EFFECTIVE USE OF ASSISTIVE TECHNOLOGY FOR BETTER QUALITY OF EDUCATION OF STUDENTS WITH HEARING IMPAIRMENT

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Abstract : **Students with hearing impairment (SwHI) are different from each other due to their knowledge, thinking, ability and capability. Everybody can solve all impossible and difficult work within few minutes by using such appropriate technology. Technology can play a key role in assisting SwHI to lead an independent and productive life. Hearing aids are the most common technology used, other technology also designed to assist them in a variety of tasks in different settings like home, school or nearby environment and it is equally assisting SwHI with a variety of needs like health, safety and recreational needs. The technology often used by Pwd's referred as Assistive Technology. There are various assistive devices under the umbrella of assistive technology which helps in teaching learning process. This study "Effective Use of Assistive Technology for better quality of education of Students with Hearing Impairment" throws focus on the importance and appropriate utilization in the classroom of SwHI. The deployment of low tech to high tech devices like PECS, Speech to text, Speech to Sign softwares and Remote Interpreting services are the most benefit in the classroom for both students and teachers. This assistive technology should be used as per the need of the subject taught and must be pre-planned and arranged. Based on the requirement the teachers have to utilise the respective assistive devices best possible ways. An optimal plan of education with awareness campaign ought to be made to the SwHI and teachers about the Assistive technology and its uses for the teaching learning process and personal use as well.**

***IndexTerms*: - Assistive Technology, Assistive devices, Softwares, SwHI.**

Introduction:

Human beings are different from each other due to their knowledge, thinking, ability and capability. Everybody can solve all impossible and difficult work within few minutes by using such appropriate technologies which can be assists them in their daily life which can be give them better quality of life. When a hearing impaired child born in a society, in that case the child gets marginalization and exclusion from society due to his/ her some lack of ability in hearing and speech. When the child going to school most of time the child suffers in study due to problem in hearing and speech. For removing that barrier some specific assistive technology can be needed for getting better quality of life as well as education equal to as normal hearing student. (Rangasayee, R. (Ed.). 2006)

Hearing Impairment

According to The Rights of Persons with Disabilities Act, 2016 Hearing Impairment defined as: (a) "Deaf" means persons having 70 DB hearing loss in speech frequencies in both ears; (b) "Hard of Hearing" means person having 60 DB to 70 DB hearing loss in speech frequencies in both ears.

"Speech and Language Disability" means a permanent disability arising out of conditions such as laryngectomy or aphasia affecting one or more components of speech and language due to organic or neurological causes.

Challenged faced by SWHI in learning at classroom

As observed by the (Weber, 2011) the challenges are

- Limited ability of hearing
- Difficulty in language comprehension.
- The number of abstract concepts in lessons.
- Textbooks that are not in accordance with the characteristic language of HI students.

- Teachers' inability to simplify the sentences and teaching learning material.
- The inadequacy of specialized learning media to HI students.

Technology

Technology is the use of scientific knowledge for practical purposes or applications, whether in industry or in our everyday lives. So, basically, whenever we use our scientific knowledge to achieve some specific purpose, we're using technology. (Ramey, 2013)

Assistive Technology

"Assistive technology (AT) devices are any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain or improve the functional capabilities of Persons with a Disabilities". (IDEA, 2004)

Assistive technology is any device, software, or equipment that helps people work around their challenges. Some examples of assistive technology are text-to-speech and word prediction. Assistive technology includes low-tech tools, too, like pencil grips. (Emly, 2015)

AT Classifications by Techniques

According to (Baharammann, 2000 & Blackhursts, 2007) three types:

No tech:-where no aids are required and much of the assistance happens through adaptations in the existing service or activity

Low tech: - It does not involve the use of batteries or any technology

Ex: flash cards, static models, grippers, highlight tape, walking sticks, and standard wheelchairs etc.

Especially for students with hearing impairment: flashcards, picture chart, word chart and highlighter strips

Mid tech: - Mid tech involves usage of battery but no processing involved

Ex: electric and electronics applications operated by power like Talking aids, Light or vibrating alarms, Schedulers, Recorders and Players, etc.

Especially for students with hearing impairment: calculator, audio recorder, vibrating and alarm etc..

High tech: - High Tech involves devices involving batteries, processing involvement

Ex: computer access, assistive software and communication gadgets like mobile phones, tablets, play stations)

Especially for students with hearing impairment: computer, Mobile phone, and tablet, speech to text and text to speech, sign to text and text to sign.

Text to speech: the device which can be using for students with hard of hearing. In this case the text will be converted to speech.

Speech to text: Speech-to-text reporters provide a real-time translation of audio to people who are deaf. They type, word for word, what is being said with the text appearing in real time on a laptop or projector screen.

Sign to text and text to sign: this can be using through relay officer and relay machine. When a hearing impaired student making sign and the sign converts to text and vice versa.

Categories of assistive technology

According to National Institute of deafness and other communication disorder (NIDCD)

1. AAC devices

2. Assisted Listening Devices (ALDs)

3. Alerting Devices

1. AAC devices

Augmentative and alternative communication (AAC) devices help people with communication disorders to express themselves. These devices can range from a simple picture board to a computer program that synthesizes speech from text. (Sharon , 1997)

Augmentative and Alternative Communication – includes all forms of communication (other than oral speech) that are used to express thoughts, needs, wants and ideas in an aided way. No specific guidelines for the AAC Systems.

The Picture Exchange Communication System (PECS) is described by its authors as "a unique AAC training package developed for use with young children with autism and other social-communication deficits." (Frost & Brody 1994)

The Picture Exchange Communication System (PECS) is a system to assist people in communications who are unable to do so through speech. The system uses picture cards for communication. It is one method that a child with a severe speech disorder can use to indicate his basic needs and wants.

Choosing Symbols and Words

Pictures can vary in detail, colour, with/without background colour features. The picture style should suit the age, personal preferences and capability of the communicator to derive continuous abstracts from the style of abstract.

- Object choice board
- Visual Scene Display
- Topic Board
- Activity Board
- Story board
- Communication wallet/book
- PODD (Pragmatically Organized Dynamic Display)
- "School to Home" board
- Eye gaze frames or boards
- PECS (Picture Exchange Communication System

Types of AAC:

According to America speech language association AAC is two types. There are two main types of AAC these are:—unaided systems and aided systems. Children/Students may use one or both types. Most people who use AAC use a combination of AAC types to communicate.

Unaided Systems: These include gestures, body language, facial expressions, and sign language.

Aided Systems: An aided system uses some sort of tool or device. There are two types of aided systems basic and high-tech. A pen and paper is a basic aided system. Pointing to letters, words, or pictures on a board is a basic aided system. Touching letters or pictures on a computer screen that speaks for you is a high-tech aided system. Some of these speech-generating devices, or SGDs, can speak in different languages.

2. Assisted Listening Devices (ALDs)

Assistive listening devices (ALDs) help amplify the sounds to hear, especially where there's a lot of background noise. ALDs can be used with a hearing aid or cochlear implant to help a wearer hear certain sounds better. A hearing aid is a device designed to improve hearing by making sound audible to a person with loss. Hearing aids are different categories both individual and group; individual hearing aids are like pocket model, BTE, ITE, ITC CTC, Spectacle Hearing Aid, Cochlear Implant, Middle ear implant and brain stem implant.

Widely used classroom/group amplification devices for the purpose of teaching learning process are hard wired system, FM System, Loop Systems, Infrared Systems. These will help the SwHI in receiving better teacher acoustic signals in the noisy environment in the school. SwHI should be offered affordable classroom amplification device, which can be a prime and utmost priority in the classroom as assistive technology. These will help SwHI both receptive and expressive experience in the classroom. (NIDCD)

3. Alerting Devices

Alerting devices connect to a doorbell, telephone, or alarm that emits a loud sound or blinking light to let someone with hearing loss know that an event is taking place. Alerting devices can help people stay connected and safe every day and in emergency situations. They use one or more of these types of signals: Visual - a flashing light, Vibrotactile - a vibrating component, Doorbell signallers, Auditory - increased amplification and lower frequency sounds, Vibro-tactile Alarm clocks, Weather alert devices, Smoke, fire and carbon monoxide detectors. Apart from this many have extra loud alarms as well as flashing strobe lights, depending on the need.

There are doorbell signallers which work with or without an existing doorbell to make sure you know when someone is at the classroom door. There are also security signallers that alert you if a door or window is opened in school. Door signallers can range from a simple flashing strobe light to a system connected to the phone or one with its personal hearing aid. (NIDCD)

Uses of Assistive technology in the education of students with hearing impairment

It is very important to provide proper and appropriate education for the hearing impaired students for their better quality of life comparing to typically developed children. Today, it appears that using only traditional teaching methods is not sufficient for the education of hearing impaired students. The use of modern technology makes training for hearing-impaired students more useful. Make use of Assistive technology in the possible ways and appropriate times will contribute to the development of academic and linguistic skills of students with hearing impairment. (NIDCD)

Assistive technology

Assistive technology can be a key factor that enables individuals with disabilities to participate in daily life and be included in society (Schneidert, 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 students with hearing impairments life. Alternatively, technology seen as a visible sign of a disability can reinforce the stigma associated with the disability. Because students 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. But the teachers must be empowered the students about the usefulness and importance of the assistive technology for both education and personal life.

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 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. Although DHH students and their teachers report that the use of hearing technology is essential for ensuring effective inclusion, the equipment is sometimes used irregularly because of the stigma associated with assistive technologies.

Importance of Assistive technology in Education

The foremost point in Education for a child or person with disability in education is physical access to the place where the education and learning takes place. And, next comes the lack of resources in accessible format and the instructional methodologies to teach. For skill development, the involvement of classroom routines likes writing, reading, and communication, discussing, and playing also impacts. So, Assistive technology can provide,

- Access provisioning to educational environment
- Positioning, sustainability and environmental Control
- Educational resources in accessible Format
- Participation in classroom routines and contribute like their Peers
- Adapt assessment procedure to the abilities
- Enhances efficiency and higher education opportunities

For example, light alarms, Vibro alarms, sign boards, specific software's and mobile apps facilitate physical access to the educational environment. Adaptations in time table, text book, language, evaluation procedures, teaching strategies, teaching methods, teaching learning materials, accessible alarms, timers, schedulers, toilets, sensor based switches and equipment's help in positioning and continuity of activities. Resources in Accessible formats like Audio, Video, Interactive media, Speech to text, Text to speech, Speech to sigh and Sign to speech, simple and question & answer based model will help in learning process. Participation in Classroom routines like note taking, reading, writing, communicating, and project and assignment activities – will be easy for children with disabilities if allowed through Note Takers, Talking calculators, AAC, Simple Word processing Applications, Vocabulary, Sentence, Grammar, and Word prediction Apps in tablets or computers. Assessment procedures through Oral recordings, Computers, Simple communications, Adapted questionnaires like multiple choice questions will assist them to accomplish the tasks with their own abilities. (Netsel, 1982)

Conclusion:

Assistive technology helps hearing impaired students in many ways including for education and personal life, this technology made to them to survive easily in their daily educational routine. Through AAC devices and other assistive devices hearing impaired students can communicate with others and gets relevant information's to solve such kind of problem which can occurs in their classroom as well as outside. By using this assistive technology a hearing impaired students can be able to attempt all kind of challenges and it is helps to reduce the problems in daily living life in their education perspective.

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