UNIT 7   AIDS, APPLIANCES AND INFORMATION AND COMMUNICATION TECHNOLOGY

Structure

7.1   INTRODUCTION

In our day to day life, we use different types of materials, tools and equipments, which are helpful in performing certain tasks and activities. For example, we use spoon to eat without spilling, wear pair of shoes or slippers to walk comfortably on a rough surface and carry bags to keep our belongings. These tools and equipments aid and provide us support to function independently. Some of the equipments are specific in nature. These are used for some specific purposes. For instance, spectacles are used to see clearly, wrist watch is used to read time and mobile phones are used to communicate. All such equipments become important part of our life. Similarly, persons with disability also require certain equipments to perform their day to day activities, which make their life easy and comfortable, help them to take care of themselves and to perform most of the tasks independently. Among these equipments, some of them are required for their daily needs or may be used occasionally for some specific purpose. Some of the equipments are manually and mechanically operated while some others are motorized and technology based. These enhance their social

acceptance and vocational competency and are necessary to lead a quality life. In this unit, you will learn about the aids, appliances and tools generally used by the students with disabilities.

7.2 OBJECTIVES

After reading this unit, you will be able to:

• explain the concept of 'aids', 'appliances' and 'Information and Communication Technology (ICT)';

• identify suitable aids and appliances for children with Sensory and Speech Disabilities;

• identify suitable aids and appliances for children with Neuro-Developmental Disabilities;

• identify suitable aids and appliances for children with Loco motor, Multiple and other disabling conditions;

• discuss 'ICT' as an aid for children with special needs.

7.3 CONCEPT OF AIDS, APPLIANCES AND ICT FOR STUDENTS WITH SPECIAL NEEDS

Aids

Aids refer to providing assistance, support, or relief to the needy to perform certain activities that may be necessary for his/her survival or may be to improve his/her life style. The aids may be of different kinds and nature. These aids may be financial, human assistance, services or in the form of materials, equipments and devices, which are necessary for a person to live with dignity in his/her own society. Providing an assistant or helper, monetary payment, teaching aids and facilitating to live in relief camp are a few examples of aids. Some aids are temporarily provided to a person to overcome a difficult situation, whereas some persons may require aids permanently throughout their life; for example, post earthquake a person may require an aid in the form of temporary accommodation in relief camp, whereas another person who lost his both lower limbs during the same earthquake may require physical assistance of a person and/or assistive devices like wheelchair permanently throughout his/her life for his mobility and to perform day to day activities. There are sources from where such aids can be obtained which include Central and State Government schemes, government organizations, private organizations or non-government organizations at local, national or international level.

Appliances

Appliances refer to the use or application of a technique and putting a technique into practice. There are machines and devices which are used as appliances to make our work easier. Refrigerators and washing machines are a few examples of electronic/electrical home appliances, which make our day to day activities easier. These appliances are used in the form of hardware and/or software that makes a particular function easier or possible to perform. A 'hand held magnifier' used by a child with low vision to read texts in a printed book is an example of a hardware appliance whereas the software appliance is software inbuilt or

downloaded in the computer/mobile to magnify the text/visuals. Thus, these device, system or design allows us to perform a task that we would otherwise not be able to do. It can increase the ease and safety in performing a task and assist in carrying out daily activities.

Information and Communication Technology (ICT)

Information and communication is the process where in the information is obtained and organized to be communicated to others. The form and structure of information is as important as the information itself, or else it would just be accumulated and cluttered. There are a range of technological resources available for handling, manipulation and communication of information such as television, satellite, video and telecommunication. Computer database and internet may have connections to global network. By using the facilities of the internet, it is possible for teachers and children to find information on almost everything and anything, access range of multimedia learning resources, communicate with others, contribute to group discussions, order different resources publish and obtain information for and from other people around the world.

7.4 AIDS, APPLIANCES FOR CHILDREN WITH SENSORY AND SPEECH DISABILITIES

In the previous units, you have learnt about sensory and speech disabilities, which mainly include children with visual disability, hearing and speech disabilities. As you know, vision and hearing are the important senses required to observe, attend and learn from what is happening around you. Both the senses provide a holistic understanding of the surroundings. Vision and hearing help in detection, discrimination, recognition and comprehension of the visual and hearing stimuli respectively. Any type of impairment in vision and hearing restricts as individual's exploration of the world around and creates problems in the learning process.

7.4.1 Aids and Appliances for Children with Visual Disability

Educational Devices

There are a number of educational devices available for children with visual disability. Some of them are Braille Duplicators and Writers, Writing Devices, Braille Paper, Talking Books and Tape Recorders, Reading Machines, Braille Computers, Mathematical Devices, Geography Devices and Science Devices.

(a) **Braille Duplicators and Writers:** *Thermoform Machine and* Vacuum Forming Machine are commonly used as Braille duplicators. 'Indutherm' is an indigenous semi-automatic Braille duplicating machine/thermoform machine. It is useful for taking out multiple copies of the Braille matter on the Indutherm (or Brillion) sheets from the master generally prepared on the Braille paper. This machine operates on the principle of vacuum and high temperature. Vacuum Forming Machine can also be used for taking out multiple copies of Braille matter.

(b) **Braille Writers** is an upward writing machine for writing on one side of the paper, enabling the Braille to be read as it is written. This machine can be compared to a normal type writer with a major difference that it has only nine keys, three for paper setting and six for embossing; the brailler embosses combinations of six dots in a Braille cell.

Fig: Brailler

(c) *Writing Devices***:** Children with visual disability require the complete *Braille Kit,* which contains the items like Braille Writing Frame, Braille Writing Pocket Frame, Rubber Sheet, Foot Ruler, Compass Set, Two Styli, Folding Stick or Abacus and Signature Guide which is in a Rexene coated wooden box. Among all these items, *Interline Braille Frame, Taylor Postcard Frame*, *Pocket Braille Frame, Styli, Braille Kit and Pragnya* Sketching Device are the famous writing devices used by the children with visual disability.

Interline Braille Frame is used for writing standard character interline Braille. The frame comprises a wooden board, a metal guide, a reversible paper clamp and a stylus. The clamp fits at the top of the board and has a small swivel stud for locking and holding Braille paper. When one side of the paper has been Brailled, the clamp with the paper still held, is turned over as a unit. The binding margin is made automatically.

Fig: Interline Braille Frame

Fig: Plastic File Type Braille Frame

Fig: Stylus-knob type

Fig: Stylus- Saddle type

Fig: Stylus-Flat type

Taylor Postcard Frame is used for writing small character Braille on one side of the paper. The corner pins are arranged in such a way that the Braille can be read without removing the paper from the frame; when the top section is lifted, the paper remains attached to it.

Pocket Braille Frame is a four-line pocket Braille frame that produces small character Braille on one side of the Braille paper. This is specially used for making small and occasional notes.

Styli are produced with handles of various shapes to suit individual needs. The points of all styli are made of stainless steel and the handles are of polished hardwood or synthetic material.

Pragnya Sketching Device enables a child with visual disability as well as one with low vision to create simple sketches and diagrams out of a thread. It is based on the principle of using acrylic thread as "writing ink" and nylon fabric fastener strips as a "writing slate".
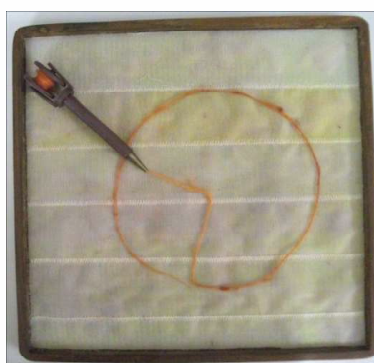
Fig: Pragnya Sketching Device

(d) **Braille Paper**: The Braille paper is used for embossing Braille dots on it. The standard size of Braille paper is 22"X28" and weight 8.6 kg. Per gross.

(e) *Talking Books and Tape Recorders*:

As Braille books are very heavy and many blind persons in recent years find it difficult to learn Braille easily, *talking books* have emerged to be the most viable alternative. The materials are recorded on cassettes/CDs/DVDs which are used for listening to the talking books.

Digital Tapeless Recorder is another invention for aural reading by the children with visual disability. It has a special voice prompt for the blind which includes a voice guide, easy research mode, volume adjustment and option for use of earphone.

(f) *Reading Machines*

Kurzweil Reading Machine and Optacon are the commonly used reading machines. Kurzweil Reading Machine is a portable optical scanner that reads type-set or type-written text and turns it into speech. *Optacon* is a book-sized electronic device with a movable camera, the size of a pocket knife and a tactile screen the size of a fingertip which presents a tactile image on an array of vibratory pins. The reader passes the camera over printed material with his right hand and his left index finger feels the vibratory respose of the image that the camera sees.

(g) Braille Computers

The basic features of Braille computer include *Braille Window, Keytone, EHG-BW/ 2-PIEZO and Versa-Braille II+. Braille Window* is the Braille-display for connection to all sorts of IBM compatible personal computers, *Keytone* is a portable information handling, word processor and computer access device that talks to its user and *EHG-BW/ 2-PIEZO* is a monitor and key board which provides the output in raised dots and can be conveniently used by the students with visual disability. *Versa-Braille II+* is recognized as a convenient Braille operating system. It can be used for editing, programming and word processing.

Fig: Braille Computer

Fig: Key board with Braille display

(h) Mathematical Devices

The commonly used mathematical devices include Taylor Arithmetic Frame, Arithmetic and Braille Writing Slate, Abacus, Talking Calculator, Primary Mathematics Kit, Compass Set, Spur Wheel, Geometry Mat and, Opisometer.

Taylor Arithmetic Frame has aluminum frame with star shaped holes with eight angles, thus allowing the double-ended metal types to be placed in different positions according to a set system. This frame is suitable for teaching arithmetic to children with visual disability.

Fig: Taylor Arithmetic Frame

Arithmetic and Braille Writing Slate has an Arithmetic frame on one side and a Writing slate on the other. It also has a reversible type clamp and two guide lines supplied with a wooden stylus.

Abacus: A simple instrument for performing rapid arithmetical calculations. It consists of a frame holding thirteen vertically arranged rods on which beads slide up and down. The beam supporting the beads is marked with a raised dot at each rod position and a raised bar between every third rod. The bars serve to indicate the decimal point and other units of decimal measure.

Fig: Abacus

Talking Calculator is an audible calculator in synthesized speech. It is useful for calculation. Inbuilt clock, alarm and calendar are its additional features.

Primary Mathematics Kit is specially designed for children with visual disability to comprehend mathematical concepts. It contains a plastic box, slide strips, number boards, fractional strips, Braille clock, geometrical shapes, geometrical figure tray, magnetic board, and geometrical devices.

Compass Set includes a foot ruler, a protractor and a set square in nylon and a spur wheel. It enables children with visual disability to use the same techniques as their sighted counterparts. The foot ruler and set square have embossed markings for their convenience. The compass has a removable component fitted with a toothed wheel for drawing embossed dotted lines on the reverse of the Braille paper.

Fig: Geometry set

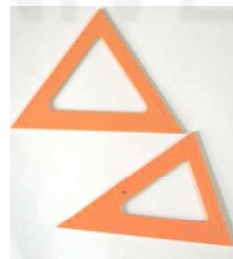
Fig: Compass

Fig: Compass

Fig: Set square

Fig: Protector

Spur Wheel is a serrated wheel revolving in a plated metal handle. It is used for making continuous embossed lines on the reverse side of the paper. *Geometry Mat* is a sheet of rubber for use as a base in conjunction with the spur wheel and Braille paper for making geometrical drawings.

Fig: Spur Wheel

Opisometer has a bell, which rings each time the disc moves a distance of one meter. It is useful for mapping and understanding mathematical problems in length and perimeter.

(i) *Geography Devices include devices like Sensory Quill, Raised Relief Plastic Maps, Relief Globes and Braille Diagram Board.*

Sensory Quill is equipment for obtaining a raised line format of any writing or drawing. The height and texture of the line can be altered.

Raised Relief Plastic Maps are vacuum formed plastic maps printed in strong colours with names in letterpress for the benefit of students with low vision. The main towns are shown by large dots and principal rivers by depressions. Braille symbols denote the names of seas, main rivers and towns, a key to which is given in the guide. The boundaries on political maps are indicated by raised lines.

Fig: Raised Map on Braille paper

Relief Globes are plastic globes in textured relief. The land masses are shown in different colours. The principal towns are indicated by raised dots; rivers and lakes by depressions. Dotted lines indicate the tropics, Arctic, and Antarctic circles, the International Date-Line and meridians. The names of oceans and the main land are shown in Braille.

Fig: Typographic Relief Globe

Braille Diagram Board has a metal sheet fixed on a board with closely formed holes in which round headed pins are stuck to form maps and diagrams.

Fig: Braille Diagram Board

(j) Science Devices

In science devices, Conductivity Apparatus demonstrates the difference in the heat conductivity of copper and iron. It consists of a wooden stand with horizontal heating rods. The *Three Dimensional Raised Relief Plastic Charts* are made with rigid Polyvinyl Chloride (PVC) sheet, printed and formed in multi-colours. The charts are available for B*otany general, some of* which includes typical plant cell, plant meiosis, plant mitosis, Ribonucleic Acid, Bacterial forms, Spirogyra and Funaria - common Moss in Botany whereas *Botany advance* depicts fertilization, T. S. dicot leaf, dicot stem, types of placentation. *Zoology charts have v*ertebrate and invertebrate; charts on *Human Physiology and Human Body Systems* include human skeleton, circulation system, heart, and nervous system, a section of the brain, muscles, digestive system, the ear, the nose, and the eye. *Human Reproduction* includes male and female reproductive organs, fertilization and foetus.
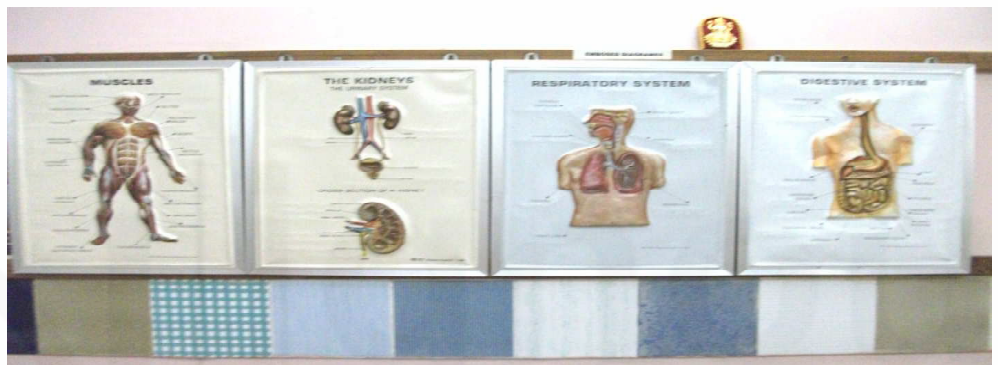

Fig: Three Dimensional Raised Relief Plastic Charts on Human body system

Mobility Devices

Canes are the most popular and cost effective mobility devices used by students with visual disability. *Symbol/folding Canes* are made of sections of light metal tubing, generally aluminum or its alloys, joined through the center by means of an elastic cord. The canes fold up conveniently for carrying in the pocket or handbag. When required for use, the top section is held and others automatically fall into position. *Long Canes* are wooden or aluminum stick of 85 to 90 centimeters. Three models, i.e. rigid, two pieces, and four pieces are available. The aluminum cane is generally sleeved with PVC material, having a rubber grip and a nylon tip with or without a crook.

Fig: Long cane   **Fig: Folding cane**

Electronic Travel (ET) Devices send out signals to sense the environment within a certain range or distance, processes the information received and furnish the student with relevant information about the environment. Most of these devices are based on integrated circuits and emit sound or tactile signals.

Fig: Smart cane

Daily Living Devices

Daily living devices are helpful for students with visual disability to perform day to day activities independently. Adapted clocks and watches, games and puzzles, sports materials, kitchen equipment and some personal devices are frequently used by the students with visual disability in their daily life.

a) **Clocks and Watches:** *Alarm Clock, Travel Alarm Clock, Pocket Watch, Ringer Timer, Wrist Watch and the Talking Time are the well known devices among students with visual disability. Alarm Clock:* Standard alarm clock is adapted for students with visual disability. It has strengthened hands and an open plastic dial having the hour positions indicated by two raised dots at the 3, 6, 9, 12 positions and single dots at the remaining hours.

Fig: Wrist watch

(b) **Games and Puzzles:** For indoor and outdoor activities of games and sports, different types of games and sports materials have been adapted and developed for the use of students with visual disability. *Playing Cards, Chess, Dominoes, Brahma Puzzle, Audible Ball, Draught Board are some of the play materials for students with visual disability.*

Fig: Chess board

(c) Sports: sports materials like *Football, Basket Ball and Soccer Ball* are equipped with a small electronic beeper which is battery powered and emits a compact sound. The beeper is held within a moulded cavity designed for easy access to 'on & off' switch. *Cricket* can be played using the audible plastic ball. *Table Tennis* has become a popular in-door game for students with visual disability. The ordinary table tennis table with some modifications in the net and the sides can be used for the purpose.

(d) Kitchen Equipment: for the students with visual disability, kitchen equipments of daily use as per the needs of the student can be modified or adapted. *Egg Poaching Rin, Measuring Jug, Bread Cutting Box, Liquid Level Indicator, Self Adhesive Labels are few examples of adapted kitchen equipments.*

(e) Personal Devices: Devices like *Notex, Signature Guide, Address Templates, Light Probe, Location Finder etc. are very useful for students with visual disability. Notex* consists of a rectangular base and flaps made of high-density polythene hinged together. It differentiates Indian currency notes of different denominations. It considers length and breadth of a currency note for its differentiation. *Signature Guide is a* template to guide the visually impaired students in placing signature in proper position on letters, cheques etc. *Address Templates* are made of cardboard with four raised lines to guide a visually impaired students to write his/her address on Inland letters and envelopes. *Light Probe* is full function light detector may be adjusted for desired sensitivity to light. *Location Finder* helps in finding your house, apartment, or office easily with portable, light weight location finder. A siren, attached outside location, will sound on pressing transmitter attached to a key chain.

Fig: Notex, a wristband to help the blind identify notes

Fig: Braille Slate with Signature Guide

Activity I

1. Distinguish between aids and appliances

2. Interact with a student with blindness studying in class VIII. Identify his/her educational needs for aids and appliances. Find out the sources, from where such aids and appliances can be obtained for the student.

Low Vision

Low vision of the students interferes in their learning. They may have varying degrees of visual limitations. They should be encouraged to use their residual (remaining) vision. They may read standard print or enlarged print. Some students with low vision try to avoid using print as they find it laborious. Some may

even prefer to use Braille for reading and writing. Students with low vision require some reading aids. They may require some environmental modifications in colour, illumination, contrast, print size, spatial relations and time. Modifications in the environment can be made for a low vision child by reducing glare through various means like appropriate placement of mirror, window and/or wall treatment for reducing the source of glare, using filters or Tints that limit the amount of light, visors or aperture limit the size or directions of light bundles entering the eye, table lamps with regulator, reading stand, typo-scope and materials in contrast colour etc. They may also require one or several low vision devices.

Low Vision Devices: optical devices which use lenses to magnify objects and non-optical devices and techniques which make objects easier to use are two main types of low vision devices. **VTS Link** is a portable large print computer and work station, specially designed to meet diverse needs of students with visual disability. It provides people with low vision with the most comprehensive solutions to computer access available today. It features a custom-made high contrast flat display screen which presents a sharp clear image of character up to 75 mm. **Visualtek**: Closed circuit TV magnifying system magnifies up to 60 times the normal size with wide variation of light intensity and both positive and negative images.

Magnifying Lenses: have many applications other than reading: they make everything bigger and brighter. The different models of magnifier lenses are *Mounted Magnifying Lens, Flexible Arm Illuminated Magnifier, Magnifying Binoculars, Book Magnifier, Illuminated Magnifier, Paperweight Magnifier, Super Loupe, Eye Loupe, Head Loupe, Flashlight Magnifier, Fresnel Wallet Magnifier, Pocket Magnifier, Rayner Recumbent Spectacles, Superscan Reading Glasses, Windsor Spherical Magnifiers, Stand Magnifier, Hand Held Magnifiers, LCD Projector etc.*

Fig: Low Vision Devices   Fig: Visualtek
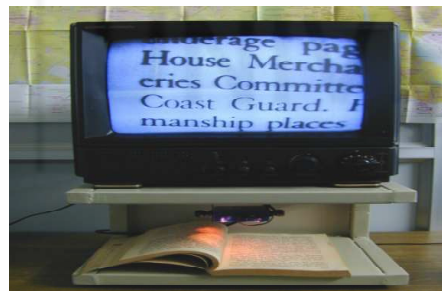
Activity II

1. Interact with a student with low vision and make a list of devices he/she is using for his/her daily activities.

2. Prepare a worksheet on simple two digit addition for a child with low vision studying in class III.

7.4.2 Aids, Appliances for Children with Hearing Disability

Hearing Aids

You have learned that children with hearing disability may have different degrees of hearing loss and they experience a range of limitations in communication with

others in the society, due to which, they try to explore different communication options. Some of them may prefer to communicate through oral expression i.e. speech reading or lip reading, called 'Oralism'. In Oralism, listening (aural) and speaking (oral) are considered to be the primary modes of communication and sounds are required to be amplified for a child with hearing disability (HD). Children with profound hearing loss usually prefer to use Sign Language to communicate. Each country has its own sign language. For example, the Indian Sign Language (ISL) is used by Indian children. Sign languages are natural languages and evolved out of the need of members of a community to interact and communicate with one another. Like all other languages, ISL also has its own grammar, but, not the same as that of other languages. ISL is considered to be the primary or first language of the child with HD. The 'verbal' or 'spoken' language of the hearing society (Hindi and English) is considered to be the second language and taught through the medium of ISL. This is known as Sign Bilingualism. However, children with different degree of hearing loss opt for total Communication approach for better communication with others in the society. Total communication includes the use of hearing aids, lip reading and the Indian Sign System (ISS). The ISS is not a natural language. It does not have its own grammar. It uses the signs of ISL and follows the grammar of a spoken language. ISS is becoming a powerful tool for teaching and learning a spoken language in a grammatically correct way in the inclusive classroom. Children with hearing disability may also explore using Alternative and Augmentative communication (AAC) with aided or unaided approach i.e. signing and body language without any use of equipment or use of an external tool e.g. Pictures and communication boards, speech generating devices etc. More about use of AAC is discussed in the next section.

As per the degree of hearing loss in children, the hearing aids are prescribed after testing the extent of hearing loss. There are different types of individual hearing aids like *Pocket Model, Behind the Ear (BTE), In the Ear (ITE), Spectacle Type and Bone Conduction (BC) hearing aid.*

*Pocket Model of hearing aid is w*orn in a pocket or harness at chest level. It consists of the body of the hearing aid containing the microphone, amplifier and controls. A cord transmits the electrical output to a receiver, which converts this signal into sound. The receiver is attached to a mould, which holds it in place. **Solar Battery Charger for Body Level Hearing Aids** Solar Battery Charger for these Hearing Aids is developed under Mission mode project scheme funded by Ministry of Social Justice and Empowerment (SJ&E) Government of India.

Fig: Pocket hearing aid

Behind the Ear (BTE) is worn behind the ear. It 'hooks' over the pinna. It is attached via plastic tubing to an ear mould, which holds it in place in

the ear. BTE hearing aids are more expensive to buy and maintain. They are small and thus easy to wear for children.

Fig: Behind the Ear hearing aid

In the Ear (ITE) The complete hearing aid is in the ear or ear canal. The hearing aid is housed in a hard plastic shell which is often custom made by taking an ear impression. In the ear and in the canal hearing aids also provide advantages of binaural amplification. They are expensive and not worthwhile for children because the entire hearing aid will need to be re cased if the size and shape of the ear changes. In- the- canal hearing aids fit in the ear canal and make use of the natural resonant properties of the external ear.
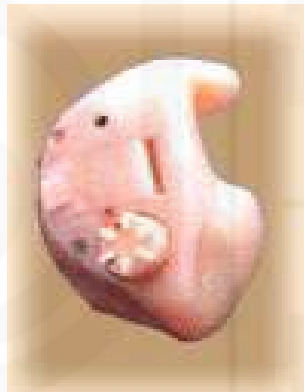
Fig: In the Ear hearing aid

Spectacle Type of the hearing aids is incorporated within a spectacle frame. It is useful for persons who require glasses along with hearing aids.
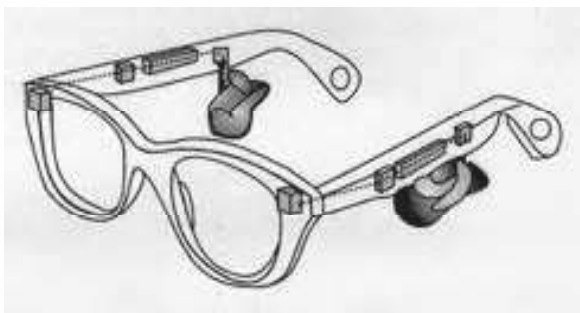
Fig: Spectacle Type of the hearing aid

Bone Conduction (BC) hearing aid is used when the ear canal is blocked or in cases where conventional amplification as described above cannot be given. BC vibrator is placed on the mastoid bone behind the ear. It converts the amplified electrical signal into vibrations.

Fig: Bone Conduction (BC)
hearing aid

Fig: Bone conduction
spectacle hearing aids

Activity III

1. Make a labeled diagram of the different parts of a hearing aid and explain how it works?

2. Interact with the mother or father of a child with hearing disability using hearing aid and find out the way they take care of the hearing aids of their child

Communication Aids

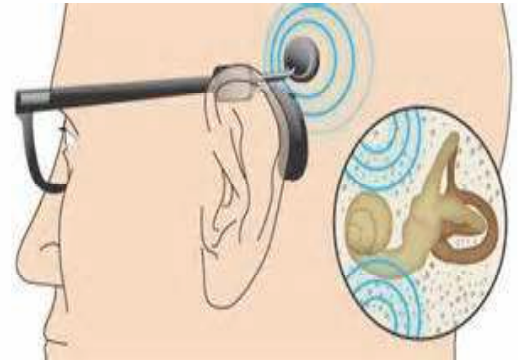To facilitate better communication, different forms of communication aids with latest sound enhancement technology systems are used, which assist in the reception of sounds. Eg. Personal and group hardwire systems, infrared systems, loop induction systems and frequency modulation systems. In these systems, microphones pick up sound (incoming) and convert it into another form of energy. An amplifier then increases the intensity of this signal. Lastly a receiver converts the amplified signal back into acoustic (sound) energy so that the person with hearing disability can hear it.

Speech Trainer/Synthesizer

Speech trainer consists of an external microphone, amplifier and headphones. The instrument has volume and tone controls that can adjust the intensity of the output signal. This can be done separately for both the ears.

Fig: Speech Trainer

Fig: Speech Synthesizer

Induction Loop Systems

In Induction Loop Systems the amplified electrical signal is made to run through a loop of wire which may be enclosed in the walls of the room or worn as a neck-loop by the user. The electromagnetic field generated around the wire

can be picked up by the hearing aid kept in 'T' (telecoil) position and reconverted to amplified sound which the child with hearing impairment can hear. These systems have been installed at ticket booking counters of railway stations in some of the major cities of India. This would enable the child with hearing disability to hear announcements made over the microphone without being disturbed by the noise. The listener would have to wear his own hearing aid and set it to 'T' position. Induction loop systems are also used in schools, where children with hearing disability are studying.

Fig: Induction Loop Systems
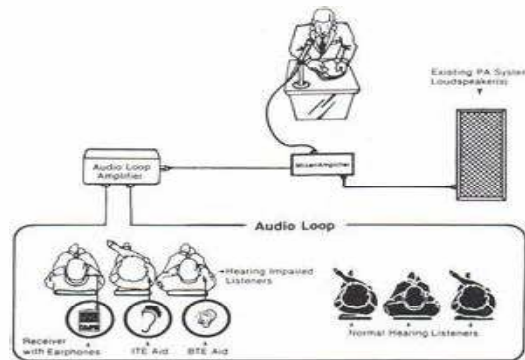
Fig: Induction Loop Systems in classroom

Group Hearing Aids

Fig: Group Hearing Aids

Group Hearing Aids are generally used in classrooms where children with hearing disability are studying. The teacher has microphone. The amplified signal is fed to earphones worn by the children sitting at their desks. Each earphone headset has a volume control adjustment on it or on the desk. There are microphones fixed to the desks so that whatever is spoken by one child can be heard by the others.

Frequency Modulated (FM) Systems

FM Systems are probably the best systems to combat the effects of noisy environment. The sound signal is picked up by the microphone (used by the person speaking) amplified and converted into a radio frequency modulated carrier waves. They are transmitted to a personal receiver worn by the child with hearing impairment. The receiver converts the signal to audible sound.

Fig: Frequency Modulation System

Infrared Systems

In Infrared Systems the sound picked up by the microphone is converted into infrared light waves, which are then dispersed throughout the listening environment. A special receiver is worn by the listener, which converts these light waves' back to sound.

Fig: Infrared hearing loop systems

Text Telephones/Telephone devices/Teletype writers

Both parties communicating must have the instrument. One child types the message. The signal is transmitted through the telephone line and displayed on the screen of the person receiving the message. With the sms facility in mobile phones today, communication of children with hearing disability using phone has become natural, easy and inclusive.

Fig: Text phones

Activity IV

1. Enlist various communication devices helpful for the child with hearing disability.

2. Differentiate between individual hearing aids and group hearing aids. Explain the suitability of both types of aids as per the context and environment.

Check Your Progress I

Notes : a) Write your answers in the space given below.

b) Compare your answers with those given at the end of the unit.

1) What do you understand by a manually operated Braille writer and mechanically operated Braille writer?

....

....

2)   Differentiate between individual hearing aids and group hearing
      aids?

      ....

      ....

      ....

7.5   AIDS, APPLIANCES FOR CHILDREN WITH NEURO-DEVELOPMENTAL DISABILITIES

Children with neuro-developmental disability include those with cerebral palsy
and other movement disorders, autism spectrum disorder, intellectual disabilities
and all other disabilities caused by malfunctioning of central nervous system.
In this section, we will focus on the aids and appliances particularly used by
children with cerebral palsy, because the range of aids and appliances used
by these children covers majority of the aids and appliances used by other groups
of children. The aids and appliances frequently required and used by these
children can be grouped into following categories:

Mobility Devices

Some children with cerebral palsy require assistance in their mobility from one
place to another. They may require wheelchair, tricycle, crutches or other walking
or mobility aids to support them in their movement. Other than this they may
require orthotics aids, which are an external support or brace worn or applied
to the body e.g. hand splint, lower limb cast, and neck support/brace. Some
people living with disability will find that the use of orthotics will aid them in
walking, standing, using their hands more effectively or positioning their body
more comfortably.

Fig: crutches, walker and wheelchair   **Fig: Tricycle**

Fig: Hand splint   **Fig: Ankle Foot Orthosis**

Positioning Devices: Seating, Standing, Walking

Sitting is an essential position in all of our lives. Children living with a neuro-
developmental disability can find sitting in standard chairs difficult, especially when

using that chair many times a day. There are many seating aids available to help to position the child comfortably and to make getting in and out of the chair easier. These can include corner chairs, high chairs, side lyres, wedges, stools and the use of belts and harnesses. Specialized seating like custom moulded seating and accessories for wheelchairs, cars etc. may also be required by such children. In school, chairs and tables may be adapted as per the need of the individual children as special aids and equipment to support them in attending school and participating in activities. Some children with cerebral palsy are unable to stand independently. Standing frames provide support to enable such children to participate in a variety of activities. The use of walking equipment can assist them by improving their balance and stability. It can also help improve their confidence in walking. There are many different types of walking aids available from simple walking sticks and crutches, to walking frames that provide more substantial support.

Transfer and Transport Devices

Some children with cerebral palsy need assistance to move from one position to the next, for example, from their wheelchair to their bed. Others are unable to stand so a hoist may be needed to assist them in moving around. A range of equipments like stretcher, strollers etc. are available to help in transferring depending on individual need. Strollers are usually used for children under five years of age having motor disability and can assist in transporting the child comfortably and with ease. The safest way to travel in a vehicle is to sit in the standard passenger seat and use the standard vehicle restraints e.g. seat belt. There are many options available including specialist car seats, safety harnesses, booster seats and seat-belt covers. As children, get older, it can get harder to transfer them in and out of a car seat and they may need to use a wheelchair for travel. This may require a vehicle to be modified.

Fig: Accessible Vehicle for Wheelchair user

Communication Devices

Communication aids are used by those with a wide range of speech and language impairments, including congenital impairments such as cerebral palsy, intellectual impairment and autism. A terminology, which is wider in use, is Alternative-Augmentative Communication (AAC). AAC is the term used to describe a broad range of communicative behaviours and methods which support and enhance the speech attempts of individuals who are unable to speak clearly. This communication system is designed to supplement or replace an individual's speech. Children who have limited or no speech or who have difficulty in understanding others typically use some or several forms of AAC. Young children, who are slow to develop communication skills, can be trained to use AAC. An AAC aid is any device, either electronic or non-electronic, that is used to transmit or receive messages. Use of AAC will assist the individual to take

part in everyday life, such as in school AAC systems include signing and gestures, communication book like "About Me", picture dictionaries, daily and weekly schedules, communication boards or books with pictures, objects and/ or messages, alphabet board and speech generating devices etc.

Fig: Communication book

Some people worry that if their child uses AAC, especially a speech generating device, they might not learn to speak or that they might "forget" to use speech altogether. However, research studies demonstrate that children who are slow to learn to speak actually benefit from using alternative ways of communicating, such as a speech generating device. Individuals with more severe forms of cerebral palsy may simply find talking just too difficult. AAC, such as a speech generating device, will help them to communicate effectively even if they are not able to speak.

Activity V

1. Differentiate between mobility aids and positioning devices. Draw diagrams of different mobility aids and positioning devices

2. What do you understand by AAC? Develop a communication book for a child with cerebral palsy with theme pages on 'my school', 'my home', 'my family', 'my daily routine' and 'my food habits'.

Speech Generating Devices

There are several different types of speech generating devices. Some are very simple switches with short pre-recorded messages. Others are more highly sophisticated speech generating devices that contain options for environmental control unit, access to the web, emails and other social media.

Fig: Electronic Communication book   Fig: Electronic Speech Generating Device

Speech generating devices displays may include pictures or words. The devices are activated through directly touching the screen or writing a message on a keyboard.

Daily Living and Household Activities Devices

Many people living with neuro-developmental disability need assistance with everyday household tasks. Aids and equipment are available that can support them in doing everyday household tasks such as cooking, making a drink, cleaning, laundry and shopping. This equipment can vary from scissors, clocks and timers, reaching and turning aids, to trays, protective clothing and trolleys and bags. There is a variety of equipment available to assist people who have difficulty eating, drinking, toileting, bathing, dressing and grooming activities. Adapted aids and appliances are mostly used in performing these day to day activities. Examples of this are cutlery with larger handles, slip resistant mats, cups with two handles. Toileting and Bathing Aids include toilet aids, rails, bath mats, shower seats, commodes and change tables which makes the washroom accessible and used safely and with ease.

Fig: Different Daily living and household activities devices

Computer Software and Accessibility

Computers are part of our everyday life. There is a variety of assistive technology available to support in using computers including specialised keyboards, desks and workstations, mouse and joysticks, tablets and smart phones, mouth-sticks and pointers, eye gaze control and touch screens.

Switches and Mounting

There is a range of switches and mounting equipment available which support people living with a disability who use a variety of electronic devices and other equipment in their everyday tasks. Using the right switch and/or mounting device are important for ergonomics, visibility and accuracy of access as well as to prevent damage to the device from being dropped.

Fig: Switches   **Fig: Switches**

Fig: Door activation switch instructions

7.6 AIDS, APPLIANCES FOR CHILDREN WITH LOCO MOTOR, MULTIPLE AND OTHER DISABLING CONDITIONS

Children with loco motor disability may have disability of the bones, joint or muscles leading to substantial restriction of the movement of the limbs. Some common conditions are poliomyelitis, cerebral palsy, and amputation, injuries of spine, head, soft tissues, fractures and muscular dystrophy. The child may not be able to raise both the arms fully or may not grasp objects or absence of any part of the limb or may have difficulty in walking. Children with loco motor disability generally require aids for positioning of their body or body parts, lifting and transferring and for mobility. These aids and appliances have been discussed in the earlier section 7.5. The aids and appliances available for the persons with loco motor disability include orthotic devices, prosthetic devices, and rehabilitative devices. The orthotic devices primarily include ankle foot orthosis (AFO), knee ankle foot orthosis (KAFO), hip knee ankle foot orthosis (HKAFO), reciprocating gait orthosis (RGO), and smart walker orthosis (SWO). Prosthesis is an artificial extension that replaces a missing body part. Prostheses are typically used to replace parts lost by injury (traumatic) or missing from birth (congenital) or to supplement defective body parts. In addition to the standard artificial limb for every-day use, many amputees have special limbs and devices to aid in the participation of sports and recreational activities. Rehabilitative mobility aids like wheelchair, crutches, tricycle and walker, surgical foot wears like special shoes, devices for daily living like adapted utensils, writing aids, items used in washrooms etc are recommended for such children as per their individual disability. Motorized tricycles and wheelchairs are provided for children with severe disability, quadriplegic, muscular dystrophy, stroke or any other person with similar conditions, where either three/four limbs or one half of the body are severely affected. Children with multiple disabilities and other multiple conditions may also require mobility devices, positioning devices, transfer and transport devices, communication devices, educational aids, hearing aids and daily living and household activities devices. These aids and appliances have been discussed in detail in different sections of this unit.

Children having intellectual disability, without any additional disabilities can be taught in natural environment using the material that other children use. The teacher should keep in mind that they need repeated instructions and step by step teaching. Adaptations in the existing equipment are used in work situations to enhance their employability. To name a few, instruments such as electronic

weighing machines that have a sound and light indicator for perfect weights, protective barricades in printing machine and baking units to prevent accidents, calculators and digital watches to make it easy to see time and do calculations and so on. An innovative teacher can adapt existing material to meet the specific need of a student with intellectual disability.

Activity VI

1. Interact with a child with cerebral palsy using computer and find out the ranges of adapted hardware and software he/she is using comfortably to operate it.

2. Differentiate between orthosis and prosthesis? Draw the labeled diagrams of five orthotic and five prosthetic devices with their explanatory notes.

3. List different mobility and positioning devices for an inclusive classroom.

7.7 FACILITATING TEACHING - LEARNING THROUGH ICT

In the new millennium, online teaching and learning has become the most prevalent way of presenting the up-to-date information to children in the quickest, most flexible and innovative ways possible. ICTs transform educational dynamics by providing alternative sources of information, which requires teachers to become facilitators and, in some cases, intermediaries between specific information sources and a child.

ICTs used as a learning tool have prompted a new dimension of education and launched the transformation of the educational approaches. A variety of technologies are utilized to facilitate learning and interaction between children. For example, asynchronous and synchronous communication and collaboration tools (e-mail, bulletin boards, whiteboards, chat rooms, videoconferencing, and teleconferencing), interactive elements (simulations, immersive environments, and games), various testing and evaluation methods (self-assessment, multiple choice testing, etc.). Educational content is presented in various media i.e. text on a website, multimedia, such as digital audio, digital video, animated images, and virtual reality environments. This content can be created in a multiple ways, utilizing a variety of tools. ICT application brings a variety of new teaching and assessment strategies for students with different educational needs. The educational needs of children with disabilities are vastly diverse. Though specific applications of ICTs are extremely diverse and varied, they may be grouped into compensatory, didactic and communication uses.

Compensatory Uses

ICT can recoup or substitute the lack of natural functions. For example, if a child has motor disability he may be helped to write, or to read if a person has a visual disability. ICTs develop the child's ability to control the environment, make choices about their experiences, support problem-solving, give access to information, and thereby enhance communication with others both in the immediate environment and around the world.

Didactic Uses

ICTs can be used as a didactical tool in order to enhance learning of children. A particular concept can be made easily available through ICT for a child to drill and practice. The didactic use of ICT facilitates learning of children with diverse needs, differences, and abilities.

Communication Uses

Technologies can mediate communication with people with disabilities. Assistive devices and software to meet the needs of students with definite communication difficulties are specific to every disability. We talk about the computer as a resource that eases and makes the communication possible. It allows a child with communication disorders to exhibit his/her abilities in a more convenient way, or children with motor and communicative disorders to start communication, show their needs and make their demands.

National Policy on Information and Communication Technology (ICT) In School Education (2012) has specially articulated national policy on ICT for Children with Special Needs under its section 4.6, which recommends that use of ICT will catalyze the cause and achieve the goals of inclusive education in schools. The ICT software and tools should be made available to facilitate access to persons with disabilities. Screen readers, Braille printers, etc. will be part of the ICT infrastructure in all schools. Special care should be taken to ensure appropriate ICT access to students and teachers with special needs. All teachers should be sensitized to issues related to students with special needs and the potential of ICT to address them. All capacity building programmes should include components of ICT enabled inclusive education. All web based interfaces developed for the programme including digital repositories and management of information systems, should conform to international guidelines for accessibility. Accessibility norms should be adopted as per the World Wide Web consortium, W3C guidelines (Web Content Accessibility guidelines, http://www.w3.org) to enable the content to be accessed by children with special needs. Web based digital repositories with W3C compliance should address the lack of availability of resources for persons with disabilities. Digital content and resources, for the exclusive use of persons with disabilities, talking books for example, should also be developed and deployed.

Check Your Progress II

Notes : a) Write your answers in the space given below.

  b) Compare your answers with those given at the end of the unit.

3) Differentiate between mobility devices and positioning devices.

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4) What do you understand by Alternate Augmentative Communication?

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7.8   LET US SUM UP

Aids refer to providing assistance, support, or relief to the needy to perform certain activities which may be necessary for his/her survival or to improve his/her life style. Appliances refer to the use or application of a technique and putting a technique into practice. There are machines and devices which are used as appliances to make our work easier.Information and communication refers to the fact that once information has been obtained and organized, it may need to be communicated to others. There are a range of technological resources available for handling, manipulation and communication of information such as television, satellite, video and telecommunication. Computer database and internet may have connections to global network.

Aids and appliances for children with visual disability include educational devices, mobility devices, daily living devices and low vision devices etc and for children with hearing disability there are hearing aids, assistive and alarming devices and communication aids.

The aids and appliances frequently required and used by children with different neuro-developmental disabilities are mobility devices, positioning devices, transfer and transport devices, communication devices, daily living and household activities devices and mobility devices and children with Loco motor, Multiple and other disabling conditions may generally require aids for positioning of their body or body parts, lifting and transferring and for mobility. The aids and appliances available for the persons with loco motor disability include orthotic devices, prosthetic devices, and rehabilitative devices.

The applications of ICTs in education of people with special needs are extremely diverse, there are three main areas for their use – compensation uses, didactic uses, communication uses. In order to implement inclusion in education there is a need to create appropriate conditions for Children with Special needs (CWSN). The achievement of conditions for successful inclusion in all areas of education can be realized by means of providing for appropriate technological infrastructure, modification of the curriculum, training of teachers involved in providing inclusive education, and build in them the capacity to use ICTs. National Policy on Information and Communication Technology (ICT) In School Education (2012) has specially articulated national policy on ICT for Children with Special Needs, which recommends that use of ICT will be helpful in achieving the goals of inclusive education in schools.

7.9   UNIT END QUESTIONS

7.9.1 Differentiate between the followings:

    a) Aids and appliances

    b) Group hearing aids and induction loop system

    c) Long cane and smart cane

    d) Wheel chair and tricycle

7.9.2 Write Short notes on the followings:

    a) Educational aids for children with visual disability

    b) Communication aids for children with hearing disability.

    c) Mobility aids for children with loco motor disabilities.

d) Daily living assistive devices for children with neuro-developmental disabilities

e) Use of ICT in education of children with different disabilities.

f) If you have children with different disabilities in your class, what are the first few steps you will take in terms of use of aids and appliances/ ICT in your class?

7.10 ANSWERS TO CHECK YOUR PROGRESS

1. A manually operated Braille writers are the Braille frame, the Braille slate and the stylus, using these a child with blindness can write Braille on the Braille paper manually; whereas *a mechanically Braille Writer* is a Braille machine, similar to a type writer, enabling a child with blindness to type Braille using its nine keys, three for paper setting and six for Braille embossing.

2. Individual hearing aids are worn and used by an individual person. It consists of the body of the hearing aid containing the microphone, amplifier and controls. A cord/tube transmits the electrical output to a receiver, which converts this signal into sound. After assessing the hearing loss and residual hearing of a person, hearing aids are prescribed and undergoing a trial. *Group Hearing Aids* are used in classrooms for a group of children with hearing disability. The teacher uses microphone and sounds are amplified and received by the earphones worn by the children sitting at their desks.

3. Mobility aids assist children with loco motor disability in mobility from one place to another. For example, wheelchair, tricycle, crutches hand splint, lower limb cast, and neck support/brace etc. *Positioning devices* help to position the body/posture of the child in comfortable position in sitting, standing and lying down and in walking. For example, specialised seating like custom moulded seating and accessories for wheelchairs, cars, standing frames and walking frames etc.

4. Alternative-Augmentative Communication (AAC) is the term used to describe a broad range of communicative behaviours and methods which support and enhance the speech attempts of individuals who are unable to talk/speak clearly. An AAC aid is any device, either electronic or non-electronic, that is used to transmit or receive messages, which include signing and gestures, communication book and speech generating devices etc.

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