

# Students Who Are Deaf or Hard of Hearing:

**A Guide for Teachers  
in the General  
Education Setting**



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## Introduction

Do you have a student in your classroom who is deaf or hard of hearing? If so, then you probably have many questions. What are this student's needs? How can you address them to maximize learning? How do you prepare the other students in your classroom to work and socialize

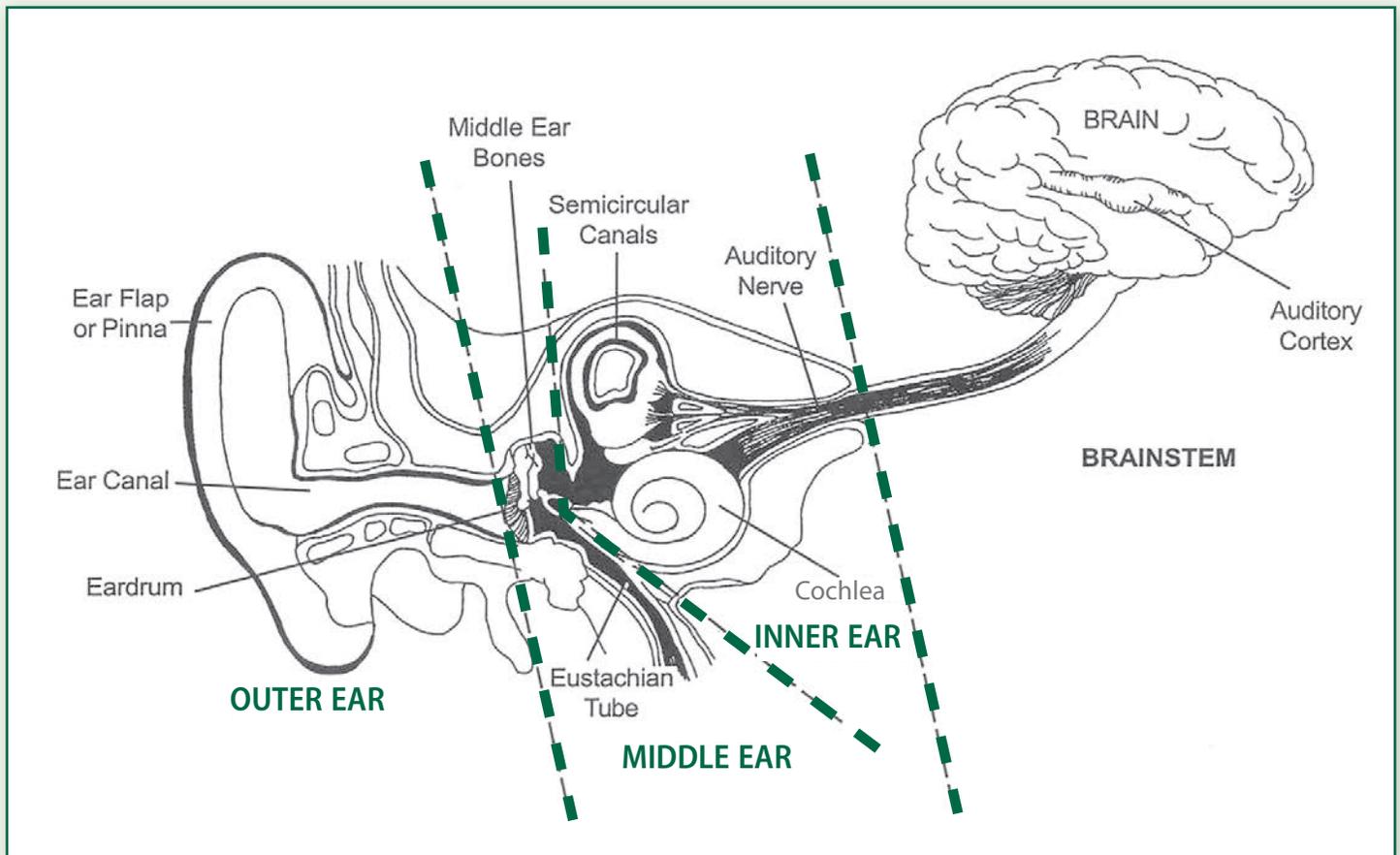
with this student? What is your responsibility as a member of the student's Individualized Education Program (IEP) team? These guidelines have been created for you. Within these pages you will find basic information presented in a concise, user-friendly format.

## How does hearing work?

Sound waves are collected by the outer ear and funneled through the ear canal to the eardrum. Sound waves cause the eardrum to vibrate. The three bones of the middle ear transmit and amplify the vibrations to the

oval window of the inner ear. Fluid in the inner ear stimulates nerve endings called hair cells. Electrical impulses are sent from the hair cells along the auditory nerve to the brain.

*Figure 1: Anatomy of the Outer, Middle, and Inner Ear*



## Describing Deafness and Hearing Loss

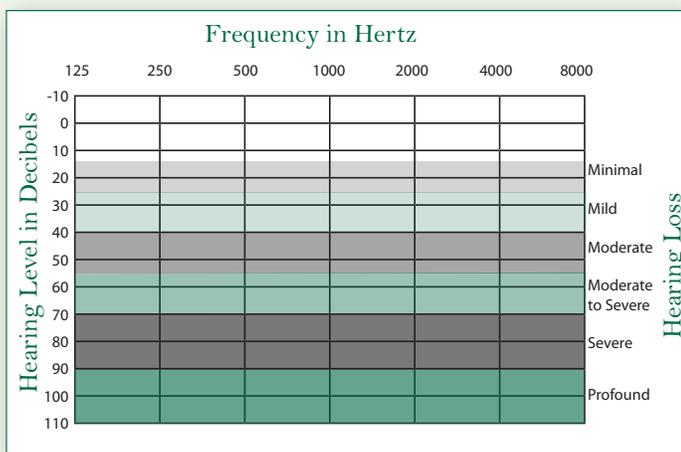
When describing deafness and hearing loss, professionals refer to the degree or intensity of deafness or hearing loss, the type of loss, and communication modes used by individuals who are deaf or hard of hearing. Explanations of these terms follow.

### Degree of Hearing Loss

Hearing losses are diagnosed and measured by professionals called audiologists. Frequently diagnostic information is plotted on a chart called an audiogram (see Figures 2 and 3). Audiograms identify how well an individual hears environmental and speech sounds at a variety of frequencies or pitches, with and without amplification, in quiet and noisy environments.

While identifying a student's degree of hearing loss is convenient for educational discussion and planning purposes, it does not tell a student's whole story. Two students with similar audiograms may function very differently from one another. If a teacher of the deaf and hard of hearing provides you with a copy of a student's audiogram, be sure to ask for a practical explanation of what it means for you as a classroom teacher. Use the audiogram as a starting point, not as an ending point.

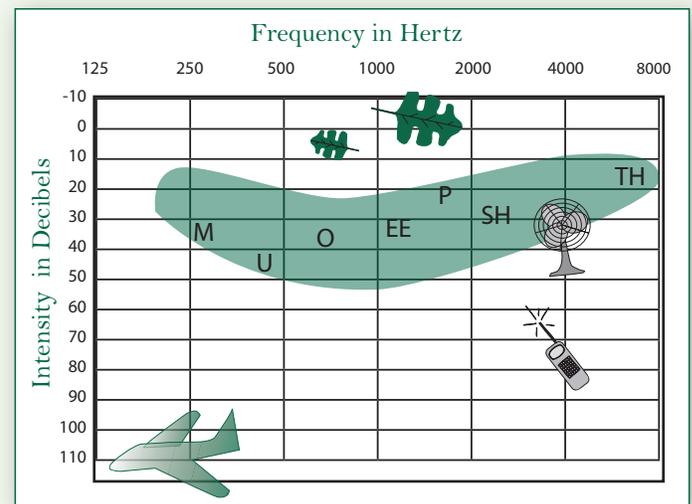
Figure 2: Audiogram



### Type of Hearing Loss

Knowing the type of hearing loss helps educators to anticipate the kinds of listening situations that will be difficult for a student and the kinds of listening situations that will lend themselves to the instructional process. This information allows educational teams to plan appropriate instructional strategies and interventions.

Figure 3: Audiogram showing selected sounds



A **conductive** hearing loss is caused by injury, obstruction, or disease in the outer or middle ear that prevents the ear from transmitting sound through the ear properly. It is usually mild to moderate in degree. Many cases are temporary; they can be treated with medication or surgery to resolve the underlying causes.

A **sensorineural** hearing loss results from damage to the hair cells of the inner ear or to the auditory nerve leading from the inner ear to the brain. It can be mild, moderate, severe, or profound. It is usually permanent; it may respond to medication, but it does not respond to surgery.

A **mixed** hearing loss refers to a combination of conductive and sensorineural losses. Part of the damage occurs in the outer or middle ear and part of it occurs in the inner ear.

A **central** hearing loss results from the absence of the auditory nerve, damage to the auditory nerve, or damage to the auditory center of the brain, leaving the outer, middle, and inner ear intact.

### Communication

Choice of communication is a decision based upon the needs and preferences of a child and family. These needs should drive all discussion of communication choice. It is essential that families be included in the decision-making process when determining appropriate communication for the child's educational programming.

Communication options need not be mutually exclusive. A child and family may use more than one communication system. For example, they may use American Sign Language at home and oral communication in social situations. Their needs may change over time. What works with a preschool child may not be effective when the child transitions to a school-age program.

**American Sign Language (ASL)**, which is sometimes referred to as the native language of the Deaf Community, is a sign language with a grammatical structure completely different from English. It does not have a spoken component.

**Pidgin Signed English (PSE)** is a sign language system that uses portions of two languages, English and American Sign Language. PSE uses some English syntax and structures while using signs and other nonmanual aspects of American Sign Language.

**Manually Coded English (MCE)** is a sign language system that represents the English language as explicitly as possible, allowing the user to speak and sign simultaneously.

**Cued Speech** is a communication method in which speech sounds not visible on the lips of the speaker are represented by a combination of eight handshapes depicting groups of consonants (cues) and four locations close to the mouth that depict vowel sounds (cues). Cued Speech supports spoken English.

**Auditory-Oral Communication** encourages students to make use of their residual hearing in conjunction with speechreading and amplification (hearing aids, FM systems, cochlear implants). Children who use this method learn to listen and speak. One component of auditory-oral communication may be Auditory-Verbal Therapy, which develops the use of residual hearing without speechreading (a technique for recognizing spoken words by watching the speaker’s lips, face, and gestures) through one-on-one instruction.

## Auditory and Visual Learning: A Quick Synopsis

While some students rely upon the auditory channel alone for purposes of communication, and some students rely upon vision alone, many students use audition and vision together to process incoming information and to convey information to others. What follows is a chart of school situations upon which communication impacts. It serves as a discussion tool for team members determining how students communicate in school environments and the kinds of supports needed for successful intervention.

Type of Learner	Definition	Instruction	Class Discussion	Extracurricular Activities	Group Socialization
<b>Auditory</b>	Uses audition (listening, speaking, amplification) to understand and participate in classroom instruction				
<b>Auditory/ Visual</b>	Uses some visual information (facial expression, natural gestures, graphic organizers) to supplement auditory learning during classroom instruction				
<b>Auditory= Visual</b>	Uses auditory and visual information equally (amplification and sign language) during classroom instruction				
<b>Visual/ Auditory</b>	Uses some auditory information to supplement visual learning during classroom instruction				
<b>Visual</b>	Uses vision to understand and participate in classroom instruction				

Assign a value from one (1) to five (5) in each box to indicate the effectiveness of the student’s use of communication.

1 = not effective      5 = highly effective

# Assistive Listening Technology

## Hearing Aids

A hearing aid is an electronic device that makes sound louder. Although not all children benefit from amplification, many children do benefit from this technology. Because all hearing losses are not the same, not all hearing aids are the same, and not all hearing aids will benefit all children. Each hearing aid must be selected carefully and fitted to an individual child’s ear. This process takes numerous visits with an audiologist.

Hearing aids come in four different styles: behind the ear, in the ear, in the canal, and completely in the canal. In school settings, many children use behind the ear hearing aids, which are attached to custom-made earmolds via clear plastic tubes. With advances in technology, a wide variety of assistive listening devices are now available.

Hearing aid batteries last from a few days to a few weeks. It is a good idea to keep extra batteries at school to replace batteries that wear down unexpectedly in the middle of the day. It also is a good idea to help or teach a young child to perform a daily listening check and visual examination of the device to make sure that it is working properly. Be on the lookout for dirt, cracks, moisture, and such substances as peanut butter in the earmold, all of which will reduce volume output and produce distorted sound. Children who depend upon their hearing aids to access classroom

content and social conversations can be very upset by the absence of sound.

## FM Systems

A personal FM system is an amplification system that is used frequently in classrooms to counteract difficult listening situations. It consists of two parts – a transmitter worn by the teacher and a receiver worn by the student. These two parts are set to the same radio wave frequency so that the teacher’s voice can be delivered directly to the student regardless of the distance between them or the noise in the environment surrounding them. Some students use personal FM systems in conjunction with their hearing aids, while others use them without hearing aids.

A sound field FM system is another type of FM system. As with a personal FM system, the teacher wears a transmitter. The teacher’s voice is transmitted to several speakers in the classroom instead of to a personal FM receiver. As a result, all students in the classroom receive the teacher’s voice at a slightly amplified volume, just enough to overcome the noise level of the typical classroom and to preserve the teacher’s voice. Many students benefit from this boost.

Teachers who use FM systems for students in their classrooms are advised to maintain files that contain such information as FM volume settings, daily listening check instructions, battery charging instructions, troubleshooting protocols, and contact information.

	Hearing Aid	FM System
<b>Description</b>	A hearing aid is an amplification system worn in the ear or behind the ear that makes incoming sound louder.	An FM system is an amplification system that transmits sound over distance via radio frequency signal.
<b>Advantages</b>	<ul style="list-style-type: none"> <li>• Hearing aids are prescribed and fitted by hearing professionals.</li> <li>• Hearing aids are tailored to the specific needs of the individual wearer.</li> <li>• Hearing aids work best in quiet environments within two feet of the wearer.</li> </ul>	<ul style="list-style-type: none"> <li>• FM systems amplify the primary signal (the teacher’s voice) over the background noise (environmental and student-produced).</li> <li>• FM systems can be used with or without hearing aids.</li> <li>• FM systems reduce vocal strain among teachers by amplifying their voices.</li> </ul>
<b>Challenges</b>	<ul style="list-style-type: none"> <li>• Hearing aids amplify all sound in the environment, primary signals and background noises.</li> <li>• Hearing aids do not function adequately beyond the 2-foot range.</li> <li>• Hearing aids do not benefit all people.</li> </ul>	<ul style="list-style-type: none"> <li>• FM systems are subject to interference from electronic signals in the region.</li> <li>• FM Systems only amplify the voice/sounds closest to the microphone. Additional microphones are required for classroom discussions.</li> </ul>

## Cochlear Implants

A cochlear implant is an electronic device that provides sound information to individuals who are severely or profoundly deaf.

Part of the device is implanted surgically under the skin behind the ear, through the mastoid bone, and through the ear mechanism; part of it is worn on the outside of the skull. Over a period of time, a cochlear implant is mapped or fine-tuned to bring the user as much sound as possible. Intensive support is typically provided by a trained professional familiar with developing a student's listening and skills. The amount of benefit varies greatly from one individual to another. Generally speaking, the younger the child when implanted, the greater the long-term benefit.

## Working With Professionals

### Teachers of the Deaf and Hard of Hearing

Teachers of students who are deaf and hard of hearing have specific pedagogical training in providing instruction and support to students with hearing loss. They often serve as a liaison between staff members and parents to assist in meeting the student's needs and delivering services effectively. They provide support to staff members throughout the year, including modeling research-based instructional strategies, communication access, and promotion of a language-rich environment for students who are deaf or hard of hearing. Listed below are examples of how a teacher of students who are deaf or hard of hearing may assist the general educator. It is not an exhaustive list as services are determined by the IEP team.

- Ensure assessments are administered in the student's primary mode of communication.
- Provide input regarding the student's IEP:
  - Assessment data
  - Communication Plan
  - Present levels of academic achievement and functional performance
  - Testing accommodations
  - Appropriate measurable annual goals
  - Monitoring of progress toward reaching goals
- Present an orientation for all staff members with whom the student will be interfacing during the year on the unique needs, related service providers, and supports available for students who are deaf or hard of hearing.
- Educate the student who is deaf or hard of hearing about hearing loss.

- Provide direct instruction for communication and language, content areas, or IEP goals (as determined by the IEP team).
- Discuss instructional needs, including differentiation of curricular content, use of prompts, cues, guides, and visual aids.
- Examine access (seating, captioned videos, additional resources and materials) and curriculum (differentiation, prompts, guides, visual aids).
- Discuss information gained from regularly scheduled observations within the inclusion setting.
- Collaborate with educational audiologist to address classroom acoustics and amplification options.
- Provide support to the student regarding self-advocacy strategies.
- Suggest effective approaches for fostering social integration between students with hearing loss and hearing peers.
- Inform parents of resources, agencies and organizations that might help them as a family.

### Educational Interpreters

An interpreter's role is to facilitate communication between hearing and deaf individuals so that they can interact fully with one another. This involves transmitting faithfully the spirit and content of the participants' messages, allowing the student and instructor to control the communication interaction. This may involve using ASL, PSE, MCE, Cued Speech, and/or oral transliteration. Any of these methods could require the interpreter to voice (speak) for the student who is deaf who does not use his/her own voice. If so, the interpreter will vocalize in English what is signed, mouthed, or cued by the student.

While many educational interpreters may have additional responsibilities as adults in general education environments, care must be taken not to ask the interpreter to perform other tasks while he/she is interpreting. This may interfere with the student's access to instruction. It may also compromise the quality of the communication being provided as well as the role of the interpreter.

### Things for teachers to remember when working with interpreters:

- Familiarity with the subject matter will enhance the quality of the interpreted message. Plan to meet with the interpreter before the class to share outlines, texts, agendas, technical vocabulary, course syllabi, and any other background information that would be pertinent.

- In class, the interpreter will attempt to stand or sit in direct line with the teacher, the student, and any visual aids. Keep lines of sight free for visual access to information.
- An interpreter normally interprets a sentence or two behind the speaker. Speak naturally at a reasonable, modest pace, keeping in mind that the interpreter must listen and understand a complete thought before signing it.
- Allow time during class discussions or question and answer periods for the student who is deaf or hard of hearing to raise his/her hand, be recognized, and ask the question through the interpreter. This will allow the interpreter to finish interpreting for the current speaker and enable the student to ask a question or make a comment.
- Look directly at the person you are communicating with, not the interpreter. The interpreter will relay your exact words. Use “I” and “you” when you communicate with deaf individuals using an interpreter. Use of third party phrases such as “ask her” or “tell him” can be confusing.
- For interactive situations, semi-circles or circles work well for students who are deaf or hard of hearing.
- Try to avoid talking while students are focused on written classwork. The deaf student cannot read and watch the interpreter at the same time.
- Plan some strategic breaks so that both student and interpreter can enjoy a mental and physical rest from the rigors of the situation. Receiving information visually without breaks can cause eye fatigue for the individual who is deaf. Additionally, interpreting requires the processing of new information while the information that was just communicated by the speaker is being delivered. For classes longer than one hour in which only one interpreter is available, a mid-class break is essential.
- Insist that all students wait until being recognized by the teacher before speaking or signing, because the interpreter can only convey one message at a time.
- Captioned films and videotapes allow the student who is deaf or hard of hearing direct visual access to the information. Inform the interpreter in advance before showing a film or videotape so that he/she can plan for appropriate lighting, positioning, and vocabulary use.
- If the interpreter will be asked to read and interpret test questions, allow time for him/her to prepare for this assignment.

- Alternative test procedures may be needed by some students. If a test has a written format, the student may prefer to have the interpreter translate the questions into sign language. Arrangements for this kind of testing should be made by the student, the instructor, and the interpreter before the test begins. Refer to the individual student’s IEP for assessment accommodations.

## Speech-to-Text Captionists

Some students prefer to access the general education curriculum through computer-aided speech-to-print transcription or notetaking. Notetaking is not a substitute for interpreting. In many cases, both services are necessary because of the physical impossibility of watching an interpreter while simultaneously taking notes. Students relying on listening and speechreading skills may also utilize captioning or transcription services.

Computer-assisted notetaking allows a captionist to type a teacher’s lecture and classroom discourse into a laptop computer. This information is displayed simultaneously on a second laptop computer or a television monitor for students to read during class. The goal is to provide a meaning-for-meaning translation while using fewer words than the original speaker. Because speech is rapid, it often is necessary for a captionist to condense information. Afterward, the printed text is made available to students for review purposes. These systems require a computer (often a laptop) with word processing software and abbreviation software. The captionist must receive training in the abbreviation system, in text-condensing strategies, and in phonetic rules. Speech-to-text services can be provided onsite or remotely, depending on the educational setting.

Real-time captioning is similar to the captioning seen on TV. It requires specialized stenographic equipment, specialized software, and a highly trained stenographer. Real-time captioning can be provided from a distance, eliminating costly travel time and frustrating down time.

### Things for teachers to remember when working with captionists:

- Introduce the captionist and the captioning service at the beginning of the first class to show your support of the service.
- Give the captionist a course syllabus, handouts, outlines, readings, overheads, and vocabulary lists to help the captionist create a specialized dictionary for each class with abbreviations of often-used vocabulary specific to that class.
- Speak loudly and clearly during class so that the captionist can hear you easily.

- Allow the captionist to sit in a location that makes hearing you and the other students as easy as possible.
- Be sensitive to and supportive of the captionist's comfort and needs in the classroom setting (e.g., close the blinds to reduce glare on the screen, provide a desk or table of appropriate height).
- Restate or summarize students' comments if they are difficult to hear or somewhat disorganized.
- Be aware that the captionist will use down time (periods of silent reading or writing, pauses during class transitions) during class periods to edit notes taken previously.
- Decide whether hearing students will have access to the hardcopy notes.
- When discussing student needs related to captioning, include the captionist in the meeting.

## Educational Audiologists

Educational audiologists specialize in the educational needs of students who have deficits in hearing, listening, and auditory processing. An educational audiologist's role may be to:

- Coordinate hearing screening programs.
- Provide community awareness about hearing.
- Conduct comprehensive hearing evaluations.
- Provide management for hearing aids and other assistive devices.
- Provide medical and community referrals.
- Provide therapy in the areas of speechreading, listening, and hearing aid care.
- Participate in IEP and multidisciplinary team meetings.
- Counsel families about effects of hearing loss.
- Provide training to staff.
- Educate about noise pollution.
- Evaluate educational environment for noise.

## Interveners

The intervener role most often applies to school-age learners who are deaf-blind and who need the one-to-one support of a trained, consistent, educational staff person who is prepared to address the needs of the student. Interveners team with the school staff and family to achieve individual goals for the student who is deaf-blind.

The role of the intervener and educational interpreter are quite different. It may be appropriate for a student in the education setting to have both an intervener and an educational interpreter depending on the student's needs. This would be an educational team's decision and should be considered. More information concerning interveners can be found through the PaTTAN Deaf-Blind Initiative on the PaTTAN website, [www.pattan.net](http://www.pattan.net).

## The General Educator's Role on the IEP Team

Under Pennsylvania and federal law, a child with a disability has a right to special education and related services in conformity with an Individualized Education Program (IEP). The IEP team (made up of the child's teachers, administrators, related service providers, and parents) writes the IEP. This plan will be written at a meeting and will include a description of all the programs and services necessary to help the student be successful.

As the general education teacher, you are an important IEP team member. You will contribute to the process and you will receive support in return. Without the general education teacher's participation, it would be more difficult for the IEP team to take on its responsibility for looking at a student's progress with regard to the general education curriculum, standards, and assessments.

The general education teacher may provide the IEP team with knowledge about a variety of topics that include, but are not limited to:

- The general education context.
- How the student with disabilities performs in a general education context.
- How the student interacts with his/her peers.
- The pace of the class.
- The dynamics of the class.
- Approaches for teaching the class as a whole.

In the case of a child who is deaf or hard of hearing, the IEP team must consider the child's:

- Language and communication needs.
- Opportunities for direct communication with peers and professional personnel in the child's language and communication mode.
- Academic level and full range of needs, including opportunities for direct instruction in the child's language and communication mode.
- Need for assistive technology devices and services.

The IEP team is required to complete a Communication Plan as part of the IEP to address the communication and language needs listed previously. The IEP must also include a description of the type, or types, of support the student will receive. Support services for students who are deaf or hard of hearing address needs primarily in the areas of reading, communication, self-advocacy, and use of assistive technologies. The student’s parents are encouraged to take an active role in the development of their child’s IEP.

Advance preparation is essential so that educators and parents can participate in the IEP planning process and ensure that it flows smoothly when the team convenes. If the student is attending the meeting, the student must also prepare in advance to participate. There are many materials available for students of transition age (14 or older). However, Figure 4 shows a series of questions – conversation starters – to help younger students articulate their experiences, their feelings, and their desires for the future.

**Figure 4. Conversation Starters for Students**

My favorite school subject is ...	
I am good at ...	
I am getting better at ...	
I need help with ...	
This year I learned how to ...	
I would like to learn how to ...	
I understand best at school when ...	
It is hard for me to understand at school when ...	
When I have a problem at school, I talk to ...	
One thing I wish I could change about my school day is ...	
I like to work with a partner.	YES NO
I like to work with a group of kids.	YES NO
I like to work by myself.	YES NO

## Working Effectively With Students Who Are Deaf or Hard of Hearing

Because the communication styles and learning needs of students with hearing loss vary tremendously, the general education teacher should be familiar with the students’ communication plans and IEPs, which include specially designed instruction determined by the IEP team.

Here are a few general guidelines to follow:

### Communication Style

- Have clear and visible speech (lip movements) and ensure students can see their faces when speaking.
- Project their voices or use amplification when provided.
- Get the attention of the class before speaking and indicate when others are speaking.
- Repeat important information and summarize regularly.
- Repeat or rephrase other students’ remarks when necessary.

### Delivery of Instruction

- Organize classroom activities and routines to make them predictable.
- Support lessons with visual aids and organizers.
- Presume competence through high expectations for attention and participation.
- Encourage students to participate, listen, and respond to one another.
- Control for noise which will limit access to instruction.
- Facilitate access to classroom communication by establishing a rule in which one person speaks at a time.
- Expect students to look at each other when talking.
- Establish communication rules for group activities and review them regularly.
- Share materials consistently with other professionals who support the student (e.g., paraprofessionals, interpreters, consultants, speech and language pathologists, teachers of the deaf and hard of hearing).

## Language and Learning

Educating students who are deaf or hard of hearing requires engaging in practices similar to those used to engage hearing students. These practices should link language-learning with content-learning.

All students must learn the language, vocabulary, and content of the courses they take. This requires all teachers to take responsibility for addressing language, reading, and writing in their specific subject areas. Because of their unique language needs, students who are deaf or hard of hearing benefit when teachers embed language, reading, and writing across all content areas. Additionally, some students will use American Sign Language as their primary language and, since ASL has its own syntax, this may impact

a student's ability to produce grammatically-correct spoken and written English. There are specific instructional practices which, when implemented, increase access to instruction for students who are deaf or hard of hearing.

## Language

- Before introducing new material, ask students to summarize the ideas discussed in the previous class.
- Relate the student summaries to the goals of the present class.
- Increase the amount of time for students to manipulate ideas through discussion, especially before assigning reading and writing tasks.
- Make ideas come alive, as much as possible, by capitalizing on drama. If, for example, students are studying the catalyst role of enzymes, acting out how these enzymes “grab” amino acids to assemble proteins would be memorable.
- Use visual diagrams to illustrate ideas.
- Use analogy to compare known with unknown concepts.
- List key concepts and vocabulary on the blackboard/whiteboard and refer to them, by pointing, during class.
- Provide explicit instruction around idiomatic and figurative language since these features of English can often present barriers to student understanding.

## Reading

- Give students a brief overview before assigning a reading.
- Mention character names and roles if the reading is a narrative.
- Model the “marking-up” of text in the form of side-paraphrases and questions.
- Encourage students to engage more with texts. For example, use double-entry journals where quotes or facts from the text are copied in one column of a journal and responses and questions are written on the facing page.
- Encourage interpreters to stand or sit close to the text. Visually project as much text as possible.
- Read difficult portions of text aloud, modeling reading strategies to make meaning out of text. For example, show how meaning builds from prior to present text and how readers predict meaning and keep reading to test predictions.

## Writing

- Recognize that English may not be the first language of students who are deaf or hard of hearing.
- Maintain high expectation for content and provide scaffolding/support for written English competency.
- Analyze models of skilled student writing, showing students exactly what will be expected of their own writing.
- Consider the benefits of requiring multiple drafts of written work and responding to each draft according to its need.

The approach to language instruction has to be individualized to every student. Teachers of the Deaf have a unique skill set to individualize instruction for all students who are deaf or hard of hearing, not just those students who use American Sign Language and, as a result are essential members of the educational team.

These suggested practices will enable students to become educated language users by strengthening the connections between new ideas and the understanding and expression of those ideas in language. The more opportunities students are given to converse, read, and write about their new learning, the more they will learn.

## Classroom Acoustics and Logistics

Classrooms are noisy. They echo. Sometimes the ventilation systems make a racket. Sometimes the lights hum. Sometimes the students hum. Sometimes window glare makes it difficult to see the teacher or the board. Students with normal vision and hearing may adjust to such annoyances over time. For students who are deaf or hard of hearing, who frequently rely upon vision and hearing together to make sense of discourse and content, nothing can be taken for granted. Environmental accommodations can make the difference between successful learning and failure, not just for students who are deaf or hard of hearing, but for all students. Try these:

- Cover hard, smooth surfaces like floors, walls, tables, and windows with sound-absorbing materials like carpeting, wall hangings, tablecloths, and drapes. Drapes will reduce glare as well. In a pinch, sliced tennis balls on chair and table legs can help reduce squealing.
- Arrange desks in a square or U-shape to improve sight lines.
- When assigning seats, place a student with a hearing loss as far away from sources of noise (heaters, fans, playgrounds) as possible.

- Allow the student to change seats as the activities and focal points change throughout the day to allow for the best possible communication. Placing the student in the obvious location, front and center, may not be the most strategic.
- Discuss options with the student. You may be surprised by the student's ability to assess the situation and suggest practical modifications.

## Frequently Asked Questions About Classroom Acoustics

Provided by Cheryl DeConde Johnson

### What causes high noise levels and other acoustical problems in classrooms?

- Heating-ventilation-air conditioning units (HVAC)
- Lights, electronic equipment, pencil sharpeners, aquariums, children talking and moving about the room
- Hallway and adjacent classroom noise
- Street and playground noise

### Who is at risk for learning difficulties due to poor classroom acoustics?

- Twenty percent of all school-age children
- Children younger than age 13
- Children with unilateral, bilateral, high frequency, minimal, or fluctuating losses
- Children with histories of otitis media (an infection or inflammation of the middle ear)
- Children with auditory processing disorders
- Children with articulation disorders
- Children with learning disabilities
- Children who are English Language Learners

### What are the effects of noise on hearing in the classroom?

Noise masks speech sounds . . . which decreases speech perception abilities . . . which decreases comprehension of information . . . which reduces academic achievement . . . which increases social-emotional problems.

### What are the effects of poor classroom acoustics?

- Teachers develop vocal fatigue.
- Developmental factors related to language capacity cause younger children to have more problems than older ones.
- Students with hearing losses listen through filters created by their hearing losses.

### Who sets standards for classroom acoustics?

The American National Standards Institute (ANSI) has approved the *Classroom Acoustics Standard Acoustical Performance Criteria Design Requirements and Guidelines for Schools* (ANSI 512.60.2002). The standard calls for a 35dB average ambient classroom noise level and a .6 second reverberation time for basic classrooms.

### The Main Sound Triggers (Distractions) in Classrooms (in Descending Order)

- Harsh, lengthy echoes caused by reverberation from large uncurtained windows, hard floors, and hard ceilings
- Computers and extractor fans
- Road traffic
- Noise from flickering fluorescent lights
- Background noise from group activities
- High pitched sounds (drilling, hammering, vacuuming, ringing fire alarms)
- Sudden unexpected sound (banging, cracking)
- Background noise from adjacent rooms and corridors

### The Main Visual Triggers (Distractions) in Classrooms (in Descending Order)

- Flickering fluorescent lights
- Direct sunlight
- Luminance (reflections, shine, fluorescent glare)
- Bright, intense lights
- Stripes on radiators, grills, gratings, and lighting diffusers
- Patterned wall paper
- Patterned clothing and furnishing fabrics
- Color and/or color contrast
- Visual changes and distractions (surrounding movement, body language)
- Glossy, shiny paint on floors and walls
- Color and tonal contrast between main surfaces (floors, walls, ceilings, doors) and secondary surfaces (skirting, moulding, furniture)

# Impact of Hearing Loss

## Educational Needs

Minimally, in consultation with the teacher of students who are deaf or hard of hearing, the IEP team must consider communication and access needs of the student with hearing loss. Supports may include:

- Academic support to ensure acquisition and retention
- Additional instruction in vocabulary, language, and reading
- Amplification (personal hearing aids and classroom FM systems)
- Auditory skill development
- Classroom acoustic treatment
- Classroom FM amplification system
- Direct support from itinerant, resource room, and self-contained classroom teachers of students who are deaf or hard of hearing to ensure acquisition and retention of academic content
- Direct support from speech and language teachers
- Early speech and language evaluations

## Communication and Degree of Hearing Loss

Normal hearing 0dB - 20 dB	Mild hearing loss 21dB - 40dB	Moderate hearing loss 41dB - 70dB	Severe hearing loss 71dB - 90dB
<ul style="list-style-type: none"> <li>• May have difficulty with whispered or quiet conversation at close range (within 3 to 5 feet)</li> </ul>	<ul style="list-style-type: none"> <li>• Will understand conversational loudness face-to-face at close range</li> <li>• May have difficulty hearing and pronouncing some speech sounds</li> <li>• Will have difficulty hearing in noisy places</li> <li>• May use sign language</li> </ul>	<ul style="list-style-type: none"> <li>• Will probably detect loud conversation at close range in a quiet environment</li> <li>• Will likely have difficulty hearing and pronouncing many speech sounds</li> <li>• Will likely have difficulty following classroom discussion</li> <li>• Will likely have delays in language and reading</li> <li>• May use sign language</li> </ul>	<ul style="list-style-type: none"> <li>• May be able to detect loud voices and environmental sounds</li> <li>• Spoken language will be intelligible to those familiar with the student</li> <li>• Mispronunciations and omissions will be evident</li> <li>• May rely on vision to supplement auditory messages</li> <li>• Will likely have severe delays in language and reading</li> <li>• May use sign language</li> </ul>

- Intensive instruction in vocabulary, language, and reading
- Interpreting
- Medical intervention for conductive loss caused by middle ear infection
- Notetaking
- Ongoing communication between parent and teacher
- Preferential seating

- Specialized instruction in speech, language, and reading
- Speech therapy
- Teacher inservice
- Teacher monitoring by a hearing professional
- Tutoring
- Use of ear protection in noisy situations to prevent additional damage

Profound deafness 91 dB and greater	Unilateral hearing loss	Fluctuating hearing loss	High frequency hearing loss
<ul style="list-style-type: none"> <li>• May detect loud environmental noises or vibrations</li> <li>• May exhibit unintelligible or no speech</li> <li>• Will likely experience severe delays in language and reading</li> <li>• Will likely rely on vision rather than hearing for communication and education</li> <li>• May find little or no benefit from amplification</li> <li>• May use sign language</li> </ul>	<ul style="list-style-type: none"> <li>• May have difficulty localizing and understanding sounds and voices using hearing alone, especially when the poor ear is closest to the teacher and when the environment is noisy (at recess, at lunch, during class discussion)</li> <li>• May exhibit fatigue due to the demands of listening</li> <li>• May appear inattentive, distractible, or frustrated</li> <li>• May have difficulty learning letter/sound correspondence</li> </ul>	<ul style="list-style-type: none"> <li>• Child hears, but may miss, fragments of what is said, especially in noisy environments</li> <li>• May miss unstressed words, consonants, and word endings</li> <li>• May not be able to identify changes in his/her own hearing as it fluctuates</li> <li>• May be perceived as immature, insecure, distractible, or lacking in self esteem</li> <li>• May not participate</li> <li>• May demonstrate language delays especially in early reading skills</li> </ul>	<ul style="list-style-type: none"> <li>• Misses high frequency speech information including /t/, /s/, /f/, /th/, /k/, /sh/, /ch/ especially in noisy environments</li> <li>• Speech production reflects the absence of these sounds</li> <li>• Has difficulty with word endings, possessives, plurals, and short unstressed words</li> <li>• Has language delays</li> </ul>

**COMMONWEALTH OF PENNSYLVANIA**

**Tom Wolf**  
Governor

