that goes with that particular disability. However, genetic counselors, professionals and society at large may express that it is not acceptable to reproduce a

104 child with that disability because they are unaware of the positive psychological and social aspects of a disability culture (Rogers, 1996).Some Deaf parents may refer their deaf child for cochlear implant surgery for better future but there is no data on it in Indian context. It is said that it is easy communication between deaf parents with their deaf children due to sign language and it creates strong emotional bonds between them. The deaf children get experiences of stable family life with quality of communication, understanding, sharing with each other, emotional support and social network. The deaf children become a part of deaf circle and enjoying social life, however, there are some deaf children who use oral as well as sign language for communication purpose, try to be a part of both deaf and hearing world. Even today, young generation of deaf people are well aware of their own rights and proud to have Deaf identity.

The 1980s in US had also seen the emergence of studies of deaf children of deaf parents where it was found that deaf children often performed better on a whole range of tasks than deaf children of hearing parents, with positive consequences for their social and emotional development. Meadow, in summarising work in this area, suggests 'deaf children tend to be less socially mature than hearing children (but) deaf children of deaf parents have been found to be relatively more mature than the deaf children of hearing parents with whom they were compared' (1980). She also concludes though 'that deaf children of deaf parents feel more positively about themselves than deaf children of hearing parents'. Such research challenged further the idea that spoken language in itself was necessary for healthy emotional and social development. 5.4.3

Deaf Parents with Hearing Child Deaf parents with hearing children face unique challenges.Deaf Parents face both physical and attitudinal barriers in addition to the daily challenge of raising children, for example finding daycare programs or babysitters that can communicate with both them and their child. Other challenges stem from behaviors that result from parents not being able to hear. For instance, a daycare provider who was caring for a hearing child of deaf parents noticed that the child tended to scream or yell. She wrote in asking if it was common for hearing children of deaf parents to yell much. Besides, the hearing children may also develop misarticulation due to lack of exposure.The teacher asked the deaf parents to get somebody's help in improving

105 pronunciation of their child's speech. Sometimes, the deaf child talks with his classmates without voices very often. It is natural that the sign language becomes first language for such children and they learn to communicate without voices. The children often forget that the hearing world find difficult to understand the speech without voices (Limaye, 2015). The hearing children with language delays face additional challenges because their language abilities do not keep pace with the increasing developmental demands of early childhood (Bornstein, Selmi, Haynes, Painter, & Marx, 1999; Irwin, Carter, & Briggs-Gowan, 2002). Children are curious to know about their parent's impairment as they are confused and want to know more their impairments. They also try to assist by finding solutions to these on their own. Adequate knowledge about the impairment can be a strategy to be adopted so that children can get help in coping with the situation.One mother (HI) informed that her children asked her whether it is genetic disorder and whether they have chances to get hearing loss. She did not know how to answer and it upset her and she was afraid of passing on her impairment to her children. She wanted to tell them that it is her fault but could not get courage to say it (Limaye, 2015). Limaye (2015) found in her study that onedeaf mother was asked by her son not to use sign language in public places as it would confer the disability on him. They asked their son also to ignore public comments as it was not their fault that she was deaf. The stigma against disability becomes a burden which even the children have to bear. A daughter who gets angry at public response about her mother's deafness and argues with the people explains that it is lucky her mother cannot hear the comments passed by the public about her. The burden of the mother falls on the child when there is lack of awareness of disability in the public domain. The mothers are sensitive about the invisible burden on their children due to their disability and they reported that it is difficult to deal their own emotion of being responsible for their children's suffering. Some children start to hide their mother's disability from public and even friends and consequently some do not invite them home. This was not confined only to mothers with deafness but those with a visual disability.Limaye 92015) found in her study that when the hearing children grow up, they became more self-conscious about their parental impairment.Some mothers reported that once their children were out of their teens, they learnt to overlook these problems and accepted their mothers' disability as a part of their life without feeling guilty.

106 Another problem for deaf parents of hearing children is that the children may try to take advantage of the fact their parents can't hear. The hearing children may have been reacting to the realities of their home life with deaf parents. When children are growing up, they are curious to know how their parents are different than others.The deaf parents had no ideas how their children noticed their differences but they felt that the children learn to adjust to these differences. The hearing children communicate with their deaf parents through sign language and they become liaison between them and their hearing world (Limaye, 2015).However, many deaf parents depend on their hearing children to act as an interpreter. 5.5 Communication patterns and parenting issues in families with Deaf parents and hearing children We already discussed the communication patterns and parenting issues between Deaf parents and their hearing children in previous section (5.4.3). You can collect more information on it by taking interviews of Deaf parents and their hearing children on various aspects. 5.6 Identify Family needs and supporting towards resource mobilisation, family network, Facility available of welfare schemes It is important to have identification and understanding of family needs while working with the family. When we focus on strengths in the assessment, needs are simply the gaps that exist that require addressing. Conversely, focusing on the problems that exist causes us to wallow in our own deficiencies. Solutions can then seem much more distant. When we first acknowledge the positive factors in our lives, we realize the solid footing we have to make changes around some of the needs we identify. 5.6.1 Family needs A family-level, needs-based model of assessment and intervention includes three major components: specification of family needs, identification of sources of support and resources to meet needs, and staff roles in helping families access resources from their support networks. The importance of a broader-based, social systems approach to assessment and intervention is emphasized.

107 Family-centred assessment is a process designed to gain a greater understanding of how a family's strengths, needs, and resources affect a child's safety, permanency, and well-being. The assessment should be strengths-based, culturally sensitive, individualized, and developed in partnership with the family. Such an approach builds on the strengths present in a family and creates opportunities to acquire new competencies to meet the outcomes. The main purpose here is to clarify the needs of the family and to allay any worries or anxieties that they might have. It is important to note that different members of the family may have different worries and anxieties and they also need to be addressed. If there are deaf children in the family, invite them to the meeting and listen to their viewpoints and ideas as well. The concepts associated with systems theory means family as a system, applies here; if something happens to one family member it affects all of the other members as well. While these families often experience additional situations and stressors, they have hopes, dreams, and concerns for their children just like other families. It is need to create positive impact on the families with a deaf child by empowering them with knowledge, empathizing with their feelings, and collaborating with other support professionals in their lives. Establishing meaningful relationships with families is a critical part of our work, and our communication is especially important when working with families with deaf child. Dunst et al (1988) make the following suggestions for outlining families' strengths, needs and resources: ● Be positive and proactive in arranging the first contact with the family. ● Take time to establish rapport with the family before beginning the interview. ● Begin by clearly stating the purpose of the interview. ● Encourage the family to share aspirations as well as concerns. ● Help the family clarify concerns and define the nature of their needs. ● Listen empathetically and be responsive throughout the interview. ● Establish consensus regarding priority needs and outcome desires. While planning for identification of needs of the families, we have to keep in mind about certain issues such as we should recognise that each family is unique and respect

108 family diversity in all dimensions (cultural, linguistic, socioeconomic, casteism), family's right to adopt particular approach to cope with, designing and implementing services that are accessible, culturally and linguistically respectful and responsive, flexible, and based on family-identified needs. 5.6.2 Resource Mobilisation Resource mobilization refers to all activities involved in securing new and additional resources. It also involves making better use of, and maximizing, existing resources. Family resources are the means that can be used by the family to cope with difficult situations; these include social, cultural, religious, economic and medical resources. Many of our resources come from within ourselves or from our relationships with other people. These are called personal resources. Our abilities and attitudes are personal resources. Other people, time, and energy are also valuable personal resources. Our abilities are what we do well.Knowledge, time, energy, finance, training, knowing scheme and utilising it all are resources and each family must know when and how to mobilise it when required. However, all families are not expert to identify their personal, social and professional resources and some families need to get training on it. An Eco map, developed by Anna Hartman is useful to identify the needs and resources and family can take their own decision by using eco map. An eco-map is a graphic representation or visualization of the family and provides an opportunity to visually represent the family's perspectives about the absence or presence, nature and strength of linkages to entities such as family members, friends, co-workers, religious or spiritual institutions, schools, social service agencies, community groups, recreational activities, health care networks, legal systems, and volunteer or advocacy organizations (Cox, 2003). 5.6.3 Family Networking Family networking is a program in which a family member mom/dad/child is introduced to another family who is going through similar experiences and it is valuable information for them.Family to Family Network helps individuals with disabilities and their family members define and achieve success for themselves and their loved ones. Through guidance and training of parents and young adults, it helps the families discover possibilities, see the potential and advocate for what they need to achieve their dreams.

109 The Family Networking Program supports the family by providing: ● A newsletter containing information about agency and community services, activity ideas, and interesting facts. ● Family events that celebrate opportunities for families to have fun together in an accessible, safe environment. ● Family Support Groups that allow caregivers time to share information and receive mutual support. By providing information on the various systems, referrals to community resources, training events on various disability topics in the office, community and at our annual conference, a website devoted to providing accurate & consistent information on the special education process, a monthly email newsletter of family & community activities, as well as a Leadership & Advocacy training program; families and individuals with disabilities have an opportunity to network and learn from one another. Today there is increasing trends to use social networks for families such as facebook, ewall, family leaf and it really helps to reach many families all over the world and share the information. 5.6.4 Facilitating availability of welfare scheme The Government of India introduced various entitlements and schemes for disabled persons from time to time. However, it is important for each family to know the scheme for their deaf child and utilise it. It is found that many parents especially from slum area, rural areas, low socio economic background, are not aware of various schemes, Some parents may know but they are not aware how to access. It is important for the professionals to make the families aware of various schemes and utilise it. The following are the ways to facilitate in utilising the availability of schemes:- 1. Educate the families about the various schemes by organising workshop and clarify their doubts 2. Provide information about the necessary documents that required to produce for entitlement 3. Explain the benefits of disability certificate as many families are not aware about it. They must know when to produce disability certificate to avail the schemes.

110 4. The professionals including clinic, social workers, teachers, schools, welfare officer should connect with each other and plan how to reach each family for utilising the scheme. 5. Conduct the camp for disability certificate especially in remote areas. 6. The welfare officer must conduct training for professionals and families on online form filling and accessibility of services. 7. There must be booklet for detailed information on various schemes and how and to whom the families can approach. 8. Utilise family network and parents support group for information on accessibility of services. 5.7 Advocacy Although current estimates suggest that people with disabilities make up 10% to 20% of any community, they can be invisible and isolated in society. Physical and social barriers exclude them from participating in mainstream society and fully realizing their human rights. Advocacy means a process designed to create positive change. Advocacy consists of a variety of actions taken to draw attention to an issue and to direct legislators, policy-makers, service providers, and other important actors to a solution. Such advocacy actions can be taken at the individual, local, national, regional, or international levels.

Advocacy involves promoting the interests or cause of someone or a group of people. An advocate is a person who argues for, recommends, or supports a cause or policy. Advocacy is also about helping people find their voice. There are three types of advocacy - self-advocacy, individual advocacy and systems advocacy.

However, there are many more types and can be used. 5.7.1 Types of Advocacy (a)

Self-Advocacy ● Self-advocacy refers to an individual's ability to effectively communicate, convey, negotiate or assert his or her own interests, desires, needs, and rights (VanReusen et al., 1994).

111 ● Self-advocacy means understanding your strengths and needs, identifying your personal goals, knowing your legal rights and responsibilities, and communicating these to others. ● Self-Advocacy is speaking up for oneself! (b) Individual Advocacy In individual advocacy a person or group of people concentrate their efforts on just one or two individuals. According to the group Advocacy for Inclusion "Advocacy is having someone to stand beside you if you think something is unfair or that someone is treating you badly and you would like to do something to change it." There are two common forms of individual advocacy - informal and formal advocacy. When people like parents, friends, family members or agencies speak out and advocate for vulnerable people this is termed informal advocacy. Formal advocacy more frequently involves organizations that pay their staff to advocate for someone or for a group of individuals. (c) Systems Advocacy Systems advocacy is about changing policies, laws or rules that impact how someone lives their life. These efforts can be targeted at a local, state, or national agency. The focus can be changing laws, or simply written or unwritten policy. What is targeted depends on the type of problem and who has authority over the problem (Brain Injury Resource Center, 1998). 5.7.2

Family Advocacy Advocacy with a little a would be considered as working on behalf of families, or for families, and educating legislators or other policymakers about family research and how policies affect families so that families are considered when policies are made. Families can be advocates and leaders at home, in their children's schools, in their neighborhood and community, Family advocates speak for and act on behalf of others as they empower them (Trainor, 2010). Parents may speak up for their own children, or join with others to represent the needs of many children (Cunningham, Kreider, &Ocón, 2012). Family leaders use and develop resources and services to strengthen their family. They speak and act from those experiences (Reynolds & St. John, 2012).

112 Family advocacy and leadership can include a range of different activities. Parent advocates and leaders can: ● act as mentors in the classroom, ● share skills with other parents, ● coordinate events for children and families, ● bring out strengths in other families, ● participate in parent meetings, advisory committees, parents committee, ● represent children and families in the development of policy and legislation. Helping families become advocates and leaders is an important step toward supporting better family and child outcomes. When family members act as advocates and leaders to influence the programs, policies, and practices that shape their children's lives, the effects can be long-lasting. 5.7.3 Strategy Advocacy rarely uses a single action to achieve change. Instead, advocates and advocacy organizations develop an advocacy strategy, which consists of many kinds of actions such as: ● Educational actions: Do we have the facts we need about the issue (research and analysis)? How can we draw people's attention to an issue (public outreach)? How can we change people's attitude toward this issue (education andtraining)? ● Political actions: ~ How can we direct governmental policy-makers to change or implement policies to address the issue (lobbying)? ● Legal actions: ~ Is a new law needed to address the issue? ~ Does existing law need to be repealed? ~ Does existing law need to be enforced by the courts or administrativeagencies of the government?

113 Wise advocacy aims at change that is sustainable. Sometimes activists can temporarily draw money and attention to an issue, but if that financial support and interest declines, the situation almost always returns to the way it was. Lasting social change usually takes time: old attitudes do not alter overnight. Successful advocacy involves persistence and a long-term commitment. 5.7.4 Effective Advocacy Effective advocacy is not spontaneous or occasional. An advocacy strategy has clear goals and objectives and a plan to fulfill them in a systematic fashion. Before advocacy goals can be established, however, a thorough analysis of the situation is required: ● What are the main challenges that concern people with disabilities? ● What are the underlying causes of these challenges? ● What can be done to address the underlying causes? Identifying the challenges is usually not difficult. On the other hand, understanding the causes of these challenges can require looking at many subtle factors such as economics, social structures, stereotypes and attitudes, political ideologies, and cultural traditions. However, the better you understand these underlying causes, the more effective your strategies to address them will be which will help bring about lasting change. Lasting social change is almost never brought about by a single individual or organization. Successful advocacy needs the collective efforts of many people with many different experiences, perspectives, and skills. An important step in advocacy planning is to identify allies and form effective collaborations with them. Sometimes people are addressing the same issue for different reasons; sometimes people have the same goals but work on different aspects of the issue. Such collaborations help to avoid wasteful duplication of efforts and nonproductive competition. However, all members of collaboration need to acknowledge their differences and be clear about their common goals, as well as their respective roles and actions. They need to plan together and stay in continuous communication. 5.7.5 The following are the principal actions involved in advocacy: 1. Educate yourself ● Understand the kind and extent of the challenges facing people with disabilities. ● Understand the underlying causes of these challenges.

114 ● Gather relevant statistics about people with disabilities locally, nationally, and globally. 2. Understand the situation in your country ● Evaluate relevant laws and policies affecting people with disabilities. ● Identify political, economic, and cultural factors that contribute to the challenges or could contribute to changing them. ● Evaluate the policies and actions of lawmakers, ministries, and political parties nationally and locally. ● Evaluate the attitudes of health professionals and service providers. 3. Set long-term and short-term goals ● Prioritize challenges. ● Establish indicators for progress in advocacy: Be clear what you hope to accomplish in six months, a year, five years, even ten years. 4. Find support/ Choose allies ● Identify individuals and other groups working on the same challenges and unite your efforts. ● Establish common goals and clear roles for collaboration. ● Establish clear methods for communication and decision making. 5. Choose strategies ● Plan a variety of different ways to address a challenge. 6. Plan actions 7. Implement actions 8. Evaluate actions and their outcomes ● Set up indicators for evaluating whether your strategies are working. 9. Make adjustments to your goals /plans ● Be flexible and prepared to change strategies in response to changing situations.

115 5.8 Let us sum up According to Bowen, a family is a system in which each member had a role to play and rules to respect. Members of the system are expected to respond to each other in a certain way according to their role, which is determined by relationship agreements.The primary function of the family is to ensure the continuation of society, both biologically through procreation, and socially through socialization. The family having deaf child has to make no. of adjustment and readjustment in many areas depending on family diversity. The responsibility of the professionals is to help the family to identify the needs, utilising services for rehabilitation of the child and using advocacy and family network for support. Advocacy is a continuous effort. There are many steps, but no one is ever complete. You cannot take action until you understand the situation, but you never stop educating yourself or analyzing the situation in your country. Advocacy is a skill. The more you advocate, the more you learn about how to do more effective advocacy. 5.9 Unit end exercises 1. What are the issues faced by the hearing parents having deaf child? Discuss with examples. 2. What are the differences between Deaf parents with deaf child and Deaf parents with hearing child regarding their issues? 3. Identify the family needs and strength and suggests suitable resources for them. 4. Explain the importance of family network. 5. What is advocacy? Describe the principle action for successful advocacy. 5.10 References Cunningham, S. D., Kreider, H., &Ocón, J. (2012). Influence of a parent leadership program on participants' leadership capacity and actions. School Community Journal, 22(1), 111-124. Cox, Ruth P. (2003). Health related counseling with families of diverse cultures: Family, health and cultural competencies. Westport, CT: Greenwood Press.

116 Disability Rights Advocacy Workbook, LANDMINE SURVIVORS NETWORK, Geneva, 2007 Hartman, A. (1995). Diagrammatic assessment of family relationships.Families in Society: The Journal of Contemporary Human Services, 76(2), 111-122. Limaye, Sandhya (2015), A Disabled Mother's Journey in Raising Her Child in Hans Asha (ed), Disability, Gender and The Trajectories of Power. New Delhi: SagePublication Olsen, R. and Clarke, H. (2003) Parenting and Disability: Disabled Parents' Experiences of Raising Children, Bristol, UK: The Policy Press Reynolds, M., & St. John, J. (2012). Core competencies of family leaders: A guide for families and organizations. Kansas City, MO: Missouri Family to Family Resource Center, UMKC/UCEDD. Rogers, J. (1996) Pregnancy and Physical Disabilities, In Krotoski, D. M., Nosek, M. A., & Turk, M. A. (ed) Women with Physical Disabilities: Achieving and maintaining health and Well being, Baltomore: Paul h. Brooks Publishing Co. Trainor, A. A. (2010). Diverse approaches to parent advocacy during special education home-school interactions: Identification and use of cultural and social capital. Remedial and Special Education, 31(1), 34-47 T Feher-Prout(ý1996) Stress and coping in families with deaf children in Theoratical and review article Website-https://www.nap.edu/read/21868/chapter/7 http://cedwvu.org/resources/types-of-advocacy/ https://www.batod.org.uk/information/the-social-and-emotional-development-of- deaf-children/

Hit and source - focused comparison, Side by Side

Submitted text	As student entered the text in the submitted document.
Matching text	As the text appears in the source.

Document Information

Analyzed document	B11_HI.pdf (D165322328)
Submitted	4/28/2023 9:07:00 AM
Submitted by	Library NSOU
Submitter email	dylibrarian.plagchek@wbnsou.ac.in
Similarity	0%
Analysis address	dylibrarian.plagchek.wbnsou@analysis.urkund.com

Sources included in the report

Entire Document

1 M. Ed. Spl. Ed. (H.I. / I.D) ODL Programme AREA - B B 11 (H.I.): ASSISTIVE DEVICES & SERVICES FOR INDIVIDUALS WITH HEARING IMPAIRMENT A COLLABORATIVE PROGRAMME OF NETAJI SUBHAS OPEN UNIVERSITY AND REHABILITATION COUNCIL OF INDIA

2 Chairman Prof. Subha Sankar Sarkar, Vice Chancellor, Netaji Subhas Open University, Kolkata Convenor Prof. Atindranath Dey, Director, School of Education, Netaji Subhas Open University, Kolkata RCI Expert Committee AREA - B COURSE CODE - B 11 (H.I.) ASSISTIVE DEVICES & SERVICES FOR INDIVIDUALS WITH HEARING IMPAIRMENT Dr. Jayanthi Narayan Former Deputy Director, NIMH, Secunderabad. Dr. Varsha Gathoo Head and Reader, Department of Education, AYJNISHD (D), Mumbai. Dr. Sanjay Kumar Assistant Professor, DSMNRU, Lucknow, Shri Ashok Chakraborty Ex- Chairperson, ZCC, RCI & Secretary, SHELTER. Dr. Hemant Singh Keshwal Assistant Prof. of Special Education and Centre In- Charge, NIEPID- RC, Kolkata. Shri Suman Kumar Assistant Professor of Speech & Hearing, AYJNISHD- RC, Kolkata. Professor A. N. Dey Director, School of Education, NSOU. Smt. Antara Choudhury Assistant Professor of Special Education, School of Education, NSOU. NSOU Expert Committee [Board of Studies (BoS)] Professor A. N. Dey Director, School of Education, NSOU. Professor Dulal Mukhopadhyay Professor of Education (Retd), NSOU. Shri Ashok Chakraborty Ex- Chairperson, ZCC, RCI & Secretary, SHELTER, Professor Debasri Banerjee Professor of Education, Department of Education, University of Calcutta Dr. Hemant Singh Keshwal Assistant Prof. of Spl. Education and Centre In- Charge, NIEPID-RC, Kolkata. Shri Suman Kumar Assistant Professor of Speech & Hearing, AYJNISHD- RC, Kolkata. Professor Swapan Kr. Sarkar Head, SoE, NSOU Prof. Sanat Kumar Ghosh Professor of Education, SoE, NSOU. Professor Sumanta Chattaraj Professor of Education, SoE, NSOU. Smt. Swapna Deb Consultant, SoE, NSOU. Smt. Antara Choudhury Assistant Professor of Special Education, School of Education, NSOU. Dr. Abhedananda Panigrahi Coordinator, B. Ed., SoE, NSOU. Shri Prabir Naskar Assistant Professor of Special Education, SoE, NSOU. Title : Assistive Devices & Services for Individuals with Hearing Impairment Unit Name of the Unit Writer Name of the Editor Unit-1 Dr. Raju Arakh, Lecturer, Dept of Education, Dr. Varsha Gathoo, Head and Reader, Department AYJNISHD(D), Mumbai of Education, AYJNISHD (D), Mumbai Unit-2 Ms. Piyali Kundu, ASLP, AYJNISHD (D), RC, Kolkata Unit-3 Mr. Indranil Chatterjee, Lecturer, Speech & Hearing, AYJNISHD, RC, Kolkata. Unit-4 Ms. Krithika Iyengar Saha, Audiologist, Peerless Hospital, Kolkata Unit-5 Dr Prithi Venkatesh, Reader, Dept of Spl Education, AIISH, Mysore.

3 Prologue I am delighted to write this foreword for the Self Learning Materials (SLM) of M Ed in Special Education (ODL). The M Ed in Special Education in ODL mode is a new academic program to be introduced at this University as per NOC issued by the Rehabilitation Council of India, New Delhi and subject to approval of the program by the DEB-UGC. I must admire the emulation taken by the colleagues from School of Education (SoE) of NSOU for developing the Course Structure, Unit wise details of contents, identifying the Content Writers, distribution of job of content writing, editing of the contents by the senior subject experts, making DTP work and also developing E-SLMs of all the 16 Papers of the M.Ed Spl.Ed (H.I/I.D)—ODL program. I also extend my sincere thanks to each of the Content Writers and Editors for making it possible to prepare all the SLMs as necessary for the program. All of them helped the University enormously. My colleagues in SoE fulfilled a tremendous task of doing all the activities related to preparation of M.Ed in Spl Edn SLMs in war footing within the given time line. The conceptual gamut of Education and Special Education has been extended to a broad spectrum. Helen Keller has rightly discerned that "Have you ever been at sea in a dense fog, when it seemed as if a tangible white darkness shut you in and the great ship, tense and anxious, groped her way toward the shore with plummet and sounding- line, and you waited with beating heart for something to happen? I was like that ship before my education began, only I was without compass or sounding line, and no way of knowing how near the harbour was. "Light! Give me light!" was the wordless cry of my soul, and the light of love shone on me in that very hour." So education is the only tool to empower people to encounter his/her challenges and come over being champion. Thus the professional Teacher Education program in Special Education can only groom the personnel as required to run such academic institutions which cater to the needs of the discipline. I am hopeful that the SLMs as developed by the eminent subject experts, from the national as well as local pools, will be of much help to the learners. Hope that the learners of the M.Ed Spl Edn program will take advantage of using the SLMs and make most out of it to fulfil their academic goal. However, any suggestion for further improvement of the SLMs is most welcome. Professor (Dr.) Subha Sankar Sarkar Vice-Chancellor, NSOU

5 AREA - B

B 11 : ASSISTIVE DEVICES & SERVICES FOR INDIVIDUALS WITH HEARING IMPAIRMENT Unit 1 : Schemes & Services For Individuals With Hearing Impairment 1.1 Schemes for persons with disabilities of various ministries/departments of central and state government in early intervention, rehabilitation, education and employment; 1.2 Schemes for availing aids and appliances: ADIP and other schemes 1.3 Services for individuals with hearing impairment: Types, availability, coverage and quality 1.4 Delivery of services; Role of various stakeholders, planning, implementing, collaboration, challenges and issues 1.5 Appraisal of services: Methods of measuring outcomes and suggesting plan of action Unit 2: Listening and Assistive Devices in Audiological Management 2.1 Hearing aids: Overview to hearing aids; Overview to electro-acoustic characteristics and need to study same; Importance of ear moulds and its modifications 2.2 Cochlear Implant: Overview to cochlear implants; Need and importance for regular mapping 2.3 FM system: Components, Functioning, Types, Advantages and disadvantages 2.4 Induction loop systems & Hardwire systems: Components, Functioning, Types, Advantages and disadvantages 2.5 Criteria for recommendation of one device over the other; Role of special educators in measuring outcome of listening devices Unit 3: Assistive Devices in Management of Language & Communication 3.1 Meta level understanding of use of technology for language development 3.2 Access to whole language: Challenges of communication options and use of technology for ways to overcome

6 3.3 Use and availability of social media for sign language users: Communicative, educational and social purposes 3.4 Orientation to web based Curriculum Based Measurement (CBM) tools 3.5 Tele captioning of popular media and its role in literacy development Unit 4: Technology & Methods in Management of Speech 4.1 Parameters measured in phonation and supra-segmental aspects of speech using advanced technology and their application 4.2 Need and methods to analyse and to correct articulation of speech 4.3 Selecting management techniques for phonation and supra-segmental aspects of speech 4.4 Selecting management methods for facilitating articulation in CWHI 4.5 Methods to improve speech intelligibility; Measurement of outcome Unit 5 : Assistive Devices in Educational Management 5.1 Impact of Technology on education: Present & Future 5.2 Assistive technologies for personal and educational purposes: Devices & Processes and their application 5.3 Mainstream Technologies: Universal Designs; its Concept, Principles & product design 5.4 Research & Developments in Educational technology: national & international 5.5 Evidence Based Practices

7 Netaji Subhas Open University AREA - B B 11 (H.I.): ASSISTIVE DEVICES & SERVICES FOR INDIVIDUALS WITH HEARING IMPAIRMENT B 11 ppppp ASSISTIVE DEVICES & SERVICES FOR INDIVIDUALS WITH HEARING IMPAIRMENT UNIT ppppp 1 SCHEMES & SERVICES FOR INDIVIDUALS WITH HEARING 9 - 41 IMPAIRMENT UNIT ppppp 2 LISTENING AND ASSISTIVE DEVICES IN AUDIOLOGICAL 42 - 117 MANAGEMENT UNIT ppppp 3 ASSISTIVE DEVICES IN MANAGEMENT OF LANGUAGE & 118 - 138 COMMUNICATION UNIT ppppp 4 TECHNOLOGY & METHODS IN MANAGEMENT OF SPEECH 139 - 173 UNIT ppppp 5 ASSISTIVE DEVICES IN EDUCATIONAL MANAGEMENT 174 - 191

8

9 Unit 1 ❏ Schemes & Services For Individuals With Hearing Impairment Structure 1.1 Introduction 1.2 Objectivesa 1.3 Schemes For Persons with Disabilities of Various Ministries/Departments of Central And State Government In Early Intervention, Rehabilitation, Education And Employment 1.4 Schemes For Availing Aids And Appliances: ADIP And Other Schemesa)

Assistance To Disabled Persons For Purchase/Fitting Of Aids/Appliances (Adip) 1.5

Services for Individuals With Hearing Impairment : Types, Availability, Coverage And Quality 1.6 Delivery Of Services; Role Of Various Stakeholders, Planning, Implementing, Collaboration, Challenges And Issues 1.7 Appraisal of Services: Methods of Measuring Outcomes and Suggesting Plan of Action 1.8 Let us Sum up 1.9 Unit end exercises 1.10 References 1.1 Introduction According to Census 2011, there were about 2.68 crore persons with disabilities in India, constituting 2.21% of the total population in country. Article 41 of constitution of India makes it mandatory to provide the education to all, freedom, justice and dignity of all individuals. Accordingly Central, State and Local Govt. bodies are responsible to ensure the fundamental rights of the citizens of India. In light of the article 14 and 41 the Government of India enacted laws, framed policies, schemes etc. for the welfare and empowerment of persons with disabilities.

10 1.2 Objectives a. To know the State and Central Government schemes for the welfare of Persons with Disabilities in India. b. To know about ADIP and other schemes for availing Aids and Appliances for the Persons with Disabilities. c. To know about the availability of rehabilitation services its coverage and quality. d. To know the role of various stakeholders in delivery of services its planning and implementation and understanding the challenges and issues comes in the way of delivery of services. e. To know the methods of measuring outcome of services and plan of action. 1.3 Schemes For Persons with Disabilities of Various Ministries/ Departments of Central And State Government In Early Intervention, Rehabilitation, Education And Employment There are many schemes being provided by the central Government and State Government for the rehabilitation and welfare of persons with disabilities in India. They are as follows. 1.3.1 Deendayal Disabled Rehabilitation Scheme (Ddrs)

Department of Empowerment of Persons with Disabilities, Ministry of social Justice & empowerment Government of India ,

New Delhi has initiated and implemented the revise scheme of Deendayal Disabled Rehabilitation Scheme (DDRC) with the main objectives of to create and enable environment to ensure equal opportunities, equity, social justice and empowerment of persons with disabilities and encourage voluntary action for ensuring effective implementation of the Rights of Persons with Disability Act, 2016. The scheme has been revised to be implemented w.e.f. 1st April, 2018 as given. The scheme includes model projects as given below. I. Pre-Schools and Early Intervention and Training II. Special Schools for Persons with Disabilities for a. Mental Retardation

11 b. Hearing & Speech Impaired c. Visually Challenged III. b. Cerebral Palsied Children IV. Rehabilitation of Leprosy Cured Person V. Half Way Home for Psycho-Social Rehabilitation of Treated and Controlled Mentally III persons VI. Home-Based Rehabilitation and Home Management. VII. Community Based Rehabilitation Programme (CBR) VIII. Low Vision Centres IX. Human Resource DevelopmentThe organisation has to apply for Grant-in-Aid on the online portal of the Ministry (e-Anudaan) and forward the complete proposal to District Social Welfare Officer. Upon inspection and submission of online inspection report, the District Social Welfare Officer would forward the proposal to respective State Government/UT administration and to Government of India. If the State Government/UT administration does not decide on the proposal within 60 days, Government of India can decide on the proposal on the basis of inspection report submitted by the inspecting officer for NGOs receiving Grant-in-Aid under the scheme. 1.4 Schemes For Availing Aids And Appliances: ADIP And Other Schemesa)

Assistance To Disabled Persons For Purchase/Fitting Of Aids/Appliances (Adip)

The

main objective of the Scheme is

to assist the needy disabled persons in procuring durable, sophisticated and scientifically manufactured, modern, standard aids and appliances to

promote physical, social, psychological rehabilitation of Persons with Disabilities by reducing the effects of disabilities and at the same time enhance their economic potential. Assistive devices are given to PwDs with an aim

to improve their independent functioning, and to arrest the extent of disability and occurrence of secondary disability. The

Scheme is implemented through the various

Implementing Agencies.

The following agencies are eligible to implement the Scheme on behalf of Department,

subject to fulfillment of following

terms and conditions:

12 • Societies and their branches, if any, registered separately under the Societies Registration Act, 1860. • Registered Charitable Trusts. • Indian Red Cross Societies and other Autonomous Bodies headed by District Collector/ Chief Executive Officer/District Development Officer. • National/Apex Institutes, CRCs, RCs, DDRCs, National Trust, ALIMCO functioning under administrative control of the Ministry of Social Justice and Empowerment/Ministry of Health and Family Welfare. • National/State Handicapped Development Corporation

and Section 25 Companies in the Private Sector. •

Local Bodies – ZillaParishad, Municipalities, District Autonomous Development Councils and Panchayats etc. • Hospitals registered as separate entity, as recommended by State/UT/Central Govt. • Nehru

YuvaKendras. • Any other organization as considered fit by Department of

Empowerment of Persons with Disability (Divyangjan), Ministry of SJ&E. The Implementing Agencies are given financial assistance for purchase, fabrication and distribution of such standard aids and appliances that are in conformity with objectives of the Scheme.

The

Scheme shall also include essential medical/surgical correction and intervention, prior to fitment of aids and appliances. The Department for financial assistance has notifies Disability-wise list of contemporary aids and assistive devices for Persons with Disabilities(PwDs) under this scheme.Disability wise list of contemporary aids and assistive devices for Persons with Disabilities(PwDs) SR. NO. 1. Types of Disability Persons with Visually Impairment Contemporary aids and assistive devices List of 51 assistive devices Kit-1: For Primary SchoolChildren studying in Class 1 to 5, Kit-2. For studying in Class 9 and 10, Kit 4: For students studying in Class 11 and 12 which has 2 sub- parts viz. Kit-4 (A) for Blind students and Kit-4(B) for

13 low vision students, Kit 5: For Collage students which has 2 sub-parts i.e. Kit-5(A) for Blind Students and Kit-5 (B) for low vision students and Kit-6: ADL Kit for Adults, It also contains COMPENDIUM OF SCHEMES - 2018 11 list of common Low Vision Devices and list of High- end & Other Common Devices meant Smart Cane: (i) a common Assistive Daily Living (ADL) Kit to be procured and distributed by ALIMCO and (ii) List of 34 individual optional devices as per requirement for distribution by NIRTAR, IPH, NIOH and NGO partners (a) 4 Kit for Mentally Retarded including viz (i) Kit-1 (A): Age group 0-3 years: Early intervention group (Code: EI) and Kit-1(B): TLM Kit for Multiple Disabled in the Age group 0-3 years (ii) Kit2: Age group (Code: PP), (iii) Kit-3 Age group 7-11 years: Primary group (Code: PR) and (iv) Kit-4: Age group 12-15 & 16-18 years: Secondary & Pre-Vocational (Code: SEC/ PV). To begin with these Kits to be provided in Special Schools across the Country, (b) 3 TLM Kits for children with Multiple Disabilities viz (i) Kit-1 Age group3-6 years (ii) Kit-2 Age group 6-10 years and (iii) Kit 3: Age group 10 years and above and (c) ALIMCO Model Sensory Kit: Multi Sensory Inclusive Education Development (MSIED) Kit for persons with Intellectual and Developmental Disabilities. Assistive devices like Body Level Hearing Aids, Analog/Non Programmable- Behind the ear (BTE), In the ear (ITE), In the canal (ITC), Completely in the Canal (CIC); Digital/ Programmable- Behind the ear (BTE), In the ear (ITE), In the canal (ITC), Completely in the Canal (CIC); Personal FM Hearing Aids, Leprosy Affected: Intellectual and Developmental Disabilities: Hearing Impaired 2. 3. 4.

14 Bluetooth neck loop for hearing aids, Vibratory Alarm, Baby-crying Alerting Wireless device, Door Bell Signaler, Fire Smoke Alarm, Telephone Signaler, Amplified Telephone, Telephone amplifier, Audio induction loop, Infrared system, Hearing aids with bone vibrator, Educational Kit (Children from 2 to 5 years, Pre-school going children) containing Language (Vocabulary) Book, Articulation drill book, Story book, Other materials (Family Hand Puppets, 5 puzzles, Montessori equipments/toys, Shape sorter clock, One set of noise makers, Block sorter boxes, Set of verb cards and 5 soft toys). Cochlear implant: Revised ADIP Scheme contains a provision to provide Cochlear implant to 500 children per year,

with a ceiling of Rs.6.00 lakh per unit to be borne by the Government.

Income ceiling for the beneficiaries will be same as for other aids/appliances.

Ali Yavar Jung National Institute for the Hearing Handicapped (AYJNIHH), Mumbai,

is the nodal agency for Cochlear Implant Surgery. The Institute invites application by issuing advertisements in news papers (all India editions) and also through their website: www.ayinihh.nic.in. Cochlear Implants are procured by Artificial Limbs Manufacturing Corporation of India (ALIMCO), Kanpur and provided at the nominated hospitals. Surgery is done at identified Government/State Government approved hospitals. For conducting cochlear implant surgery, the Ministry has approved empanelment of Government and Private Hospitals.

Motorized tricycles and wheelchairs for severely disabled and for Quadriplegic (SCI), Muscular Dystrophy, Stroke, Cerebral Palsy, Hemipeligia and any

Persons with Orthopaedic Handicapped 5.

15 Quantum of Assistance : Aids / appliance

which do not cost more than Rs. 10,000/ - are covered under the Scheme for single disability. However, in the case of SwDs, students beyond Intellectual Disability (ID) class, the limit would be raised

uptoRs. 12,000/-.

In the case of SwDs, students beyond ID class, the limit would be raised to Rs. 12,000/-. In the case of multiple disabilities, the limit will apply to individual items separately in case more than one aid / appliance is required. Income Limits : Total Family Income Amount of Assistance i) Up to

Rs. 15000/- per month i) Full cost of aid/appliance (

ii) Rs. 15,001/- to Rs. 20,000/- per month (ii) 50% of the cost of aid // appliance

The extent of financial support would be limited to Rs. 10,000/- for each disability and Rs. 12,000/- for students with disabilities in respect of devices costing

up to Rs. 20,000/-. For all expensive assistive devices costing above Rs. 20,000/-, Government

shall bear 50% of cost of these items and the remainder shall be contributed by either the State Govt. or the NGO or any other agency or by the beneficiary concerned, subject to prior approval of Ministry on case to case basis, limited to 20% of the Budget under the Scheme.

other person with similar conditions, where either three/ four limbs or one half of the body are severely impaired. Extent of subsidy would be Rs.25,000/-. This will be provided to the persons of age of 16 years and above, once in ten years. However, severely disabled persons of 16 years and above age having mental impairment shall not be eligible for Motorized tricycles and wheelchairs since it puts them at a risk of serious accident/physical harm.

Any suitable Aids and Appliances as may be specified for new disabilities added in

Rights of Persons with Disabilities (RPwD) Act,2016. 6. Any disabled specified in RPWD Act 2016

16 Travelling cost:

Travelling cost would be admissible separately to the PwD and one escort limited to bus fare or railway, subject to a limit of Rs. 250/- each person, irrespective of number of visits to the centre. Boarding and lodging expenses:

Boarding and lodging expenses at the rate of Rs. 100/- per day for maximum duration of 15 days would be admissible, only for those patients whose total income is upto Rs.15,000/- per month and the same will be allowed to attendant/escort.

b) SCHEME FOR IMPLEMENTATION OF PERSONS WITH DISABILITIES ACT, 1995 (SIPDA) As per the provisions of

Persons with Disabilities (Equal Opportunities, Protection of Rights and Full Participation) Act, 1995 (PwD Act), the

Ministry

has been Implementing the Scheme for Implementation of Persons with Disabilities Act, 1995 (SIPDA)

for providing financial assistance to undertake various activities outlined in the Act. The Ministry has been releasing funds under the Scheme since 1999.The activities/projects under the Scheme are implemented and executed by the following ● States Governments/Union Territories. ● Autonomous Organizations set up by Central/State Governments including Central/State Universities. ● National Institutes/ CRCs/DDRCs/RCs/Outreach Centres under MSJ&E. ● Statutory Organizations of Central/State Govts/UTs. ● Organizations/Institutions set up by Central and State Governments. ● Central/State recognized Sports bodies & Federations. ● Non-Governmental Organizations empanelled by the Department for Skill Training Programme under National Action Plan. Activities/ components covered in SIPDA scheme ● To provide barrier free environment for the persons with disabilities which include access to built environment in schools, colleges, academic and training institutions, offices and public buildings, recreational areas, health centres/hospitals etc. This would include provision for ramps, rails, lifts, adaptation of toilets for wheelchair users, brail signages and Department of Empowerment of Persons with Disabilities

17 (Divyangjan) 16 auditory signals, tactile flooring, causing curb cuts and slopes to be made in pavement for the easy access of wheelchair users, engraving on the surface of zebra crossing for the blind or for persons with low vision, engraving on the edges of railway platforms for the blind or for low vision and devising appropriate symbols of disability, etc. ● To make Government websites at the Centre/State and District levels accessible to PwDs. ● Skill Development Programme for PwDs. ● To enhance the accessibility of built environment, transport system and information and communication eco-system through "Accessible India Campaign (Sugamya Bharat Abhiyan)" ● To support and set up new Composite Rehabilitation Centres (CRCs)/ Regional Centres/Outreach Centres and District Disability Rehabilitation Centres (DDRCs) ● To assist State Government to organize camps of issuance of disability certificates. ● To create awareness campaign and sensitization programmes for various stake holders and other Information Education Communication. ● To set up/support resource centres facilitating dissemination of information on disability issues, counseling and providing support services. ● To promote accessibility of libraries, both physical and digital and other knowledge centres. ● Supporting activities relating topre-schooltraining for childrenwithdisabilities, counselling for the parents, training for care givers, teachers training programme and activities relating to early detection camps for children of age 0-5 years and early intervention. ● To establish early diagnostic and intervention centres at District Headquarters/ other places ● Construction of special recreation centres for PwDs ● Support for sporting events at National/State level ● Identification and Survey/Universal ID of PwDs ● Research on Disability Related Technology, Product and Issues.

18 • Incentive to employers in the private sector for providing employment to persons with disabilities. c) DISTRICT DISABILITY REHABILITATION CENTRES (DDRCs) In order to facilitate creation of infrastructure and capacity building at district level for awareness generation, rehabilitation, training and guidance of rehabilitation professionals, the Department is supporting setting up District Disability Rehabilitation Centres in all the unserved districts of the country for providing comprehensive services to the persons with disabilities.The broad objectives of the DDRCs are as follows: • Survey and identification of Persons with Disabilities through camp approach • Awareness generation for encouraging and enhancing prevention of disabilities • Early intervention • Assessment of need of assistive devices, provision/fitment of assistive devices and follow up/repair of assistive devices • Therapeutic Services e.g. Physio-therapy, Occupation Therapy, Speech Therapy etc. • Facilitation ofissue of DisabilityCertificates, bus passes and other concessions and facilities for Persons with Disabilities • Referral and arrangements for surgical correction through Government and Charitable Institutes • Arrangement of loans for self-employment from banks and other financial institutions including State Channelizing Agencies (SCAs) of NHFDC • Counseling of PwDs, their parents and family members • Promotion of barrier free environmen • Provision of supportive and complementary services for promoting education, vocational training and employment of Persons with Disabilities through: Imparting orientation training to teachers, community and families; Training to Persons with Disabilities for early motivation and early stimulation for education, vocational training and employment; o Identifying suitable vocations for Persons with Disabilities, keeping in view local resources and designing and providing vocational training and identifying suitable jobs, so as to make them economically

19 independent and o Providing referral services for existing educational, training and vocational institutions. d) OTHER SCHEMES • SCHOLARSHIP/EMPLOYMENT SCHEMES • Pre-matric scholarship and post-matric scholarship for students with disabilities Objectives and brief of the scheme: • The objectives of the schemes are to provide financial assistance to the students with disabilities for studying in the pre-matric level (class IX and X) and post- matric level (Classes XI, XII and upto post graduate degree/diploma level). • The financial assistance includes scholarship, book grant, escort/reader allowance, etc. • Number of scholarships to be granted during 2017-18 is 20,000 for pre-matric level and 17,000 for post-matric level. • Selection of the beneficiaries under these two scholarship schemes is done on the basis of merit after the recommendation of the State Governments/Union Territory Administration. • These schemes are being implemented on-line, through a web-portal "National e- Scholarship Portal" (www.scholarships.gov.in) so that the students can apply on- line and the benefits reach the beneficiaries through Direct Benefit Transfer (DBT). (i) Scholarship and other grant Items Day Scholar Hostellers Rate of Scholarship (in Rs. 350 600 Per month) payable for 10 months in an academic year. 1,000 1,000 Book and adhoc grant (Rs. Per annum)

20 (ii) Allowances: Allowances Amount (in Rs.) Monthly Reader Allowance for Blind 160 students Monthly Transport Allowance, if such 160 students do not reside in the hostel which is within the premises of the Educational Institution. Monthly Escort Allowance for Severely 160 Disabled (i.e. with 80% or higher disability) Day Scholars/Students With low extremity disability Monthly Helper Allowance admissible to 160 any employee of the hostel willing to extend help to a severely orthopaedically handicapped student residing in the hostel of an Educational Institution who may need the assistance of a helper Monthly Coaching Allowance to 240 Mentally Retarded and Mentally ill Students Post-Matric Scholarship: The value of Post-matric scholarship includes the following for complete duration of the course:- (i) Maintenance allowance, (ii) Additional allowance for students with disabilities, for the complete duration of the course,and (iii) Reimbursement of compulsory non-refundable fees, (iv) Book allowanceThe details are as follows:

21 • Maintenance allowance Groups Rate of Maintenance allowance (in Rupees per month) Hostellers Day Scholars Group I 1200 550 All PG Degree / Diploma Courses recognised by UGC in any discipline. All Bachelor's Degree courses in Medicine (Allopathic, Indian and other recognized systems of medicines), Engineering, Technology, Planning, Architecture, Design, Fashion Technology, Agriculture, Veterinary & Allied Sciences, Management, Business Finance/ Administration, Computer Science/ Applications. Group II 820 530 Professional Courses leading to Degree, Diploma, Certificate in areaslike Pharmacy (B Pharma), LLB, BFS, other para-medical brancheslike Rehabilitation, Diagnostics etc., Mass Communication, Hotel Management & Catering, Travel/Tourism/ Hospitality Management,Interior Decoration, Nutrition & Dietetics, Commercial Art,Financial Services (e.g. Banking, Insurance, Taxation etc.) for which entrance qualification is minimum Sr. Secondary (10+2). Group III 700 500 All other courses leading to a graduate degree not covered under Group I & II eg. BA/B Sc/B Com etc.

22 Group IV 650 400 All post-matriculation level non-degree courses for which entrancequalification is High School (Class X), e.g. senior secondary certificate (class XI and XII); both general and vocational stream, ITI courses, 3 year diploma courses in Polytechnics, etc. In addition, the scheme also provides for books allowance, typing and printing charges, Reader allowance, Escort allowance, coaching allowance and special allowance etc.Scholars will be paid enrolment/registration, tuition, games, Union, Library, Magazine, Medical Examination and such other fees compulsorily payable by the scholar to the institution or University/Board maximum up to the ceiling of Rs.1.50 lakh per annum subject to actual.Refundable deposits like caution money, security deposit will, however, be excluded. ● Scholarship for top class education for students with disabilities ● The Scheme aims at recognizing and promoting quality education amongst Students withDisabilities by providing financial support. ● The scheme will cover Students with Disabilities (SwDs) for pursuing studies at the level ofPost Graduate Degree or Diploma in any discipline. ● The scheme is operating in institutions notified by the Department of Empowerment ofPersons with Disabilities, Ministry of Social Justice & Empowerment as institutions ofexcellence. ● The financial assistance includes scholarship, book grant, escort/reader allowance, etc. ● Number of scholarships to be granted during 2017-18 is 110 Scholarship for Top Class Education. 50% of the scholarships are reserved for girls. ● Parental income ceiling is Rs.6.00 lakhs per annum for Top Class Education. ● Selection of the beneficiaries under these three scholarship schemes is done on the basis ofmerit after the recommendation of the Governments of State or Union Territories.

23 The scholarship will include the following :- Sl No. Components of Scholarship Rate per awardees1. 1. Reimbursement of tuition fees and Up to Rs. 2.00 lakh – per nonrefundable charges paid/ payable (subject to actual amount). to the Institution annum 2. Maintenance Allowance Rs. 3,000/- per month for hostellers, Rs. 1,500/- per month for day-scholars 3. Special Allowances (related to types Rs.2000/- per month of disabilities like reader allowance, escortallowance, helper allowance etc.) 4. Books & Stationery Rs. 5,000/- per annum. 5. Reimbursement of expenses for purchase Rs. 30,000/- per awardee of acomputer with accessories. as a one-time grant for entire course. 6. Reimbursement of expenses for purchase Rs. 30,000/- per awardee of Aids and Assistive Devices including as a one-time necessary software related to the grant for entire course particular disability of the selected candidate. The Department of Empowerment of Persons with Disabilities announce the details of the scheme and invite applications by issuing an advertisement in the leading newspapers and through the websites and other media outfits. Applications are called for through the National Scholarship Portal, an on-line scholarship management program being developed by Department of Electronics & Information Technology for this purpose. ● National Overseas Scholarship for students with disabilities: Major Activities under different Schemes & Programmes of the National Trust:- ● DISHA (Early Intervention and School Readiness Scheme):- This is an early intervention and school readiness scheme for children in the age group of 0-10 years with the four disabilities covered under the National Trust Act and aims
at setting up Disha Centres for early intervention for Persons with
24 Disabilities (PwDs) through therapies, trainings and providing support to family members.
RO should provide day-care facilities to PwDs for at least 4 hours in a day (between 8 am to 6 pm) along with age specific activities. There should be
a Special Educator or Early Intervention Therapist, Physiotherapist or Occupational Therapist and Counsellor for PwDs along with Caregiver and Ayas in the centre. The revised Early Intervention Scheme will have provision to cover 0 to 10 year age group of children in place of 0 to 6 age group as envisaged in the earlier scheme. The set up cost has been increased from Rs. 50,000 to Rs. 1.55 lakh. ii) VIKAAS (Day Care):- This is a Day cares cheme, primarily to expand the range of opportunities available to persons with disabilities for enhancing interpersonal and vocational skills as they are on a transition to higher age groups. The centre will also offer care giving support to Persons with Disabilities (PwDs) during the time the PwDs are in the Vikaas centre. In addition it also helps in supporting family members of the Persons with disabilities covered under the National Trust Act to get some time during the day to fulfil other responsibilities.
RO should provide day-care facilities to PwDs for at least 6 hours in a day (between 8 am to 6 pm) along with age specific activities. Day care should be open for at least 21 days in a month ●

SAMARTH (Respite Care):- The objective of Samarth scheme is to provide respite home for orphans or abandoned, families in crisis and also for Persons with Disabilities (PwDs) from BPL & LIG families including destitute with at least one of the four disabilities covered under the National Trust Act. It also aims at creating opportunities for family members to get respite time in order to fulfil other responsibilities. This scheme aims at setting up Samarth Centres for providing group home facility for all age groups with adequate and quality care service with acceptable living standards including provision of basic medical care from professional doctors. The revised Samarth Scheme will have provision of Work Center. The per beneficiary monthly recurring cost has been revised from 1600 P.M. to 7,000 P.M. The Scheme will have full time support in place of tapering grant. ● GHARAUNDA (Group Home for Adults):- The objective of Gharaunda scheme is to provide an assured home and minimum quality of care services throughout the life of the

persons with Autism, Cerebral Palsy, Mental Retardation and Multiple Disabilities
with adequate and quality

25 care service with acceptable living standards including provision of basic medical care from professional doctors. Gharaunda Centre should provide vocational activities, pre-vocational activities and assistance for further training. The revised GHARAUNDA Scheme will have 1:1

ratio for LIG (including BPL) and above LIG PwDs, (which will be paid seats for

Registered Organisations) in place of 5:1. There will be monthly recurring fund of Rs. 10,000 per PwD in place of one time payment of Rs. 8 lakh per PwD. In addition, there will be one time set up fund of Rs. 2.50 lakh, crisis fund of Rs. 10 lakh and fund for setting work center ranging from Rs. 25, 000 to 1, 00,000. ● v) 'NIRAMAYA' Health Insurance Scheme-The scheme is to provide affordable Health Insurance to

persons with Autism, Cerebral Palsy, Mental Retardation and Multiple Disabilities.
The enrolled beneficiaries get a health insurance cover upto Rs.1.0 lakh, by paying a nominal fee. ● SAHYOGI (Caregiver training scheme):- This scheme aims at setting up Caregiver Cells (CGCs) to provide training and create a skilled workforce of caregivers to provide adequate and nurturing care for Persons with Disabilities (Divyangjan) and their families who require it. It also seeks to provide parents an opportunity to get trained in care giving, if they so desire. This scheme will provide a choice of training through two levels of courses primary and advanced to allow it to create caregivers suited to work both with Persons with Disabilities (Divyangjan) families and other institutions catering to the needs of the Divyangjan (NGOs, work centres etc.). There is a provision of training cost of Rs.4,200 per trainee, for primary course and Rs.8,000 for advanced course. Also, stipend for trainee @ Rs.5,000 for primary and Rs.10,000 for advanced course has been introduced in the scheme. This scheme aims at setting up Caregiver Cells (CGCs) to provide training and create a skilled workforce of caregivers to provide adequate and nurturing care for Persons with Disabilities (Divyangjan) and their families who require it. It also seeks to provide parents an opportunity to get trained in care giving, if they so desire. This scheme will provide a choice of training through two levels of courses primary and advanced to allow it to create caregivers suited to work both with Persons with Disabilities (Divyangjan) families and other institutions catering to the needs of the Divyangjan

26 (NGOs, work centres etc.). There is a provision of training cost of Rs.4,200 per trainee, for primary course and Rs.8,000 for advanced course. Also, stipend for trainee @ Rs.5,000 for primary and Rs.10,000 for advanced course has been introduced in the scheme. ● GYAN PRABHA (Educational support):- Gyan Prabha scheme aims to encourage people with Autism, Cerebral Palsy, Mental Retardation and Multiple Disabilities

for pursuing educational courses like graduation courses, professional courses and vocational training leading to employment or self-employment.
The National Trust is providing a specific amount per course to a Divyangjan which covers fees, transportation, books, out of pocket expenses (OPEs) etc. ●

PRERNA (Marketing Assistance):- Prerna is the marketing assistance scheme of the National Trust with an objective to create viable and widespread channels for sale of products and services produced by Persons with disabilities (PwDs) covered under the National Trust Act. This scheme aims at providing funds to participate in events such as exhibitions, melas, fairs, etc. to sell the products made by PwDs. The scheme also provides an incentive to the Registered Organisations (ROs) based on the sales turnover of the products made by PwDs. The National Trust shall fund RO participation in national, regional, state and district level events such as fairs, exhibitions, melas etc. for marketing and selling products and services prepared by PwDs. However, at least 51% of employees of these work centres should be Persons with Disabilities covered under the National Trust Act. • BADHTE KADAM (Awareness and Community Interaction):- This scheme shall support Registered Organisations (ROs) of The National Trust to carry out activities that focus on increasing the awareness of The National Trust disabilities. Aim of scheme is to create community awareness, sensitisation, social integration and mainstreaming of Persons with Disabilities. The National Trust shall sponsor a maximum of 4 events for each RO per year. Each RO should conduct at least 1 event (either for community, educational institutes or medical institutes) in a year. Bathe Kadam was earlier an initiative of the National Trust which is now converted into a scheme.

27 Ministry of Human Resource and Development(MHRD) Scheme for Integrating Persons With Disabilities In The Mainstream of Technical And Vocational Education: The Scheme was introduced in the year 1999- 2000 with the objective of upgrading some of the selected polytechnics to integrate persons with disabilities in the mainstream of technical and vocational education. The scheme envisages each polytechnic to train upto 25 disabled students through formal courses consisting of regular three-year diploma programmes and upto I 00 disabled persons each year through non-formal courses consisting of vocational/skill development programmes. The disabled students are encouraged through provisions like scholarship, supply of books/educational materials, uniforms, free boarding and lodgi ng etc. At present the scheme covers about 50 polytechnics throughout the country. Sarva Shiksha Abhiyan (SSA): SSA is a programme for Universal Elementary Education. SSA has been operational since 2000-2001 to provide for a variety of interventions for universal access and retention, bridging of gender and social category gaps in elementary education and improving the quality of learning. Aims: 1. To provide useful and elementary education for all children in the 6-14 age group by 2010. 2. To bridge social, regional and gender gaps with the active participation of community in the management of schools. 3. To allow children to learn about and master their natural environment in order to develop their potential both spiritually and materially. 4. To inculcate value-based learning this allows children an opportunity to work for each other's well being rather than to permit mere selfish pursuits. 5. To realize the importance of Early Childhood Care and education and looks at the 0-14 age as a continuum. ● SSA interventions include inter alia, opening of new schools and alternate schooling facilities, construction of schools and additional classrooms, toilets and drinking water, provisioning for teachers, regular teacher in service training and academic resource support, free textbooks& uniforms and support for improving learning achievement levels / outcome. With the passage of the RTE Act, changes have been incorporated into the SSA approach, strategies and norms.

28 ● The changes encompass the vision and approach to elementary education, guided by the following principles : ● Holistic view of education, as interpreted in the National Curriculum Framework 2005, with implications for a systemic revamp of the entire content and process of education with significant implications for curriculum, teacher education, educational planning and management. ● Equity, to mean not only equal opportunity, but also creation of conditions in which the disadvantaged sections of the society – children of SC, ST, Muslim minority, landless agricultural workers and children with special needs, etc. – can avail of the opportunity. ● Access, not to be confined to ensuring that a school becomes accessible to all children within specified distance but implies an understanding of the educational needs and predicament of the traditionally excluded categories – the SC, ST and others sections of the most disadvantaged groups, the Muslim minority, girls in general, and children with special needs. ● Gender concern, implying not only an effort to enable girls to keep pace with boys but to view education in the perspective spelt out in the National Policy on Education 1986 /92; i.e. a decisive intervention to bring about a basic change in the status of women. ● Centrality of teacher, to motivate them to innovate and create a culture in the classroom, and beyond the classroom, that might produce an inclusive environment for children, especially for girls from oppressed and marginalised backgrounds. ● Moral compulsion is imposed through the RTE Act on parents, teachers, educational administrators and other stakeholders, rather than shifting emphasis on punitive processes.Convergent and integrated system of educational management is pre-requisite for implementation of the RTE law. All states must move in that direction as speedily as feasible Scheme of Integrated Education of Disabled Children (IEDC) – 1974 Integrated Education of Disabled Children (IEDC), was initiated by

the Ministry of Welfare, Government of India, in 1974 to promote the integration of students with mild to moderate disabilities into regular schools. The

scheme was later transferred to the

29 Department of Education in 1982-83. The Scheme was last revised in 1992. The program was also designed to promote the retention of children with disabilities in the regular school system. Children were to be provided with financial support for books, stationery, school uniforms, transportation, special equipment and aids. IEDC Scheme –Aims : ● The IEDC scheme had the following three main broad aims. ● To facilitate admission to as many children with disabilities as in need in the integrated set up so that the infrastructure and resources already in existence would be made available to these children too. ● To adopt suitable and appropriate teaching methods for effective teaching learning experiences and thereby reduce the drop out rate. ● To establish a linkage between the special schools and the integrated schools in the area for continuing education and "functional" education in the mainstream. Inclusive Education for Disabled at Secondary Stage (IEDSS): ● The Scheme of Inclusive Education for Disabled at Secondary Stage (IEDSS) was launched during 2009-10 and replaces

the earlier scheme of Integrated Education for Disabled Children (IEDC). ● The

aim of this scheme is to enable all students with disabilities to pursue four years of secondary education in an inclusive and enabling environment, after completing eight years of elementary schooling. ● The scheme covers all children studying in classes IX to XII in Government, local body and Government-aided schools, with one or more disabilities as defined under the Persons with Disabilities Act (1995) and the National Trust Act (1999). ● The type of disabilities range from blindness, low vision, leprosy cured, hearing impairment, locomotor disability, mental retardation, mental illness, autism and cerebral leprosy, speech impairment, learning disabilities etc. ● Girls with disabilities are provided with special attention to help them gain access to secondary education, information and guidance for their developing potential. Moreover, the scheme envisages to set up model inclusive schools in every state.

30 1.5 Services for Individuals With Hearing Impairment: Types, Availability, Coverage And Quality There are many rehabilitative services being provided for the persons with disabilities in India. They are as follows. Types of Services: 1. Diagnostic / early identification and fitment services 2. Disability Help line 3. Early intervention services 4. Therapeutic services 5. Educational Services 6. Counselling Services 7. Skill development Diagnostic / early identification and fitment services for the persons with hearing impairment: The professionals who are trained in the diagnosis and rehabilitation of hearing and speech problems. Carry out the hearing assessment

Diagnose the type of hearing problem Do hearing aid testing and fitting Tell you how to use the hearing aid Help you with a program geared at helping the child learn to make use of his hearing and develop speech

and language Remedial of speech problems. i.e. provide speech therapy Presently Ali Yavar Jung National Institute of Speech and Hearing institute and its regional centers carry out the diagnostic services. Composite Regional Centers spread all over India, District Disability Rehabilitation Centers(DDRCs), non -governmental organisations , private establishmentsalso involved in providing the diagnostic services for the persons with hearing impairment. AYJNISHD Mumbai is a nodal agency to

31 implement the cochlear implant services. It has doctors/ surgeons panel spread all over India to take up this work. In diagnostic testing audiologist and speech language pathologist generally do the following tests to detect the hearing and speech problesm. Air conduction testing Bone conduction testing. Speech testing. Distortion product otoacoustic emissions (DPOAE) testing. Auditory brainstem response (ABR) testing. Tympanometry or acoustic emittance testing. Disability Help line :

The Disability Line launched by AYJNISHD, Mumbai in 2005 was envisaged to bridge this gap to some extent by enabling the public to have easy access to information regarding disabilities, the services available in their neighbour -hood as well as the schemes and concessions offered by the Government. Specifically, the Disability

Line provides information about : ● Different types of disabilities. ● Diagnosis and intervention strategies. ● Diagnostic and therapy centres. ● Educational opportunities

and Special schools. ●

Vocational training and job opportunities. ● Special Employment Exchanges. ● Government Schemes and facilities. ● Organizations working for PWDs. ● Prevention and management of disabilities. 103 ●

DRS/NHFDC forms by fax. Disability Help Line has presently been implemented in Maharashtra, Goa and Delhi Telecom Circles and can be accessed by dialing the following telephone numbers:- Maharashtra/Goa : 022-26404019/24/43 or 155206 Delhi : 011-29825094/95

32

Early Interventional services :

A collaborative project by AYJNISHD, Mumbai and Balavidyalaya, Chennai on 'Early Identification and Early Intervention towards Inclusive Education of Children with Hearing Impairment (0 to 5 years)' was initiated in 2002.

Since its commencement in the year 2002, nearly 100 rehabilitation professionals have been trained through orientation programs to equip them to handle the 0 to 2.5 year age group. Nearly 150 children with hearing impairment under the age of 2.5 years have received intervention at the seven centers under the project. AYJNIHH plans to increase the number of intervention centers by training more professionals and also by providing technical as well as financial assistance to the extent possible.

NCED India, Maharashtra Chapter has taken initiatives in the year 2016-17 and conducted short term training programs for the teachers on early intervention programs zonal wise throughout the state of Maharashtra. As part of manpower development RCI has included subject contents in its certificate, diploma, degree and post degree syllabus to train the teachers on early intervention cervices. AYJNISHD, Mumbai has AVT program for pre and post auditory therapy after CI. It has also PIP parent infant program at head office and at its regional centers. Many other NGOs are also involved successfully in providing early intervention to the children with hearing impairment. Therapeutic services : AYJNISHD is the major institute to provides various therapeutic services to the persons with hearing impairment such as speech therapy, post cochlear implant therapy, auditory training, auditory verbal therapy. Private clinics run by the registered professionals and CRCs also provides similar kind of services to the persons with hearing impairment. Educational Services : There are many facilities available for education of children with hearing impairment in India. More than 387 registered special schools for children with hearing impairment are available in India (AYJNISHD, Website). You may get an idea of education facilities from the following. Majorly education for the children with hearing impaired is provided through special schools and inclusive schools through its different programs such as

33 Early intervention PIP Pre schooling Primary schooling Secondary schooling Collage education Education through NIOS Indian Sign Language training Commonly oral, bilingual and total communication modes are used for instruction and communication of the children with hearing impairment. AYJNISHD and its regional centres have diploma programs in Indian Sign Language which is for persons with hearing impairment and normal hearing person as well. ISLRTC is a national institute located in Noida has main objective to disseminate information and create the manpower in Indian Sign Language. Counselling Services: Government and private major institutions provide the counselling services through its psychologist and vocational counsellors. Skill Development Services : The

Department of Empowerment of Persons with Disabilities (Divyangjan), Ministry of Social Justice and Empowerment , Govt. of India

being the nodal agency implement the skill development program for persons with disabilities under the SIPADA scheme. Persons with disabilities in India face many challenges when looking to develop employable skills and gaining meaningful employment. The vocational training is provided by network of skill training providers led by NGOs, private training institutions and public sector government training institutions. The training partners are provided outcome based financial support DEPwD and Ministry of Skill Development and Entrepreneurship. The training under this scheme is provided to the person who is having Indian citizenship and 40% disability not less that 15 years of age and not more that 59 years of ageand also the applicant should not have gone through any other training program.

34 Quality and coverage of servicesNow a days there is lot of awareness among the people about disabled people since last decade is observed. Public and private efforts are key to disseminate the information. In India almost every state and district is covered by DDRCs, CRCs, private organisation that work for providing services. As per report by Program Evaluation Organization (PEO) which was entrusted in 2007-08 and 2009 -10 conducted an evaluation study of the ADIP scheme with the objective of assessing the coverage, targets achieved, implementation process, timeliness and availability of funds, quality of aids/appliances, capability of implementing agencies in providing aids, explore bottlenecks and give recommendations if any for improvement and necessary rectification in future. The details of quality and coverage is discussed in sub topic appraisal of services in this chapter.As per SSA study report in 2010 the enrollment of children in primary education has significantly increased how ever it fail to maintain the quality in education and later the rate of dropout has increased at the secondary level. There are many studies have conducted to see the loopholes in education and other services. And many reports have provided recommendation to the government to improve situation and quality such as making available of teachers, special educators on full time basis in inclusive schools, creating barrier free environment etc. 1.6 Delivery Of Services; Role Of Various Stakeholders, Planning, Implemention, Collaboration, Challenges And Issues First of all let us know who all are stakeholders in providing the rehabilitation service for divyangjan person. ● Persons with disabilities ● Parents and families of Persons with disabilities ● Organisations of divyangjan people ● Organisation for divyangjan people ● Service provider Agencies (professional) Role of Persons with disabilities: In India many facilities and services are available for divyangjan person however a person with disability must know to receive all these available facilities, he must be aware of schemes and govt. policies, legislations like RPWD Act 2016. He must know

35 his legal rights and how to get his own right, it may for his education, employment, equal participation, social rights etc. He should also know how to get the services and raise voice in case of violation of rights. Role of Parents and families of Persons with disabilities: Parent of any child play very crucial role in overall development of child. In case of divyangjan child parents role become more critical. The parents first of all are expected to accept the child and his/her disability and start looking in his/her capabilities. Parent has very important role in availing rehabilitative services like getting done diagnosis of disability, getting information about the disabilities and information of service provides, counselling, availability of all kind of services those are most important for child's overall development. Role of Organisations of divyangjan people: Disabled people's organizations believe that people with disabilities are their own best spokespersons. Disabled people believe that they best know the needs and aspirations of disabled people. They will represent themselves to governments, service providers. The organisation of divyangjan can involved in many welfare activities like identification of grass-root needs of disabled people ,representing the government service providers, democratic representations, holding open forums to discuss issues of concern to disabled persons, evaluating and monitoring the services,self -development of disabled people and can act as service provider. Role of Organisation for divyangjan people: There is great role to play by the organisation for the persons with disabilities like creating awareness, providing intervention, clinical diagnosis, therapies, education, aids and appliances distributors etc. Planning and Implementation - Resource persons from

Department of Empowerment of Persons with Disabilities (Divyangjan), Ministry of Social Justice and Empowerment including personnel from implementing agencies like ALIMCO and National Institutes State and District level Implementing Agencies would be doing planning through workshops and by inviting open suggestions form stakeholders and guideline is prepared for implementation of welfare scheme. Non-governmental organizations are involved in delivery system of services. The concerned Ministry provides the funding to implement the schemes State government involves as well in

36 the program. The National Institutions and CRCs having major role in planning and implementation. The effectiveness of schemes are assessed through conducting research, survey and the strengths and weakness of the schemes are noticed like extreme poverty, illiteracy, non - availability of services at unreached rural areas, cost effectiveness of services, lack of quality of services, lack of sufficient and timely funding to the non – governmental, complicated and lengthy procedure etc. are the major issues in implementation of delivery service. 1.7 Appraisal of Services: Methods of Measuring Outcomes and Suggesting Plan of Action Methods of Measuring Outcomes:Outcomes of rehab services can be measured through direct and/or indirect method which can be included various ways such as field survey, beneficiaries interviews, data from implementing agencies etc.Government is the major agency to implement the welfare schemes for the persons with disabilities like ADIP scheme, Scholarship schemes,skill development scheme etc. Outcomes are measured under the parameters of ● Benefits to the disabled person in reducing disabilities ● Convenience ● Enhancing the economic potential of the disabled person ● Durability and quality of aids and appliances ● Modern standard aids ● Coverage of the beneficiaries ● Capability of implementing agencies in providing aids ● Exploring bottlenecks The Government of India launched

the

scheme of

Assistance to Disabled persons for Purchase/fitting of Aids/Appliances (ADIP)

with effect from April, 2005. The Ministry of Social Justice and Empowerment implements the ADIP by providing grant-in-aid to the NGOs and other executive agencies of the Centre/State Governments with the aim of reducing the effects of disabilities, and, enhancing the economic potential of

the disabled persons by bringing suitable, durable, scientifically manufactured, modern, standard aids and appliances within their reach.

37 The

Ministry of Social Justice and Empowerment, the Development Evaluation Advisory Committee (DEAC) entrusted Programme Evaluation Organisation (PEO) to conducted an evaluation study of the ADIP scheme with the objective of assessing the coverage, targets achieved, implementation process, timeliness and availability of funds, quality of aids/appliances, capability of implementing agencies in providing aids, explore bottlenecks and give recommendations if any for improvement and necessary rectification in future. The study reference period is from 2007-08 to 2009-10 (3 years). The total coverage was 124 In-depth Interviews and 4329 semi-structured interviews spread across 53 districts and 18 States. There have been mixed response from the beneficiaries on the quality of appliance provided. Field teamfound that the appliances which most of the beneficiaries were using currently are of BIS Standards andmostly purchased by Artificial Limb Manufacturing Corporation . But they were found in damaged conditionand beneficiaries are some how managing with such appliances. This is due to the fact that theimplementing agencies are not providing the maintenance of appliances, hence some of them becomeredundant. As the appliances are given to persons who are below poverty line, these beneficiaries do noteven have enough money to maintain these appliances. It is also found that shops for repair andmaintenance of aids and appliances are also not available within their reach. Thus, costly aids andappliances with very minor problems are abandoned by the beneficiaries and they go back to theirprevious condition of disability. Many of the beneficiaries have reported that they had to throw (in case ofhearing aid) or have sold (in case of tricycle) the appliances received by them because they were notworking properly. The major problems of the appliances as was reported include: ● Punctured tyres, in some cases even torn off ● Broken tricycle handles ● Crutches without rubber bushes ● Arm rest of crutches torn off ● Hearing aids not functioning properly ● There is no doubt that the scheme has helped in changing lives of a large number of persons. The overallimpact observed during field survey based on detailed

38 interaction with the beneficiaries, district offices andimplementing agencies are as follows: ● Increased mobility, now the Differently Abled in the "locomotor" category are able to move freely withoutconstant support from others. ● It was observed that these people now move freely in their villages and interact with other people ratherthan sitting at home, which was the case before. ● Many have been able to find some livelihood as they can now reach workplace easily. ● There is a feeling among the beneficiaries that the government gives a thought for their condition andattempts are being made to improve them. Issues: Though the ADIP scheme has succeeded in its objectives, there are some constraints which hinder effective implementation of the scheme. Some of these are as listed below. ● Weak institutional coordination, State level line departments are involved in approving and forwardingthe application of the implementing agencies. However, once the fund gets approved by the CentralGovernment, implementing agencies are directly receiving funds from Central Government and Statesare not intimated about fund disbursal. Thus, State Government is not been able to monitor and assessthe process and quality of implementation. Because of this reason some implementing agencies are notadhering to the implementation guidelines. ● Poor and untimely release of fund has been observed, as only 60% of the allocated fund was actuallyreleased during the reference period. Implementing agencies reported that delay in release of fund is abig challenge which is directly affecting the planning of scheme implementation. ● Lack of proper and updated database of the Differently Abled people- There is no proper records of thedistribution of Differently Abled person either with the district office of Social Justice and Empowermentor the implementing agencies. ● The district offices and implementing agencies are relying on the census done by the Central ● Government which is done once in ten years. For providing effective aid to the Differently Abled it isnecessary to have proper details which will help in planning

39 the location of organising camps and thenumber of Differently Abled who need to be attended. ● Lack of mechanism to ensure that all tehsils and villages of the district are benefited from the scheme- ● The Centre allocates funds for a specific district. There is no mechanism to ensure that all tehsils andtheir respective villages are benefited from the received fund. The implementing agencies have theliberty to select location of organising camps as per their ease. ● There are other self managed NGO's who are working in the district. Some of these also organize camps and distribute appliances to Differently Abled persons. ● Also it is difficult to ensure that the beneficiary will not sell the appliance given to him/her to some otherpeople or for scrap, which has been pointed out by the implementing agencies. There have beenincidents where many Differently Abled people have sold the appliance given to them for some moneyas they do not have any other livelihood. ● Many beneficiaries cannot afford the Maintenance cost of the appliances given to them. As a result asthe appliance breaks down after some months, they become non functional. This is affecting theeffectiveness of the scheme. Also, under this scheme a person will be provided the aid next time onlyafter three years, while in many a cases the issued appliance becomes non functional within six monthsor a year. ● There is serious lack of system to evaluate the work done by the implementing agencies. ● It was pointed out by the IA's that persons living in distant villages do not come to take the appliances inthe camps organised, as bulky appliances such as tricycles would need a jeep to carry them to theirvillages and they cannot bear that cost. ● The awareness among the beneficiaries (56.91%) about the scheme seems low. Only a handful of thebeneficiaries said that they have heard about the scheme. ● Before conducting camps, organisations advertise and inform people about when and where camp isgoing to be organised. In the case of Artificial Limb Manufacturing Corporation, implementing agencieslike Narayan SewaSansthan, Bhagwan Mahaveer, Viklang Sahayatha Samiti are based outside thedistrict and have no institutional setup in most of the States. Therefore, information about the

40 camp isnot able to reach to the beneficiaries properly specially in the remote areas. Hence, a large chunk ofpopulation remains un-served. ● It was observed that before getting benefit, the beneficiaries and their care takers were not aware of thescheme. ● Caretakers are also not able to take up livelihood options because of the beneficiary. ● In some cases the quality of the aids provided was poor in quality. This is happening especially withhearing aids. Beneficiaries using artificial limbs have complained that the durability of the limbs is verylow. Once it gets damaged they have no option, other than discarding it or approaching to DistrictDisability Rehabilitation Centre for getting it repaired. ● There is lack of capacity in local level agencies/NGOs to implement the scheme 1.8 Let us Sum up Many schemes and facilities are being provided by the Department of Empowerment of Persons with Disabilities, Ministry of Social Justice and Empowerment,Government of India ,

Ministry of Human Resource Development and Labour Ministry for the welfare of persons with disabilities. The schemes such as ADIP,SIPDA, IEDSS, SSA, Scholarships etc. Along with government non governmental organisations having great contribution in providing special education, inclusive education ,therapeutic services, dissemination of information, screening ,fitment and distribution of aids and appliances. Stakeholders like disabled persons, parents, organisations, institutions play the key role in utilizing of available services and helping for reaching to the needy population. There is no doubt that the services have helped in changing lives of a large number of persons, howeverstill there are many challenges and issues being encountered in delivery system of rehabilitation services.Quality issues, lack of state and central coordination, illiteracy, funding, unavailability of services, lacking trained professionals,quality and cost effectiveness of aids and appliances are the major issues observed. 1.9 Unit end exercises Q.1. List out the governmental schemes and facilities available for the welfare of the persons with hearing impairment.

41 Q.2. Write on the different types and availability of rehabilitation services for the persons with disabilities in India. Q.3. Discuss on the role of various stakeholders in service delivery system. What all are the challenges and issues in service delivery in rehabilitation services? Q.4. Discuss on appraisal of services. Suggest plan of action for improvement in service delivery system. 1.10 References

Department of Empowerment of Persons with Disabilities. Ministry of Social Justice and Empowerment. Govt. of India. Compendium of schemes (2018). Retrieved on December 29, 2019, from http:// disabilityaffairs.gov.in/content /page/compendium-of- scheme. php

Department of Empowerment of Persons with Disabilities. Ministry of Social Justice and Empowerment. Govt. of India. Compendium of schemes (2018).Skill development of persons with disabilities. Retrieved on January 5, 2020, from http:// disabilityaffairs. gov.in/upload/ uploadfiles/ files/ Revised% 20SIPDA% 20Scheme(2).pdf Henry Enns (n.d.).The role of organization of disabled people. A disabled peoples' international discussion paper. Retrieved on December 30, 2019, from https://www. Independent living. org/ docs5/ RoleofOrgDisPeople.html Rehabilitation Council of India (n.d.). Establishment of early intervention centers and training of personals. Retrieved from http://www.rehabcouncil.nic.in /writereaddata/ hi.pdf

42 Unit 2 ❏ Listening and Assistive Devices in Audiological Management Structure 2.1 Introduction 2.2 Objective 2.3 Hearing Aids 2.4 Cochlear Implant 2.5 Classroom Amplification System 2.6 Loop Induction System 2.7 Criteria for recommendation of one device over the otherAdvantages of ITEs compared to BTEs 2.8 Let us sum up 2.9 Unit end exercises 2.10References 2.1 Introduction Assistive technology can be a key factor that enables individuals with disabilities to participate in daily life and be included in society (Schneidert, Hurst, Miller, & Üstün, 2003). However, this technology has a double-edged nature in that it is both a tool for achieving independence and a visible sign of disability (Scherer, 2002). Assistive technology that is seen as a tool or as one way of achieving desired activity is more likely to be assimilated into the user's life. Alternatively, technology seen as a visible sign of a disability can reinforce the stigma associated with the disability. Because individuals with the latter view of technology may avoid or resist using this technology, they may avoid meaningful activities and suffer both social and physical isolation (Polgar, 2010). Hearing technologies for deaf and hard-of-hearing (DHH) individuals include personal amplifiers (e.g., hearing aids [HA] and cochlear implants [CI]), which are typically worn on the head or on the body and assistive listening devices that are not used on the head or body, such as classroom sound field amplification systems (Dillon, 2001). Specialized hearing technologies may reduce the impact of barriers that DHH

43 students experience in schools, such as classroom noise, rapid rate of discussion, rapid change of topics, and large numbers of people engaged in conversation, all of which can prevent DHH students from participating in teacher–student and student–student communication (Luckner & Muir, 2001; Stinson & Antia, 1999). Although DHH students and their teachers report that the use of hearing technology is essential for ensuring effective inclusion (Eriks-Brophy et al., 2006; Luckner & Muir, 2001), the equipment is sometimes used irregularly because of the stigma associated with assistive technologies. 2.2 Objective 1. Understanding Assistive Technologies 2. What are the options available for the Hearing Impaired individuals with reference to Assistive Listening Devices? 3. Technological Considerations of Assistive listening devices 2.3 Hearing Aids Hearing aids used today can be broadly classiûed into two styles: Those that ût behind- the-ear (BTE) or more speciûcally are worn over the pinna (commonly called BTE hearing aids) and those that ût in-the-ear (ITE) or in the concha and ear canal (commonly called ITE hearing aids). A BTE hearing aid is coupled to the ear with tubing and either an earmould made custom for the hearing aid user's ear or with an ear dome, also commonly called an ear tip. Within these two broad categories are many different speciûc styles and sizes of hearing aids. When considering what style of hearing aid is appropriate for a patient, many factors are taken into account including the ability of the patient to manipulate the controls on the hearing aids and change the battery and the features contained within the hearing aid. Generally, the smaller the hearing aid, the harder it is to manipulate the controls and change the battery. Choosing a style of hearing aid is also related to an individual's cosmetic preference. For the most part, the signal processing can be implemented in any style of hearing aid with the exception of a few features such as telecoils (a feature for phone communication and looping and directionality). If a telecoil is a desired feature, a hearing aid style with a telecoil built 44 inside must be selected. Directionality, a feature that helps hearing aid users to hear better in noise, cannot be implemented in the smallest ITE devices. The largest percentage (about 71%) of hearing aids sold in the United States is BTE hearing aids (Hearing Industries Association (HIA), 2012). Behind-the-Ear BTE hearing aids can be further broken down into those with the receiver located within the case of the hearing aid (traditional BTEs) and those with the receiver removed from the case and instead located at the end of the tubing and placed inside the ear canal (receiver-in-the-ear (RIE)). RIE aids have also been termed receiver-in-the-canal (RIC) but for the purposes of this chapter the term RIE will be used. The traditional BTE aid is shown with tubing and an earmold attached to the aid. The RIE is also shown with tubing which includes the receiver and an ear dome for placement into the ear. TRADITIONAL BTES Traditional BTE hearing aids come in different sizes and are primarily deûned by the hearing aid battery that they use and how they are coupled to the ear. The one on the left would be ût to the patient with a length of plastic tube attached to a custom made earmold, whereas the other two are conûgured to use thin tubing and would be ût to the ear with either a non-custom plastic tip or custom-made earmold. These BTE aids use battery sizes 312, 13, and 675, respectively. As a general rule, the larger the battery used, the more gain the hearing aid is capable of producing. However, the battery size mainly determines how long the patient can use the hearing aid before having to change the battery, with the larger batteries lasting longer. Today, the only hearing aids that use the largest batteries (size 675) are for ûtting patients with severe-to-profound hearing losses. As stated earlier, BTE hearing aids are coupled to the ear with a tube running from the aid to the ear with either a custom Ear hook Receiver Pre-Amplifien ADC Converten, DSP Chip Behind the ear (BTE) Hearing Aid Volume Contn al Battery Compantment

45 RECEIVER-IN-THE-EAR RIE hearing aid style makes up over 45% of the hearing aids sold in the United States (HIA, 2012). This may be different in other countries. RIE hearing aids use a thin tube and couple to the ear with an ear tip or an earmold called a micro mold. An RIE is like a BTE device in that part of the instrument ûts behind the ear, but the receiver is located at the end of the tube within the ear canal. A small wire cable running through a thin tube connects the device behind the ear to the receiver (see Figure 38.3). RIE devices have become popular in the last few years because of their cosmetics and thin-tube options; however, there are thin-tube options in traditional BTE devices as well. To determine if there are beneûts to the RIE style over the traditional BTE, Hallenbeck and Groth (2008) studied the gain (amount of ampliûcation provided to the hearing aid user) before feedback (squealing in hearing aids) in the two styles as this was thought to be one of the reasons that RIE aids had become so popular. Their study concluded that similar gain could be achieved in the two styles and should not be used as a reason to select an RIE product over a traditional BTE. The study did point out that RIE hearing aids potentially offer a smoother, wider frequency response and that there are no moisture problems associated with the tube because of the design. The drawback of RIE hearing aids is that the receiver being located in the ear might cause it to malfunction more often and the receiver is signiûcantly more expensive to replace than a thin tube. In-the-Ear ITE hearing aids come in many speciûc styles and make up approximately 29% of the hearing aids sold in the United States (HIA, 2012). Like BTE hearing aids, this may be Battery Door Microphone Volume Wheel Speaker Vent In-The-Canal (ITC) Microphone Program Button Battery Speaker Amplifien In-The-Ear (ITE)

46 slightly different in other countries. ITE hearing aids are for the most part custom devices made speciûcally to ût an individual's ear. There are, however, a few styles that ût into the ear that come in standard, noncustom sizes. NONCUSTOM ITE STYLES: There are some ITE styles that are not custom-made products but do ût in the ear. Figure 38.7 shows examples of three of these types of products. These products are placed in the ear but are not made individually for a patient. Generally these hearing aids do not cost as much as custom-made or BTE devices and they do not have as many features as the other styles overall. Some of these devices are being sold over the counter. If the manufacturer of such devices has not attained Food and Drug Administration (FDA) approval for them as medical devices, they are termed personal sound ampliûcation products (PSAPs) rather than "hearing aids." PSAP is a category of devices deûned by the FDA that is "not intended to compensate for impaired hearing, but rather is intended for non-hearing-impaired consumers to amplify sounds in the environment for a number of reasons, such as recreational activities" (FDA, 2009). They are often compared to reading glasses for the ear and typically marketed for part-time use. HOW A HEARING AID WORKS This involves a complex interaction between the device and the individual who uses it. Hearing aids of excellent quality meeting all technical speciûcations may not always be judged to "work" by the user. The many factors which contribute to the ultimate effect of wearing ampliûcation Components Hearing aids are wearable electronic ampliûers of sound in the environment that are used to assist with communication for a hard-of-hearing person. At a minimum, hearing aids require a microphone to pick up the sound and convert it to an electrical signal, electronic circuitry to amplify and treat the signal, a

47 speaker—called a "receiver"—to convert the signal back to sound waves, and a battery to power the device. An example of how these components may be assembled in a BTE device. MICROPHONE The microphone is one of the hearing aid's transducers. A transducer converts one form of energy to another. The microphone contains a diaphragm that is set into vibration by the pressure variation of sound waves that enter the opening of the microphone, often called a port. The motion of the diaphragm transduces the acoustical energy (sound) to electrical energy. Although various microphone technologies have historically been used in hearing aids, virtually all devices now have either electret or, increasingly, microelectrical- mechanical system (MEMS) microphones. These microphone technologies offer high-quality technical performance, can be very small, and are well suited to mass production. Hearing aid microphones can faithfully transduce sounds over a broad range of frequencies as well as a large span dynamic range and contribute very little noise to the processed sound that exits the hearing aid. Compared to other hearing aid components, microphones impose the fewest limitations on overall hearing aid electroacoustic design and performance. DIGITAL SIGNAL PROCESSOR : The circuitry which manipulates the signal in a hearing aid has traditionally been referred to as the ampliûer. The ampliûer has traditionally been thought of in terms of how it increased the level of the signal at different frequencies. Although the goal of hearing aids is still to amplify sound for compensation of hearing loss, the circuitry in modern hearing aids treats the signal in many other ways to accomplish.

48 RECEIVER Like the microphone, the receiver is also a transducer. It converts the processed electrical signal back to acoustic sound waves. The principle is similar to that of the microphone insofar as a diaphragm is set into vibration. The movement of the diaphragm in this case creates the sound waves that are produced by the hearing aid, and the sound waves travel through tubing that connects the receiver to the outside of the hearing aid. Physical properties of the receiver components and the tubing, as well as magnetic forces that drive the vibration of the diaphragm are deciding factors for the output and frequency response of the receiver. The hearing aid receiver most often also incorporates the function of digital-to-analog conversion. BATTERY The battery provides the electrical energy to hearing aids. The most common type of hearing aid battery is the zinc– air. It has small holes that allow oxygen to enter the cell when activates the battery. The amount of energy that is stored in the battery is called the capacity and is given in milli-Ampere hours (mAh). Larger batteries can store more energy and thus provide more hours of use than smaller batteries. The combination of how much electrical current in milli-Amperes (mA) is drawn by the hearing aid and the capacity of the battery allows an estimation of battery lifetime. For example, a hearing aid battery may have a capacity of 90 mAh. If the hearing aid draws 1 mA of current, then the estimated hours of use per battery is 90 mAh/1 mA = 90 hours. In reallife use, current consumption by the hearing aid is variable, which means that actual battery lifetime is virtually always shorter than estimated in this way

49 Rechargeable battery technology is available in virtually every consumer small electronic product, so one might expect hearing aids also to make use of rechargeability. OTHER STYLES OF HEARING AIDS CROS/BICROS Contralateral routing of signal (CROS) and bilateral contralateral routing of signal (BICROS) hearing aids are a special type of hearing aid used when an individual does not have any hearing in one ear that can beneût from a hearing aid. These hearing aids are designed so a microphone is worn on the ear that cannot beneût from a hearing aid and the sound picked up at this microphone is sent wirelessly or via a wire in some cases to the other ear. A CROS hearing aid is worn when one ear cannot beneût from a hearing aid and the other ear has normal hearing. In this case, the sound picked up at the "dead" ear is sent to the aid on the opposite ear with this sound sent to the eardrum. In the case of the BICROS hearing aid, the user has one ear that cannot beneût from a hearing aid and other ear that has some degree of aidable hearing loss. The sound picked up at the "dead" ear is sent to a hearing aid on the other ear where the signal is ampliûed and delivered to the ear. Bone-Anchored Hearing Aids BAHAs are surgically implanted aids that directly stimulate the cochlea through bone conduction. These aids consist of a titanium implant, an external abutment, and a sound processor. These aids are meant to bypass the external and middle ears. The titanium implant is surgically placed into

50 the skull behind the pinna percutaneously (directly coupled to the bone). The sound processor sits behind the ear. This type of aid works by picking up sound at the microphone of the sound processor which is then transmitted to the implant. The implant vibrates within the skull and stimulates the nerve ûbers of the inner ear

by bone conduction. Recently, a new BAHA-type device was announced that is transcutaneous; part of the device is implanted but the other part is kept outside the skin similar to a cochlear implant. BAHA-type devices are for unilateral deafness, chronic external and/ or middle ear conditions, and congenital ear malformations. Bone Conduction Bone conduction hearing aids are a special kind of hearing aid used when the outer ear cannot wear hearing aids. Reasons for this might include an atresic ear, a draining ear, or any a number of problems with the ear where a hearing aid cannot be worn. In this type of device sound is sent directly to the cochlea via bone vibration, thereby bypassing the part of the ear that is diseased. Bone conduction hearing aids traditionally have used a similar type of vibrator known from bone conduction audiometry and attached to the skull with a metal or elastic band. Some manufacturers are also making use of the bone conduction principle in innovative ways, such as encasing the vibrator in a dental appliance and wearing it in the mouth or encasing it in an earmold and wearing it in an ear canal. In these cases, the microphone and sound processor might be worn on a deaf ear, thus serving the same function as a CROS hearing aid. Extended Wear An extended wear hearing aid is one that is placed deep in the ear canal near the tympanic member by an audiologist or otolaryngologist and can be worn for several months. These hearing aids were introduced to the market in 2008. The primary advantages of this type of hearing aid are cosmetic and convenience. The technology inside the device is analog rather than digital, but it is digitally programmed for a patient's hearing loss. The only nonsurgical extended wear hearing aid on the market today, the Lyric, is disposable. Once the battery wears out the aid is thrown away and a new hearing aid must be inserted in the ear canal.

51 Candidates for extended wear hearing aids must have ear canals that can accommodate the device which limits the candidacy as some individual's ear canal size is not suited for this device. Extended wear hearing aids can cost signiûcantly more than other types. Body Worn Body-worn hearing aids are the largest hearing aids. These aids are composed of a hearing aid worn on the body (usually around the neck) which is connected with cables and earmolds to the ears. Body aids can provide a wide range of gain and output. Body-worn hearing aids were the only hearing aid style available until the 1950s when BTE hearing aids were introduced. Eyeglass Eyeglass hearing aids are a combination of eyeglasses and hearing aids. The hearing aids can be located in the frame of the glasses or can be coupled to the frame using an adapter. Tubing then extends from the frames to couple the aids to the earmolds and ear. These types of hearing aids are not very commonly seen today. ELECTRO ACOUSTICS CHARACTERISTICS INTRODUCTION The performance characteristics of a hearing aid, that is the changes affected in a signal as it is transduced from acoustic to electric to acoustic energy are known as the electro acoustic characteristics. Purpose of EAC:- ✓ Studying the performance of the hearing aid and to check if a hearing aid confirms to standard specifications ✓ Serves as a quality control ✓ Helps in comparing and classifying hearing aids ✓ Assists in hearing aid selection ✓ To study the effects of electronic and/or acoustic modifications of hearing aid ✓ Monitors the hearing aid performance at the time of purchase and during use

52 ✓ In order to work effectively with hearing aids, it is necessary to understand how they work and how their performance is measured. ✓ The accurate electro acoustic characterization of hearing aid is important for the design, assessment and fitting of the hearing aid. HOW TO MEASURE- ✓ The performance of hearing aid is most conveniently measured when the hearing aid is connected to a coupler. ✓ A coupler is a small cavity that connects the hearing aid sound outlet to a measurement microphone. COUPLER- ✓ The basis for this measurement is the ISI standard with HA-2 coupler. ✓ An acoustic coupler is a simple cavity of specified shape and volume which is used for the calibration of an earphone. ✓ It contains a calibrated microphone to measure the sound pressure developed within the cavity & hence to a SLM, without sound leaking out to other place. ✓ A coupler gives only a rough approximation to the acoustic properties of the human ear but has the advantage of simple design and construction. ✓ The standard coupler used for the hearing aids has been around for over 50 years and has a volume of 2 cubic cm. This volume was chosen because it was an approximation of the average adult ear canal volume. when a hearing aid is worn. ✓ The SPL generated in any cavity by a hearing aid depends directly on the impedance of the cavity. This in turn depends on the volume of the cavity, and on the nature of anything connected to the cavity. ✓ In the average adult ear, the residual ear canal has a physical volume of about 0.5cc. This volume acts as an acoustic spring. Or more formally, an acoustic compliance. ✓ The ear canal, of course, terminates in the eardrum, on the other side of which is the middle ear cavity. The compliance of the middle ear cavity and eardrum together act as if they have a volume of about 0.8cc

53 ✓ The combined 1.3cc volume determines the impedance for low frequency sounds. As frequency rises, the mass of the eardrum and ossicles cause their impedance to rise, while the impedance of the residual ear canal volume falls. ✓ An ear simulator mimics this variation of impedance with frequency. As well as the main cavity, with a volume of 0.6cc, the simulator shown has four side cavities, each with volumes from 0.10 to 0.22cc, connected to the main cavity by small tubes, three of which also contain dampers (ANSI s3.25, 1979). ✓ As frequency rises, the impedance of these tubes rise and they effective total volume to gradually fall from 1.3cc to 0.6 cc. ✓ One ear simulator with four cavities is known as the Knowles DB100 ear simulator. Another ear simulator in common use is the Bruel &Kjaer 4138 ear simulator. It operates on the same principles, except that it has two simulators have a very similar variation of impedance with frequency. ✓ But unfortunately, the standard 2-cc coupler is larger than the average adult ear canal with a hearing aid in place, so the hearing aid generates lower SPL in the coupler than in the average ear. ✓ This difference is called Real ear to coupler difference.(RECD) ✓ So a more complex measurement device, which better stimulates the acoustic of the human ear, is called an ear simulator. ✓ An ear simulator or artificial ear is a far more sophisticated device for the calibration of an ear phone. Like the acoustic coupler, it contains a calibrated microphone for the measurement of the sound pressure developed within a cavity. ✓ Several standards published by the ANSI & International electro acoustical commission (IEC) specify how hearing aids should be tested. ✓ ANSI S3.22 specifies that hearing aids be measured in a 2-cc coupler; whereas IEC 118-0 specifies that hearing aids be measured in an ear simulator. ✓ The ITE and ITC hearing aids usually connected directly to a coupler or ear simulator. BTE and body aids, however, connect to the real ear via an ear mould, so an ear mould simulator is added between the coupler or the ear simulator and the hearing aid. In addition BTE hearing aids use tubing when connecting to the real ear, so they also require tubing when connecting to the coupler or simulator.

54 ✓ ANSI S3.3 describes a 2-cc coupler as being used in several different applications, the most important of which are..... ✓ HA-1 coupler has no ear mould simulator and is used for ITE & ITC aids, which are connected to the coupler via putty. ✓ The HA-2 coupler includes an ear mould simulator, which is connected to the BTE hearing aid via tubing, or into which a receiver for a body aid snaps. ✓ HA-3 coupler – The HA-3 coupler is a special form of the HA1 coupler, using a rigid or flexible sealing construction. It is intended for the testing the module portion of the modular ITE hg aid and /insert type receiver that does not have a nub. The tube diameter is 1.93mm and the length is 10mm. The length starts at the end of the receiver tubing protruding from the module or receiver. ✓ HA-4 coupler- The HA-4 coupler is a variation of the HA-2 coupler and is intended for testing BTE or Eye Glass Hg.Aids its simulates a fitting in which the bore through the ear mould from the end of the ear hook of the BTE aid or from the end of the sound outlet on the eyeglass aid is assumed to have a uniform diameter of 1.93mm and a length of 43mm. Instrumentation- ✓ The sound box has sound – absorbent walls in order to maintain free field conditions. ✓ An audio frequency sine wave generator drives a loudspeaker, which is located in the sound box. ✓ Any non linearity in the loudspeaker frequency response in the sound box causes errors in the measurement of frequency response of the hearing aid. Therefore the frequency response of the loudspeaker must be flat between 100 Hz and 10 KHz. ✓ As no loudspeaker can offer such an accurate frequency response, the non linearity in the loudspeakers frequency response is compensated electronically. ✓ The text box provides a convenient way to get sound into the hearing aid in a controlled manner. These sounds can be pure tones that sweep in frequency, or can be complex, broad band sounds are necessary to perform meaningful measurements or many non linear hearing aids.

55 ✓ The text box generates sounds of required SPL at the hearing aid microphone. ✓ A test box includes a tone and or noise generator, an amplifier, a loud speaker and a control microphone. ✓ The control microphone or reference microphone is placed next to the hearing aid microphone. ✓ As we know the frequency response of the loudspeaker should be flat between 100 Hz and 10 KHz, so no loudspeaker can offer such an accurate frequency response, the non linearity in the loudspeakers frequency response is compensated electronically. This can be accomplished in two ways. 1) The first method is called comparison method. 2) There is a 2 nd method is called as substitution method. Comparison method- ✓ A control microphone (a second microphone) is installed in the sound box symmetrically opposite the test point. ✓ The control microphone measures the sound pressure. Whenever the sound pressure deviates from the references value, the electrical input to the loudspeaker amplifier is rapidly adjusted so that the sound pressure at the control microphone again matches the reference value automatically turn the volume of the sound coming from the test box speaker down or up, respectively, until the required level is obtained. Substitution method- ✓ Only one microphone is required for substitution method. ✓ It differs from the comparison method in that the electrical input to the loudspeaker amplifier needed to achieve the desired sound pressure is determined in advance. ✓ The control microphone is placed in the test position prior to the actual measurement. ✓ Prior to measuring any hearing instruments, the loudspeaker frequency response is determined with the measuring microphone at the test point. This curve is stored and the microphone is removed.

56 ✓ During subsequent measurements of hearing instruments, the electrical input to the loudspeaker amplifier is manipulated so as to "flatten out" the stored curve ✓ If the stored curve has 5 dB notches at 10 KHz, then the electrical input to the loudspeaker amplifier is increased as to give a 5 dB more intense signal at this frequency ✓ In this way, a linear frequency response is achieved COMMON ELECTROACOUSTIC CHARACTERISTICS- GAIN – ✓ The amount, in decibels, by which the sound pressure level developed by the hearing aid in the coupler exceeds the sound pressure level in the sound field at the hearing aid microphone is the gain. ✓ Simply, gain equals output minus input. FREQUENCY RESPONSE – The frequency range of a hearing aid refers to the useful range of the frequency response.It is expressed by two numbers. ✓ Low frequency limit of the amplification. ✓ High frequency limit of amplification. The relation between frequency and gain constitutes one area of interest in specifying electro acoustic behavior of hearing aid. SATURATION SOUND PRESSURE LEVEL – The saturation sound pressure level (SSPL) value represents the maximum root mean square (rms) sound pressure level obtainable in the coupler as generated by the receiver of the hearing aid. HARMONIC DISTORTION – Usually the result of overloading either the hearing aid amplifier or receiver. It is best indicated when the instantaneous sound pressure of the hearing aid receiver is not directly proportional to the instantaneous sound pressure at the microphone. The distortion results mainly from peak clipping. When clipping occurs, the maxima and minima of the signal are clipped, and hence changing the wave form of the signal.

57 Measurement of OSPL frequency response:- The purpose of this test is to determine the sound pressure level obtained in the HA- 2 coupler while giving an input 90 dB SPL and the hearing aid gain control in the full on position as a function of frequency. It is important to know at what level a hearing aid limits its output when it receives a high level input signal. The maximum possible level should not exceed the threshold of discomfort for a user. Test procedure:- ✓ Turn the gain control 'full on' and set other controls to the required positions. ✓ Adjust the input sound pressure level to 90 dB SPL at 200 Hz by setting by sine wave generator and input SLM octave filter at 200 Hz. ✓ Vary the frequency of the sound source over the recommended frequency range from 200 Hz to 5000 Hz keeping the input sound pressure level constant at 90 dB SPL. Record the respective sound pressure level at all these frequencies from the output SLM by changing the frequency of the sine wave generator and octave filter is set at the input and output SLMs to their respective settings. ✓ Both IEC and ANSI standards specify that hearing aid maximum output should be measured using a 90dB SPL input signal, and both standards now use the term OSPL90 to describe the measurement. This level is high enough to cause many hearing aids to reach their highest possible output level at each frequency. ✓ Note down the peak SSPL 90 and the corresponding frequency ✓ Find HFA SSPL 90 by taking the average of SSPL 90 at frequencies of 1000 Hz, 1600 Hz and 2500 Hz. ✓ Plot the SSPL 90 as a function of frequency. ✓ The resultant value is referred to as the high frequency average SSPL90 (HFA- SSPL90). ✓ This particular term was chosen to delineate between the existing value and the value calculated in accordance with the earlier standards. ✓ The tolerance applied to the HFASSPL90 is such that the value shall be within ± 4 dB of the manufacturer's specified value for that model of hearing aid.

58 Measuring on full on acoustic gain frequency response:- Acoustic gain is defined as the output SPL in an earphone coupler and the input SPL. It is a measure of how much the input signal is amplified. Acoustic gain is a function of frequency and the user gain control setting as well as other factors. When the gain control is set to its maximum position, i.e. full on, and the input SPL is adjusted to a suitable value that will not overload the hearing aid, the full-on gain may be measured and recorded as a function of frequency. The purpose of this test is to determine the full on acoustic gain obtainable with the hearing instrument. The output sound pressure level in the HA 2 coupler is measured at full on gain control setting with an input below the hearing instrument's saturation sound pressure level (Normally 60 dBSPL) Test procedure:- ✓ Turn the gain control full of the hearing aid on and set other controls to the required positions ✓ At a 200 Hz frequency, set the input sound pressure level to 60 dBSPL, where the relationship between the level of the input and out is essentially linear such conditions are considered to exist it at all frequencies within the range of 200 Hz to 5000 Hz, change of the input sound pressure level of 10 dB causes a change of recorded output level of 10 +1 dB, the input sound pressure level must be reported ✓ The frequency response with full on gain is measured by a varying the frequency of the sine wave generator over the recommended frequency. Range of 200 Hz to 8000 Hz keeping the input sound pressure level constant at 60 dB. ✓ The full on acoustic gain is plotted as a function of frequency ✓ The minimum gain is noted and also the HFA full on gain is calculated by taking the average of gain obtained at the frequencies of 1 KHz, 1.6 KHz and 2.5 KHz. Measurement of basic frequency response :- The purpose of this test is to measure the frequency response of a hearing aid without acoustic (feedback) or mechanical (vibration problems) If one compares the shape of the full on acoustic gain frequency response the basic frequency response, then acoustic or mechanical problems can be identified. The more similar the shapes of the curves are, the more stable is the hearing aid.

59 Test procedure:- ✓ Adjust the gain control to the reference test gain position i.e. with an input sound pressure level of 60 dBSPL. The gain should be adjusted so that the output sound pressure level at 1.6 KHz is about 15 + 1 dB lower than the OSPL 90 value at 1.6 KHz ✓ The other controls should be set to positions that give the broadest frequency range. ✓ Vary the frequency of the sound source over the recommended frequency range of 200 Hz to 8000 Hz keeping the input sound pressure level at 60 dBSPL. ✓ Plot the output sound pressure level as a function of frequency. ✓ Find out the HF average and note down value. ✓ Draw a horizontal line 20 d B below this value. Draw vertical lines at the points at which this line touches the curve. These points on the frequency axis give f 1 and f 2 . FREQUENCY RANGE :- To provide a general idea of the range of frequencies over which a hearing aid might be considered effective, a standardized method of determination has been adopted. The method is based on the frequency response curve. A horizontal line is drawn at a specific location. The frequency range is defined by the intersections (f1 & f2) of the response curve and the horizontal line. The location of the horizontal line is 20 dB downward from the average value of points R1, R2 and R3 at 1000, 1600 and 2500 Hz, respectively. Non linear distortions:- The purpose at this test is to determine the degree of the amplitude nonlinearity in the sound output under specified conditions. The ability of a hearing aid to deliver a clean signal at the required output level is indicated by measuring its nonlinear distortion characteristics. The total harmonic distortion is a measure of nonlinearity. The amplitude nonlinearity can be described in terms of

60 a) Harmonic distortion :- When the input is a sine wave, the distortion products occur at frequencies that are harmonics (i.e integer multiples) of the input frequency. Consequently the process is called harmonic distortion. b) Inter modulation distortion: - When a more complex signal is peak clipped, the distortion products occur at frequencies that are harmonics of all the frequencies in the input signal, and at frequencies that are combination of all the harmonics. If two tones, with frequencies f1 &f2 are input, for e.g. distortion component will occur at 2f1, 3f1, 4f1, 2f2, 3f2, 4f2, f2-f1, 2f2-f1, 2f1-f2, 3f1-f2, to name but a few frequencies. Although the mechanism causing the distortion is exactly the same as for harmonic distortion (peak clipping is the most common cause), the result is called intermodulation distortion. Total Harmonic distortion: - (The power of all the distortion products is summed and expressed relative to the power of the wanted output signal component; This ratio is reffered to as total harmonic distortion.) The gain control is adjusted to the reference test position and the input sound pressure level increased to 70 dBSPL. The total harmonic distortion is measured an input level of 70dB at 500, 800 and 65dB at 1600 Hz. In the event the specified frequency response curves rises 12 dB or more between any distortions test frequency and its second harmonic, distortion tests at that frequency may be omitted. Percentage of total harmonic distortion (%THD) may be determined using either of the following methods. Method 1:- The amount of total harmonic distortion is measured in the output coupler by filtering out the fundamental and measuring the RMS sum of the harmonics that remain. Method 2:- An alternative, and perhaps preferred method the fundamental and each harmonic sound pressure individually. This method has the advantage of reducing the effects of ambient noise. The methods gives virtually identical results up to 20 % THD. Percentage of THD values in typically hearing aids are usually in the range of 3 to 10 %. For THD value higher than 20 % , method 2 should be used. Total harmonic distortion at 500 Hz >2%

61 Total harmonic distortion at 800 Hz >2% Total harmonic distortion at 1600 Hz > 1% EQUIVALENT INPUT NOISE LEVEL: - The quantity is not too important because the internal noise levels of normally operating modern hearing aid electronics are low compared to ambient noise levels typically encountered. The test space must be extremely quiet to avoid false readings due to ambient noise when making the test for this quantity. Measurement of Battery current:- The purpose of this test is to determine the current consumption of the H/A in operation. Test procedure:- With the gain control in the reference test gain position, measure the battery current at the reference test frequency with an input sound pressure level of 60 dB SPL and at the reference test frequency. ● A 1000-Hz tone is introduced in to the free field at an intensity of 65dB SPLand battery current drain is measured. ● When other than a standard hearing aid battery is used as a power source, the internal impedance of the power source is to be stated. The tolerance for battery current drain is such that it shall not exceed the value specified by the manufacturer for that model of hearing aid. Coupler SPL with Induction coil :-The sensitivity of a telecoil is measured with the aid set to the 'T' mode and oriented to produce the greatest coupler SPL. The aid is placed in a strong magnetic field created with a" Telecoil Magnetic field simulator" and the gain control set to the reference test position. A frequency response (sound pressure level for an inductive telephone simulator or SPLITS) curve can be made between 200 and 5000 Hz. A high frequency average of the SPLITS curve (HFA-SPLITS) or a special purpose average (SPA-SPLITS) can be calculated as described for acoustic gain. Also available are simulated telephone sensitivity (STS) HFA-SPLITS (HFA-SPLITS- Reference test gain + 60 dB0, which is a figure of merit for how much the volume control will have to be rotated when switching from microphone position to telephone position, or STS SPA-SPLITS (SPA-SPLITS-reference test gain + 60dB) I/O CHARACTERISTICS – AGC Aids :- It is important to know how output SPL varies with as a function of input SPL from 50 to 90 dB in 5 dB steps, measured at one of the following frequencies; 250, 500, 1000, 2000, or 4000 Hz. The curves are drawn on a grid with output SPL as the ordinate and input SPL as the abscissa.

62 DYNAMIC AGC CHARACTERISTICS: - The AGC function takes time. The "Dynamic AGC characteristics" is a method to determine the attack and release times for the AGC function. With the aids gain control set to the reference-test position, a 2000Hz input tone is abruptly alternated between 55 and 90 dB SPL. The attack time is defined as the time between the abrupt increase and the point where the output level has stabilized to $\pm$3 dB of the steady-state value for the 90 dB input. The release time is defined as the time between the abrupt drop and the point where the hearing aid output stabilized to $\pm$4dB of the steady state 55-dB input SPL. Times are stated in milliseconds. ELECTRO ACOUSTIC MEASUREMENTS OF DIGITAL HEARING AIDS Introduction

Digital hearing aids are still hearing aids. While they may have many benefits, they are not perfect. At least three possible sources of error exist when fitting hearing instruments and testing can ensure that these errors are minimized. Some digital instruments are noise reduction programs that can make them more difficult to test. Methods are outlined to enable with pure tone and composite signals.

All hearing instruments have some elements in common. All include an input microphone; an output receiver and a battery with its connectors and some way to control the electronic circuit. In an analog hearing instrument, this hardware is all there. In a digital hearing instrument, the additional element of software is added, and this determines how the hearing instrument operates. With most digital hearing instruments, a programmer is also needed to adjust the operational parameters. It may take the form of a small box with a cable and connects to the hearing aid, or it may be a personal computer operating under control of a programming module.

When

preparing a digital hearing instrument for the customer, it is usually programmed. In this process, the programming device often displays the predicted response of the hearing instrument as a graph or family of curves. It should be remembered that this display is a prediction, not an actual measurement. The programmer may make a display that, because of a software bug or other hearing instrument defect, does not show the real operating state of the hearing instrument. The instrument may have a frequency response that does not agree with that displayed on the screen. Its AGC action may be disabled, or its knee-points may be set to unknown levels.

63 It is up to the hearing care professional to determine if the hearing instruments is really doing what it is supposed to do. The professional must be willing to test a digital hearing instrument to be sure that it is operating correctly, and should verify that the hardware, software and programming are all working correctly determine that something has gone wrong and things are not behaving as was expected. Tests: The

following are the test descriptions: ✓ 50 / 60 / 90 dB response: - Device is stimulated with 84 discrete sinusoids at 50, 60, 90dB. For the 50dB sweep, output response at microphone is measured and compared with average value of 100 typical devices. Each point on the curve is compared to the corresponding, previous and next point on the ideal template. If any point passes this comparison, the point passes. The template is moved up or down to center the response between the upper and lower template boundaries. The tolerance is 4dB from 400Hz to 1900Hz. The tolerance is 6dB from 2000 Hz to 4000Hz. Points outside of the 400 to 4000 ranges are not considered. If all points pass. If any points fail, the 50 dB response test fails. The 90db sweep generates several parameters. The 60dB sweep has no pass/fails parameters. ✓ Total Harmonic Distortion: - Total harmonic distortion is measured at 500, 800, and 1600 Hz at 70dB. Device is stimulated at a given frequency and amplitude. Device response at sideband frequencies is measured. ✓ [Max THD at 1-2 KHz, 85dB. Aid is swept at 85db. The maximum distortion from 1 to 2KHz is measured. ✓ Battery current:- The current consumed by the device is measured while being stimulated by a specified frequency and amplitude sine. Two standards are used: (a) ANSI and (b) JIS / IEC (2.1 mA). ✓ Attack and Release time: - At a specified frequency and amplitude, the time between the stimulating signal and the response is measure. There are of two types: o Enhanced attack and release time o Adaptive attack and release time. #Enhanced attack and release time The procedure displays numerical and graphical results of attack and release tests using ary of 18 different pure-tone frequencies, or the speech weighted composite signal. These tests are important for testing the performance of frequency specific signal processing circuits. A choice of test frequencies lets you exercise the attack and release phases of the hearing aid in the specific frequency region for which a particular signal processing

64 circuit was designed to work. Example: 'ASP-type' circuits are usually designed to reduce low frequency background noise. So you would use a low frequency to test the circuit. The speech weighted composite signal lets you see how the circuit reacts to the broadband speech like signal. The numerical display gives you the attack and release time for the chosen test signal. Attack time is particularly critical for low frequency active circuits such as 'ASP' since a fast attack time will reach to speech, whereas a slow attack time will react only to ongoing noise. The graphical display of 'output versus time' lets you see how the device performs over the attack and release phases. Erratic performance during these critical phases could results in effects that are audible to a hearing impaired listener. These effects could be annoying or even could obscure parts of a conversation. # Adaptive attack and release time The adaptive attack and release time test makes it possible to evaluate the performance of special compression circuits that changes their release time, depending on the length of the input signal. This type of processing is designed to distinguish between ongoing speeches and load, abrupt noises that can often cause normal compression circuits to obscure parts of conversation. (Example: Telex's adaptive compression). It performs a 2KHz attack test following by a special two signal release test consisting of a short signal 1 sec and a long signal 2 sec. we can select whether the signal level varies between 55 and 75, 80, 90 or 95dB SPL (80 is standard). The results will be displayed numerically and graphically on the screen. Digital signal processing New technology in hearing aids had added a great deal of capability such as increased clarity and flexible programming. However, the same technology can also have its pitfalls. This test will tell you the digital processing or group delay and the signal phase of the hearing aid. Digital processing delay Its measurement will help you in determining whether or not a hearing aid is suitable for a monaural fitting. One of the properties of digital technology is that it always takes time to process digital data. Imagine the aid or a miniature computer; it takes an analog sound wave, turns it into digital information, performs some kind of algorithm to amplify signal and

65 turns it back into an analog sound wave, for the ear to hear. All of this calculating takes precious time; it's never instantaneous. The processing delay for some hearing aids is so slight that it is imperceptible to the human ear. The processing delay for other aids can extend to several msec-longer than the calculating time of an analog hearing aid. How delay will cause problems? When you fit a client monaurally with an aid with a significant digital processing delay, that person might experience some confusion because his unaided ear will be hearing sounds slightly faster than his aided ear; which creates an echo effect. Problems can also be predicted for patients with open canal fittings. It can be eliminated by fitting patient with an occluded binaural set, than both ears will be listing with the delay, and the confusion will be alleviated. Measurement Procedure Done by sending a short impulse from the sound chamber speaker to hearing aid. Hearing aid analyzer mic collects information from the hearing aid for 20 msec from the time the impulse is delivered. This information is a series of number of varying amplitudes. Hearing aid analyzer finds the maximum peak amplitude of the resulting information. Since the impulse response of a hearing aid is not always simple, the analyzer also checks for any peak occurring before the max peak. If a smaller peak exists, and it has amplitude of at least 50% of the max peak, the time of the smaller peak will be considered the processing delay point otherwise, the time of the max peak will be considered the processing delay point. The hearing aid analyzer system delay is subtracted from this delay point in order to form the actual processing delay time. The data collected in the digital processing delay measurements is displayed in graphical format as amplitude v/s time. A dotted vertical line is placed at the calculated delay point. The numerical value is also displayed. Signal phase Helps you to determine whether custom binaural hearing aids are working properly together as a team. This measurement is a test of the 'pushing' and 'pulling' of the amplified sound of the aid. Sound is created by vibrations in the air. These vibrations can be thought of as air pushing pulling against the ear. If sound goes through a hearing aid, the hearing aid might cause a phase shift, turning a 'push' of the sound wave into a 'pull'. The components of a custom hearing aid are usually wired by hand. The receiver is typically wired into the amplifier in such a way that it may or may not cause a phase

66 shift of the signal. If care is not taken, it is entirely possible to wire one hearing aid of custom binaural set one way, and wire the other aid in the opposite way. This could cause one of the hearing aids to be pulling while the other aid is pushing, resulting in strange sound quality for the hearing and wearer. So it is very important to check the signal phase of the hearing aid while fitting a client with binaural set in order to ensure that the aids are working together as a team. Measurement procedure Signal phase measure works by generating a 1 KHz cosine wave, turning it into a test signal, and delivering it to the aid. The cosine wave signal is affect at the time of generation so that it starts at the baseline (0 point). It continuous through a complete cycle and terminates when it reaches the baseline again. This signal, although consisting of only a simple pulse, contains very few frequencies above 1 KHz and is few msec wide at base. The data collected from this measurement is displayed in a graphical formant 20msec wide. The system delays as well as the digital processing delay are noted for reference on the phase graph in the form of vertical lines. When measuring a set of binaural hearing aids, both the phase and the delay graphs should match fairly closely. Digital speech signal ● The ANSI 87 and 96 standards were written and published in the days before noise reducing digital hearing aids.

67 ● They have made no provision for testing digital hearing aids. ● However, one can still perform accurate frequency response measurements using the digital speech signal. ● The digital speech signal was developed in order to test noise-reducing digital hearing aids without fear of them going into noise suppression mode. ● It does this by taking the standard composite signal and interrupting it randomly. ● The digital hearing aid responds to this modulated signal as it would respond to normal speech. ● The advantage of digital speech is that the analyzer treats it just as another signal source. ● Then we don't have to test the digital hearing aid any differently than how we test a normal analog hearing aid. Testing digital noise suppression ● We can use combination of the continuous composite signal and the digital speech signal to see how much the aid lowers the its gain when subjected to a noisy signal. ● This will give an idea of how much advantage the user will be getting in a noisy environment.

68 ✓ We can see the difference between the two curves ✓ The composite curve should show lower gain than the digital speech curve. ✓ If the two curves fall on top of each other, it's a good indication that the noise suppression feature on the hearing aid either is not working correctly or is not enabled. Measuring directionality ✓ Although directional hearing aids can have different types of polar maps and two or even three microphones, the basic concept is fairly simple: speech sound from in front of the hearing aid wearer is louder than noise from behind him. ✓ The hearing aid test system cannot give you a polar plot of the directional hearing aid response, but it can provide you with the basic information of how much directional benefit the hearing aid wearer is receiving and at which frequencies. ✓ The directional test takes advantage of the speaker placement in the large sound chamber and the flat testing surface that makes it easy to position the hearing aid for testing. ✓ There are two measurements: one where the hearing aid is positioned so that it is facing towards the sound chamber speaker, and one where the hearing aid is positioned so that it is facing away from the sound chamber speaker. ✓ You should use the same input signal for both measurements. ✓ The source amplitude used for this measurement should be greater than the noise floor of the testing environment but less than the compression knee point of the hearing aid, if possible. ✓ 50 dB SPL is usually a good choice. Speaker Placement ✓ The speaker in the sound chamber is positioned on the right side of the chamber at a 45º angle. ✓ It is important to keep this in mind when positioning the directional hearing aid for measurements.

69 Forward measurement ✓ The first step in doing a directional test is to position the hearing aid in the sound chamber so that the front of the hearing aid is pointing towards the right side of the chamber. ✓ Close the sound chamber lid and perform the following steps: 1. Enter the Coupler Multi curve screen by pressing [F1] from the Opening screen. 2. Use [F5] to set the source type to Digital Speech. 3. Use [(", '"] to set the source amplitude to 50 dB SPL. 4. Press [START]. ✓ After the measurement has stabilized, press [STOP]. The measured curve is the "forward" measurement of the directional test. Reverse measurement ✓ Open the sound chamber and position the hearing aid so that the front of the hearing aid is pointing towards the left side of the chamber. ✓ Different hearing aids have different null points so you will want to adjust the positioning so that the sound chamber speaker is pointing towards what should be the null point of the directional aid. ✓ Close the sound chamber lid when finished and perform the following steps: 1. Use [F2] to select the next curve. 2. Use [F5] to set the source type to Digital Speech. 3. Use [(", '"] to set the source amplitude to 50 dB SPL. 4. Press [START]. ✓ When the measurement has stabilized, press [STOP]. ✓ The measured curve is the "reverse" measurement of the directional test. ✓ If the directional microphones of the hearing aid are working properly, this curve should have less output or gain than the forward measurement. ✓ The difference in the RMS Out of the two curves will give you the average overall advantage provided by the directional microphones. In this example, the hearing aid has an 8 dB average directional advantage.

70 Coupler I/O ✓ The Coupler I/O Test measures the input/output of the hearing aid from 50 dB SPL to 90 dB SPL in 5 dB steps ✓ Test results are shown in both graphical format and numerical format and can be displayed in either Gain or SPL (Output). ✓ By default, this test is done with a puretone stimulus at 2000 Hz. ✓ The frequency of this stimulus can be changed by using [>, <]. ✓ You can also toggle the source type between Pure tone and Composite by using [F5]. ✓ (The frequency selection is only available when the source type is set to Pure tone.)

71 Hearing aid measurement standards:- There are several national and international standards that define measurement on hearing aids. These standards describe a series of electro acoustic tests of hearing aids. This chapter essentially deals with the ANSI specification of hearing aids. These standards describe a series of electro acoustic tests of hearing aids. This chapter essentially deals with the ANSI specification of hearing aid characteristics ANSI S3.22- 1996; the Indian standard institute specification of hearing aid standards and the international electro technical commission (IEC) standards. (IEC) 118-1994. People who work with hearing aids can use these standards to compare the performance characteristics of individual instruments to the nominal performance characteristics specified by the manufacturers. SSUMMARY OF SPECIFICATIONS AND TOLERANCES ASA STD 7-1976 (ANSI S3.22-1976) SPECIFICATIONS TOLERANCE 1) SSPL 90 CURVE Maximum value of SSPL 90 shall not exceed specified value. 2) HF-AV. SSPL 90 Must be within +4 dB of specified value. 3) Full- on gain curve No tolerances. 4) HF-AV, Full on gain Must be within +5 dB of specified value. 5) Frequency response curve (text 1) See text 2 6) Harmonic distortion (text 1) Must not exceed specified values at 500, 800, 1600 Hz 7) Equivalent input noise level (text 1) Must not exceed specified maximum value. 8) Battery current (text 1) Must not exceed specified maximum value. 9) Induction coil 1000Hz sensitivity. Must be within +6dB of specified value. 10) AGC Input-output characteristic Match measured and specified curves at 70 dB input.Measured value @50 and 90 dB must be within +4dB of specified values. 11)AGC attack and release times Must be within +5ms. Or +50 % (Whichever is large of specified values)

72 TEXT 1:-reference test gain control position is used in items 5, 6, 7 and 8. Gain control must be set 17 dB (+1 dB) below HF –average SSPL 90 for each individual instrument. TEXT 2:- FREQUENCY RESPONSE CURVE. a) From the manufactures specified frequency response curve determine the average of the 1000, 1600, and 2500 Hz response levels. b) Subtract 20 dB. c) Draw a line parallel to the abscissa at the reduced level. d) Note the lowest frequency, f1, at which the response curve intersects the straight line. e) Note the highest frequency, f2, at which the frequency response curve intersects the straight line. FREQUENCY RANGE: - For information purpose, but not for tolerance purpose, the frequency range of the hearing aid shall be considered as being between f1 &f2. FREQUENCY RESPONSE TOLERANCE: - The tolerances in two bands shall be as follows. Freq. limit Tolerance Low Band (1.25f1 to 2000Hz) (+4 dB) High Band 2000 to 4000Hz or 0.8f2 (+6dB) Whichever is lower. Basic setting of controls on the hearing aid All trimmers have to be set to give the widest possible frequency response range, the maximum gain and the maximum output. If it is not possible to achieve both the maximum output and the maximum gain set the hearing aid for the maximum output. An exception is an AGC instrument having compression controls. Set the controls as indicated by the manufacturer. Leveling the test equipment:- Leveling must account for all items present in the test chamber at the time of testing. The complete hearing/coupler/microphone apparatus (or equivalent) must be in place

73 during leveling with a single microphone system, 'the equivalent substitution method is used and leveling must be redone when even a change is made that could affect the acoustics of the measuring system. Standard parameters Ø Output sound pressure level (OSPL-90) with the gain control of the hearing instrument full and an input sound pressure of 90 dBSPL, the output sound pressure is determined. Frequency of the source is varied from 100 to 10000 Hz. The maximum OSPL 90 reading has to be no more than 3 dB higher than the manufacturer's specification. Ø HF average OSPL 90:- The maximum output sound pressure level with full on gain at 3 frequencies 100 Hz, 1600 Hz and 2500 Hz are added and the sum is divided by 3. The sound pressure so obtained is called the HFA OSPL 90. the reading can be derived from the OSPL 90 curve. The HFA OSPL90 has to be within + 4 dB of the manufacturer's specification Ø Full on gain:- With the gain control of the hearing instrument set at full on and an input sound pressure of 60 dBSPL, full on gain is recorded as a function of frequency if a 60 dB input SPL would overload the hearing instrument, then 50 dBSPL is used. Ø HFA full on gain:- The average of the full on gain at the frequencies 1000, 1600 and 2500 Hz. These three frequencies are chosen by ANSI becoz most hearing aids produce usable output at those frequencies. An HFA reading gives a single number that represents the over all performance, of an instrument for the test condition in question. The HFA full on gain has to be within + 5dB of the manufacturer's specification. Ø Reference test position:- With an input sound pressure of 60 dBSPL, the amplification control is adjusted so that the output sound pressure level is 17 dB lower than the HF average OSPL 90. A tolerance of + 1 dB is allowed for setting gain control to the reference test position.

74 Ø Frequency response curve:- A frequency response curve is obtained with the gain control in the reference test position and the average SPL of the frequencies 1000, 1600 and 2500 Hz is determined. A horizontal line is drawn on the graph 20 dB below this average value. The point at which the line intersects the frequency response curve indicates the ASA frequent range. The lower band position of the frequency response curve (> 2 KHz) must fall within + 4 dB of the specified curve. The high band portion of the frequency response (<2 KHz) must fall within + 6dB of the specified curve. Ø Introduction coil sensitivity:- The hearing instrument is set to the 'T' (telephone input) mode and placed in a sinusoidal alternating magnetic field having an rms magnetic field strength of 10 mA/ m at 1000 Hz. The gain control is set to full on and the hearing instrument is oriented to produce the greatest coupler sound pressure level. Ø Battery current drain:- The battery current is determined with the hearing instrument adjusted to the reference test position. The battery current is measured a this position with an input sound pressure level of 65 dB SPL of 1000 Hz. The hearing aid manufacturer is required to state the battery type used for all the published S3.22 tests of an instrument. The battery current drain may not be more than 20% higher than the highest value specified by the manufacturer. Ø Equivalent input noise level (EIN) The equivalent noise level Ln is measured in very quiet ambient conditions with the gain control in the reference test position. It is calculated as follows. Lav = Average dBSPL output at frequencies 1000, 1600 and 2500 Hz L2 = Noise level of the unit in the reference test position Ln = L 2 (Lav -60) dBSPL The EIN level has to be less than or equal to the highest value specified by the manufacturer plus 3 dB. A

75 Some highlights ✓ When you set up an AGC aid for an ANSI test sequence, you will start with its compression controls set to minimum (with the compression knee point set as high as possible) Just before the input/output and attach and release measurements, the test sequence will pause to allow you to set the compression controls of the aid to maximum (with the compression knee point see as low as possible.) ✓ When you adjust the gain control of the H/A midway through the automated test sequence, the measured reference test gain value will now only have to be within 1.5 dB of the target value instead of within 1 dB. ✓ The EIN formula uses a 50 dBSPL input instead of a 60 dBSPL input. With ANSI 96, any aid with a compression knee point below 60 dBSPL showed artificially high EIN results. This means that ANSI 2003 EIN test results should be better (lower) for AGC aids. Indian Standards Institutions (ISI) standards The Indian standard was adopted by the Indian standard institution in February 1984. This standard is designed to be a basic document specifying a wide range of measurement standard from which those applicable to particular needs can be selected. The standards include numerous hearing aid performance parameters that are felt to be significant in predicting the suitability of a H/A for various applications. Classification of hearing aids The performance of H/S shall be classified on the basis of the following parameters a) The maximum saturation sound pressure level b) The average OSPL 90 c) Full on acoustic gain and d) HF average full on gain H/A are classified into the following 3 classes mild, moderate and strong class H/A General requirements This standard is based on the free field technique in which the H/A is placed in a plane progressive wave, with the earphone coupled to a standardized coupler, and the

76 sound pressure generated by the H/A in the cavity of the coupler being measured by a condenser microphone. The measurement specified are based on the substitution method in which the reference point of the H/A is made to coincide with the test point chosen on the axis of the sound source. Test equipment and environment Sound source substitution method: + 1 dB over the range 200 to 5000 Hz + 1.5 dB over the range 5000 to 8000 Hz Comparison method: + 1.5 dB over the range 200 to 3000 Hz + 2 dB over the range 3000 to 8000 Hz Frequency accuracy Accurate within + 2% of the indicated value. Total harmonic distortion of the sound source not to exceed 1% 70 to an input SPL of 70 dB 2% of an input SPL greater than 70 dB and up to 90 dB Total harmonic distortion in measuring equipment less than 1% for SPL up to 130 dB in the range 200 to 5000 Hz less than 3% for SPL above 130 dB and up to 145 dB Coupler microphone Flat within + 1dB over the range 200 to 3000 Hz, within + 2 dB in the range 3000 Hz to 8000 Hz relative to the pressure sensitivity level at 1000 Hz Battery or supply voltage:- accurate with + 2% reference test frequency: 1600 Hz frequency range: at least 200 to 8000 Hz temperature: 15 to 35 0 C Relative humidity: Less than 80% Air pressure 86 to 106 Kpa reference sound pressure 20 u pa. Test environment free field conditions where in the sound pressure variations do not exceed + 1 dB . Controls on the hearing aid The tone control setting that gives the widest frequency range, shall be selected in preference to setting in which the low and high frequencies are attenuated. All other control settings should be chosen to give the highest OSPL 90 and the highest acoustic gain.

77 Standard parameters:- ● Sound pressure level curve for an input SPL of 90 dB (OSPL 90) with the gain control of the hearing instrument on and an input sound pressure of 90 dBSPL, the output sound pressure is determined. The recommended frequency range over which the frequency of the source is varied from 200 to 8000 Hz. ● HF average full on gain:- The average of the full on gain at the frequencies 1000, 1600 and 2500 Hz. ● Full on acoustic gain frequency response: The output SPL in the coupler is measured at fuli on gain control setting with an input SPL of 60 dB. If this does not produce essentially linear input output conditions it can be set to 50 dBSPL. Linear input output conditions are considered to exist at all frequencies within the range 200 to 8000 Hz a change of the input SPL of 10 dB causes a change at the output level of 10 + 1 dB ● Comprehensive frequency response and basic frequency response:- With the gain control at the reference test gain position, the frequency of the sound source in the range of 200 to 8000 Hz keeping the SPL constant at 50, 60, 70, 80 dB and 90 dB the frequency response shall be obtained. The basic frequency response is the curve obtained an input level of 60 dB ● Frequency range:- A frequency response curve is obtained with the gain control in the reference test position and the average SPL of the frequencies 1000, 1600 and 2500 Hz is determined. A horizontal line is drawn on the graph 20 dB below this average value. The point at which the line intersects the frequency response curve indicates the frequency range. ● Effects of tone control position on the basic frequency response:- The tone control setting that gives the widest frequency range, shall be selected in preference to setting in which the low or high frequencies are attenuated. The frequency of the sound source is varied over the range 200 to 8000 Hz, keeping the input SPL constant at 60 dB. ● Effect of gain control position on frequency response:- The gain control from a full on position is varied downward in approximately 10 dB steps at the reference frequency. At each setting the gain control shall be varied over the frequency range from 200 to 8000 Hz keeping the input SPL constant. 78 ● Effect on the full on acoustic gain of variation of battery or supply voltage. With the gain control full on. The Input SPL is set to a sufficiently low value at the reference frequency and the gain is determined. This shall be repeated for two values of the supply voltage (i.e. at 1.5 volts and 1.0 volts) within the specified voltage range for normal operation of the battery. ● Effect on OSPL 90 of variation of battery or supply voltage:- with the gain control full on, the input SPL is set to 90 dB at the reference frequency and the OSPL 90 is determined. This shall be repeated for various values at the supply voltage within the specified voltage range for normal operation of the battery. ● Battery current:- With the gain control in the reference test gain position measure the battery current at the reference test frequency and at an input SPL of 60 dB. The direct current measuring system shall have the following characteristics. a) An accuracy of + 5% at the value of the current measures b) A direct current resistance not exceeding 50/1, when I is the current being measured in mill amperes and c) An alternating current impedance not exceeding 1 ohm over the frequency range 200 to 8000 Hz ● Harmonic distortion:- The gain control is an adjusted to the reference test position and the input sound pressure level to set to 70 dB SPL, the frequency of the sound source is varied over the frequency range 200 Hz to 8000 Hz and analysis of output signal to be done for levels at the harmonic frequencies. In the event the specified frequency response curves rises 12 dB or more between any distortion test frequency response curves rises 12 db or more between any distortion test frequency and its 2 nd harmonic, distortion tests at the frequency may be obtained and its 2 nd harmonic distortion tests at the frequency, may be omitted. The total harmonic distortion is given by the formula. And harmonic distortion of the n th order by the formula Where P1 is the sound pressure of the fundamental frequency of the signal in the coupler and P 2 , P 3 , P 4 —— P n are the sound pressure of the harmonic components of the second, third fourth —— nth order. In ISI specification the harmonic distortion measures at 1.5 volts and 1.0 volts.

79 Intermediation distortion:- With the gain control of the H/A in the reference test gain position, set the frequencies f1 and f2 (within 350 to 5000 Hz) such as f2-f1=250 Hz having amplitude within 1.5 dB, f2 being higher in frequency then f1. The sound pressure level of the two test tones shall be at 64 dB. Frequency differences other than 250 Hz may be appropriate and when used the frequency difference should be stated. If the signal to noise ration is too low at 250 Hz a higher frequency difference may be used. Internal noise generation in the H/A,the internally generated noise is expressed as an equivalent input noise level the equivalent noise level LN is measured in very quiet ambient conditions with the gain control in the reference test position. The reference test frequency is 1600 Hz, but for certain H/A s a higher frequency may be chosen. The equivalent input noise level LN can be calculated as follows. LN = L 2 - (L 8 − L 1) dBSPL Where L2 = The sound pressure level in the coupler L 8 =The sound pressure level in the coupler L 1 = The input sound pressure level at the RTF (60 dB) Comparison of main test standard and condition Subject IEC ANSI ISI RTGCP Single frequency 15 dB HFA (SPA) 17 dB Single frequency 15 + gain control set back gain control set back 1 dB control set back Battery current 60 dBSPL input 65 dBSPL input 60 dBSPL input Input full on gain 50 dBSPL if OSPL 90 50 dBSPL if OSPL 90 60 dBSPL linear I/o SPL 60 is >5 dB SPL 60 is > dB connect to 50 dBSPL Full on gain at 1.5 volt Yes Yes Yes Full on gain at 1 Volt No No Yes Distortion at 1.5 volt 1 frequency 3 frequency 3 frequency Distortion at 1 volt No No 3 frequency Frequency range No Yes Yes Tolerance No Yes No

80 Subject IEC ANSI ISI AGC measurements No Yes Yes Directional microphone No Yes No Ambient conditions Temperature 23 0 C + Temperature 23 0 C + Temperature 15 0 C + 5 0 C 5 0 C 35 0 C Relative humidity Relative humidity >80% 40-80% 0%-80% Air pressure 101.3 Kpa Air pressure 101.3 Kpa Air pressure (+5, -20) (+5, -10) 86 to 106 Kpa EAR MOULD Development of Ear mould technology and modification :- The ear mould is an integral part of an individual amplification system. It is a bridge between the hearing aid and the user. An
ear mould is a plastic or silicon insert that couples the hearing aid receiver or tube to the ear canal
so that amplified sound is conducted from the hearing aid receiver to the ear canal.
81 Functions of Ear Mould:- (a)
The basic purpose of an ear mould is to keep the hearing aid /the receiver in place. It serves as a comfortable and effective anchor for the hearing aid in the ear. (b) It provides a channel of transmission for the amplified sound from the receiver to the eardrum. (c) The ear mould prevents acoustic feedback from occurring. Acoustic feedback is a squealing sound that emanates from the hearing aid if the ear mould is ill fitting. The amplified sound escapes from the ear canal if the mould is ill fitting and is again fed into the microphone causing the squealing sound. The ear mould also acoustically shapes the amplified signal by contributing
to
the spectrum of the sound reaching the ear. It can enhance or reduce the amplification in certain frequency ranges and can also contribute to the quality of the sound reaching the ear. The ear mould
provides several basic functions. First, it couples the hearing aid with the user's ear. It channels the sound from the hearing aid, through the ear canal, to the
82 eardrum. The ear mould also helps to secure the hearing aid in place. The challenge is to provide the user with a secure fit. Yet the tighter the fit, the more uncomfortable the device is to wear. A well fitted ear mould directs sound from the hearing aid to the ear without feedback, thus allowing the user to hear comfortably (Lachapelle, 1999). Ear moulds are required for all hearing aids, and since the anatomical structure of the ear varies from person to person, the majority (80%) of all ear moulds are custom made.

83 An ear mould is also used to protect hearing in environments with loud noise. For example, the ear mould can be used in recreational settings such as car racing, hunting, and for fans of sports or music during games and concerts. It also provides hearing protection for industrial workers such as carpenters, factory workers, machinists, and others (Ear mould Design, 2000). The use of ear moulds for Assistive Listening Devices (ALD) is less common; however, in those situations where ear moulds are appropriate, the general characteristics do not vary from those of a hearing aid. Only 5% of the people who experience hearing loss use ALDs (National Center for Health Statistics, 1997). Statement of the Problem The ear mould is an important link in fitting a hearing aid system and must meet multiple requirements. The ear mould must: ● Provide a satisfactory acoustic seal. ● Acoustically couple the hearing aid to the ear. ● Retain the hearing aid on the pinna (auricle). ● The ear mould must be better integrated into the overall design and performance of the hearing aid. ● Be comfortable to wear for an extended period. ● Be aesthetically acceptable to the user. ● Be of a style that the user can physically handle. Failure to meet any of these requirements will increase the likelihood of product abandonment by the user. Therefore, Stakeholders desire improvements in the fitting, production, comfort and performance of ear moulds as they are used for hearing aids or as hearing protection devices. Current Technology Custom modification of the ear mould aids in the overall fit (comfort & security) and minimizes acoustic feedback. These custom designs are handmade which is time consuming and costly. Yet, the time taken to properly fit the ear canal in the beginning may reduce the need for modification to the ear mould shell later.

84 There are a number of options in the type of materials used to create the ear mould. Proper selection of the material is critical to improve the overall fit and comfort to the user. Some materials may cause allergic reactions for the user, some provide options in colours, while others are simply more comfortable for the user (individual perception). Material characteristics or properties may change over time and become hard, or may experience shrinkage causing poor fit or discomfort to the user. hearing aid. Three of the most common options include; venting, dampers and horn effects. Each will affect different portions of the hearing aid response curve (Microsonic, 2000a). Venting is an opening that is drilled into the earmold to release low frequency sound. This reduces the "plugged feeling" experienced by the hearing aid user while speaking, described as "talking inside a barrel." This sensation is called the occlusion effect. Dampers are materials that are used to alter the frequency and decrease unwanted peaks of sound waves. Common materials used include wool, plastic and metal, which fit inside the ear mould tubing. The horn effect is provided when the bore of the ear mould increases as it goes deeper into the ear canal. It increases and extends the high frequency sound waves. A reverse horn effect is achieved by adapting the ear mould to gradually narrow towards the inner portion of the ear canal. Additional adjustments to the ear mould can be made by buffing and shaping the product for a better fit. However, this is a "hit and miss" approach. Another method of securing the ear mould in the ear canal is to wrap the shell with a flexible material that will provide a temporary solution to the problem. Health care professionals must evaluate each person individually as to the material and style selection of ear moulds to best meet their needs and to ensure the highest success rate with the hearing aid. Issues to consider include: ● whether the user is active or sedentary in their lifestyle, ● user dexterity (for example, the persons ability to handle hearing aid insertion, daily care, and cleaning of the ear mould), ● the anatomy of the individual's ear and the affect it has on the choice of material or style of hearing aids that are to be used (anatomic considerations when choosing a hearing aid include: a deformed outer ear, the depth of the concha, whether ear canal is of sufficient diameter and whether there is a sharp enough bend to hold the hearing aid),

85 ● growth changes, (in particular children), ● changes in morphology of the ear canal as it slowly adapts to the continuous pressure of the device (continuous pressure may cause the area to expand slightly), ● amplification objectives of the fitting, ● toxicity or allergies to plastics, ● appearance — colour selection, hearing aid style and ear mould design options, and ● the number of modifications that may be required after delivery of the device (Microsonic, 2000b). Each manufacturer offers a variety of materials to be used with ear moulds to meet the specific needs of each client. Choosing the correct material for ear moulds is as important as determining the ear mould style and acoustics. Some of the generic varieties include: ● Acrylic is used to create hard custom ear moulds, used with mild to severe hearing losses. Most ear mould styles can be made with acrylic and are available in a range of colour options. ● Polyethylene is a semi-rigid material and is hypoallergenic. It is used for mild to severe hearing losses. Polyethylene is not as durable as other materials and should be handled with care. The color selection is limited to white. ● Silicone is a flexible inert material that is useful when fitting client's with allergy problems (although the hypoallergenic feature is not available if produced in any color other than beige or clear). There is little to no shrinkage with silicone and can therefore be used when fitting high power hearing aids. ● Lucite is a clear synthetic plastic resin that is rigid at all temperatures. It is useful for mild to moderate hearing losses. It does not shrink over time, is easy to grind and buff, but is not recommended for children. ● Poly Vinyls (Polymerized vinyl) provide a soft, comfortable fit with a superior acoustic seal. The texture of the material provides a rich mellow sound quality that preserves the harmonic and resonant characteristics of the ear canal.

86 2.4 Cochlear Implant Introduction Cochlear Implants (CI) are surgically implanted electronic devices coupled to external components that provide useful hearing and improved communication to adults and children with severe-to-profound hearing losses. A CI consists of a microphone; an external processor, which analyze the incoming signal; an internal processor and an electrode array, which is surgically placed inside the cochlea. A speech processor converts the acoustic sound signal into an electrical signal. The electrical stimulation of the electrode array replaces the transduction process that is performed by the sensory cells of the inner ear in the normal cochlea. In this manner, the CI provides direct input to the central auditory pathway by electrically stimulating the spiral ganglion cells of the auditory nerve. WORKING OF THE IMPLANT 1. Sound waves are received by the microphone. 2. The signal from the microphone is sent along the cable to the speech processor. 3. The speech processor acts on the signal according to the coding strategies develop to enable optimal hearing with the cochlear implant. 4. The coded signal is sent through the cable to the transmitter. 5. The transmitter transfers the signal together with the energy required by the implanted electronics through the intact skin to the implanted receiver. 6. The implanted receiver and stimulator decodes the signal and sends a pattern of small electrical impulses to the electrode in the cochlea. 7. The small pulses conducted by the contacts stimulate the spiral ganglia at various sites and different parts of the auditory nerve are stimulated according to the pitch

87 of the sound. In response the auditory nerve carries out its natural function and conducts the nerve impulses to the brain. 8.
The brain receives the
impulses and interprets them as sound, which the implant user hears.
COMPONENTS OF CI SYSTEMS CI systems are made up of several components and all require the patient to wear equipment externally as well as having the internal, surgically implanted electrode array. The internal part implanted at the operation consists of a receiver and an active electrode. All materials used in the manufacture of the implant are fully tested for biological compatibility and durability. The electronic components of the receiver are held in sealed housing which is implanted under skin behind the ear. The active electrode connected to the receiver is inserted to the cochlea through cochleastomy into the basal turn. The contacts (platinum-iridium alloy) are enclosed in silicone and the electrode cable made in such a way that it can be inserted about 25mm into the cochlea. The external components consist of a speech processor and transmitter. The speech processor can be body worn or behind the ear. The speech processor converts incoming signals into the required electrical signals.

88 External components: It consist the microphone, the speech processor and a means of transferring the signal to the implanted electrodes. 1) Microphone: The microphone picks up sound from the environment and converts it into an electrical signal. For most body-worn system the microphone is housed in its own case which is similar in appearance to a small post-aural hearing aid. The signal is transferred from the microphone to the body-worn speech processor via a lead. The Nucleus CI 24M, Medel Combi 40+ and Clarion CII system have the option of BTE processors which have integral microphones. 2) Speech processors: The speech processor converts the raw signal from the microphone into a form that can be delivered to the implanted electrodes and produces an audible yet comfortable sensation of hearing. The speech processor has programmable electronics that are set individually to suit each patient by an audiologist with the aid of a computer and a device-specific interface. Speech processors have on/off switches and adjustable sensitivity controls. They may also have volume controls and programming selection buttons if the processor can store more than one program. The processor is powered by batteries. Hearing aid batteries are used for the head-level processors, and larger batteries (e.g., two to four AA batteries are used for the body-worn processors. Battery life typically exceeds 12 to 16 hours, allowing patients to use their devices during the waking hours without the need for recharging or replacing the batteries. Adequate battery life for the head-level processor is made possible trough use of low-power integrated circuit technology, particularly low-power digital signal processing (DSP) chips that have become available. The head-level processors in some cases have reduced capabilities or reduced options for changes in processing strategies or processor 89 parameters to save space and to reduce power consumption. Such tradeoffs may reduce the speech reception performance for users. In those cases, a body worn processor may be preferable to a head-level processor, even though the latter is more cosmetic and convenient. Advanced in battery, integrated circuit, and DSP chip circuit technologies have been driven by huge commercial markets for mobile phones, portable computers, and other hand held or portable instruments. The economic incentives to develop better batteries and power-efficient chips are enormous. Most new-generation processor has warning lights or sounds to indicate faults. Speech processor may be body-worn or post-aural. The Nucleus Esprit and Esprit 22 post-aural processors support the SPEAK strategy only. The Nucleus 3G post-aural processor can support SPEAK and other faster rate speech processing strategies. The Medel Tempo+ post-aural speech processor supports the CIS processing strategy. The Clarion CII post-aural processor supports a range of speech processing options. A processor requires rechargeable batteries that generally need to be changed more than once a day. PACKAGING: BODY WORN SPEECH PROCESSOR: Body-worn speech processors allow the presentation of some or all strategies in regular use (SPEAK, CIS, ACE). They may have flexibility for research on alternative strategies. There is a telemetry link sending voltage from implant electrodes back for analysis. It has a liquid crystal display of program settings, signal levels, and diagnostics. There is a control panel disable feature for children. It also had data logging to monitor usage, and compatibility with assistive devices. It could be used with single-or double- battery packs, the weights being 114 and 146g, respectively. The Clarion S body worn speech processor provided the SAS and CIS strategies and had the dimension of 7x6x2.2cm. The body worn version CIS PRO+, with the dimensions 9x6. 8x2cm, it requires two rechargeable AA batteries for an average of 1 day of operation (Med EI application to the FDA, August 21, 2001). The MXM Digisonic speech processor operated with two rechargeable batteries that had a life of 12 to 16 hours. There was also a sensitivity control with separate base and treble to improve the contrast of speech in noise.

90 Behind-the-ear speech processor: Many patients find a behind-the-ear speech processor desirable, particularly as it is more convenient and cosmetically pleasing to dispense with the leads passing from the microphone to the body-worn device. Miniaturization of the nucleus 24 processor required high-powered since-air batteries and a low power consumption, which is easier to achieve with strategies using low stimulus rates. Its dimensions were 4.6x1.9x0.9cm. In 2002 the ESPrit-3G provided alternative strategies such as ACE and CIS. It gave a choice of sensitivity or loudness control, simple rotary and in-line switches, and compatibility with assistive devices. Triple 675 zinc air batteries gave typically from 16 to 150 hours of usage. The ESPRIT-3G had a built-in telecoil that allowed listeners access to hearing aid compatible telephones and to connect to sound systems is public venues with assistive listening devices like induction loop and infrared or FM system. The Clarion behind-the-ear speech processor used rechargeable batteries, but this limited their running time. The Med EI Tempt+ speech processor used three zinc-air batteries for approximately 36 hours operation. It dimensions were 6.6x1.3x0.9cm, and came in straight, angled and children's configuration. Signal transfer to the implanted electrodes: A direct hardware connection through the skin via a plug or pedestal fixed surgically to the skull is the simplest method for transferring signal to the internal electrode array, as used in the Inner aid implant. This method of connection is known as percutaneous connection and has the advantage that

91 it is easier to apply new processing strategies without replacing the internal electrode array. However, prone to damage and infection can develop around the pedestal, which in the worst case can necessitate reimplantation. Currently available CI use Transcutaneous links where the skin remains intact. The signal is transmitted across the skin via a FM carrier wave to the internal receiver stimulator; here the signal is converted back to an electrical signal and stimulates the implanted electrodes in most systems the transmitter and the internal receiver stimulator are magnetized to keep the transmitter and receiver correctly aligned and thus maintains good contact across the skin. Transmission link There are two types of transmission link: 1. Transcutaneous transmission link 2. Percutaneous connector A transcutaneous link consists of an external transmitting coil and an internal, implanted receiving coil. The external transmitting coil encodes the stimulus information and sends a radiofrequency signal across the skin to the internal receiving coil of the receiver/stimulator package. This radiofrequency signal powers the receiver/stimulator package, which decodes the signal and appropriately stimulates the electrode array via

92 a cable connecting the package to the electrodes. The external transmitting coil is held in place over the internal receiver/stimulator package with a pair of external and internal magnets in the centers of the coils. The receiver/stimulator package is implanted posterior to and above the pinna in a flattened or indented part of the skull. A percutaneous connector is a wire that passes through the skin and directly connects the speech processor to the electrode array. (Wilson, 2004) No commercially available cochlear implant systems use a percutaneous connector. This is likely due to the fact that skin is closed over the implant when there is a transcutaneous link, decreasing the risk of infection. Use of a transcutaneous link instead of a percutaneous link, however, limits the amount of information that can be transmitted. Transcutaneous links limit stimulus update rates and restrict the types of stimulus waveforms that can be transmitted. (Wilson, 2004). In some cases the transmission link may be bidirectional, allowing data to be transmitted from the internal components to the external components. Such data can include impedances of electrodes, voltages at unstimulated electrodes, and intracochlear evoked potentials. Such measurements can be useful in assessing the condition of the auditory nerve and for programming the speech processor. (Wilson, 2004)

93 A. Internal device components: It consists of a receiving coil or internal processor and an electrode array. 1. Receiving coil or internal processor: It is the largest portion of the internal device and is surgically placed in the mastoid bone. It is composed of magnet and an antenna, which receives the signal from the external coil. Either silastic or ceramic casting houses the receiving coil. 2. Implanted electrode array:

94 It is connected to the internal receiver stimulator. Extracochlear electrodes are located outside the cochlea, such as on the plate of the receiving coil or placed under the temporalis muscle. Generally, extracochlear electrodes are used as a ground source for monopolar stimulation and usually single-channeled. Intracochlear electrodes are housed along a carrier called the electrode array and can be programmed to serve as either an active or indifferent component of the electrical charge. Intracochlear electrodes are surgically placed inside the cochlea and may vary in material, shape, size, number and spacing along the electrode array. Multichannel devices, which use more than one intracochlear electrode, take advantage of the tonotopic organization of the cochlea and provide differently processed information to electrodes positioned at different locations with in the cochlea. The total no. of electrodes available on may be less than the no. of electrode available on the array. For e.g. a particular electrode may be the deactivated because the patient feels discomfort (dizziness) when it is stimulated. Several electrodes along the array may be deactivated for a specific speech processing strategy. Lastly, incomplete insertions may limit the no. of electrode that can be stimulated. The Medel Combi 40+ allows the deepest insertion. Presently, electrode array are either precoiled or flexible. Precoiled arrays are spiral shaped and are designed to follow the curve of the scala tympani. Flexible array are straight and thin are designed to follow the natural curve of cochlea. The design of the electrode array that 'hug' the modiolus is currently an area of intense research activity. CI manufacturers may offer a choice of electrode arrays. Medel and MXM have split electrode that may be more suited to ossified cochlea. Different parts of the cochlea are drilled out and then two or more sections of the split array are placed in different regions of the cochlea thus maximizing the use of tonotopic organization of the cochlea.

95 Design rationale: Research for the design and development of an electrode array: Ø Electrode placement: Clarke et al (1975) observed fewer traumas when a free- fitting electrode carrier was inserted along the scala tympani of the basal turn Ø Electrode placement close to auditory nerve in speech frequency range: The preliminary results to insert the electrodes along the scala tympani of the basal

96 turn through the round window were not successful. The electrode did not go beyond 15mm. but the electrodes were needed to inserted 20mm and preferably 25mm to lie opposite the auditory nerve fibres conducting the speech frequencies. To overcome this difficulty, drilling with care into the scala tympani at points around the cochlea so that electrode arrays could be threaded along the basal and middle turns of the cochlea (Clark et al., 1975).with this technique, there was a problem of the underlying structures as a result of fenestration. Another technique was retrograde insertion. However, this methods method caused more traumas than the earlier one. Later, it was found preferable to insert a free –fitting electrode array via the round window along the scala tympani of the basal turn of the cochlea. However, problem still remained how to insert it sufficiently to lie close to auditory nerve. A significant limitation to deep insertion was friction between the electrode array and outer wall and with graded stiffness from tip to base. The solution came from an electrode array made from a silastic tube which reduces friction between it and the outer wall and with graded stiffness from tip to base. Ø Current localization: Black and Clack (1977) developed a computer model, which plotted voltage distributions for different electrode stimulus configurations. The results show that the best current localization could be expected from any array within the scala tympani. Ø Electrode metal: In developing an electrode array, one of the issues is the metal to be used for the electrodes. Initially, gold electrodes were preferred (Michelson, 1971). Later, platinum was used. The advantage of platinum black is that it increased the surface area, but this was significantly reduced in the presence of protein. In 1975, development of a multiple electrode array by sputtering platinum onto a thin ribbon of Teflon so that a large no. of electrode tracts and electrode pads could be condensed into a small space (Clark and Hallworth, 1976). But this array could not sufficiently bend well to pass around the cochlea without cracks developing in the electrode tracks or pads. Furthermore, when the Teflon strips were inserted into the 'cat's cochlea, their edges cut the basilar membrane (Clark et al., 1987). Later, bared ends of 20 individual electrodes around silastic carrier were developed. This provided a large surface area. However, this electrode caused significant trauma when removed for replacement with another. To avoid this problem, a banded electrode was conceived and used for subsequent patients. Being circumferential it also has the advantage that it could be rotated to facilitate 97 insertion, and still make good contact with the auditory neurons. Shepherd et al., 1984, evaluated the tissue reaction of the biomaterials in the multi-channel cochlear prosthesis. Silastic MDX-4-4210 was compared with other widely used biomaterials including FEP Teflon, polyurethane (Pellethane) and silastic tubing. The histological response of muscle and the cochlea to silastic were minimal and compared favorably with other three materials assessed. The minimal tissue reaction and near normal appearance of the cochlea, demonstrates the suitability of this material for use in intracochlear implants. Ø Electrode insertion depth and frequency up-shifting: Electrode arrays are inserted only partially into the cochlea, typically 22-30mm, depending on the state of the cochlea. The fact that the electrode array is not fully inserted into the cochlea creates a frequency mismatch between the analysis frequency and the stimulation frequency. For e.g. an electrode array, consisting of 5 electrodes, inserted 22 mm into the cochlea. The output of the first analysis filter, which is centered at 418 Hz, is directed to the most apical electrode which resides in the 831 Hz place in the cochlea. As a result, the speech signal is up-shifted in frequency and is therefore less intelligible. This is consistent with patient's reports that speech sounds unnatural and "high-pitched" or "Donald-duck like" when their device is first activated. Ø Electrode design: Some of theissues associatedwith electrode design are:- (1) electrode placement, (2) no. of electrodes and spacing of contacts, (3)orientation of electrodes with respect to the excitable tissue, and (4) electrode configuration. 1. Electrode placement: The extracochlear and intracochlear electrode placement (already dealt is previous section). Gostoettner and Aduunka et al., 2001, studied on the perimodiolar-positioned CI electrodes that have been developed in order to bring the electrode contacts as close as possible to the spiral ganglion cells, which are the target of electrostimulation. This resulted in lower electrical thresholds, higher dynamic ranges and less channel interaction when compared with normal implant electrodes which are usually located peripherally within the scala tympani. 2. No. of electrodes and spacing between electrodes: The no. of electrode as well as the spacing between the electrodes affects the place resolution for coding frequencies. In principle, the larger the no. of electrodes, the finer the place coding

98 frequencies. Frequency coding is constrained by the no. of surviving auditory neurons that can be stimulated at a particular site in the cochlea and by the spread of excitation associated with electrical stimulation. Unfortunately, there is not much that can be done about the first problem. The spread of excitation varies with the electrode configuration: monopolar and bipolar (dealt later). 3. Orientation of electrodes:Current electrode arrays do not include any special provision for positioning the electrodes within the cross section of ST.Presently, electrode array are either precoiled or flexible. TYPES OF ELECTRODES STANDARD ELECTRODE ARRAY The Standard Electrode Array offers the deepest insertion (approximately 31mm) and widest contact spacing (2.4mm) available today. It features 12 pairs of electrode contacts and is designed to provide stimulation of the complete frequency range. COMPRESSED ELECTRODE ARRAY Specifically designed for partial ossification or malformation of the cochlea, the Compressed Electrode Array features 12 pairs of contacts equally spaced over a shorter distance to maximize the number of channels available and Optimize performance. SPLIT ELECTRODE ARRAY Specifically designed for severe ossification of the cochlea, the Split Electrode features two separate electrode branches, one with five pairs and one with seven pairs of contacts. The arrays are designed for insertion into different areas of the cochlea to maximize the number of channels available and optimize performance.

99 MEDIUM ELECTRODE ARRAY The Medium Electrode Array features 12 electrode pairs with moderate contact spacing for cases where deep insertion is not desired or is not possible due to anatomic restrictions. FLEXsoft ELECTRODE ARRAY Similar to the Standard Electrode Array, the FLEXsoft Electrode Array allows deep insertion into the apical region of the cochlea. The specially designed leading section offers increased mechanical flexibility for reduced insertion force. FLEXeas ELECTRODE ARRAY The FLEXeas Electrode Array is intended for situations in which insertion no deeper than the basal cochlear turn is desired. The array features a designed leading section with increased mechanical flexibility and reduced insertion force. Summary: Based on the above, the CI can be classified as:

100 ● Based on transmission: 1. Percutaneous system 2. Transcutaneous system ● Based on electrode placement: 1. Intracochlear system 2. Extracochlear system ● Based on mode of stimulation of electrodes: 1. Monopolar stimulation system 2. Bipolar stimulation system ● The most common classification: 1. Multichannel CI system 2. Single-channel CI system IMPLANT CHARACTERISTICS Several types of implant device have been developed over the years. These devices differ in the following characteristics: 1. Electrode design (already dealt) 2. Type of stimulation: Analog or Pulsatile (dealt later in speech processing strategies) 3. Mode of stimulation: Monopolar, Bipolar, or Common 4. Transmission link: Transcutaneous or Percutaneous (already dealt) 5. Signal processing: Waveform representation or Feature extraction Stimulation mode: To induce an electrical field current must flow from an active electrode or positive pole to a reference or ground electrode or negative pole. This current flow can be produced in 3 different ways in CI. They are: ● Monopolar stimulation ● Bipolar stimulation ● Common ground stimulation

101 For monopolar stimulation, the active and reference electrodes are positioned remotely; the active is inside cochlea and reference is on the receiver stimulator case or embedded in muscle (temporalis) outside the cochlea. Thus, an electric field is created from the stimulated electrode (usually an intracochlear electrode) to the ground (placed extracochlear). Hence, current spread over a wider area for monopolar stimulation. The tonotopicity pitch can be maintained with monopolar stimulation as the current density is greatest around the active intracochlear electrodes. MONO stimulation causes the greatest overlap of electrode fields. Monopolar configurations might excite a larger population of neurons, creating a richer representation of the stimulus and yield better current-level sensitivity. Advantages: ● The wide current spread can produce auditory percepts using much lower current level. ● The information can potentially be presented at a faster rate and that the power consumption of the system can be minimized. ● The tonotopic pitch order of the electrode percepts is maintained with monopolar stimulation as the current density is greatest around the active intracochlear electrode.

102 Disadvantage: ● Some current flows external to the cochlea, potentially causing stimulation of other structures. For bipolar stimulation, the active and reference electrodes are adjacent to each other. Bipolar stimulation gives more specific stimulation but because fewer neurons are stimulated, a higher current level is required to produce the same loudness sensation as monopolar stimulation. ● In a true bipolar mode, often too few ganglion cells stimulated to create a sufficiently loud percept within the output limits of the system which may be inadequate for the patient. ● Power requirements are higher. Advantages: ● Stimulation of electrodes in close proximity provides more spatially selective stimulation (highly selective fields- pitch specificity) ● The bipolar configuration was an attempt to limit the interelectrode interaction by placing a ground near each electrode such that a smaller field would be created with less interference and more discrete stimulation. In common mode stimulation, when an active electrode has been designated, all of the other electrodes are connected together electronically to constitute a single reference electrode. As a result, current spreads from the active electrode to each of the other in

103 the array. In practice, the common ground mode, in spite of its wider current spread, offers electrode discrimination equivalent to that provided by bipolar modes. This occurs because the concentration of the current or the "charge density" is greatest in the vicinity of the active electrode. The spiral ganglion cells in this region therefore receive to the position of this electrode within the cochlea. As such there appears to be no disadvantage in employing the common ground mode for young implantees with complete electrode insertions. The spatial specificity of stimulation for selective activation of different populations of cochlear neurons depends on many factors, including: ● Whether neural processes peripheral to the ganglion cells are present or absent ● The number and distribution of surviving ganglion cells ● The proximity of the electrodes to the target neurons ● The electrode coupling configuration. The factors can interact in ways that produce selective excitation for monopolar or bipolar stimulation and in a way that produce broad excitation fields for either type of stimulation. Eg. Highly selective fields can e produced with bipolar electrodes oriented along the length of surviving neural processes peripheral to the ganglion cells. Highly selective fields also can be produced with close apposition of monopolar electrodes to the target neurons. In addition, broad fields become more likely with increasing distance between electrodes and target neurons for either coupling configuration. Broad fields may be required for adequate stimulation of cochlear with sparse nerve survival.

104 An important goal of implant design is to maximize the number of largely of largely non overlapping population of neurons that can be addressed with the electrode array. This may be accomplished thorough positioning of electrode contacts immediately adjacent to the inner wall of the ST. The current electrode array do not include any special provision for positioning the electrode within the cross section of the ST. placement close to the inner wall can increase the spatial specificity of stimulation and produce reductions in threshold and increase in the dynamic range of stimulation (Cohen et al, 1998, Ranck, 1975; Shepherd et al 1993). Although the close placement next to the inner wall is likely to improve spatial selectivity, it is important to note that the inner wall is not always close to the spiral ganglion (SG) throughout the length of the ST (Ariyasu et al, 1989, Ketten etal, 1997). The neural tissue likely to be activated by electrical stimulation is located nearest to the electrodes. In the cochlear the current pathway from the electrode to the axonal process is likely to be through the highly conducting fluid of the ST. it is notable that the threshold and comfortable levels of implanted patients are usually lowest with MONO stimulation, highest with BI, and intermediate for CG. STIMULATION PARAMETERS: The parameters are manipulated to produce sufficiently loud stimuli in the shortest possible time. This allows the highest possible stimulation rates for signal processing. These considerations have resulted in the "stimulus level" scales used within the programming software, which provides a logarithmic scale of "charge delivered" by varying current and pulse width. TYPES OF IMPLANT: Cochlear implants can be categorized in at least two important ways. ● Electrodes may be inserted either within the cochlea (intracochlear) or placed outside the cochlea (Extracochlear); ● The signals may be transmitted through either one channel (single channel) or several independent channels (multichannel); Extra cochlear electrode: the electrodes may be attached to the round window niche or, in some cases, to the promontory. Single-channel stimulation is more common in this form of implant.

105 Extracochlear stimulation, in contrast to intracochlear stimulation, has the advantage that the procedure does not invade the cochlea and is reversible. The disadvantages of extracochlear stimulation are narrower dynamic range, higher current density, and, concomitantly a greater potential for stimulating other neural tissue, possible resulting in facial nerve stimulation or vertigo. An additional concern is maintaining long-term contact between the external electrode and the round window or promontory. Intracochlear electrode: In an intracochlear implant, an electrode or electrode array is inserted into the cochlea. For multichannel operation, the electrode array is usually inserted quite deeply into the cochlea (toward the apex), whereas for single-channel operation, a short single-channel electrode that does not extend beyond the first bend in the cochlea can be used. Multiple electrode arrays have been developed with as many as 24 electrodes that can be stimulated independently. SINGLE CHANNEL VERSUS MULTI-CHANNEL COCHLEAR IMPLANTS In cochlear implant systems, the term channel refers to the number of stimulation sites within the inner ear, or cochlea, and is defined by a range of frequencies, or pitches. All sounds, ranging from low pitch (bass) to high pitch(treble) sounds are separated into the number of available channels. In a single channel system, all sound information is delivered to only one channel. Thus, all information is transmitted to a single area of stimulation within the cochlea, regardless of the pitch of the incoming signal. Thus the Single-channel implants provide electrical stimulation at a single site in the cochlea using a single electrode. Advantages: ● It does not invade the cochlea ● The process is reversible. ● Less risk of insertion trauma Disadvantages: ● Does not utilize the place coding mechanism as in a normal cochlea. ● Speech perception using single-channel implants

106 Multi-channel cochlear implant systems divide the incoming signal into various frequency bands that are then transmitted to various sites of stimulation spanning the inner ear. In this way, low pitch sounds are sent to one part of the cochlea and high pitch sounds to another. The goal in multi-channel systems is to more closely mimic the human ear, in which sounds are organized by frequency, like the keys of a piano. Because the system can transmit much more detailed information about the incoming signal, the processing of sound is more complex, and the device fittingis somewhat more involved. Multi-channel implants provide electrical stimulation at multiple sites in the cochlea using an array of electrodes. An electrode array is used so that different auditory nerve fibers can be stimulated at different places in the cochlear, thereby exploiting the place mechanism for coding frequencies. Different electrodes are stimulated depending on the frequency of the signal. Electrodes near the base of the cochlear are stimulated with high frequency signals, while electrodes near the apex are stimulated with low frequency signals. Advantages: ● These have a potential for low current density. ● They have a wider DR ● It uses the convenient tonotopic stimulation ● Information is transmitted in a form that is easier for the user to understand. Disadvantages: ● Usual hazards of the surgery ● insertion trauma ● possibility of mechanical damage to the cochlea ● possible release of toxin corrosion products ● Difficulty of replacing the device. RISKS AND COMPLICATIONS OF SURGERY 1. Infection of the wound: the device may need to removed 2. facial weakness: for mast cases weakness is transient

107 3. balance symptoms: usually transient 4. taste disturbance: 5. Device failure: total implant failure may occur, but this is uncommon (less than 4% in Nottingham). 6. risk of meningitis with middle-ear infection: rare occurrence; vaccination is advised. 7. Electrochemical damage to the ear from long-tern electrical stimulation: the effects appear to be minimal based on current knowledge if the stimulation is appropriate. 8. head growth in children 9. Limitation of certain activities like rugby, boxing, squash. 10. electrostatic damage 11. tinnitus: usually transient 12. vertigo: usually transient 13. complication relating to anesthesia: if occurs, may be serious PROTOCOL FOR POSTOPERATIVE MANAGEMENT: 1. FOR CHILDREN: Postoperative Recuperation ● Recuperation includes 1 to 2 days at the hospital. ● Additional time is required for healing of the incision. ● Recuperation takes about 4 to 6 weeks on average. ● Pre-programming response training can be started or continued during the recuperation period. Speech Processor programming ● Programming patient contact time is often longer for children than adults as they have shorter attention spans and require more breaks. ● Several days may be required to develop the program for long-term use.

108 ● Regular visits should be scheduled for the first 6 months so that the processing can be refined as the child gains more experience with sound. Rehabilitation/Habilitation training ● The habilitation/rehabilitation period for children will be long-term and emphasis of initial sessions at the implant centre is on continued training of auditory concepts as the program is refined, along with practice with the processed signal. ● Follow up Visits ● Follow up visits should be scheduled at 6 month interval for 2 years, and then once in a year. ● At follow up sessions, the child's MAP should be assessed and adjusted as necessary. ● Follow up questionnaires are administered. Time set aside for Counselling. Post operative evaluations ● Annual evaluations are recommended. ● Evaluations should include warble tone thresholds in the sound field, closed or open set speech perception tests, and measurement of speech reading ability. Recommended postoperative protocol ● Warble tone and speech detection thresholds (in sound field) ● CID Early speech perception test. ● NU-CHIPS ● GASP words ● MAC ● CID sentences. ● PBK words 2. FOR ADULTS: Postoperative Recuperation ● Recuperation includes 1 to 2 days at the hospital.

109 ● Additional time is required for healing of the incision. ● Recuperation takes about 4 to 6 weeks on average. ● Pre programming response training can be started or continued during the recuperation period. Speech Processor programming ● Approximately 9 hours of patient contact time is required for the initial fitting procedure. ● Three hour test sessions, one each for 3 days, provide the patient with experience with the device (including overnight at home) before the speech processor is programmed for long term use. Rehabilitation ● The first half of the session is used for testing, evaluating, and reprogramming the speech processor. ● The second half of each session is used for counselling and practice with the speech processed signal. ● Pre-lingual deafened individuals need extensive auditory training to get the most out of their potential with the cochlear implant. It is important for patients and family members to recognize that a long time course is required for the development of auditory skills. Also, consistent use of cochlear implant is important for the development of auditory skills. Follow up ● Post operative follow up checks are suggested at 6 months, 1 year, and yearly, with additional training available if the patient needs it. ● A minimum of 4 weeks of home experience with the cochlear implant device is suggested before the postoperative evaluation Recommended Postoperative protocol ● Warble tone and speech detection thresholds (in sound field) with the cochlear implant. ● Four choice spondees.

110 ● Vowel identification. ● Monosyllabic words (NU6) ● CID sentences. ● Iowa sentences. Equipment During mapping the headset is connected to the speech processor and placed over the implant. The recipient's system via the processor is connected to the programming system via the programming cable and the programming system is connected to the computer that runs the programming software. 2.5 Classroom Amplification System In a classroom situation, the children with hearing impairment usually sit some distance away from the teacher. Due to their physical placement, the signal to noise ratio available at the ears of the children is much poorer than what is available in a one to one situation. This leads to reduction in the intelligibility of the speech of the teacher. So various method have been adopted to overcome these difficulties and to increase the distance between the teacher and the students in classroom situation. So classroom amplification system is necessary. Individual hearing aid: Children using individual hearing aid experience all the difficulties of an increase in the signal to noise ratio in a classroom situation. When the acoustic environment of the classroom is not satisfactory, then speech intelligibility is affected. Hardwire Group Hearing Aid System: The amplification device which is used simultaneously more than two persons at a time is called group hearing aid. Hardwire system is one of the group hearing aid in which the microphone and headphones separately connected to the amplifier by means of electric cables. This system consists of teacher's microphone, amplifier, a set of headphones, student's microphone attenuator box and mixers.

111 Teacher's microphone is connected to amplifier and the set of headphones are also connected with amplifier and amplifier is connected with power supply. For two headphones one microphone is provided and these are connected with the mixer. In mixer there are many switches to control individual or by the students. When the teacher speaks, the teacher's microphone converts sound energy to electrical energy which is amplified by the amplifier. The amplified electrical energy is again converted into sound energy by earphones and thus the children hear the teacher's volume. Volume control is attached with each earphones of headset separately. Hence, the gain of headphones can be controlled separately. When the child speaks, the student microphone converts sound energy into electrical energy and amplified the input signal. Then the same process occurs as in the case of teacher's microphone. In this way the children are able to hear their own speech or the speech of other children in the classroom. Advantages: 1) This system provides good speech quality because of higher signal to noise ratio and here the distortion is less. 2) The range of frequency response of group hearing aid is wide (from 200 Hz to 6000 Hz) and output deliver by the headphone is also wider as compared to receiver of conventional hearing aid. 3) The distortion of the microphone will be less because of its high powerful microphone. 4) Communication between student vs. teacher, teacher vs. students and student vs. student will be better. 5) Each student irrespective of distance from the teacher can get equal input. Disadvantages: 1) Mobility of the student is collapsed here. Learning by activities is an important part of education especially in children and this is totally impossible here. 2) The headphone is heavy and cover the larger part of the head, it may create difficulty sometimes in children. 3) The attenuator may be misused regularly by children.

112 FM System FM hearing systems are also sometimes called as the wireless hearing systems. This system consists of a microphone, a FM transmitter, amplifier and processor. Each child in the class has FM receiver, processor and amplifier. Functions: Microphone picks up the acoustical signal and converts it into electrical signal. Then it is amplified by amplifier. The speech of a teacher is transmitted by means of radio waves. Audio waves are superimposed on radio-waves in FM circuit. Radiowaves act as a carry wave. The transmitter transmitted the radio-waves into the atmosphere. These radio-waves are detected and received by the FM receiver and it converts into acoustical energy. Advantages: 1) Mobility of child is present. 2) Here signal to noise ratio is very higher. 3) Sound quality is very good. This is the reason that hearing is better and education is better. 4) There is no question of spill-over. 5) Frequency response is of wide range. 6) Teacher vs. student communication and student vs. student communication are present here. Therefore this is the best amplification for classroom. 7) Electromagnetic interference is generally not a problem here. 4) It cannot be used outside the classroom.

113 2.6 Loop Induction System It is one of the method of providing amplification for the children with hearing impairment using the conventional hearing aid. A loop induction system can be used in conjunction with the individual hearing aid. Loop induction system consists of group of components consists of a microphone, an amplifier, an impedance matching transformer, a loop of wire fixed around the inner walls of the room and a hearing aid which have the telephone pick up or telecoil facility. Usually copper wire is used around the room at the 3 feet higher from the floor (in classroom situation). Functions: The speech signal from the speaker or teacher is picked up by the microphone, and amplifier of the system amplifies the input signal and fed to the loop. The electrical current passing through the loop produces electromagnetic field within the room. Suppose a child using conventional hearing aid on "T" position (telecoil is on) the telecoil in the hearing aid pick up the signal (electromagnetic waves) and amplify this signal by amplifier and then the receiver converts it to acoustical energy or sound energy. If hearing aid position is on "M", the microphone cannot pick up electromagnetic wave because it only picks up acoustical energy. When the wearer wishes to hear sounds from the environment, to hear friend's talking for instance then he must be fitted with a switch that allows the microphone to remain operative. This is known as an "MT" switch. Where a hearing aid is not in use, separate induction loop receivers can be used. Advantages: 1) Mobility of student is not restricted. Here child can move freely, inside the classroom. That is the reason learning through activity is better. 2) Signal to noise ratio is better because the microphone is close to the teacher's mouth. 3) This system is the most in expensive than others, require little maintenance, work relatively well. 4) The children have the advantages of continuing to use their own hearing aids, when the system is in use and the environmental noises are also cut off because of hearing aid is on "T" position. 5) It may also be use in public area such as railway station, own TV room etc.

114 Disadvantages: 1) Using loop induction system in the spill over effect. The electromagnetic waves generated by the system do not remain confined to the boundaries of the room and infiltrate the other neighboring rooms as well. This is the reason it would create problems of interferences in signals when the system is used in the two adjacent rooms. This is the reason it is used in alternative classrooms. 2) There may be some space in the room where electromagnetic field is not made. From here, telecoil does not pick up electromagnetic waves. This is the reason that sound is not heard. This dead spot is called null- point. This can be avoided by re-designing the room. 3) Some hearing aids has no telecoil/ MT facility. Here student to student communication is very less. For that cordless microphone or suspension microphone should be used. 4) Even with a strong telecoil, the distance and orientation of the hearing aid telecoil from the loop can significantly affect the gain and frequency response of the signal. 5) Any device that produces a magnetic field like TV, radio may interfere with signal reception. This is the reason if a loop system is near by TV, radio station, disturbance may occur. It requires proper earthling. 2.7 Criteria for recommendation of one device over the other Advantages of ITEs compared to BTEs 1) Considered more modern and cosmetically acceptable. 2) Better microphone placement for obtaining high frequency gain. 3) Easier to insert and remove and to adjust volume control. Advantages of ITCs over ITEs 1) It is more cosmetically appealing than the ITE. 2) Here high frequency amplification is better. 3) Users often experience less difficulty with feedback when using the telephone, compared to the ITE.

115 4) Users experience less wind noise due to a more deeply seated microphone. Advantages of ITEs over ITCs 1) More gain and output can be attained. 2) Telecoil and direct audio input are available 3) ITEs are less expensive volume control and battery is larger in size that is the reason for easier manipulation Advantages of CICs over ITCs 1) Deep microphone placement and reduced residual ear canal volume result in a significantly increased output, and in high frequency amplification. 2) Deep fitting helps to reduce the occlusion effect. 3) It is easy to insert and remove. 4) Feedback problems are reduced, including during phone use. ROLE OF SPECIAL EDUCATOR IN MEASURING OUTCOME OF LISTENING DEVICES ● The special educator ensures the involvement of parents of students with additional requisites in the educational processes of the children. ● The

special educator collaborates closely with teachers, other professionals and administers to foster the teaching and leaning of students with additional requisites. ●

Create a program geared to the assessed needs , goals & objectives, functional levels and motivational levels of students. ● Conduct frequent assessments / listening checks which focus on both long and short term needs of the students ● Selection of appropriate texts, learning aids, materials and supplies ● Supervision of students in classroom and school buildings. ● Prepars, adapts and delivers instructional materaials to deaf and head of hearing students. ● Partipation in auditory training and follow up.

116 2.8 Let us sum up The hearing technology offered to DHH children in inclusive schools can consist of assistive listening devices, including teacher-worn microphones and student-worn microphones used by hearing classmates. Teachers and students must make daily use of the equipment. Their attitudes toward hearing technologies may affect the degree of usage and, accordingly, the level of participation in school. This article presents DHH children's attitudes toward the different hearing technologies offered and explores predictors that can affect the children's attitudes toward these technologies and their utilization. A comprehensive understanding of the factors affecting the utilization of HA can improve rehabilitation interventions provided by health personnel and itinerant educators both at school and at home. 2.9 Unit end exercises 1. Write an essay on amplification technologies. 2. Enumerate Assistive technologies with suitable illustrations. 2.10 References: Clark G.M., Cowman, R.C.S., & Dowell,, R.C.(1997). Cochlear implantation for infants and children Advances. San Diego: Singualar publishing group. Cullington H.E. (2003) Cochlear implants. London: Whurr Publishers. Earmold Design. (2000). Hearing & Ear Protection - Introduction, Retrieved from www.earmolddesign.com/catalog_html/36.htm. Kochkin, S. (1997a). Customer Satisfaction & Subjective Benefit with High Performance Hearing Aids. Knowles Electronics. Retrieved from www.knowlesinc.com . Kochkin, S. (1997b). MarkeTrak IV: What is the Viable Market for Hearing Aids? Knowles Electronics. Retrieved from www.knowlesinc.com. Lachapelle, R. (1999). The Earmold. Retrieved from www.rayshearing.com/ earmold.htm . Laurie S. Eisenberg. (2009). Clinical Management of Children with Cochlear Implants.

117 Microsonic, Inc. (2000a). Custom Earmolds -- Acoustic Options. Retrieved from www.earmolds.com/acoustic_opt.htm. Microsonic, Inc. (2000b). Patient Evaluation for Earmold Selection. Retrieved from www.earmolds.com/patient_eval.htm . National Center for Health Statistics. (1997). Advance Data (292). Washington, DC: Vital Statistics of the Centers for Disease Control and Prevention. Smedley, T, & Schow, R. (1998). Problem-Solving and Extending the Life of Your Hearing Aids. In R Carmen (Ed.), The Consumer Handbook on Hearing Loss and Hearing Aids - A Bridge to Healing (pp. 130-158). Sedona: Auricle Ink Publishers. Sweetow, R. (1998). Hearing Aid Technology. In R Carmen (Ed.), A Consumer Handbook on Hearing Loss & Hearing Aids - A Bridge to Healing (pp. 111-129). Sedona: Auricle Ink Publishers. Waltzman S.B. & Roland J.T. (2000). Cochlear implants. Boston: Theme publishersClinical Guidance, 2011, Cochlear

118 Unit 3 ❏ Assistive Devices in Management of Language & Communication Structure 3.1 Introduction 3.2 Objectives 3.3 Meta Level Understanding of use of Technology for Language Development 3.4 Access to Whole Language: Challenges of Communication options and use of Technology for ways to Overcome 3.5 Use and Availability of Social Media for Sign Language Users: Communicative, Educational and Social Purposes 3.6 Orientation to Web Based Curriculum Based Measurement (CBM) Tools 3.7 Tele Captioning of Popular Media and its Role in Literacy Development 3.8 Let us sum up 3.9 Unit end exercises 3.10 Reference 3.1 Introduction The terms assistive device or assistive technology can refer to any device that helps a person with hearing loss or a voice, speech, or language disorder to communicate. These terms often refer to devices that help a person to hear and understand what is being said more clearly or to express thoughts more easily. With the development of digital and wireless technologies, more and more devices are becoming available to help people with hearing, voice, speech, and language disorders communicate more meaningfully and participate more fully in their daily lives 3.2 Objectives ● Understanding developmental needs of communication

119 ● Components of Assistive Technologies ● Users' aspect of Assistive technology ● Modalities to develop curricular framework of language usage 3.3 Meta Level Understanding of Use of Technology for Langage Development Language development will start from the birth. During the course of time language development has been enhanced by the effective usage of high tech gadgets like computers, smart phones, tablets etc. A variety of e-learning technologies are available for use in educational programs. In many parts of the world, education ministries and universities have invested much effort into increasing the use of the web in all its forms (for example, e-books, simulations, text messaging, podcasting. wikis, and blogs) to meet the demands of competitive markets and to bring a variety of learning choices to their learners. It has been reported that the advent of new technology has a positive influence on both learners and teachers. Researchers have demonstrated that technology boosts the development of teaching methods as well as students' knowledge. Technology provides learners with regulation of their own learning process and easy access to information the teacher may not be able to provide. The potentially positive side of incorporating technology has encouraged foreign language educators to apply its advantages to enhance pedagogical practices. However, the integration of technology in the classroom cannot be devoid of problems. This paper aims to discuss both the positive and negative aspects of technology use so as to provide practicing teachers and researchers with some essential background information and useful references. The list is not exhaustive but serves to be a starting point for interested readers. We will begin with the advantages. In addition, technology appears to improve language learners' academic ability. Computer Assisted Language Learning (CALL) can do just this. This improvement is probably achieved by changing students' learning attitudes and boosting their self-confidence. The use of technology enhances learners' language proficiency and their overall academic skills. The advent of technology and development in the field of education has accelerated a shift from teacher-centered to learner-centered approaches in language learning and teaching. To meet the needs of digitally grown-up learners, teachers need to adopt a different role. They need to be facilitators, rather than the traditional bench-bound instructors, and

120 they need to support and guide students' learning. Learning technologies support this important shift for the benefit of the learner. 3.4 Access To Whole Languge : Challenges of Communication Options And Use of Technology for ways To Overcome Audiological (re)habilitation and aural (re)habilitationrefer to a widerange of modalities employed by the audiologist tomaximize the hearing-impaired patient's ability tolive and communicate in a world of sound. The modalities of audiological intervention include the use of physical instruments such as hearing aids, cochlear implants, tactile aids, and hearing assistance technologies, as well as therapeutic approaches like patient and family counseling, developing effective communication strategies, and auditory- visual training. To this list must be added referrals to and interactions with other professionals who are involved with the patient's management, such as speech-language pathologists, physicians, psychologists, teachers, etc.The primary step in audiological management involves determining the need for amplification, and then providing the patient with it, always staying mindful of the fact that the hearing aid is partof the aural rehabilitationprocess, and not an end unto itself. This concept is by no means limited to hearing aids, but applies equally to cochlear implants, hearing assistance technologies, and tinnitus management. In each case, the overall process involves considerations of the patient's candidacy for intervention; the selection of the instrument; verificationof its fit, functioning, and ability to provide the prescribed characteristics; and validationof the patient's performance; as well as counseling, monitoring,and follow-up. Candidacy for Audiological Intervention Who is a candidate for audiological interventions, such as amplification? The consensus of current opinion is that any patient complaining of auditory difficulties in communicative situations should be viewed as a potential candidate for audiological intervention, such as hearing aids or other kinds of assistive devices (e.g., Hawkins, Beck, Bratt, et al 1991). Clearly, the patient should have some degree of hearing loss, and the need for amplification unquestionably rises as the degree of hearing loss worsens. Complicating matters is the distinction between the need for amplificationdue to the extent and impact of the auditory deficit versus how much benefit thepatient experiencesfrom the hearing aid. When the hearing loss is moderate to severe, unaided speech communication is belabored or impossible (need), and this situation improves
121 appreciably albeit not totally when hearing aids are worn (benefit). What's more, the improvement is readily appreciated by the patient and by others. However, the need for amplification can be ambiguous in cases considered to be marginal because of a mild, high-frequency, or unilateral loss. Here the degree to which the hearing loss affects speech communication is often subtle, inconsistent, and situational, depending on such factors as speaking level, whether there are background or competing noises, and the communicative demandsof the patient's occupational and social interactions. The benefits of amplification can be similarly subtle and inconsistent in patients with marginal impairments, so that a patient may need a hearing psychology aidbut perceive little or no benefit from it. However,little perceived benefit does not mean no benefit. The subtle benefits of amplification often become apparent when the patient forgets to bring his hearing aid to an important meeting or must do without the instrument while it is being repaired. At the opposite extreme, patients with profound losses have the greatest need for hearing aids, but they often receive relatively little benefit in terms of auditory speech reception because their residual auditory capability is often minimal. Again, however, remember thatlimited benefit for the purpose of hearing speech is not the same as no benefit at all. On the contrary, patients with profound losses benefit considerably from their hearing aids in terms of the ability to hear for alerting, warning, and emergency signals, and as an aid to lipreading. Clearly, hearing aid candidacy depends on more than auditory status alone, and is particularly affected by the patient's communicative requirements and theneed to rely on auditory information. Other motivational factors interact with the hearing loss to induce the patient to see an audiologist, and then to follow the recommendation to obtain hearing aids and to use them. Some of the major factors that appear to motivate patients to obtain a hearing aid for the first time include communication problems at home, in noisy listening situations, in social situations, and at work, as well as encouragement by the spouse (Bender &Mueller 1984Acceptance of the hearing impairment itself and of the need for clinical assistance to deal with it alsoweighs heavily in the patient's decision to obtain amplification. A patient in one of the "marginal" categories is often not willing to accept himself as hearing impaired, let alone so much so that amplification is needed. This is particularly true when the loss has developed slowly and insidiously over a long period of time. Special candidacy issues come into play with pediatric patients, and it is essential for comprehensive intervention including appropriate amplification to be introduced as

122 soon as possible (e.g., PWG 1996; JCIH 2007, 2013; AAA 2013). It is important to be mindful that infants and children are in the process of developing auditory skills, speech, language, and world knowledge. Thus, the hearing-impaired child is faced with a double challenge because (1) development in these areas relies heavily on auditoryinput, and (2) she cannot depend on linguistic and world knowledge to make up for missed sounds. At this point, it important to mention a large-sample prospective study by Ching, Dillon, Marnane, et al(2013) because it overcame many of the limitations ofprior studies that failed to provide cogent support for early intervention for young children with prelingualhearing loss (see, e.g., Puig, Municio, &Medà 2005;Wolff et al 2010). They found that better speech/ language and related performance in prelinguallyhearing- impaired 3-year-olds was significantly associated with (1) cochlear implants that were turned on at an earlier date, (2) less severe hearing losses, (3) no other disabilities, (4) female gender, and (5) higher maternal education.1 The significant impact of cochlear implants highlights the efficacy of early intervention with children with severe and profound losses. In fact, delaying cochlear implantation from 10 months to 24 months was associated with a dramatic decrease in performance scores at age 3. In addition to the considerations already discussed, hearing-impaired infants and children are also candidates for amplification if they have unilateral and/or mild losses, or permanent conductive losses, as well as for a trial period with hearing aids when cochlear implants are being considered and in cases of auditory neuropathy syndrome disorder (see, e.g., GDC 2008; Roush, Frymark, Venediktov, &Wang 2011; AAA 2013). Research indicates that practices offering aural rehabilitation (AR) tend to have higher rates of hearing aid satisfaction, along with fewer hearing aids returned for credit (Kochkin, 1999). AR is an important aspect of treating a patient with hearing loss; however, it is often overlooked by the hearing health-care provider, as much of the emphasis of treating individuals with hearing loss focuses on the technology of the device rather than rehabilitation. While technology does play a large and important role, aural rehabilitation is still necessary and vital in increasing patient satisfaction. Despite exciting and rapidly advancing developments, technology alone often is not enough to address a patient's hearing needs. The use of AR can be likened to the repair of a broken arm in which surgical treatment is provided to repair the damage. Once the

123 medical and surgical treatment is completed, it is still important to exercise the arm to achieve maximum recovery. It is not so different with hearing aids. Just as we provide hearing aid technology as treatment of hearing loss, the brain still needs to be "exercised" to maximize the benefit received. In addition to demonstrating lower hearing aid returns and better outcomes (Kochkin, 1999), another advantage of AR is that it requires the patient to be an active participant in his or her own care, treatment, and eventual success. Patients are encouraged and guided to learn management strategies that can empower them to advocate for themselves. Aural rehabilitation addresses the patient as a whole, which includes active input and collaboration. Incorporating AR into a hearing aid fitting allows audiologists to offer a customized, patient-centered approach to obtaining amplification. This collaboration can improve the patient's satisfaction with hearing aids. AR also has the potential to emphasize audiology from other hearing service professionals because it positions the audiologist to look at the patient as a whole entity beyond the prism of technology. In a competitive market of "big box" stores and hearing aids delivered over the Internet, the ability to offer AR provides the audiology professional with an opportunity to remain relevant and viable while better serving patients. As sales over the Internet have the potential to grow, so does the potential of dissatisfaction. The Internet is not an ideal forum for hearing aid candidates to discuss issues related to their hearing loss and it lacks personal contact with a knowledgeable professional best able to provide assistance beyond the technology. The training of an audiologist provides the knowledge to address the patient's unique hearing needs along with the psychosocial aspects related to the loss. This holistic view equips and prepares the audiologist to implement recommendations beyond providing hearing aid technology. Aural rehabilitation has become a more streamlined service to offer, with an increasing number of affordable and customizable treatment options with the advancement of the Internet, computers, and tablets. AR is often viewed as financially limiting in the confines of most practices. However, using new AR delivery models can provide a cost-effective opportunity to incorporate AR into your practice. Some clinicians prefer a traditional style of AR that involves direct, in-person patient contact. A cost-effective alternative to this option is a group workshop. This eliminates the time spent on individual programs and it allows this service to be provided in a group environment. A group dynamic also offers the opportunity for patients to provide support to each other and discuss their relevant experiences. Multiple participants will also allow the program to be offered at a lower cost to the individual patient. If you choose to offer individual or group sessions, remember these should be provided on a fee-for-service schedule as appropriate. Consider

124 supplementing formal programs with informal AR exercises as well. Melissa Heche, AuD, from New York Speech and Hearing, Inc., reported that she provides exercises that are tailored to the patient's needs, lifestyle, and experiences. An example of this includes a therapy in which she introduces music (sometimes using specific notes on a piano), infiltrates environmental noises, and asks the patient to perform and actively listen to a variety of phonemic exercises. One of the more popular types of AR that has been increasing in visibility is the LACE (Listening and Communication Enhancement) program. LACE is a computer-based software that allows patients to complete the training at home on their own time. As a way to increase participation, some clinics have chosen to include the LACE program as part of a complete hearing rehabilitation package bundled into the cost of the hearing aids and service. Some clinics will offer the program as an additional option to purchase. The advantage of incorporating the LACE into your program is that it helps reinforce the notion that the rehabilitation process consists of several components. The hearing aid serves as the tool to provide access to sound, and AR is the exercise used with the tool to maximize auditory processing. Offering LACE as part of the program eliminates the need for patients to "choose" to participate, and it simply becomes part of the process. Patients can be registered for LACE at the time of the hearing aid evaluation or at the time of the fitting. Getting registered is the first step toward participation. The actual sessions can then be initiated either at the time of the fitting or several weeks after they have worn their hearing aids. The program should be monitored to ensure follow-through. Audiologists, assistants, or staff can conduct follow-up calls to the patient. Progress can also be tracked online, allowing for continued contact with patients regarding their training at follow-up appointments. This also provides an opportunity to provide reminders to continue or start sessions. Some clinics will offer incentives such as free batteries to complete a set amount of LACE sessions within a certain time period. There are also alternatives to LACE. Some manufacturers have developed programs that can be used in the office or at home. This includes Starkey's Hear Coach app currently available for use on Mac-supported devices, including iPhones/iPads, and is also available on Android-supported technologies. This may be a great option for your more technologically savvy clients and will give them the opportunity to complete their AR on the go. As discussed, the importance of incorporating AR into our daily practice is evident, and there are ways to make it more cost-effective. AR can be used in any clinic environment with delegation and practice, and we should all be making an attempt to incorporate this service to maximize our patient's success. Not every patient may be inclined to participate in AR, but at the very

125 least our patients should be counseled regarding the important role it plays in their success, and it should be provided as an option. The treatment phasealso addresses several broad areas of redemption: (1) Psychosocial counselingis provided, dealing with such factors as explaining the nature of the hearing loss, helping the patient and her family understand its ramifications, and dealing with the patient's attitudes regarding aural rehabilitation. Of course, audiological counseling should not meander into the realm of psychotherapy, the need for which should be handled by appropriate referrals. (2) Amplification and other instruments are a major component of the intervention process. These instruments include hearing aids, group amplification devices, and other assistive listening and warning devices. The instruments must be selected and fitted, and must also be adjusted over time. Theaudiologist also orients and instructs the patient (and often others as well) regarding the use and care of each device, its use in various situations, coordination with other devices, etc. (3) Communication traininginvolves learning strategies to improve communicativesituations and listening effectiveness,as well as developing skills through auditory-visualtraining, and other activities. (4) The overall coordinationphase of the program deals with making useof other professionals and resources that are appropriatein a given case, such as vocational rehabilitation,social work, psychology, medicine, etc. 3.5 Use And Availability of Social Media For Sign Language Users Sign Languages (SL) are necessary for the intellectual development of Deaf children. They are complete linguistic system used by the Deaf Culture for education, communication, creation and dissemination of knowledge. Arbitrarily forbidden for more than 100 years, the lack of SL artifacts is now a major problem the Deaf: there are few loci where they can interact in their own language (i.e. there are few media in SL). The recent growth in social media (virtual applications that allow the user to create and share their own content) has provided a new vector for the use of SL (whether in real time, or separated in space and time) and value SL as a Language of culture, identity and inclusion. The research surveyed Deaf students of a Bachelors program in Linguistics and shows that social media has become a new Agora for the Deaf Culture. Social

126 Media and the Deaf Bishop, Taylor and Froy, discussed the potential of computer- mediated communication to reduce the social isolation experienced by the Deaf, and found that the subjects demonstrated that the use of social media could be less stressful. Barak and Sadovsky showed that the use of social media brought extra benefits for the Deaf because it is a means of communication that is primarily based on visual and images, and not on the auditory channels; and that the Deaf were more prone to use social media, and concluded that the use of social media may be seen as an empowering aid. Other studies treated the Deaf as deficient, such as that conducted a study on the implications of communication as social engagement for interactions between Deaf and non-Deaf people. Donovan, examined the online health information seeking practices of the Deaf using existing tools based on the oral language, which mirrors the findings of Zazove et al., that the use of Internet was associated with the English language. Lomick and Blogg found that Deaf people relied more on blogs and vlogs as important communication tools during a social movement activisms at a school for Deaf. As can be seen, most of these studies treat deafness as a disease to be hidden from others. We find in Möbus one of the few studies that are concerned about the use of SL to make digital content accessible. Valentine and Skelton explore how the Deaf are using the Internet to communicate within their community given a new space and boost to their activities. And Blom et al. explores ways in which Deaf people find online friends. This is a clear call for further research on the informational and communication practices of the Deaf using SL in social media. Language and communication with people are paramount to create understanding and appreciation for diverse cultures and perspectives. Traditional social venues such as school, clubs, associations and church, for example, provide opportunities for important human interaction and socialization. In the digital environment, individuals are capable of finding those who share the same linguistic codes, like SL, and thus are exposed to learning, exchange of experiences, diversity of information whereas otherwise they might be isolated (e.g. consider the case of a Deaf individual living in rural areas). The Deaf may also find others who use the written form of the oral language, and try to expand their inclusion into that world, and increase their social life. Most social media studies show that the value of using social media is that it builds relationships through making new friends that participate in social communities. Social media use also allows for members to support one another. As such, the use of social media is related to social capital gains. Putnam, describes Social Capital as the "features of social organizations such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit". Social capital can

127 be expressed when the ties refer to emotionally supportive relations. In other words, social capital is what is acquired through relations among people who trust one another, who are more inclined to share personal experiences and help their peers, count on the collaboration of others, reduce conflicts. Social media interaction can increase self esteem through conflict resolution; and can reduce uncertainty and suspicion of others. For example, the use of social media makes individuals feel happier. Many research has shown that social media is more interactive (than traditional media such as television): they allow for interactions with various people who regardless of political, socio- economic and geographical barriers. Unfortunately, most social media available are designed for non-Deaf people (i.e. heavily relied on text). But social media that provide the ability for the user to post video and to make video calls present a new opportunity for the Deaf. Given that social interaction and communication provide social support and sense of belonging, it is valid to research how the Deaf are using these new social media for their well-being. The D/deaf and users of British Sign Language (BSL) have a very strong culture which includes attitudes, behaviours, history and norms. Since 2003, BSL has been recognised as a language in its own right and is often, the preferred language of D/deaf people in the UK. The D/deaf do not consider themselves to be disabled, just different from those who can hear. One advantage is that groups are very easy to set up, and it has become a platform to promote activities such as information and learning. Social media also has the ability to connect both local and national groups, and when sites such as Facebook first became popular, it allowed for BSL users to be able to communicate instantly with hearing friends, family and groups online. There are a large range of D/deaf groups and the Deaf Opinions Group is a particularly popular group, and the brain child of Angel Walford. Angel is a freelance support worker, who set up the group on Facebook to help people obtain easy access to information people often asked her about. It's this type of group that provides the function of a D/deaf club on a very large scale. The only snag with social media is that users of BSL have experienced difficulties in fully engaging, due to the fact that English is not their first language. Status updates are written in English text and BSL has its own grammatical structure This has led to BSL users posting their updates in the form of video. Online activity means that deaf organizations such as the British Deaf Association (BDA) have been required to adapt. David Buxton who is the Director of Campaigns and Communications

128 said ''The BDA produces a large amount of video in BSL for posting on Facebook. This means D/deaf people do not have to rely on written statements or stories which they sometimes find difficult to follow." One concern is that Facebook's popularity amongst the D/deaf and BSL users could lead to more D/deaf clubs within the community closing, and fewer opportunities for people to physically meet and sign with each other face-to-face. However, most D/deaf people feel the benefits outweigh the negatives. Communicative Approaches Several communication approaches and techniques are available for use by the hearing impaired and deaf. Because the means of communication cannot be separated from the overall habilitation and education of this population, the choice of which communication method will be used is a central issue in the education of the hearing impaired and deaf. Audiologists have a responsibility to inform parents about the approaches available for their children. However, we must remember that we share this responsibility with other professionals such as educators of the deaf and speech-language pathologists, and that the final placement decision rests with the child's parents. In fact, even though the JCIH (2013) guidelines highlight the importance of listening and spokenlanguage, they make it clear that language means "all spoken and signed languages" (p. e1325); thus, families may choose American Sign Language (ASL) as the preferred communication mode, and services in these cases should be provided by people who are fully competent in ASL. Manual Systems American Sign Language (ASL) developed as the manual language of the deaf community. It is not a "translation" of the English language into a set of equivalent signs, but is rather a language unto itself with its own lexicon and grammatical rules. This concept can be difficult for hearing individuals to understand even if they have learned to speak a foreign language like Spanish or German, either of which is a spoken language. In contrast to spokenlanguages, which are suited to transmission via sound (acoustic spectra that change with time), ASL uses spatial dimensions (hand shakes, movements, and locations and orientations relative to the signer's body) over time. Signed English (Bornstein 1974) is similar in many ways to ASL, with modificationsintended for use by younger children, suchas the addition of signed pronouns, helping verbs,and syntactic markers. A variety of other signing systems have

129 been developed over the years that have attempted to represent the spoken language manually; however, these have not received the wide acceptance enjoyed by ASL. Fingerspelling involves hand positions and motions corresponding to the conventional 26 letters of the alphabet. Words are spelled out with letters in order. Fingerspelling is employed by users of both oral/aural and manual systems. Cued speech (Cornett 1967) is a visual system used to supplement lipreading. It uses a total of 12 hand postures and positions produced by the talker while speaking to help the speechreader distinguish between homophonous sounds. Total communication encourages the combined use of both speech and/or sign language in whatever combination fosters the child's best language development (Jordan, Gustason, & Rosen 1979). This approach has replaced oralism as the principal means of communication in most educational institutions for the hearing impaired. The relative advantages of oral versus total communication programs for the speech communication abilities of profoundly hearing-impaired children have always been controversial. Studies comparing the effects of these two types of settings have yielded conflicting results. One reason for the inconsistencies involves comparisons among elementary school children whose communicative skills are still being developed.Geers and Moog (1992) improved our understanding of this issue by comparing two large, well-matched groups of teenagers with profound hearing impairments who were educated in either oral versus total communication programs since they were in preschool. They found that speech perception, speech production, and oral communication skills were significantly better for the subjects who were educated in oral programs. Todomais a manual system employed by individuals who are both deaf and blind. In the Todoma method, the "listener" feels the talker's face and neck. Reed and colleagues (1985) found that speech reception by Todoma relies principally on the feel of lip and jaw movements, laryngeal vibration, and oral air flow, and secondarily on the feel of muscle tension and nasal air flow. 3.6 Orientation to Web based Curriculum Based Measurement (CBM) Tools. Curriculum-based measurement, or CBM, is a method of monitoring student educational progress through direct assessment of academic skills. CBM can be used to

130 measure basic skills in reading, mathematics, spelling, and written expression. It can also be used to monitor readiness skills. When using CBM, the instructor gives the student brief, timed samples, or "probes," made up of academic material taken from the child's school curriculum. Curriculum-Based Measurement (CBM) is a method teachers use to find out how students are progressing in basic academic areas such as math, reading, writing, and spelling. CBM can be helpful to parents because it provides current, week-by-week information on the progress their children are making. When your child's teacher uses CBM, he or she finds out how well your child is progressing in learning the content for the academic year. CBM also monitors the success of the instruction your child is receiving – if your child's performance is not meeting expectations, the teacher then changes the way of teaching your child to try to find the type and amount of instruction your child needs to make sufficient progress toward meeting the academic goals. When CBM is used, each child is tested briefly each week. The tests generally last from 1 to 5 minutes. The teacher counts the number of correct and incorrect responses made in the time allotted to find the child's score. For example, in reading, the child may be asked to read aloud for one minute. Each child's scores are recorded on a graph and compared to the expected performance on the content for that year. The graph allows the teacher, and you, to see quickly how the child's performance compares to expectations. (The figure below is an example of what a CBM graph looks like.) After the scores are entered on the graphs, the teacher decides whether to continue instruction in the same way, or to change it. A change is called for if the child's rate of learning progress is lower than is needed to meet the goal for the year. The teacher can change instruction in any of several ways. For example, he or she might increase instructional time, change a teaching technique or way of presenting the material, or change a grouping arrangement (for example, individual instruction instead of small-group instruction). After the change, you — and the teacher — can see from the weekly scores on the graph whether the change is helping your child. If it is not, then the teacher can try another change in instruction, and its success will be tracked through the weekly measurements. CBM can also help you work more effectively with the school system on your child's behalf. CBM graphs make the goals, and your child's progress, clear to you and to the

131 teacher. In this way, CBM can help parents and teachers communicate more constructively. In contrast to norm-referenced academic achievement tests, CBM offers distinct advantages. Using CBM, an instructor can quickly determine the average academic performance of a classroom. By comparing a given child's CBM performance in basic skill areas to these classroom, or local, norms, the teacher can then better judge whether that child's school-skills are significantly delayed in relation to those of classmates. CBM has other benefits as well: Good overlap with curriculum Because CBM probes are made up of materials taken from the local curriculum, there is an appropriate overlap between classroom instruction and the testing materials used. In effect, CBM allows the teacher to better test what is being taught. Quick to administer CBM probes are quick to administer. For example, to obtain a single CBM reading fluency measure, the instructor asks the student to read aloud for 3 minutes. CBM measures in math, writing, and spelling are also quite brief. Can be given often CBM probes can be given repeatedly in a short span of time. In fact, CBM probes can be given frequently, even daily if desired. The resulting information can then be graphed to demonstrate student progress. Sensitive to short-term gain in academic skills Unlike many norm-referenced tests, CBM has been found to be sensitive to short-term student gains. In fact, CBM is so useful a measure of student academic progress that teachers employing it can often determine in as short a span as several weeks whether a student is making appropriate gains in school skills. Q: What effect does CBM have on academic progress? A: Instructors are faced with a central problem: they cannot predict with complete assurance that a particular instructional intervention will be effective with a selected student. The truth is that only through careful observation and data gathering can teachers know if a child's educational program is really effective. Much of the power of CBM, therefore, seems to lie in its ability to predict in a short time whether an intervention is working or needs to be altered. By monitoring students on a regular basis using CBM the teacher can quickly shift away from educational programming that is not found to be sufficiently effective in increasing a child's rate of learning. In fact, research has shown that teachers who use CBM to monitor the effectiveness of instructional interventions tend to achieve significantly higher rates of student learning than those instructors who rely on more traditional test measures.

132 3.7 Tele Captioning of Popular Media And Its Role in Literacy Development Hearing aids are devices that boost sound levels so the patient canhear them. This process is called amplification. Most simply, a hearing aid amplifies sounds justlike a megaphone, except the amplified sound is directed right into the listener's ear. The hearing aid's microphonepicks up sounds and converts them into an electrical signal. A device that transforms energy from one form to another is called a transducer. Thus, the microphone is an acoustic-to-electrical transducer.Once the sound has been changed into an electrical signal it can be manipulated by electronic circuits. Obviously, the principal manipulation is to boost its intensity, that is, to amplify it. This is done by the amplifier. The amplified electrical signal is then converted back into sound by an electrical-to-acoustic transducer or loudspeaker. The hearing aid's loudspeaker is called the receiver. The amplified sound from the receiver is directed into the patient's ear. Two other components of all hearing aids should be mentioned at this time. One is the battery, which provides the power to accomplish all of the hearing aid's functions. The other is the earmould, which is the object actually inserted into the patient's ear. In fact, the majority of modern hearing aids are completely contained within the earmould itself. Earmouldsare almost always custom-made from an impression taken of the ear. The sounds picked up by the microphone are called the input to the hearing aid and the sounds produced by the receiver are called the output. The patient hears the output from the hearing aid. The amount of amplification is called gain. Any hearing aid has a range of gains that it can generate, and the patient has some degree of control over this gain by using a volume control(more technically called a gain control), just like the volume control of a radio. The sound level of a hearing aid's output cannot be limitless. The greatest sound magnitude that canbe produced by a hearing aid is quite descriptively called its maximum power output (MPO) or outputsound pressure level (OSPL). Itrefers to the output of the hearing aid in dB SPL when the hearing aid is saturated. In fact, OSPL used to be called saturationsound pressure level (SSPL). Two more commonly encountered hearing aidcomponents are worthy of mention. One of theseis the tone control. It adds flexibility to the instrumentby adjusting the relative levels of the higherand lower frequencies much like the bass and trebleon a stereo set. The telecoilis a circuit that allows the hearing aid to pick up magnetic signals generated by many telephone receivers instead of using the microphone. Telecoils are 133 associated with a switch labeled "M/T"or "M/T/MT," allowing the patient to select between using the hearing aid's microphone (M) in the normal manner, using the telecoil(T) while bypassing the microphone, or in some cases using the microphone and telecoil simultaneously (MT). The telecoilallows the patient to hear the telephone signal withoutinterference from noises in the room, and/or to attend to a telephone conversation that would not be possible using the microphone. The MT position might be selected when the patient desires to hear the phone clearly but also needs to hear what is going on around her, or when she needs her hearing aid to monitor her own voice while speaking on the phone. TYPES OF HEARING AIDS Body hearing aidscontain all of their components and controls (except for the receiver and earmold) in a case about the size of a small pocket calculator. A wire leads from the case to the receiver and earmoldat the patient's ear. The case is usually worn somewhere on the chest. Typical locations are in a chest-level pocket; clipped to a shirt, jacket, or undergarment; or in a specially made harness. Behind-the-ear (BTE)orpost-auricularinstruments have their components contained in a crescent-shaped plastic case that fits behind the auricle. The amplified sound produced by the receiver, which is located in the case ofthe instrument, is transmitted via a plastic tube to an earmold in the patient's ear. Receiver-in-the-canal (RIC) hearing aid is a noteworthy modification of the BTE arrangement in which the receiver is located inside of the patient's ear canal, and is connected to the body of the instrument by a tiny wire. The more powerful models of BTE instruments rival the amounts of gain that could only be provided by body aids in the past, although many patients with very severe and profound losses still require body instruments. Eyeglass hearing aids have their components built into the temple piece of the patient's glasses. Similar to BTEs, the receiver output goes through a plastic tube to an earmold in the patient's ear. These instruments have various practical problems because they are part of and inseparable from the patient's eyeglasses, and are rarely used anymore. In-the-ear (ITE) hearing aids have all of their components built into the earmold. In spite of their small size, the technology has progressed to the point that a majority of

134 patients can now be fitted with ITE-type instruments. In-the-ear hearing aids vary widely in size. The largest ones fill the whole concha and extend into the ear canal. Smaller units take up less and less of the concha, and the smallestones fit completely into the ear canal. The lattergroup constitutes a category of instruments called completely-in- the-canal (CIC)hearing aids. To be considered a CIC instrument, the outermost partof the device must be at least 1 to 2 mm inside of the ear canal entrance. Very tiny CIC instruments are sometimes called invisible in-the-canal (IIC) hearing aids. Most CICs also are deep canal fittings, meaning that the device extends into the bony part of the canal so its receiver end is within ~ 5 mm of the eardrum. (Actually, a deep canal fitting can be achieved with any kind of hearing aid as long as its earmold extends this deep into the external auditorymeatus.) Telephone Devices Hearing aid compatibility has been required for most new telephones since 1991. The simplest systems are telephones that provide amplified signals, often with a volume control. The use of special telephone amplifiers is facilitated by the common use of modular telephone connectors, which are available as special replacement handsets or as in-line amplifiers installed between the telephone and the handset. One should be sure to check for electronic compatibility with the telephone when using replacement handsets and in-line amplifiers. Several telephones specially designed for use by the hearing impaired are also available, as are various portable amplifiers. Portable amplifiers and other instruments can pick up either acoustic or magnetic signals from telephones, or are connected by direct audio input. Telecommunication devices for the deaf (TDDs)or text telephones (TTs) as well as personal computers(PCs) provide telephone access for those who cannothear amplified speech from the telephone. The TDD is basically a portable terminal that sends and receives typed messages via the telephone. The TDD and telephone are often connected using an acoustic coupler. Communication between people using voice telephones and TDDs (or computers) is made possible by dual-party relay systems, which telephone companies must provide under Public Law 101-336 (the Americans with Disabilities Act). Communication between TDDs and PCs has been somewhat of a problem because TDDs have traditionally used a system called Baudot code, whereas PCs use ASCIIcode and also operate at much faster transmission rates. As one might expect, TDDs are now available that can use both formats.

135 Television and Related Devices Closed captioning is probably one of the best known assistive approaches in current use. It involves providing subtitles on a television monitor or movie screen giving the gist of what is being said from moment to moment. Although closed captioning previously necessitated the use of a decoder box, Public Law 101-431 (the Television Decoder Circuitry Act of 1990) mandates that closed caption decoders be built into all new television sets with screens 13 inches in size and larger. Real-time captioninginvolves providing the detailed text of what is being said, and is often desirable for lectures and similar situations. Alerting and Safety Aides Many hearing-impaired individuals cannot rely upon the auditory channel to know when the doorbell is ringing, when the alarm clock sounds, or when emergency signals like smoke or burglar alarms go off. For this reason, sound signals like bells, tones, buzzers, and sirens are supplemented or replaced with flashing lights and/or vibrators on all kinds of common devices. In addition, special-purpose devices are alsoavailable, such as lights or vibrators that indicatewhen a call is coming in on a telecommunication device, or when the baby is crying. Before leaving this section, we must not forget that hearing dogs can serve as portable alerting and assistive aides, as well as valued and loved companions, to their severely hearing-impaired or deaf owners. The right of hearing-impaired persons to have and be accompanied by their hearing dogs is protected by several federal laws, such as the AirCarrier Access Act of 1986 for airlines, the Americanswith Disabilities Act of 1990 for public places, and the Federal Fair Housing Amendments Act of 1988 for housing. Auditory and Visual Training One of our principal goals is to maximize the amount and quality of speech information that the hearing impaired patient can obtain. This involves (1) providing an optimum acoustical signal with hearing aids or other devices, and (2) training the patient to derive the most information about the spoken message from what he hears and sees by using the acoustical and visual representations of speech to the fullest, and taking advantage of various forms of contextual and linguistic cues. Even though we will be considering some aspects of speechreading and auditory training separately, the student should know from the outset that combined auditory-visual training is usually the

136 preferred treatment mode. Also, virtually all practice exercises can be done in the auditory, visual, or combined audiovisual mode. In fact, it is not uncommon to present exercises in all three modes to demonstrate to the patient the benefits of using all possiblecommunication channels, and to give him practice indoing so. In addition, most techniques are successfully used in both individual and group therapy. Continuous-discourse tracking (De Filippo & Scott 1978) is a popular therapy technique that provides practice in the use of repair strategies. The clinician orally presents a passage to the patient, who must in turn repeat it back verbatim on an ongoing basis (based on vision, audition, or a combination of the two). Thus, the patient literally tracks what the clinician is saying: the clinician says a phrase, the patient repeats it word for word, the clinician presents the next phrase, the patient says it back exactly, etc. This continues until the patient makes an error. Then the clinician provides the patient with a variety of clues and prompts to help her get the correct word(s). The prompts might include repeating the misperceived word, paraphrasing it, using fill-ins, or any of a host of other tactics to help the patient get the correct word. Tracking performance is assessed in terms of the number of words per minute that can be repeated by the patient. Computer-based approaches A growing number of computer-based auditory training programs are becoming available. Let's briefly review several of them. The Seeing and Hearing Speech (Sensimetrics2002) program provides practice (and assessment) materials for adult patients in four groups: (1) vowels; (2) consonants; (3) stress, intonation, and length; and (4) everyday communication. The material can be presented in the auditory, visual, or combined auditory-visual mode, and a variety of noise backgrounds may be used. Sound and Beyond includes auditory training materials for adults with severe to profound losses. It includes exercises on pitch discrimination; environmental sound discrimination and identification; discriminating male and female voices; discrimination and identification for vowels and consonants; word discrimination; sentence recognition; and identifying musical instruments and tunes. Adaptive Listening and Communication Enhancement (LACE; Sweetow&Sabes 2006) providesauditory training for adults. It includes speechreception exercises in the presence of babble or acompeting talker, and for compressed speech; auditoryshort- term memory and processing speedexercises; and communication strategies. In LACE, the patient receives feedback on his responses, and the approach is adaptive in the

137 sense that exercises increase and decrease in difficulty based on whether the patient's prior responses were correct. Conversation Made Easy (Tye-Murray 2002) is a computer-based speechreading program that can be used in the vision- only or combined auditory-visual mode; and has versions for adults and teenagers, as well as for children with higher- level and lower- level language skills. It includes speechreading exercises involving (1) analytic exercises with sounds, words, and phrases; (2) unrelated sentence recognition with repair strategies; and (3) contextually related material with both repair and facilitative strategies. Computer-based approaches A growing number of computer-based auditory training programs are becoming available. Let's briefly review several of them. The Seeing and Hearing Speech (Sensimetrics2002) program provides practice (and assessment)materials for adult patients in four groups: (1) vowels; (2) consonants; (3) stress, intonation, and length; and (4) everyday communication. The material can be presented in the auditory, visual, or combined auditory-visual mode, and a variety of noise backgrounds may be used. Sound and Beyond includes auditory training materials for adults with severe to profound losses. It includes exercises on pitch discrimination; environmental sound discrimination and identification; discriminating male and female voices; discrimination and identification forvowels and consonants; word discrimination; sentence recognition; and identifying musical instruments and tunes. Adaptive Listening and Communication Enhancement (LACE; Sweetow&Sabes 2006) providesauditory training for adults. It includes speechreception exercises in the presence of babble or acompeting talker, and for compressed speech; auditoryshort- term memory and processing speedexercises; and communication strategies. In LACE,the patient receives feedback on his responses, andthe approach is adaptive in the sense that exercisesincrease and decrease in difficulty based on whetherthe patient's prior responses were correct. Conversation Made Easy (Tye-Murray 2002) is a computer-based speechreading program that can be used in the vision-only or combined auditory-visual mode; and has versions for adults and teenagers, as well as for children with higher-level and lower- level language skills. It includes speechreading exercises involving (1) analytic exercises with sounds, words,and phrases; (2) unrelated sentence recognition with repair strategies; and (3) contextually related material with both repair and facilitative strategies.

138 3.8 Let us sum up The terms assistive device or assistive technology can refer to any device that helps a person with hearing loss or a voice, speech, or language disorder to communicate. These terms often refer to devices that help a person to hear and understand what is being said more clearly or to express thoughts more easily. With the development of digital and wireless technologies, more and more devices are becoming available to help people with hearing, voice, speech, and language disorders communicate more meaningfully and participate more fully in their daily lives. 3.9 Unit end Exercises 1. Write an essay on Assistive technologies. 2. How sign language is used as the substitute for spoken language in persons with hearing impairment ? 3.10 Reference 1. Curriculum-Based Measurement: A Manual for Teachers Jim Wright Syracuse (NY) City Schools 2. Dillon, H. (2001) .Hearing Aids. Boomerang press. 3. Gelfand, S. A. (1997).Essentials of Audiology. Thieme Medical Publisher. 4. Katz, Z.(2009). Hand Book of Clinical Audiology. Library of Congress Cataloging- in-Publication Data. 5. Pollack , M. C.(1988). Amplification for The Hearing-Impaired. Harcourt Brace Jovanovich, publishers. 6. The New Agora: Social Media as a Vector for Sign Language as a Language of Culture, Identity and Inclusion of the Deaf, Proceedings of the 51st Hawaii International Conference on System Sciences

139 Unit 4 ❏ Technology & Methods in Management of Speech Structure: 4.1 Introduction 4.2 Objective 4.3 Parameters measured in phonation and suprasegmental aspects of speech using advance technology and their application 4.3.1 Procedures & Software used to assess Phonation and Suprasegments 4.4 Need and methods to analyse and to correct articulation of speech 4.4.1 Need for Assessment 4.4.2 Screening procedures 4.4.3 Assessment battery for Articulation / Phonological Disorders 4.4.4 Formal traditional articulation tests 4.4.5 Combined Articulation and Phonological tests 4.4.6 Phonological tests 4.4.7 Assessment of Stimulability 4.4.8 Assessing Speech Intelligibility 4.5 Selecting management techniques for Phonation and Suprasegmental aspects of Speech 4.5.1 Techniques for management of Phonation 4.5.2 Techniques for managing Suprasegments (Stress, Intonation & Rhythm) 4.6 Selecting management methods for facilitating articulation in CWHI 4.6.1 Need for treatment 4.6.2 Selection of Intervention approach (Phonetic Or Perception) 4.7 Methods to improve Speech Intelligibility; Measurement of Outcome. 4.7.1 General considerations

140 4.7.2 Approaches for Improving Intelligibility 4.7.3 Measurement of speech intelligibility. 4.8 Let us sum up 4.9 Unit end exercises 3.10 Reference 4.1 Introduction Phonation: Sounds produced from the vocal folds are called phonation. It is a physical process by which the sound is produced. The measurement of sound signal as produced by the vocal folds is important in order to identify the underlying physiological deficit of voice. This measurement can be done by 3 ways: ● Perceptual measurement ● Acoustic measurement ● Aerodynamic measurement However there has been little standardization in measurement across laboratories. Some centers have developed their own equipment configuration for extracting acoustic information from vocal signal. Even when using the same equipment, center often differ in the way in which a portion of the vocal signal is selected for analysis. These methods provide objective data relative to a set of normal values. There is a large number of acoustic measures many which are mathematical derivation of five common features. These measures are: 1. Fundamental frequency-perceptual correlates of pitch 2. Intensity-perceptual correlates of loudness 3. Perturbation measures-cycle to cycle variation in the acoustic signal for either frequency or amplitude of the wave form. 4. SNR-Relative contribution of periodic and a periodic component of the signal.

141 Suprasegmental aspects: In linguistics, prosody refers to intonation, rhythm, and vocal stress in speech. The prosodic features of a unit of speech whether a syllable, word, phrase or clause are called suprasegmental features because they affect all the segments of the unit. ● Stress:
Stress is the degree of loudness with which a syllable is spoken as to make it prominent. Loudness is a component of prominence. If one syllable is spoken louder than the others, it will be heard as stressed syllable. ●
Pitch:
It is some degree of highness or lowness of tone in each syllable of a word. ●
Intonation: The pattern of rises and falls in pitch across a stretch of speech such as a sentence
is intonation. In other words,
the going up and down of pitch over different syllables in an utterance is called

as intonation ● Rhythm: It is the sense of movement in speech, marked by the stress, timing and quantity of syllables. It shows the recurring alternation of strong and weak elements in the flow of sound and silence in sentences or lines of verse. 4.2 Objectives ● To understand concepts of Phonation , Suprasegments, Articulation/Phonology ● To understand methods of evaluating Phonation &Suprasegments ● To understand how to evaluate Articulation/Phonological errors in Speech ● To understand concepts & management strategies for Phonation/Voice &Suprasegments ● To understand concepts & management strategies for Articulation/phonological errors. 4.3 Parameters measured in phonation and suprasegmental aspects of speech using advance technology and their application There have been various advanced technologies introduced to assess these suprasegmental aspects and the phonation using digital processing signals system (DSP).

142 Some of the instruments used for this purpose are as follows: MDVP, VAGHMI, SSL, CSL, DR.SPEECH, LTAS, PELSA, VISI PITCH, CAFET, PEPPER, PORTA, SALT 1. Dr. Speech: It is a voice activated software device. It is a game like tool to provide real time reinforcement of a clients' attempts to produce in pitch, loudness, voiced/unvoiced phonation, voicing onset and MPD. Vocal assessment: it allows the user to record analyzes and display the acoustic and EGG signal in real time. The programme will automatically compute statistical information and plot a voice a profile from a sustained vowel. Capturing the subject's video image and recording progress from one session to another session can be easily obtained. Vocal assessment provides an objective, non invasive, measures from acoustic and EGG signals &comparison can be made with a normative data base. Based on the comparison preliminary vocal function, harshness, regularity of vocal fold vibration and glottal closure time. 2. Multi Dimensional Voice Profile (Mdvp): This is software from Kay-electronics New Jersey. Voice analysis is best accomplished by an organized protocol of perceptual evaluation, aerodynamic analysis, and electrographic analysis. MDVP is part of the acoustic analysis. MDVP and CSL can be used effectively for perceptual analysis by storing samples of the patient's voice (usually sustained & read passage) and critically listening to these stored voice samples juxtaposed with past visits to help hear changes in the voice. MDVP provides a robust multidimensional analysis of voice with graphical and numerical presentation of analysis result.MDVP is the leading programme for voice analysis in use around the world and is commonly cited in the profession literature. MDVP is delivered with two versions a basic and an advanced. The advanced version is intended for use by skilled users who requires more flexibility and power in their analyzer. MDVP PARAMETERS ✓ Amplitude perturbation quotient (APQ)

143 ✓ Amplitude tremor intensity index (ATRI) ✓ Degree of sub harmonics (DSH) ✓ Degree of voice less (DUV) ✓ Degree of voice breaks (DVB) ✓ Amplitude tremor frequency(FATR) ✓ Fo- tremor frequency(FFTR) ✓ Jitter percent(jitt) ✓ Noise to harmonic ratio(NHR) ✓ Number of sub harmonics(NSH) ✓ Number of un voice segments(NUV) ✓ Number of voice breaks(NVB) ✓ Pitch periods(PER) ✓ Phonation fundamental frequency range (PFR) ✓ Pitch perturbation quotient (PPQ) ✓ Highest fundamental frequency (Fhi) ✓ Lowest fundamental frequency (Flo) ✓ Average fundamental frequency (Fo) ✓ Frequency tremor intensity index (FTRI) ✓ Absolute jitter (jita) ✓ Relative average perturbation (RAP) ✓ Smoothed amplitude perturbation quotient (SAPQ) ✓ Total no. of segments(SEG) ✓ Shimmer in dB(shdB) ✓ Shimmer %(shimm) ✓ Soft phonation index (SPI0): ✓ Smoothed pitch period perturbation (SPPQ)

144 ✓ Standard deviation of the Fo (STD) ✓ Average pitch period (To) ✓ Tsam:. ✓ Peak amplitude variation (VAM) ✓ Fundamental frequency variation (VFo) ✓ Voice turbulence index(VTI): Real analysis: it provides real time visual and auditory feedback of acoustic performance of speakers during speech. Phonetogram: it displays the dynamic range of the human voice in terms of both Fo and Io. Speech therapy: it can be used for both assessment and therapy It provides a real time reinforcement when client attempts to produce change in pitch, loudness, MPD etc 3) VAGHMI This system is used for the diagnostic, therapeutic and research in the speech and hearing field.It consists of ● Voice analysis -Fo and intensity -jitter and shimmer -LTAS ● Physiologic measurements -inverse filtering -mark glottal wave -EGG marking ● Speech analysis -dis fluency analysis -listen and mark

145 These measurements can be ONLINE OFFLINE ONLINE MEASUREMENTS: The subjectsspeaks in the microphone and immediately the results are displayed, it consists of: MPD, S/Z RATIO, SUBGLOTTAL PRESSURE, NASALANCE AND TONAR, DDK. OFFLINE MEASUREMENTS: There are four stages in off line measurements: - preparation of sample file - Analysis - calculation for statistical saving - Recall of saved statistics Offline measurements include= acoustic analysis and physiologic measurements, nasalance module It also has a Therapy module which is a sophisticated software tool that converts a personal computer to therapy equipment relating to voice and speech disorders, it has two groups,1) articulation therapy,2) voice therapy ● Articulation therapy: consist of programme for vocal tract profile indicating articulators positioning, viewing speech signal waveform, spectrum training, production of vowels, nasals, fricatives, plosives, and for dis fluent speech for stutters ● Voice therapy: consist of programmes for respiratory laryngeal and nasality controle that determine voice quality. This software incorporates various games, puzzles, with colour visuals. The performance are scored and reinforcement message appears on the screen.This software is easy to operate and user friendly 3) SSL (Speech Science Lab) Speech science lab was first introduced in 1992. It is a comprehensive software package especially for speech science research. It consists of a wide range of tools for graphic visualization of signals and spectra, analysis, and synthesis and display and editing the parameters. Modules of SSL are……

146 a) Wave spectrum b) VSS spectrograph c) ACOPHONE I& ACOPHONE II d) ARTACO e) Utilities f) Record and play a) Wave spectrum: this module provides a programme to study temporal and spectral properties of signals. Iit has signal display and manipulation Signal display:uses ● to compare wave forms ● spectra and auto correleation function of 2 signals ● to measure duration of segments ● to measure manually the Fo formants and levels ● to measure temporal and spectral properties of speech sounds ● for preparation of stimuli based on signal editing for speech perception experiments ● for segmenting speech sidnal to create the data base ● signal manipulation : to scale, to pre emphasis, & to add filters etc b) VSS Spectrograph(voice and speech system spectrograph) This module provides programme to generate 1 or 2 channel spectrogramme(NB,WB,VERY WIDE BAND). They can be displayed in a variety of option ,this VSS spectrograph can be used to ● compare original and coded synthesized speech utterance ● compare speech segments across different speakers ● rates of speaking and context ● measures formant frequency and Fo ● measures the duration of the segments

147 ● validate analysed formant data and Fo c) ACOPHONE I: acoustic phonetic I provides programmes for analysis editing and synthesis based on the principle of uniform frame rate coding. It can be used to ● acoustic phonetic studies ● research in speech production and perception ● studies on voice sources and intonation ● development of voice mail ● fixed vocabulary voice response system. There are sub module a. VSLP: voice source excited linear prediction b. FBAS: formant based analysis synthesis ACOPHONE II: it provides programme for interactive analysis synthesis and editing. It implements cascaded hybrid and parallel formant filter module. Application are: ● to develop a text to speech synthesis system ● detailed and accurate analysis of microphonetic events ● preparation of stimuli for perception d) ARATACO(Articulatory acoustic of vowels): it provides a program to calculate formant frequency and bandwidth for user defined Articulatory shape or vocal tract function of vowel sounds . This module is useful to steady speech production of vowel quality. Articulatory parameters and vocal tract area function for a given reference vowel can also be determined interactively. e) Utilities: this provides programmed to print and edit speech data file to create and print leader file , to print parameters result file to initialize variables to create batch file etc it prints on screen the sampled values of a signal file and save the sampled values and also to save the contents of binary result f) Record and play: this module provides programme to record and play one signal for vss data acquisition hard ware. This is specific to vssdata acquisition hard ware. 4) Aniwax computer speech system

148 It is a hard ware/soft ware voice input/output packages that enhance speech communication skills and understanding, including pitch rate, intensity, resonance, phonation, articulation, accent removal and auditory training. The module converts voice into real time , animated graphics for user matching and assessments. 5) CAFET: it is a cognitive behavioral approach to fluency/stuttering therapy. It integrates the feed back from the phonatory and respiratory function. Visual biofeedback and real-time message on the computer screen measure programmes and print out breathing and voicing errors. The result are recorded on the disk or printing and analysis ,itincludes,internal circuit board, respiratory transducer, respiratory sensor and microphone. 6) IBM personnel system / 2 speech viewer : it is a professional clinical tool that addresses a key element in speech therapy the feedback process. Bold animated display and audio play back refine and simplify the process by focusing on the speech signal and by making feed back information that clear and meaningful. 7) Nasometer: measures the ratio of acoustic energy from the nasal and oral cavities. As the client speaks micropne collects the data, which is translated into oral/nasal ratio and displayed on the screen. The softwares calculates statistical information for display.it consist of an I/P device (2 directional microphone and a nasal-oral separator . analysis circuit which utilizes, IBM pc and software. The nasometer is useful in evaluating clients and in therapy for providing feedback. 8) Parrot easy language sample analysis (PELSA): PELSA is designed for a grammatical analysis of a language sample. The user types and translates a language sample up to 100 utterances. The computer analysis percentage correct of specific demonstration locatives, pronouns, conjunction, articles, preposition, possessives, comparatives, superlatives, past and present tense markers. The use is provided with a list of auxillary, verb infinite, past tense, and present progressive verb forms. There is a table of the percentage correct no. of affirmative, no. of utterance, and MLU. The other feature includes sample editing and print out of result. 9) PEPPER (programmes to examine phonetic and phonologic evaluation record): it is a series of speech analysis programmes desiged to examine, phonetic, phonologic, prosodic aspects of normal and disorderd speech. Speech transcripts can be entered using IPA or more narrow phonetic transcription system for single or multiple samples.

149 10) SALT (systematic analysis of language transcripts) Is an language analysis tool with coding and analysis option to specific need. SALT perform 50 analysis of language samples with coding and analysis option to meet specific needs. The flexible coding and editing including complete and incomplete utterances total root wprds,pauses and morpheme analysis. SALT can be directed to find symbols, words or combination of items before after with any other items. 11) Port a voice speech system: It's a augmentative communication speech system that includes a battery operated computer , speech synthesizer and soft ware. Port a voice is used by locating a words or phrases with in lists, making a vocabulary list and typing words the user wishes to speak. 12) Computerized speech science lab (CSL): model 4300 and 4400 is the latest one. This is a CSL hardware/software package for the acquisition, analysis, display, playback and storage of speech signal. Analysis format includes spectrograph, pitch, intensity, and long term average spectrum. CSL 4300: is highly flexible audio processing package which is designed to provide variety of speech analysis operations. Operations are data acquisitions file, management, graphic numerical display, audio output, signal editing and variety of analysis function. CSL 4400: this can do a various analysis like pitch extraction, intonation counter, nuclear tone, IPA and these can be done for any part of the sample to be analyzed. 13) Forensic Voice Analysis ● It has been used for the purpose of voice identification & elimination since 1960s ● It has been used in a number of criminal cases of murder, rape, extortion, political corruption, money laundering, etc,. ● The basic theory is that every voice is individually characteristic and can be identified through the "voiceprint" analysis ● Type of analyses ● specifically spectrographic analysis ● aural or perceptual comparison Spectrographic analysis has been paramount in eliminating and identifying voice

150 Instruments for analysis ● Visual comparison of voice using spectrography ● A spectrogram displays speech signal frequency across time ● Vertical impressions for consonants, horizontal bars indicating formants for vowels and amplitude information through the grayness/darkness Formants are "vocal tract resonances displayed in spectrograms as broad bands of energy" Important formants in speech analysis are f1 & f2 Visual comparison involves General examination of features like time, frequency and amplitude Specific features in vowels and consonants in isolation vowels and consonants in combination Pitch, bandwidth, mean frequency, vowel formants, nasal resonance plosion, and pauses. The instrument used for spectrography should be *a professional one and * should have the facility for wide band and narrow band spectrography Aural comparison Aural comparison is carried out using special tapes of high quality • It is used to facilitate visual comparison • Features included are - resonance quality, pitch, temporal factors, inflection, dialect & breath pattern Procedural considerations ● Only original recordings of voice samples are accepted unless the original is erased and high quality copy is available ● Recordings to be played back on appropriate professional tape recorder, digital recording is not accepted ● Spectrograms to be produced on professional instrument

151 ● When necessary, enhanced tape copies are prepared and separate set of spectrograms are prepared ● Similarly pronounced words are compared between the original and the recorded voice samples, atleast 20 words are needed for comparison ● Words with distorted spectral patterns are not included ● Aural examination is to be made of each voice sample to determine similarities or dissimilarities in pronunciation (disguise, drug/alcohol use, altered psychological state, manipulation) ● An aural comparison is made by repeatedly playing the 2 voice samples on separate recorders and electronically switching back and forth between them ● The examiner has to resolve differences (if any) found between the aural and visual results by repeated comparison ● Results given as "voices similar (identification)" or "voices dissimilar (elimination)" ● Through a comparison of test sample yields decisions like – "correct acceptance", "correct rejection", "false acceptance" and/or "false rejection" Speech features to be compared ● f0 at selected locations ● amplitude of nasal consonant ● band amplitude of filtered vowels ● mean freq. of f1 & f2 separately 14) Oral output signal: the most readily available signal for acoustic analysis is the sound pressure waveform emanating from the mouth. It can be tape recorded of fed into analytical system via a microphone placed in front of the subject mouth. The usefulness of the signal obtained in this manner, however is limited. The acoustic features of the oral output signal are determined not only by the glottal sound but also by transmission characteristic of the vocal tract and lip radiation characteristic. In assessing vocal function, the glottal sound must be examined.

152 15) Glottal sound wave by inverse filtering based on a physical model The idea of inverse filtering is to obtain the glottal sound or glottal volume velocity wave form by eliminating the contribution from the vocal tract transmission and lip radiation from the oral output signal. The technique is theoretically based on the vowel production model as a linear physical system. Use of the digital computers has facilitated technical progress. However precise determination of the formant frequencies and band width for each oral output signal is tedious. In addition FM tape recorder is required because any low frequency phase distortion which inherent in regular tape recorders interferes with accurate approximation of glottal sound source. 16) Residue wave derived by the inverse filtering based on linear prediction This filtering technique is theoretically based on a mathematical model called the linear prediction model of speech production.(Atal and hanaver 1971). The inverse filtering in this case is a equivalent to a combination of the inverse characteristic of the lip radiation, vocal tract and glottal shaping spectra contribution to the oral output signal i.e. speech signal. The residue signal which is obtained by filtering the speech signal with this filter is an estimate of a periodic source signal which is theoretically an impulse train. Since it is a hypothetical input signal it is not directly related to any physically observable signal. It can be, however obtained automatically and more easily than the glottal sound wave form obtained with the physical inverse filtering technique compares the speech , glottal sound and residue signal. 17) Glottal sound wave derived by a reflection less tube (sondhi's tube) This technique employs long reflection tube which is considered to act as pseudo infinite termination of the vocal tract. When a subject produces a neutral vowel into the tube, a microphone with in the tube picks the glottal source wave form, because the reflection less termination of the tube significantly reduces the resonant characteristic of the vocal tract. This method was originally described by sondhi 1975. Under ideal condition it should be an easy, simple, quick means of obtaining the glottal source wave form. Recordings reported previously, however, were not satisfactory. 18) PM 100 pitch analyzer This device displays Fo and Io separately on a monitor that is split screen. It is used in practice for analysis a longer speech segments. Mean Fo (and SD), jitter, shimmer, and is also used as a therapy tool.

153 Advantage: it also input up to 30 min ● used as therapy tool Dis advantage: Audio output is not available ● absence of spectral analysis 19) IVANS (The interactive voice analysis system) It is a unique and innovative system for clinical voice analysis. The programme is organized for client record keeping such as entering data about client's medical history, recording voice samples, performing acoustic measurements and maintaining client's progress. The following parameters can be obtained: S/Z ratio, jitter, MPD, relative average perturbation, shimmer, amplitude perturbation quotient, glottal noise, normative noise energy, pitch amplitude, spectral flatries ratio, phonation range, dynamic range, tremor measurement, LTAS. 20) VISI pitch IV model 3950 Kay pentax has introduced visi pitch, the latest version of the most widely used clinical instrumentation tool for speech language pathologist, encompassing the many features of previous generations of this acclaimed speech therapy tool. VISI pitch provides the latest state of art high fidelity hard ware for robust data acquisition and play back and an additional software module. Now with 8 standard modules, VISI pitch can be used with virtually every type of communication disorder in both assessment and therapy task. Critical speech and voice parameters are extracted and displayed in true real time to help clients achieve therapy goals with visual feed back protocol driven assessment tasks provide clinician with valuable objective data using parameters that are well documented in the professional literature. In addition to visual feedback and analysis of important speech/voice parameters, VISI pitch IV also provide multiple auditory feed back tools that compliments the visual feedback offered by other module. Importance of speech biofeedback: VISI pitch IV extracts acoustic parameters during speech/ voice production and present these in real time, providing clients with clear intuitive visual display, using target vocalization provided by a clinician, client attempts can be directly compared both graphically and with auditory play back. Application ; voice disorders

154 Motor speech disorders Voice typing Fluency Selected articulation testing Hearing impaired speech Professional voice Accent reduction 21) Praat Is a programme for speech analysis and synthesis written by Paul Boersmaoch and David Weenick at the department of phonetics of the University of Amsterdam This programme is constantly being improved and a new build is published almost every week. The latest version was introduced on 22 February 2005. Praat analyses mono as well as stereo signal can be recorded and saved, opened, and played back in stereo. The modest support for stereo signal that praat does provide is therefore the convenience of colleagues who have their speech material in stereo form. In fact, outside the lab it is almost impossible now a day to produce monotape recording with standard equipment and standard connecting cables. 4.4 Needs and methods to analyze and to correct Articulation of speech Need for assessment Assessment and Diagnosis is major stage in Articulation and phonological Diagnosis and management. It includes gathering and synthesizing the information about client'sproblem and assigning an individual to a particular categorywithin a classification system based on attributes, characteristics, or behaviours. The main purpose of initial evaluation is a) Determine the Reality of the problem b) (b) determine the etiology(ies), and c) provide a clinical focus as to potential treatment approaches(Haynes &Pindzola, 2004).

155 After a thorough differential case history is collected, a carefulassessment should be completed as a basis for diagnosisand for planning appropriate and effectivetreatment. Through observation, the diagnostician obtains significant information about theclient's speech sound system, motivation, approachto a problem, interests, perseverance, cosmeticcharacteristics present when talking, and other importantidiosyncrasies. Preliminary consideration Conducting an accurate assessment require knowledge and awareness of the general characteristicsof persons with articulation/phonologicaldeviances and good observation skills. Although there are a great manybehavioural differences, a number of likenesses arepresent among persons with these speech disorders. Furthermore, not all of the characteristics may havebeen clearly implicated,another characteristic common to articulationand phonological problems is that of multiple causes (Haynes &Pindzola, 2004; Powers, 1971;Shriberg, 1982). Sometimes, there may be an obviousreason for the speech disorder and, consequently, the diagnostician fails to consider other possibilities. Screening Procedure Screening most often occurs in preschool or school settings. Screening of preschool and school populations typically includes all of the domains of communication, including articulation/phonology, language, voice, fluency, and hearing. Screening instruments are either formal or informal. Informal tools designed by speech language pathologists that includes items such as saying one's name and address, counting, naming, etc. formal screening procedures include published instruments such as Flucharty Preschool Speech and Language screening test (Second edition, 2000) and Slosson Articulation Test and Phonology (SALT-P, 1986). Assessment battery for Articulation and Phonological Disorders Accurate assessment of articulation/phonology involves eliciting various types of speech samples including formal articulation/phonological test, assessment of stimulability and intelligibility from spontaneous speech samples. The assessment includes Case history information, assessment of speech structures and function, auditory sensitivity, benefit from the hearing amplification, and probably assessment of speech sound discrimination skills. The assessment of speech structures often includes diadochokinetic tasks, which are to sample speech rate.

156 Four steps are involved in speech sound evaluation procedures: ● Obtaining speech samples ● Tape recording the client's responses ● Transcribing the sample ● Scoring and analyzing the sample The samples should be collected in the form of words, phrases, conversation and spontaneous speech. Newman &Creaghead (1989) pointed out that the optimal sample should 1. Reflect the child's production in actual communicative situation 2. Reveal both inconsistencies and consistent patterns 3. Contains the full set of phonemes of the language Ideally the sample should include conversational speech. The primary disadvantage of single-word, phrases and sentences, particularly when elicited by repetition or imitation, is that the sound production may not truely reflect the child's production of these same sounds in spontaneous speech. Conversational speech can be elicited in various ways, such as by using toys and pictures, talking about the child's interest, retelling stories, and observing the child and parents interacting verbally. The speech samples need to be transcribed live, such that the diagnostician makes notes about the production and transcribes them as accurately as possible while the child is speaking. Additionally, audio and video tape should also be taken. The examiner should then compare the live transcription with the perception of sound production from the tape recordings. The last step in articulation/phonological testing is to analyse the speech sample. Articulation and phonological tests: Assessment of the child's speech production system should include formal articulation/phonological tests. There are three types of articulation tests, most of which are standardized: ● Traditional articulation test

157 ● Combined articulation and phonological tests and ● Phonological test Formal traditional articulation test: Generally, formal articulation tests sample speech sound production in isolated words that typically are elicited by pictures without a model from the examiner. Some tests also provide written word lists pr written sentences for individuals who prefer the test items are sequenced in the development order of the phoneme acquisition. The test results provide information about types of misarticulation, and the word position where the error occurs. Some of the Formal traditional articulation tests are as follows: ● Arizona Articulation Profeciency test (3 rd revision) ● Goldman-fristoe test of articulation (G-FTA-2) ● Photo Articulation test (3 rd) (PAT-3) ● Templin-Darley tests of Articulation ● Weiss Comprehensive Articulation Test Combined articulation and phonological tests: Some tests assess both individual phonemes misarticulations. These tests have advantage of being able to do a phonetic analysis and phonological deviation analysis from the same speech sample. However, it takes more time than in traditional articulation test. ● The BanksonBernthal test of phonology ● The clinical test of articulation and phonology ● The computerized articulation and phonological evaluation system ● The Smit-hand articulation and phonological evaluation ● The structured phonographic articulation test Phonological tests: The phonological tests provide a more efficacious intervention programs for selected children by providing a clearer and more precise understanding of the child's underlying phonological system. Phonological test generally provide the following information :

158 ● Types of phonological deviation used ● Frequency of their occurrences ● Percentage of occurrence when considering the number of opportunities ● Phonetic interventory Some phonological tests are mentioned below: ● Hodson assessment of phonological patterns (HAPP-3) 2004/ Hodson computerized assessment of phonological patterns (HCAPP), 2003 ● BanksonBernthal test of phonology ● Clinical assessment of articulation and phonology ● Khan-Lewis phonological analysis Assessment of stimulability: The assessment of stimulability provides information about the child's articulation abilities and is used determining prognosis and for planning treatment (Miccio, 2002; Powell &Miccio, 1996).testing stimulability requires the child to imitate the clinician producing the phonemes that were misarticulated during articulation testing. It demonstrate the child's ability to produce a sound in a highly supportive condition (Bain, 1994). A suggested procedure for assessment of stimulability is to elicit three repetitions in isolation and three in words containing each phoneme that are misarticulated. Speech intelligibility assessment: The measurement of intelligibility has been approached in number of way (Gordon- brannan, 1994) ● Open-set word identification ● Close-set (multiple choice format) identification ● Rating scales; in which the listeners judge o a predetermined rating scales ● Estimation from articulation/phonological testings ● Some formal assessment instruments are available to measure intelligibility (Weiss, 1982). The assessment of intelligibility of dysarthric speech, the children's Speech Intelligibility Measures, the Weiss Intelligibility (1982).

159 4.5 Selecting management techniques for phonation and suprasegmental aspects of speech The voice varies according to the context of speech and to the physical and psychological conditions of the human being, and there is always a normal standard for the vocal output. Hearing loss can impair voice production, causing social, educational and speech limitations with specific deviation of the communication related to speech and voice. The deviations of voice can represent such a negative impact on this population that it can interfere on speech intelligibility and crucially compromise the social integration of the individual. Voice problems in individuals with this impairment are directly related to its type and severity, age, gender and type of hearing device used. While individuals with mild and moderate hearing loss can only present problems with resonance, severely impaired individuals may lack intensity and frequency control, among other alterations. The commonly found vocal deviations include strain, breathiness, roughness, monotone, absence of rhythm, unpleasant quality, hoarseness, vocal fatigue, high pitch, reduced volume, and loudness with excessive variation, unbalanced resonance, altered breathing pattern, brusque vocal attack, and imprecise articulation. These characteristics are justified by the incapability of the deaf to control their vocal performance due to the lack of auditory monitoring of their own voice caused by Hearing loss. Some of the therapy techniques that could be used for phonation in CWHI are Individual who are deaf or hard of hearing, often have difficulty monitoring VP function due to lack of, or decreased auditory feedback. Hearing aids and cochlear implants serve to assist the individual's auditory feedback mechanisms, thereby improving self-monitoring skills. Visual and tactile feedback Individuals who are profoundly deaf may benefit from visual and tactile feedback to normalize hypernasal speech (Nguyen et al., 2008).These feedback techniques may include ● visual monitoring of nasal airflow with a mirror, See-Scape™, or nasometer and ● tactile feedback during chewing exercises associated with vibratory sensations in the nasal and facial bones or during humming.

160 ChantTalk Similar to a religious chant, this technique is performed using a soft glottal attack (SGA) along with a recorded voice or the therapist, who gradually introduces normal speech as the patient progresses. Chewing Technique Practice the motions of chewing in an exaggerated manner and then gradually, over time, add random sounds, words, phrases, sentences, and conversation while slowly reducing the degree of exaggeration of the mouth movements. This exercise helps to release excess and produce natural tension in the vocal tract and laryngeal area and if done correctly encourages mouth opening and reduction of tensions in the jaw. Yawn Technique Practice yawning accompanied by a vocal sigh. This helps to produce a relaxed sound (often referred to as phonation) by creating normal muscular tension in the laryngeal area. Humming The humming task helps to produce a gentle airflow through the larynx as the sound (phonation) begins. To increase phonation duration and breath support Respiratory exercises to increase breath support including deep inhalation and exhalation should be implemented. To increase phonation duration CWHI should be asked to take deep breath and once the inspiration is complete, child should start phonating /a/ or /E/ from the beginning of inspiration. For supra segmental aspects Over the years there has been, a shift away from this atomistic view of language learning towards a more holistic, "top down" approach which has been reflected in both syllabus and material design, as well as in testing and in classroom practice. (Thornbury 1993) The current emphasis on pronunciation teaching is on the broader phonological aspects of connected speech, and their link to meaning on discourse level, and has resulted in renewed interest in the place of pronunciation in communicative language teaching. (Evans & Jones 1995).

161 The supra-segmental features are those which operate over longer stretches of speech, such as, stress, rhythm, intonation, pitch, and voice quality as opposed to the segmental features which are referred to as the individual sounds. In his book, pronunciation, Laroy asserts that : It is impossible to speak without rhythm and intonation, and these deeply affect the quality of speech sounds. (Laroy 1995:39) It is commonly agreed upon that it is intonation that has the greatest likelihood of impeding intelligibility in a learner's speech. By giving prominence to a word that conveys an altogether different message than what was intended or by using an inappropriate pitch key when speaking which confuses whether or not the speaker is making a statement or asking a statement are just two examples of problems that could occur. Although the supra-segmental features are sometimes called the 'unteachables', Laroy (1995) suggests that they are not' unlearnable'. Beginning at the top: By beginning with the overall voice setting or voice quality of English and engaging the learner in activities which raise his or her awareness to the way the language sounds, (perhaps by comparing it with other languages), is in line with a holistic, "top-down" approach. This integrates listening and speaking skills, involves the students' personality and opinions, and raises their awareness of how English and other languages they are familiar with differ, or are somehow similar: In this light O'Connor states the following: The basis of articulation has already been shown to be important in foreign- language teaching: better results are achieved when the learner gets the basis of articulation right rather than trying for the foreign sound sequences from the basis of his own language (O' Connor, 1973:289 in Thornbury 1993). The most common supra segmental errors made by CWHI include the following: 1. Difficulty in pronouncing sounds which do not exist in the student's language. 2. Confusion of similar sounds, for example, /i:/ in eat or N in it, or /b/ and /p/. 3. Use of simple vowels instead of diphthongs, for example, use of /i:/ instead of /I/. 4. Difficulty in pronouncing consonant clusters, for example, desks, fifth. 5. Tendency to give all syllables equal stress, and flat intonation.

162 Stress, rhythm, and intonation are the three important elements of the Supra- segmental system used. When the syllables are produced with more force or intensity than others, it is called stress. Focusing on selected sounds: The sounds targeted to teach stress, should be part of a meaningful word or phrase or sentence. Children generally pick up the sound system by listening to the model or voices on cassette, etc. However, the presentation of sounds in a carefully selected word or phrase or sentence will help to direct the child's learning process. And this will help to monitor progress. By practicing words and phrases which contain the sounds to be learned, students are able to master the production and use of these sounds. Following are the steps to teach stress: ● Introduce the sound. ● Focus child's attention on the teaching point. ● Present a sentence or line/text which has the sound. ● Underline the sound in the text. ● Avoid complications of stress, intonations, etc. ● Include examples of the sound in all the positions. Teaching stress and intonation: The syllable should be well understood by the clinician who should be able to identify the syllables in an utterance. The clinician should be skilled in identifying and counting the syllables in words, phrases, and sentences. It is to be remembered that most words with two or more syllables have one stressed or strong syllable and one or two unstressed or weak syllables. Stress is not dependent upon fixed place in the sentence. Stress can occur on any syllable. Generally speaking, only nouns, verbs, adjectives, adverbs, demonstratives and interrogatives are stressed. The goal is to increase the ability of the students to recognize and place stress. To achieve this it is important to give students groups of graded lists of words, such as two syllabic, three syllabic, four syllabic, and five syllabic words. Perhaps each group may consist of five or six words, and students will be asked to listen to the oral model provided and to mark the syllable or syllables which are stressed. The task may be

163 made more complex by asking students to mark not only the stressed but also the unstressed syllable of the words. Auditory recognition must be followed by oral production. Production of individual words must be followed by the production of phrases and sentences in that order. This means that the length of time between stressed syllables is always about the same, and if there are several unstressed syllables they must be said more quickly. For example: "He wrote a letter". "He wrote a long letter". "He wrote a very long letter". In each of these sentences, the unstressed syllables (a, a long, a very long) take about the same amount of time to say. So, "a very long" has to be said more quickly Rhythm : Rhythm of speech can be corrected clapping or tapping on a desk on each words spoken in the sentence. Clapping or tapping more loudly for the stressed syllables, and less for the unstressed syllables. Write the stressed syllable in heavier letters. Prator, Jr., and Robinett (1972) suggest tackling the problem of acquiring a good speech rhythm under five parts: I. Giving proper emphasis to stressed syllables, and making these recur rather regularly within a thought group. II. Weakening unstressed words and syllables, and obscuring the vowels in most of them. III. Organizing words properly into thought groups by means of pauses. IV. Blending the final sound of each word and syllable with the initial sound of the one following within the same thought group. V. Fitting the entire sentence into a normal intonation pattern. Intonation: Intonation is speech melody. The way our voice goes up and down during speech. Intonation is very important in expressing meaning, and especially Intonation patterns are quite complex, and it is better for students to acquire them naturally rather than try to learn them consciously. That is, modeling and imitation in an unconscious way is important. Rising intonation is used in asking yes/no questions, and to express surprise, disbelief, etc. The voice rises sharply on the stressed syllable.

164 Falling intonation is used for normal statements, commands, and for WH-questions. The voice rises slightly earlier in the sentence, and then falls on the key word being stressed. The way to practice stress and intonation: The easiest way for students to practice stress and intonation is by repetition. Prepare sets of sentences with contrasting intonations and give them to the students to practice. Identify such sentences, wherever possible, from within the lesson. ● A good model of the sentence should be given. ● Say it at normal speed, making a clear difference between stressed and unstressed syllables, and using natural intonation. ● Indicate the stress and intonation clearly, using gestures. ● Say the sentence in sections, starting with the end of the sentence and gradually working backwards to the beginning. For example, living here/been living here/ have you been living here?, etc. ● Watch carefully whether the child pays attention to stress and intonation when they repeat the sentence. 4.6 Selecting management techniques for facilitating articulation in children with hearing impairment Need for treatment: Analyzing the results of articulation assessment is important; but the decision for implementing intervention involves more than looking at the standardized test scores. Beyond the test performance, the need for treatment is related to social, occupational, cultural and ethical aspects of the individual's environment. The factors determining the needs for treatment of articulation: ● Articulation deficits result in barrier to social and professional opportunities (Bryne&Shervanian, 1977). Hence a probable or desired lifestyle or occupation of a person should be considered when determining need for articulation treatment. ● Another factor in determining the need for treatment of articulation/phonology is the attitude of peers, family and important others in the peer's environment

165 (Andrews, 1996; Johnson et al., 1967). Attitudes of the speakers range from acknowledge of speech problem to the rejection and insistence that the problem does not exist to intense concern or preoccupation with it. ● A third factor is the nature of the articulation/ phonological deficiency itself; that is, the cause, severity, and effects on communication. Certainly, an important criterion for determining the extent of the problem is the intelligibilityof the speaker. Additionally, the frequency with which articulation errors occur, the type of misarticulation, the phonological deviations used and stimulability. The consistency with which the individual misarticulates the phoneme is also a factor (consistency effect). ● Age is also a critical factor for determining the need of the treatment. The developmental age of the phoneme should be considered while determining the need of the treatment, along with other factors. ● Final factor pertains with etiology of the disorder. One reason for differentiating between functional and organic causes is to acquire some idea about seriousness of the communication problem and its possible prognosis. Selection of intervention approach After the diagnosis and determining the need of treatment; the clinician must select the treatment approach and develop the treatment plan individualised for each client. Intervention approach and plan for children with hearing impairment can never be same with that of children with childhood developmental Dysarthria. Murphy and Dodd (1995) summarized phonological rules used by profoundly hearing impaired children. They reported that the hearing- impaired children use many of the same phonological processes young hearing children do (e.g., voiced/ voiceless confusions, final consonant deletion, and fronting). However, other deviant patterns are also apparent in the speech of hearing-impaired children, such as, glottal replacement, deaffrication, stopping, and a preference for the use of nasal consonants. The production of vowels by the CWHI is commonly characterized by substitutuion, neutrilization, centralization, and omissions (Osberger&McGarr, 1982). Study by Serry and Blamey (1999) reported that the order of acquisition for the CWHI and normally hearing children are closely related. The rate of acquisition is however slower for CWHI.

166 Acquisition of speech production skills depends on the hearing amplification used, hearing age, and auditory deprivation, speech and language development, benefits from the amplification, associated problems, etc. When articulation/phonological treatment are implemented, the first decision is to determine whether a phonetic or phonological approach should be implemented. Phonetic approach focus on individual speech sound targets whereas phonological approach focuses on speech sound patterns. Considerations of phonetic treatment approach: The following questions need to be addressed: ● How many sounds will be targeted or taught at a time? ● Which sound or sounds will be taught first? ● Will specific auditory training or speech perception training be needed? Number of sounds to be targeted at a time: Traditionally, treatment began with working on one or two phonemes if they are cognates of one another; for example, /s/and /z/, or /t/ and /d/. Working on second sound will began while continuing the generalization of the first sound. One possible exception to this recommendation of working with only one sound at a time is, with adults or children who are highly motivated and better able to handle two or three sounds at a time. Target phoneme selection There are several criteria to aid in selection of target phonemes. It is advisable to select the misarticulated phoneme(s) that are relatively easy for the client to produce Selection criteria for phoneme target ● Phoneme that is earliest to develop. ● Later developing phoneme ● Stimulable phoneme ● Nonstimulable phoneme ● Phoneme produced correctly in a key word

167 ● Frequently occuruing phoneme ● Visible phonemes (i.e., labials, dentals, alveolars, some palatals) ● Consistently misarticulated phoneme ● Phoneme that client/others desired to target ● Phoneme for which the client has been criticized or penalized ● Phoneme that is omitted or has an atypical substitution ● Phoneme least affected by physical limitations ● Same phoneme for a group of clients Speech perception training: Much study has been done about the relationship between speech perception and articulation skills. Various opinions are held regarding whether or not to include perception training (variously called auditory training, ear training, and speech sound discrimination training) as part of the treatment of articulatory disorders. For example, Van Riper and Erickson (1996) generally recommend auditory training for all "functional" articulation cases; while, Rvachew (1994) recommended it for all clients. For CWHI, auditory training is functional step for the articulation treatment. The rationale for implementing auditory training is that speech is learned by the ear. A person has to hear a sound several times before all its salient features are perceived. On the other hand, the rationale for not using auditory training is that individuals usually can learn to produce sounds correctly without it. 4.7 Methods to improve speech intelligibility; Measurement of outcomes Understanding oral speech is one of the most important factors, in the evaluation of articulation and phonology. Speech intelligibility has been characterized as the single most practical measurement of oral communication competence (Metz, Samar, Schiavetti, Sitler& Whitehead, 1985).the degree of unintelligibility is perhaps the most important single pragmatic indicator of articulatory/phonological severity. Attaining a valid, reliable and valid intelligibility is problematic because of numerous factors: ● Articulation/ phonological characteristics ● Suprasegmental aspects

168 ● Voice characteristics ● Fluency ● Linguistic factors ● Contextual factors Following are the methods to deal with these factors: Slow Down Children with hearing impairment have speech clarity issues because along with having poor articulatory repertoire; they speaks very fast; substituting most of the speech sounds with vowels. By having them slow down slightly, their tongue, lips, and jaw have a little more time to get where they need to be produce intelligible speech. This can make a significant difference in intelligibility. Hence speech intelligibility can be improved by reducing the rate of speech and children should be asked to speak as slow as one word at a time. And stretch and give stress to each word. Speak Slightly Louder Many children with hearing impairment have intelligibility issues due to mumbling. Most of the children have hypernasality with cul-de-sac features of voice. Mumbling occurs because of low volume and minimal movement of the jaw, lips, and tongue while talking. By increasing the volume slightly, a stronger signal is sent from the brain to the larynx (voice box). However, the way the human body is made means that the stronger signal does not just go to the larynx, but also to the tongue, lips, and jaw. The stronger signal results in exaggerated movement of these articulators. For example; while playing games the child should be asked to speak loudly (like yelling) with his mouth open wider, and lips move further, and tongue's movement become magnified. A slight increase in volume will likely increase speech clarity because the mouth must make bigger and more forceful movements. Speech should have Context Context gives a listener cues about the conversation. If clinician know that the child is trying to tell you about a situation at lunch or at recess, clinician are much more likely

169 to decipher what the child is attempting to say. While this strategy doesn't actually change the child's intelligibility, it can significantly increase how much of his conversation is understood. Clinician can get context by asking questions that begin with "what", "who", "where", and "when". If possible, ask the child to show you what he is talking about. Get on the Child's Level While it is not always practical to get eye level with the child every time he talks, it will be helpful at times. Getting eye level with the child will help the clinician and the child focus on each other. Even minor distractions can prove to be significant barriers if the child has difficulty articulating what's on his mind. Second, it shows the child that you are giving your full attention and that you care about what they are saying. Praise Good Speech Most children are highly motivated by praise and they want to make you happy. By praising good speech behaviors (i.e. going a little slower and slightly louder), you encourage them to repeat those behaviors. Praise can come as words of admiration, high-fives, fist-bumps, etc. If an immediate reinforcement is followed after their good speech with a little bragging to the child's parents later the same day, it can make a significant impression on that child. Practice Consistently to Become Habit Spaced repetition develops into habits. For the first week, child should be praised at every possible opportunity. The praise can slowly be faded out as their good speech behaviors become habit. The winning strategy for improving speech clarity over the long term is this: Consistent (daily) reinforcement of good speech will result in long term improvement. A little bit of practice on a daily basis will result in much faster progress than intense practice that happens sporadically. Don't Stress Getting anxious and uptight about the child's speech clarity is counterproductive. It's not unusual that one week their speech clarity may seem good, but the next week it is poor again. Their speech clarity is definitely going to fluctuate some, but overall their clarity should be improving. Another reason not to get uptight about the child's speech is that they will likely feed off of caregiver's and clinician's emotions- If you seem anxious it will affect their mood and likely their speech.

170 Approaches for improving intelligiblity The Core Vocabulary Approach 1. Choose 50 words that are highly important to the child and to the child's environment. These words should be used a lot. 2. Achieving consistency is paramount. Establish consistent productions at any level and build their consistency up to the word level. 3. As words become clearly spoken, move them off of the list and add some new. The list always stays at 50 words. 4. Stick with the list and use it to take data to see what to keep and what to have become intelligible. Speech intelligibility of CWHI depends on various factors. Clinician must keep in mind that a child's speech will be perceived unintelligible if the child has ariculatory/ phonological errors. Hence, first target is to treat misarticulation of speech. The management of speech intelligibility should begin at word level, followed by connected speech, phrases, sentence, complex sentence and other higher levels of speech production. Choosing the stimulus ● At word level- core word, side word ● At phrases level- common phrases including activities of daily living, verbs, etc ● At sentences level- daily activities, story narration, situational descriptions (like- birthday party, a visit to zoo), etc Measurement of outcome The measurement of the outcomes associated with speech and language therapy is an essential component of delivering effective and high quality services. Outcome measurement is core to: ● Delivering evidence-based and child-centred services. ● Evaluating clinical effectiveness and supporting quality improvement. ● Demonstrating the impact of the therapy.

171 To support best-practice in relation to outcome measurement, it is recommended that speech and language therapists are aware of the importance of: ● The routine measurement of the outcomes of therapy, using an appropriate approach and tools. ● The use of validated outcome measurement tools. ● Capturing the service-user's perspective on their outcomes and their experience of care. ● Using outcome data in the context of other data and alongside other available tools, frameworks and resources, to support the delivery of quality services. ● Outcome measurement being embedded within a model of working that emphasizes the need for reflection, and that holds the notion of health benefits and outcomes as an integral part of practice. Hence, for outcome measurement, the speech language pathologist should use the same test used for assessment of intelligibility before starting the therapy in order to find out the baseline function of the child and do the post therapy evaluation in order to estimate the current baseline of the child after the therapy. Once, the clinician has the current reports of the child's baseline function; clinician should compare the pre therapy and post therapy functions of the child to see the effectiveness of therapy. Based on the comparison, further decisions regarding the therapy should be made. 4.8 Let us sum up Sophisticated, computer-based instrumentation has become increasingly available to the voice clinician. Yet substantial questions remain regarding its clinical necessity and usefulness. A theoretical model based on the scientific method is developed as a framework that can be used to guide the clinician in the selection and application of instrumental measures. Using the process of hypothesis testing, instrumentation is presented as an integral component of clinical practice. The uses of instrumental measures, and their relevance to long- and short-term treatment goals, are addressed. Clinical examples are presented to illustrate the incorporation of instrumentation and the scientific method into assessment and treatment.

172 4.9 Unit End Exercises 1. What is the need of advancement of technologies in the management of Speech Disorders for the hearing Impaired ? 2. Illustrate various instruments for assessment and management of Speech Disorders by a qualified Speech Pathologist? 4.10 References 1. Adamson, L., Romski, M., Deffebach, K., & Sevcik, R. (1992). Symbol vocabulary and the focus of conversations: Augmenting language development for youth with mental retardation. Journal of Speech and Hearing Research, 35, 1333-1343. 2.

American Speech-Language-Hearing Association. (2018). Facilitated communication [Position Statement]. Retrieved from www.asha.org/policy/ 3. American Speech-Language-Hearing Association. (2016).

Scope of practice in speech-language pathology [Scope of Practice]. Available from www.asha.org/ policy/. 4. Angelo, D. H., Jones, S. D., & Kokoska, S. M. (1995). Family perspective on augmentative and alternative communication: Families of young children. Augmentative and Alternative Communication, 11, 193-201. 5. Assistive Technology Act of 2004, Pub. L. No. 108-364. 118 Stat. 1707 (2004). 6. Autism Spectrum Australia (Aspect) (2013, March). Evaluation of the Language Acquisition Through Motor Planning (LAMP) Program with children with autism spectrum disorders (ASD). Aspect Research Insights, 6, 1-4. Retrieved from https://w w w. l i b e r a t o r. c o . u k / m e d i a / w y s i w y g / D o c u m e n t s / Autism_Spectrum_LAMP_Research_Report.pdf 7. Bailey, R. L., Parette, H. P., Jr., Stoner, J. B., Angell, M. E., & Carroll, K. (2006). Family members' perceptions of augmentative and alternative communication device use. Language, Speech, and Hearing Services in Schools, 37, 50-60. 8. Barker, R. M., Saunders, K. J., & Brady, N. C. (2012). Reading instruction for children who use AAC: Considerations in the pursuit of generalizable results. Augmentative and Alternative Communication, 28, 160-170.

173 9. Beukelman, D., McGinnis, J., & Morrow, D. (1991). Vocabulary selection in augmentative and alternative communication. Augmentative and Alternative Communication, 7, 171-185. 10. Beukelman, D. R., & Mirenda, P. (2013) Augmentative and alternative communication: Supporting children and adults with complex communication needs. Baltimore, MD: Brookes. 11. Binger, C., & Light, J. (2006). Demographics of preschoolers who require AAC. Language, Speech, and Hearing Services in Schools, 37, 200-208. 12. Binger, C., & Light, J. (2007). The effect of aided AAC modeling on the expression of multi-symbol messages by preschoolers who use AAC. Augmentative and Alternative Communication, 23, 30-43. 13. Blockberger, S., & Johnston, J. (2003). Grammatical morphology acquisition by children with complex communication needs. Augmentative and Alternative Communication, 19, 207-221. 14. Blockberger, S., & Sutton, A. (2003). Towards linguistic competence: The language experiences and knowledge of children with extremely limited speech. In J. Light, D. Beukelman, & J. Reichle (Eds.), Communication competence for individuals who use AAC (pp. 63-106). Baltimore, MD: Brookes

174 Unit 5 ❑ Assistive devices in Educational Management Structure 5.1 Introduction 5.2 Objective 5.3 Impact of technology on Education: Present & Future 5.4 Assistive technologies for personal and educational purposes: Devices & Processes and their application 5.5 Mainstream Technologies: Universal Designs; its Concept, Principles & product design 5.6 Research & Developments in Educational technology: National & International 5.7 Evidence Based Practices 5.8 Let us sum up 5.9 Unit end exercises 5.10 Reference 5.1 Introduction The world of education is currently undergoing a massive transformation as a result of the digital revolution. Because of this "digital revolution," it is both important and practical to make use of the availability and accessibility of technology in designing educational or training programs. Technology has the potential to contribute to a better quality of life for students with intellectual disabilities, which is more than just a matter of convenience. The use of technology in education is inevitable; it is only a matter of time before schools will fall behind unless they try to catch up. Students spend long hours of their day outside school using technology, so is it reasonable to expect them to come to school and find themselves in the world of no technology and feel attracted to this world. In addition to the factor of attractiveness, there is also the effectiveness of using technology, which has been proven through some studies. For instance, argue

175 that digital textbooks offer a better alternative than traditional textbooks because they can provide instant feedback, interactive representations, and the system of universal design for learning (UDL). Continuing to deliver education and training in the traditional way and using the same tools that have been used for decades is affecting these programs' outcomes and making them fall far behind what the labor mark demands. Thus, updating school programs with current technological tools and devices for both students with and without disabilities has become necessary. It is very important to ensure that students with disabilities are prepared to meet the challenges of postsecondary settings; many technological tools could increase, as much as possible, the possibilities for students with disabilities to overcome these challenges with fewer difficulties. In many cases adapting the right assistive technology for students with disabilities could save time and effort. Ignoring the existence of devices and tools that can help students with disabilities facilitate and maximize their educational and academic gains can also prevent students from having opportunities to reach their maximum performance, or at least to make them more confident while undertaking some tasks that can be done easily using low-tech Assistive technology. 5.2 Objectives To understand the present and future impact of technology on education To understand the assistive technologies for personal and educational purposes To know about universal designs; its concept, principles & product design To know about the national &international developments in educational technology 5.3 Impact of technology on Education: Present & Future Technology has played a central role in all aspects of our lives. Technology has helped human beings shape and change the physical world to meet their needs by manipulating materials and tools with updated techniques. The term educational technology refers to the instructional use of computers, television and other kinds of electronic hardware and software. Educational technology is interchangeably used as instructional technology because it draws attention to the instructional use of educational technology. According to the Association for Educational Communications and Technology " Instructional technology is a complex , integrated process involving people,

176 procedures, ideas, devices and organization for analyzing problems, implementing, evaluating and managing solutions to these problems in situations in which learning is purposive and controlled. Technology and Learning The primary purpose of employing instructional technology in schools is to enhance student learning. Technology cannot take over a teacher at anytime, but it can support the teacher's teaching. The principal task of the teacher is to transfer knowledge and textbook content to the student's mind. Teacher's instruction is followed by periodic examinations to determine if the transfer has occurred. Instructional technology assists this transfer process by means of accurate and compelling presentations of content. Computer Assisted Instruction programs were essentially technology based instructions used in classrooms in the form of printed, programmed learning books. The programme encouraged self-paced learning among children. In computer assisted instruction, computer would keep track of students work and provide a record of each student's progress for the teacher. Instructional technology also helps children with learning difficulties provide drill and practice exercises by installing software and hardware in school laboratories. The above paragraphs discussed the evolution of technology in Education and its growth in the field of technology. In the following paragraphs, we will read about the current role of technology in education. A teacher may use a variety of theories and techniques to teach children, but technology will help her to enhance her teaching and thereby supporting student learning. Although a teacher might have a variety of technological support to select from but she will select only those which will promote their instructional goals. Technology is currently being used to support the four goals namely: 1. Building student capacity for research 2. Making student inquiry more realistic 3. Presentation of information in an appealing form 4. Offering access to learning resource beyond the school. Let us see these in detail : Student research: Computer and technology has paved for student research. Students can now collect information not only through school/ college libraries, but they have

177 access to digital versions of these references. They can substantiate their work by gathering /add digital images, video, audio and global positioning satellites. Primary and secondary sources of information could be gathered from internet which includes government documents, photographs and diaries. Student Inquiry: Education is meaningful when it is real and authentic for the learner. Learning through technology helps students to get a view of the real world activities. Students can not only collect data, but they also have an opportunity to investigate questions or issues that concern them. Technology (especially communication technology) can help individuals to contact experts working in various fields of their interest. Technology has paved ay for interactive learning wherein, it has taken education beyond the four walls of the classroom. For.e.g. If a student who want to learn more about a current event, such as an experiment on an international space station, scientific endeavours or wants to have a peek into an activity happening at the other end of the globe, he/she can do so with the help of going on a virtual trip with the help of internet and web camera. Constructing new knowledge: James Pellegrino and Janice Altman (1997), believe that the ultimate use of technology occurs when students use technology to move from being knowledge consumers to being knowledge producers. Students have upgraded their work by integrating digital video, audio text, multimedia presentations or web based documents in their project work rather than just projecting it in a traditional paper or research report. The use of technology has helped students to express their knowledge in a more interesting manner. Access to learning resources: To make the process of learning interesting, the learners should be provided with a varity of technologies (e.g.interactive television, internet video conferencing) so as to make them active participant in the learning process. Access to learning is beneficial for students who may be unable to attend classes in the school building and are home bound, home schooled and for dropouts. Learning resources helps not only the regular learners, but children with special needs are also benefitted with the same. Impact of technology in Future The future of education is technology dependent. Literature reveals that technology will play a central role in nearly all aspects of our lives as we as embarking on the fourth Industrial Revolution. World Economic Forum estimates that 65% of children entering primary school will find themselves in occupations that do not exit. It is also estimated that by 2020, there will be 1.5 million new digitized jobs across the globe. In our complex and rapidly evolving world today, academic models based on interdisciplinary research are necessary to create effective teaching and learning

178 environments. The future of classroom lies in technology driven environment like cloud based technology, customisable learning management platform, distributed cognition (dCoG)-(A concept in which the people, environment and artefacts are regarded as one cognitive system). Through dCoG, educators can view human learning through digitally enhanced learning experiences that facilitates the interaction of people, the environment (classrooms, workplace, learning, informed settings) and tools (hands-on-activities, simulators, games etc). According to human psychologist, learning has not changed vastly overtime, but external factors like how we comprehend, retain and receive new material. However, to accelerate learning, technology gives us exciting opportunities to shape learning experiences and achieve learning goals. Thus it could be concluded that, technology based education can create a dynamic, digital and hands-on-learning experience that is tailored, flexible and relevant thereby developing the talent needed to power the digital economy. However, it should be understood that the role of human teacher cannot be replaced by technology. As teachers will have a unique and personal insight into each learner's progress, serving as a role model and local expert therby providing inspiration in a way that both should go hand in hand. 5.4 Assistive technologies for personal and educational purposes: Devices & Processes and their application Technology can serve two major purposes i.e. helping and teaching (Smith, 1991). Technology that helps an individual to carry out a functional activity is termed assistive technology. Assistive technology can serve a variety of functional needs. It can also be used as part of an educational or rehabilitative process and also for remediation or rehabilitation. Often rehabilitative or educational technology is employed to develop skills for the use of assistive technologies. Appliances versus tool: An appliance is a device that "provides benefits to the individual independent of the individual's skill level (Vandeheiden,1987,p 705) Tools, on the other hand require the development of skill for their use. Household appliances such as refrigerators' do not require any skill to operate whereas tools such as a hammer or saw do require skill.This same criterion applies to assistive technologies. The determining factor in distinguishing a tool from an appliance is that the quality of the result obtained using a tool depends on the skill of the uses. For e.g eyeglasses, splints a seating system or a key guard for a computer are all appliances, since the

179 quality of the functional outcome does not depend on the skill of the user. On the other hand, success in maneuverings a powered wheelchair does depend on the skill of the user, therefore the wheelchair is classified as a tool. Before going to the assistive technologies for personal and educational purposes; it is important to know the principles of assessment and intervention in assistive technology. The assistive technology intervention begins with an assessment of the consumer. Through this assessment information about the consumer is gathered and analyzed so that appropriate assistive technology (Hard and Soft) can be recommended and a plan for intervention developed. Information is gathered regarding skills and abilities of the individual, what activities she would like to perform and the context in which she will performing these activities. The assessment also yields information regarding the consumer's ability to use assistive technologies. Based on the assessment results a plan for intervention developed and a decision regarding the type of assistive device used could also be made. Let's us now discuss few assistive technologies for personal and educational purposes. Planar: It is a technology used to support the body only where it easily comes in contact with the body (Such as bony prominences) used for individuals who require minimal support. Fig 1. Fig 2. The above figures 1 and 2 shows the two types of Planar. This is basically used for growth or postural changes. This technology is used for postural control and deformity management. There are two types namely 1. Pre-fabricated 2. Custom fabricated

180 1. Pre-fabricated: It is made to fit a wide range of individuals. This type of pre- fabricated planar has adjustable components. This type allows the system to be modified for growth or posturer changes. 2. Custom fabricated: Custom fabricated planar systems are made of similar materials and design as pre-fabricated systems but the dimensions of the seating surface and components are customized to fit the individual. Standard Contoured Modules Planar systems provide adequate support for many individuals who have relatively good motor control, fair trunk support and spinal curvatures or fixed deformities however for individuals with less control, the planar surface does not provide enough support .Contoured technologies use curved surfaces depending on the specific approach which match closely to the shape of the human body. By contouring the seating surface to the person's body. We increase the amount of contact that the body has which the seating surface. This provides increased support and control. For a significant number of individuals, there is a need for contouring, as it helps to take the exact shape of the body. One model included in the standard contoured module is called as vacuum consolidation. The vacuum consolidation method of contouring uses a bag filled with small particles (similar to a bean bag chair)) (Fig 3:a, b & c)to make the basic shape for contoured cushion the person to be fitted is seated in the bag and placed in the optimal position. A vacuum pump is used to draw air out of the bag which forces the particles in the bag to compress and closely match the person's shape. Fig 3a. Fig 3b.

181 Control enhancers: Interface positioning, Arm supports, Mouth sticks, Head pointers and Hand pointers. Control enhancers include aids and strategies that enhance or extend the physical control (range and resolution). This helps to enhance the persons control to the extent that his range and resolution make it possible for the person to be independent. It also helps to make the task easier and minimize fatigue for an individual. These include mouth sticks, head and hand pointers and arm supports. (Fig 4, a,b,c,&d) Fig 4a Fig 4b (Or)

182 Fig 4d Fig 4c The person and the control interface should both be positioned to maximize function. Individuals who have weakness in the arm may not have enough strength to access the full range of a keyboard adequately. A mobile arm support which supports in arm movements by eliminating some of the effects of gravity may then allow the individual to access a keyboard. There are commercially available aids that can be strapped on the hand to assist in pointing [7.4. B] such as the typing aid as shown in Fig 5 Fig 5 Fig 6 For individuals who lack functional movement in their arms and hands, a mouth stick or head pointers (Fig 6) can be used with head and neck movement to access a

183 keyboard or perform other types of manipulation tasks (e.g dialing a telephone numbers or turning pages in a book). Mouth sticks are often used by individuals who are quadriplegic as a result of a spinal cord injury. A mouth stick consists of a pointer attached to a mouth piece. The user grips the mouth piece between his teeth and moves his head to manipulate control interfaces on other objects. Keyboards: For written communication, a keyboard is typically considered the most efficient means of in putting information. The standard keyboard is the first choice for computer access. The other types of keyboard include [Fig 7:a,b & c] Fig 7 a Fig 7 b Fig 7 b Thus it could be concluded that educational and personal assistive devices cannot be separated and they are interdependent on each other.

184 5.5 Mainstream Technologies: Universal Designs; its Concept, Principles & product design Let us begin with the meaning of Universal Design (UD). Universal design (UD) is the design of prodiucts and environments that can be used by all individuals as much as possible without having to make adaptations. (Connell et al.1997). Universal design then promotes accessibility for as many people as possible across environments. Universal Design stems from efforts to make environments "barrier free" and assistive technology , which creates access to environments, that might not otherwise be possible for individuals with disabilities. Removing barriers allows people with disabilities to participate in events and activities of daily life , but removing those barriers also helps people without disabilities. Universal design can also be applied to education and is called universal design for learning (UDL) (CAST,2004). UDL focuses on the design of curricula and instruction that helps teachers be responsive to the individual differences of their students with disabilities while also being beneficial for students without disabilities. Orlwis and MCLane (1998) describe universal design as how materials and instruction are designed so that all students with a variety of differences in learning, seeing, hearing, moving and understanding English can access and benefit from instruction. Universal design of curricula and instruction means that adaptations are incorporated into the materials and instruction during development. The intent is that the materials be flexible enough to accommodate the diverse learning needs evident in most classrooms There are three features of universally designed curricula and instruction. First, there are multiple means of representation, which means that information is presented in various formats to reduce sensory and cognitive barriers. The second feature, the multiple means of expression, refers to the ability of students to respond in a variety of ways. The third feature , multiple means of engagement refers to actively involving students in activities and matching the mode of representation and expression with their needs and interest. Digital media is an excellent example of how universal design features promotes access for students with different needs such as learning, seeing, hearing, moving and understanding English. Universal design allows the broadest spectrum of learners to access the curriculum, students with varying learning needs, those with disabilities and those with other special needs.

185 Let us see few products supporting Universal Design for Learning Curb cuts and wheel chair ramps allows people who use wheelchairs to use sidewalks , cross streets , have access to buildings , and be free to move independently as they shop , go to restaurant or go to the movies. However, curb cuts and wheel chair ramps also help parents with strollers and people with shopping carts as they shop and walk through neighborhoods or shopping centers. So the universal design feature of curbs and ramps benefits many individuals in society. For reducing sensory and cognitive barriers, written text can be accompanied by audio for students who are blind and graphics can be used to enhance the content for students who are deaf or have learning problems. Closed captions on video are another example of ways of representing information. For multiple means of voice recognition software, scanning devices and switches help students with physical disabilities access the computer to complete computer based activities. Digital media is also engaging in universal design features which include current technology and partnership with textbook publishers making electronic version of the textbook for the ease of reading. For children with learning disabilities, having difficulty in reading, computer can be used to immediately translate visual access (print) to the curriculum materials to an auditory means (listening to the text) of gaining information. Electronic media also helps persons with severe visual disabilities allowing books to be 'heard' rather than 'read'. Like the students with visual impairment can listen to the social studies text book rather than reading it through Braille print. 5.6 Research & Developments in Educational technology: National & International Technology has become a part and parcel of our lives. It plays an important role in the learning process. Technology has played a seminal role in the field of education. Just as the modern world is incomplete without technology, similarly education too would fall short of an "enlightening experience" without the use of technology. In order to understand the full impact of technology, it is important to know how it has impacted education. Some of the developments in Education using technology are given below: 1. Classroom based learning: Nowadays technology has supported textbook learning. Information could be gathered from textbook as well as from computers. It has become an integral pat of classroom based teaching and learning. Today

186 many educational set-ups like schools, colleges and universities in India use projector screens instead of blackboards to teach in the classroom set-up. Powerpoint presentations have helped teachers to support teaching and put across their ideas in the most amazing way. Student experience a different kind of set-up in today's technology based classroom. Gadgets like tablets and laptops are used to take down notes. Animated content are created on various subjects and in different languages so that students can have a better understanding of a complex subject in a simple way. 2. Online learning management system: Technology has made the learning process interesting. Many colleges and universities are integrating online learning management system or LMS platform into their web portal. Students can remotely login to access course material and also attend live classes with their teachers. The features of online learning management system include: a. Pre-recorded lectures b. Learning through recorded material c. Revising and reviewing course material at the learner's own pace. But the difficulty lies in non-availability of computer and broadband in schools and in rural areas. However, Government is providing computers to consumers residing in remote areas and creating content that consumes less data and can be easily accessed on internet. Learning through mobile apps India is one of the second largest mobile phone user after China. Mobile phone is used not only for communication but also presents a huge opportunity for delivering e- learning content through mobile apps. Educational mobile apps have paved their way into the educational scenario. Popular platforms like android and iOS are hosting educational mobile apps. Educational app based on particular subjects are being developed. They are simplifying complex concepts with easy to understand illustrations and animations, puzzles, games etc. There are subject wise apps available. Since the affordability of these products have gone up people from rural set-up can also pursue their dreams of higher education. Thus it could be concluded that for a nation to progress, the younger generation should be educated and updated. This up gradation is possible through a strong technological and educational support.

187 5.7 Evidence Based Practices Evidence based practices will provide us with literature which suggest that with the integration of assistive technology, lives of individuals with disabilities will be improved and lead to increased productivity, independence in areas of daily living activities, school work and leisure. It may also provide these individuals with opportunities to compete more equally with peers who are able –bodied. However, in order to allow for this productivity and independence, the assistive technology must match the varied needs of the client. Studies addressing the benefits of assistive devices, have looked at potential barriers to the use of the device. Research has also shown that research data can help in the area of service delivery. Evidence based research may help the therapists and other professionals to make effective and efficient service delivery in this area. Research and literature provide access to and use of assistive technology. This will increase the individual's access to and independence within the community. Qualitative research has developed evidence in the area of assistive technology. The data collected not only guides decision but also describes how individuals are effectively using their technology. Studies on interactive framework support collaboration and decision making. Effectiveness regarding the implementation of these models may also be best measured through qualitative methodologies such as case studies and ethnographies. A collection of information regarding the assistive technology is important for decision-making, procurement and implementation in order to prevent abandonment and to meet the varied needs of the clients. 5.8 Let us sum up Assistive technology is defined as "an item or piece of equipment or product system either acquired commercially, off the shelf, modified, or customized and used to increase, maintain, or improve functional capability for individual with disabilities" (Johnston, Beard, & Carpenter, 2007). Special education teachers, especially in middle and high school, should be exposed to technological tools that can help students to bypass their academic weaknesses. Teachers will help students by training them to use portable and cheap tools that, in most cases, could make students live and behave more independently

188 when they leave high school, which will increase their chances of maximizing their degree of achievement and independence, though it will still be behind their peers without disabilities. For instance, training students to use a calculator can be more practical than beginning to teach middle and high school students' basic math (like adding two numbers). Furthermore, if students can use the calculator but have difficulty saying numbers correctly, they can use more advanced tools, such as a talking calculator, which helps students to say numbers correctly and can be used whenever or wherever they need it. 5.9 Unit end exercises 1. Write a note on Evidence Based Practices in Educational Technology. 2. Explain mainstream technologies with suitable illustrations. 3. Write a brief note on 'impact of technologies in Special education'. 5.10 References Anderson-Inman, L., Knox-Quinn, & Horney, M. (1996). Computer-based study strategies for students with learning disabilities: individual differences associated with adoption level. Journal of Learning Disabilities, 29, 461-484. Basham, J. D., Israel, M., Graden, J., Poth, R., & Winston, M. (2010). A comprehensive approach to RTI: Embedding universal design for learning and technology. Learning Disability Quarterly, 33, 243-255. Basham, J. D., Lowrey, K., & deNoyelles, A. (2010). Computer mediated communication in the universal design for learning framework for preparation of special education teachers. Journal of Special Education Technology, 25, 31-44. Blackorby, J., & Wagner, M. (1996). Longitudinal postschool outcomes of youth with disabilities: Findings fromthe National Longitudinal Transition Study. Exceptional Children, 62, 399-413. Bouck, E. C., Doughty, T. T., Flanagan, S. M., Szwed, K., & Bassette, L. (2010). Is the pen mightier? Using pentop computers to improve secondary students' writing. Journal of Special Education Technology, 25, 33-47.

189 Brown, C. (1987). Computer access in higher education for students with disabilities. Washington, DC: Fund for the Improvement of Postsecondary Education, U.S. Department of Education. Retrieved from http://www.htctu.net/publications/ articles/cahe/cahe.htm Burgstahler, S. (2003).The role of technology in preparing youth with disabilities for postsecondary education and employment. Journal of Special Education Technology, 18, 7-19. Collins, A., & Halverson, R. (2009). Rethinking education in the age of technology: The digital revolution and the schools. New York, NY: Teachers College Press. Retrieved from http://ocw.mit.edu/courses/media-arts-and-sciences/mas-714j- technologies-for-creative-learning-fall-2009/readings/ MITMAS_714JF09_read03_coll.pdf Collins, T. (1990). The impact of microcomputer word processing on the performance of learning disabled students in a required first year writing course. Computers and Composition, 8, 49-68. Cullen, J., Richards, S. B., & Frank, C. (2008). Using software to enhance the writing skills of students with special needs. Journal of Special Education Technology, 23, 33-44. Cutler, E. (1990). Evaluating spell checkers, thesauruses, dictionaries and grammar editors for the community college student with learning disabilities. In H. J. Murphy (Ed.), Proceedings of the Fifth Annual Conference on Technology and Persons with Disabilities, 5, 163-175. Elbro, C, Rasmussen, I., & Spelling, B. (1996). Teaching reading to disabled readers with language disorders: A controlled evaluation of synthetic speech feedback. Scandinavian Journal of Psychology, 37, 140-155. Higher Education Opportunity Act, 20 U.S.C. § 1001 et seq. (2008). Retrieved from http://www.nacua.org/documents/heoa.pdf Johnston, L., Beard, L. A., & Carpenter, L. B. (2007). Assistive technology: Access for all students. Columbus, OH: Pearson Merrill Prentice Hall. Lankutis, T. (2004). Special needs technologies: An administrator's guide. Technology & Learning, 25, 30-35.

190 Ludlow, B. L., & Fosha, J. D. (2007). Critical technology issues for school leaders/the universally designed classroom: Accessible curriculum and digital technologies. Journal of Special Education Technology, 22, 60-62. McInerney, M., Riley, K., & Osher, D. (1999). Technology to support literacy strategies for students who are deaf. Final report. Washington, DC: American Institutes for Research. Retrieved from http://www.bglad.org/literacystategies.pdf Mitchem, K., Kight, J., Fitzgerald, G., Koury, K., & Boonseng, T. (2007). Electronic performance support systems: An assistive technology tool for secondary students with mild disabilities. Journal of Special Education Technology, 22, 1-14. Mull, C. A., & Sitlington, P. L. (2003). The role of technology in the transition to postsecondary education of students with learning disabilities: A review of the literature. Journal of Special Education, 37, 26-32. Patton, C. M., & Roschelle, J. (2008, May 7). Why the best math curriculum won't be a textbook. Education Week, pp. 24-32. Raskind, M. H. (1994). Assistive technology for adults with learning disabilities: A rationale for use. In P. J. Gerber & H. B. Reiff (Eds.), Learning disabilities in adulthood: Persisting problems and evolving issues (pp. 152-162). Stoneham, MA: Andover Medical. Rose, D. H., Hasselbring, T., Stahl, S., & Zabala, J. (2005). Assistive technology and universal design for learning: Two sides of the same coin. In D. Edyburn, K. Higgiris, & R. Boone (Eds.), Handbook of special education technology research and practice (pp. 33-41). Skylar, A. A. (2008). iPod "teach": Increased access to technological learning supports through the use of the iPod Touch. Journal of Special Education Technology, 23, 45-49. Stodden, R. A., Conway, M. A., & Chang, K. T. (2003). Findings from the study of transition, technology and post secondary supports for youth with disabilities: Implications for secondary school educators. Journal of Special Education Technology, 18, 29-43. Trace Center. (1995). Principles of universal design. Madison, WI: University of Wisconsin - Madison, Trace Center.

191 Wehmeyer, M. L. (2006). Universal design for learning, access to the general education curriculum and students with mild mental retardation. Exceptionality, 14, 225- 235. Wehmeyer, M. L., Palmer, S. B., Smith, S. J., Davies, D. K., & Stock, S. (2008). The efficacy of technology use by people with intellectual disability: A single-subject design meta-analysis. Journal of Special Education Technology, 23, 21-30. Wehmeyer, M. L., Smith, S. J., Palmer, S. B., Davies, D. K., & Stock, S. E. (2004). Technology use and people with mental retardation. International Review of Research in Mental Retardation, 29, 291-33

192

Hit and source - focused comparison, Side by Side

Submitted text	As student entered the text in the submitted document.
Matching text	As the text appears in the source.