

STUDENTS WITH HEARING DIFFICULTIES

Hearing Impairment and its Effects on Learning

According to the Individuals with Disabilities Education Act (IDEA), there are two types of hearing impairment: deafness, and hard of hearing. According to the Curry School of Education web site “Deafness means a hearing impairment which is so severe that the child is impaired in processing linguistic information through hearing, with or without amplification, which adversely affects educational performance.” On the other hand, “a person who is hard-of-hearing is one who, generally with the use of a hearing aid, has residual hearing sufficient to enable successful processing of linguistic information through audition.”

Hearing loss can have several different causes. According to About.com, the top 10 causes for hearing loss in children are as follows:

1. Prematurity
2. Other Pregnancy Complications
3. Cytomegalovirus (CMV) – this is pregnancy related cause and is similar to rubella in how it affects the fetus.
4. Otitis Media (ear infections)– this is the most common post-natal cause of deafness in children.
5. Meningitis – it is not the meningitis that causes deafness, but rather the drugs that must be prescribed to treat it.
6. Various Genetic or Syndromic Causes the most common of which is Down Syndrome
7. CHARGE Syndrome – this is a disorder that causes deformation of the head and face.
8. Waardenburg Syndrome – the connection between this disorder and deafness is unclear.
9. Treacher Collins Syndrome – like CHARGE, this is also a disorder that causes deformation of the head and face.
10. Unknown Causes, which account for nearly 53% of deafness cases.

It is often difficult to determine the degree of hearing loss in young children because the diagnosis relies mostly on subject feedback and young children tend to give less accurate results than older subjects. In the United States, we categorize hearing loss into four different degrees. Mild hearing loss (26-45 db) causes a slight difficulty in hearing speech, but can still have serious implications for speech development in young children. Moderate hearing loss (46-65 db) causes more pronounced difficulty in hearing speech. Severe hearing loss (66-85 db) is the level at which we begin to use the term “deaf” and causes a great deal of difficulty in hearing speech. With Profound hearing loss (85+ db), hearing aids may or may not help, but cochlear implants are often an option. Hearing loss can also be experienced at different degrees in each ear, a condition known as Unilateral Hearing loss.

The educational implications of hearing loss on a student are rather obvious. Hearing loss that occurs in early childhood nearly always affects speech development as well. In the classroom,

many teachers rely heavily on verbal instruction, using written materials only as supplements to their oral teaching. Hearing loss at a young age can also affect a student's learning to read. Most mainstream reading programs are based on letter and word sounds. The development of phonemic awareness in a deaf student would be challenging at best.

Adaptive and Assistive Tools

For hearing impaired students, there are many assistive devices and software programs that can benefit them in the learning process. Depending on the current need of the student, the devices can include interpreting, notetaking, assistive listening systems, voice to print technology and captioned educational media. Listed below are the different devices and how they assist students in learning:

- **Interpreting** – Providing an interpreter for a hearing impaired student allows the student to receive instruction through signing and/or cueing.
- **Notetaking** – Notetakers can receive specialized training in order to take notes from classroom instruction.
- **Assistive Listening Systems** – Depending on the severity of the student's hearing loss, incorporating audio loops or FM systems may be beneficial in the classroom.
- **Voice to Print technology** (realtime captioning) – Captioning information during classroom instruction that is viewable by students. Some examples include:
 - **CART** - Communication Access Realtime Translation allows someone to caption what is being said which is transferred to a hearing impaired student viewable on a small monitor.
 - **C- Print at NTID** – This technology is very similar to CART, however, it is not verbatim.
 - **Typewell** – Also similar to the C- Print system. A hearing transcriber uses a notebook computer with abbreviation software to transcribe meaning-for-meaning class lectures and discussions. Students read the transcription in real-time from a computer. Students can also type questions and comments to the transcriber during class, and even take their own notes on the reader computer.
 - **Viable Technologies** – In this voice to print technology a transcriber is not present in the classroom but listens to instruction in a remote location.
- **Captioned Educational Media** – This source of assistance was very limiting, however much more material is being captioned today. Examples of captioning include:
 - **Captioned Media Program** – Internet streaming has become a good source for this type of captioning.
 - **Captioned and subtitles DVD**
 - **Captioned television and web programming**
 - **Captioned educational software**

There are numerous educational software programs that have been developed for hearing impaired students depending upon their instructional needs. A few educational software programs that have been developed for hearing impaired students include the following:

- **Meet the Math Wiz** – A math software program with 5 CDs that uses voice animation and explanation in American Sign Language.
- **Rosie’s Wolf** – A literacy program with instruction for preschool/early elementary, middle, and high school students uses sign language.
- **Team Up with Timo** – Vocabulary software that was designed for the hearing impaired.

Justification for Using Adaptive and Assistive Tools

As listed above, there are many technological items that are necessary for students with hearing impairments. Without these items, some students might be falsely considered ignorant and foolish and yet they would not be able to understand the simple items that students without these disabilities take for granted. If students with these disabilities would have had these opportunities twenty years ago, we would have had more successful hearing impaired people from that time period. Therefore, with the advances in technology, all disabled individuals have a better chance of success.

One technological item that is a necessity for the beginning of the day is the television. During the morning announcements, it is important to visualize the announcements up on the board or put the information up on the TV screen that is in your room. It is necessary to have a television in every classroom. Not only does this help a hearing impaired student, it also gives the information to a person who is not hearing impaired and helps them if they miss an item over the intercom.

There are a few items that would be helpful for the teacher to have in their classroom to help communicate with hearing impaired students. An FM device called the Pocketalker would help these students. It is a device that magnifies the sound in the hearing impaired student's ear, but does not distract the other students. The teacher would wear a microphone and it would send a radio signal to the receiver that the student would hold. There are two ways of relaying the receiver to the student's ears. You can either plug in a set of headphones into the receiver or, in some cases, you can plug the receiver directly into the hearing aid. In the same manner, you can also use a ChatterVox. This uses a microphone in the same manner as a Pocketalker, but the speaker is strapped onto the belt of the teacher. This allows everyone to hear the magnified sound of the teacher and replicates a small megaphone. One more item that would help lip readers, would be to have a small video camera pointed at the teacher's lips. This would then be projected on a small laptop computer screen that the hearing impaired student is using.

Resources

- About.com - Hearing Loss Basics (<http://deafness.about.com/od/hearingbasic1/>)
- About.com - Parenting and Education (<http://deafness.about.com/od/growingupdeafhoh/>)
- About.com – Classroom Accessibility (<http://deafness.about.com/od/education/a/classroomaccess.htm>)

Note: These About.com pages have excellent links to many articles on the subjects. The menu on the left side of the page also contains links to many different subtopics related to Deafness and Hard of Hearing.

- Assistive Technology for People Who Are Deaf or Hard of Hearing – DRM Webwatcher (<http://www.disabilityresources.org/AT-DEAF.html>)
- Assistive Technology - National Association of the Deaf (<http://www.nad.org/assistivetechology>)
- ChatterVox – Portable Voice Amplifier (<http://www.chattervox.com/>)
- Curry School of Education (<http://curry.edschool.virginia.edu/sped/projects/ose/categories/hi.html>)
- Internet Disability Resource Site: Hearing Disabilities (<http://www.netreach.net/~abrejcha/websites.htm#HEARING%20DISABILITIES>)
- Journal of Deaf Studies and Deaf Education (<http://jdsde.oxfordjournals.org/>)
- Pocketalker – Amplifier (<http://www.enablemart.com/productdetail.aspx?store=10&pid=611>)
- Rochester Institute of Technology - Deaf Studies Guides (<http://wally.rit.edu/pubs/guides/ntidmenu.html>)
- Tennessee School for the Deaf (<http://tsdeaf.org/>)
- The State of Vermont, Division of Vocational Rehabilitation – Assistive Technology for the Deaf and Hard of Hearing (http://www.dad.state.vt.us/dvr/deaf/Assistive_Technology_Deaf.htm)
- Wald, M. (2002) Hearing disability and technology, in Phipps, L., Sutherland, A. and Seale, J., Eds. Access All Areas: disability, technology and learning, chapter Chapter 5, pp. 19-23. JISC Techdis Service with ALT. <http://eprints.ecs.soton.ac.uk/10725/>

Group Division of Tasks

- Angela - A broad representation of specific adaptive/assistive devices and software available that would assist the child's learning
- Dan – Resource list and a brief description of how the task was divided among group members
- Jacob - A detailed discussion of the disability and learning implications for students
- Jeff - Description of disability and educational implications