

# Beyond Hearing Aids: Accommodations for Individuals Who are Hard of Hearing or Late Deafened

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## Abstract

Many people give up their jobs, often after putting in years of service, because they feel they are no longer able to manage group meetings, supervise other workers, or communicate effectively over the phone due to their hearing loss. Others avoid, drop out, or fail in educational settings. This could be prevented if service providers and consumers were aware of the crucial role technology, beyond hearing aids, can play in restoring communication—even for persons with severe to profound losses. This paper provides a brief overview of the wide array of accommodation options available that will help individuals who are deaf, hard of hearing, and late deafened remain a productive and vital part of the work force and successfully continue their educational endeavors. Detailed information on the topics presented here can be found at <<http://www.wou.edu/wrocc>> under 'Training Materials'.

There's no doubt about it—hearing loss is a growing issue throughout American culture. Presently, approximately 10% of the U.S. population has a significant hearing loss. Of that group, more than half are still of "working age" and may not be aware of the toll their hearing loss is taking. For people 45 years and older, the rate of hearing loss is greater than any other major disabling condition. These are prime working years, when people are typically well settled in their professions and looking forward to advancement into leadership roles. Instead of advancing, people with a hearing loss tend to leave their jobs early, citing issues around phone use, participation in meetings, leading group meetings, social difficulties and isolation (Scherich, 1996). As communicating effectively becomes more stressful, people look to other options such as early retirement or changing jobs. Unfortunately, changing jobs entails retraining or returning to the postsecondary educational system, a daunting task to those who do not know that accommodations are available.

Surprisingly, rates of unemployment stay essentially constant regardless of whether the loss is in one or both ears. This has significant implications for Vocational Rehabilitation (VR) eligibility, selection of services and accommodation needs. It also indicates that people with unilateral hearing loss have been even more overlooked for specialized educational and vocational services than their peers with binaural losses. It is particularly important that postsecondary educators and service staff, VR staff and partners understand not only the prevalence of hearing loss but also its multiple effects. Mild or moderate hearing losses are often seen as a minor barrier to successful employment—to the point of frequently being considered so insignificant that without additional disability issues, the applicant is determined ineligible for services. This is not just a mistake—it is a disservice. This on-going problem was highlighted in a recent information memorandum from the Rehabilitation Services Administration, which revealed, "the number of 'successful employment outcomes' for deaf and hard of hearing individuals has declined over the past ten years (1989 to 1998)" (RSA, 3/21/00).

## Effective Accommodation Often Starts with Hearing Aids

The most common VR service for a hard of hearing individual is the purchase of hearing aids, without any other rehabilitative services (Corthell & Yarman, 1992). Hearing aids are an important part of communication access for many individuals with hearing loss. A hearing aid system consists of a microphone that picks up sound waves and converts them into electrical signals; an amplifier that increases the strength of the electrical signals; a battery that provides electrical energy to operate the hearing aid; and a loudspeaker (receiver) that converts the amplified signals back into sound waves and directs them into the ear through a specially fitted mold. Hearing aids are designed to fit the individual's hearing loss. If the loss is in the high frequencies, those frequencies are amplified and others are left alone; if the loss is in the lower frequencies, it is those that are boosted. Similarly, less amplification is provided for a mild loss than for a profound loss. When an individual has a high frequency loss, he or she may have more problems hearing children's and women's voices, as these tend to be higher pitched. This is why someone with a hearing loss seems to be able to hear one person and not another.

Unfortunately, hearing aids cannot discriminate be-

tween background noise and the sounds the individual wants to hear. Any sounds in the targeted frequencies are amplified. Hearing aids are perfect for one on one interactions where there is little background noise. An individual may function very well in a job or intake interview with a service provider, because the meeting will likely be held in a quiet environment where people use eye contact and maintain full attention. This may lead to misunderstandings about functional ability. An employer may think that the individual either has no loss, or will do fine on the job without accommodations because he or she did so well in the interview. A VR counselor or support service provider may think the individual has no need of services. However, functional skill may look very different once the person is no longer in the quiet environment with the opportunity to supplement what he or she is hearing with speech reading. Blair (1990) illustrates the characteristics of sound waves and explains why some listening situations are more difficult than others:

- **Distance:** The further away from the sound one is, the softer the amount of pressure that is exerted on the eardrum, and thus the less intense (loud) the sound.

- **Signal-to-Noise Ratio (SNR):** This refers to how much louder speech is than the background noise. People with normal hearing need speech to be at least 6 dB louder than the background noise. To achieve the same level of speech discrimination for individuals with a hearing loss, speech must be 15 to 25 dB louder than the background noise. Hearing aids do not improve the Signal-to-Noise Ratio because they amplify all sounds. *Only ALDs will improve the SNR.*

- **Reverberation** is measured as the amount of time it takes for the intensity of a sound to drop 60 dB once it has stopped being produced. The longer the time, the more of an echo effect is produced. Research indicates that even small amounts of reverberation have a negative impact on ability to understand speech in individuals with hearing loss. Thus, poor room acoustics can make a setting inaccessible to individuals with hearing loss.

What can be done in these listening situations? An assistive listening device (ALD) consists of a transmitter and a microphone (worn by the speaker and about the size of a pager), and a receiver with some type of coupling device to transmit either the sound to the listener's ear or the signal to the listener's hearing aid. The voice of the person speaking into the microphone is the only sound that is amplified for the ALD user, not other noises in the room. The ALD amplifies all the sounds at the same level, much like turning up the volume on the TV. When hearing aids and ALDs are used together, only the targeted sounds and the targeted frequencies are amplified to fit the individual user. This is the incredible benefit of using ALDs. By reducing the level of background noise and increasing the level of the targeted

speech (i.e., improving the SNR), ALDs provide the clarity needed for interpretation and understanding.

Beyond hearing aids, there are a variety of ALDs and other accommodations available. These options are described briefly below. Information on catalogs and links to more in-depth information can be found at the end. It is important that vocational rehabilitation counselors and other disability services providers be aware of the assistive technology available to hard of hearing and deaf individuals. These may be the only other professionals (besides audiologists) the individual sees concerning his or her hearing loss. Unfortunately, many hard of hearing individuals are not aware of the variety of technology that can help them hear in groups and other noisy situations.

### Assistive Listening Devices

There are the three basic ALD systems in use today. FM systems use radio waves to transmit sound directly from the speaker to the user. Infrared systems depend on light waves and induction loop systems transmit signals via magnetic waves emanating from a loop of wire. All types of ALD systems have volume control settings that can be adjusted by the individual user, help to minimize the effects of poor acoustic conditions in classrooms, and can be used with public address systems. The cost varies depending on whether you are purchasing a personal system or a larger system that uses a mixer and PA equipment. There are also single-unit ALDs (e.g., PockeTalker, Sound Wizard) that have the microphone and listening jack on the same unit. These are very handy for hearing in noisy restaurants or hearing over road noise in the car.

### Interpreters

Interpreters are another example of an accommodation. In an employment setting, they may be used intensively while a deaf person is learning a job and then be phased out, returning only for training sessions or group meetings. Most hard of hearing individuals do not use sign language, but may benefit from an oral interpreter to assist with speech reading. All certified interpreters follow a code of ethics. They are not allowed to participate in the meeting other than to translate. They must keep information gained while on the job confidential. When hiring interpreters, ask about their certification level. The Registry of Interpreters for the Deaf (RID) and the National Association of the Deaf (NAD) provide nationally recognized certification indicating skill level. Many states also have quality assurance state screening exams for entry-level interpreters. Contact the Registry of Interpreters for the Deaf to locate local certified interpreters (<http://www.rid.org>).

### Print Communication Access

There are several options for print accommodations. The appropriateness of the accommodation will depend

upon the situation and the needs of the individual. Speech-to-print accommodations are divided into several categories:

- **Captioning:** the printed text appearing (typically) at the bottom of a television or movie screen. This may be done concurrently with the broadcast (e.g., news reports) or be pre-recorded (e.g., television shows and movies). This is a word-for-word representation of what is said, in addition to indicating other sounds, such as music or horns. All training videos should be captioned. Caption decoders allow closed captions on videos and television broadcasts to be seen. Since 1993, the federal government has mandated inclusion of these decoder chips in new televisions with screens of 13" or more (Federal Communications Commission, 1990).

- **Communication access realtime translation (CART):** a service is provided by a trained stenographer, such as a court reporter, who can transcribe at up to 300 words per minute. All text is projected from his or her computer to a screen or TV monitor so it can be easily read.

- **Remote transcription services:** CART provided via a modem and phone line or Internet connection when local CART is not available. The remote transcriptionist will only be able to transcribe what he or she can hear. The presenter must repeat questions from the audience into the microphone so the transcriptionist can record the information.

- **Summary systems:** These systems use typists' summarization skills and a dictionary of abbreviations, to increase typing speed and take down meaning-for-meaning in real time what is happening in the class.

Notetaking, whether by hand or computer-based, only provides facts and is not considered communication access. Because a deaf or hard of hearing individual cannot look down to take notes and at the same time keep his or her eyes on the presenter or interpreter, it is generally appropriate to provide notes in addition to other accommodations.

### Accommodations for Evaluation Settings

Formalized testing—interest, aptitude, achievement, personality inventories, etc.—can be an integral part of determining what services are needed or what training program is indicated. When working with a hard of hearing or deaf person, the service provider must consider communication, the physical environment and the impact of the individual's hearing loss on his or her academic achievement.

Prior to administering any test, the evaluator should ensure that communication issues are addressed:

- Consider the need for an interpreter or assistive listening device
- Use a special alerting device if using timed tests
- Check to be sure that hearing aids and eyeglasses are being used

- Minimize visual and auditory distractions in the testing area
- Ensure there is enough light in the testing area to see clearly, but don't err on the side of blinding light.
- Avoid placing the evaluator in front of a light source—this will ensure there are no shadows on the evaluator's face to prevent speech reading

If English comprehension is an issue, seek non-verbal evaluation tools or non-traditional methods of evaluation. If written testing is unavoidable, the individual may need additional time to complete the evaluation as a reasonable accommodation.

### Telephone Accessibility

There are many issues around telephone use for individuals who are deaf or hard of hearing. Inability to effectively communicate over the telephone is one of the leading reasons given by hard of hearing individuals for early retirement or quitting a job.

For individuals with a hearing loss, comprehension is greatly improved with the use of both ears. Headphones or a neckloop may be plugged into phones with special jacks, so the individual can take advantage of hearing with both ears.

Amplification often helps comprehension on the telephone. Several types of telephone amplification devices are available.

- **A battery-powered amplifier** held over the earpiece with an elastic strap, and then removed in order to hang up the phone is especially useful for travelers, who may not know what type of phone access will be available to them on the road.
- **Amplified handsets with volume control** (available for some phones) can be adjusted by each user. These handsets replace the regular handset but only work with phones with the dialing mechanism in the base.
- **In-line amplifiers** are attached between the handset and the base. (For use with phones having the dialing mechanism in the base, not in the handset.) They usually include both a volume and a tone control.
- **Phones developed specifically for individuals with hearing loss** include a variety of combinations of the features described in this section.

Feedback will often occur if the hearing aid microphone is covered, as might happen when holding the phone over the ear. A piece of foam over the earpiece may help prevent this (one commercially available device is called Squeal Stop). Rather than depend upon the hearing aid microphone, the individual might choose to use their hearing aid telecoil. Telecoils pick up magnetic fields, not acoustic sound waves. Hearing aid compatible telephones give off a magnetic field that can be picked up by telecoils (not all phones will give off an adequate

magnetic field for all hearing aid users). Telecoil advantages include reduction or elimination of background noise, elimination of feedback and inability for others to overhear what the caller is saying. Many hearing aids can be retrofitted with the telecoil option for around \$70.

For those who cannot use amplification or telecoils to access the telephone, teletypewriters (TTYs, also known as TDDs) are available. TTYs come with and without printers; those with a printer are more convenient, as it is difficult to record information like phone numbers or addresses while watching the screen. TTYs are not universally compatible with computers. There are programs that can be used between computers to allow TTY-like communication. Newer TTYs can send in ASCII (computer) format. TTY payphones are installed in public places, as required by the ADA.

In order to use a TTY for direct communication, both parties must have one. If one party does not have a TTY, the ADA mandated, free nationwide network of relay services can be used instead. For example, the deaf TTY user can call the relay service and use a confidential operator (Communication Assistant or CA) to facilitate communication: the CA reads what the deaf person types to the hearing person and types what the hearing person says for the deaf person.

If an individual can speak independently, but cannot hear well enough to use the phone, a newer service called Voice Carry Over (VCO) is an ideal match. VCO calls are a little faster than TTY and relay calls, as the hard of hearing person speaks directly to the hearing party and the CA only types what the hearing person says.

Another option is 2-line VCO. This setup requires that the hard of hearing person have 2 phone lines, one of which must have a 3-way conference call option. The hard of hearing person connects with the relay service via TTY on one line and has the CA to call the other line. She answers and tells the CA that this is a 2-line VCO call, puts the CA on hold, and calls the hearing individual. With the hearing party on the line, the hard of hearing person brings the CA into the conference mode. The CA types what the hearing person says (this information comes in on the TTY on the other phone line). The hard of hearing individual speaks for herself, using her own hearing and/or the text coming in on the TTY to understand what is said to her. The CA is not allowed to speak or interrupt during the conversation. In this case alone, the hearing person may not be aware that the other party is hard of hearing, or that any assistance is being provided for the call.

There are also other relay service features, such as hearing carry over for people who can hear but cannot speak, telebraille for deaf-blind individuals, and foreign language relay services (i.e. Spanish to Spanish).

More recent additions are the IP Relay and Video Relay services. The user with hearing loss accesses IP Relay via the Internet (<http://www.ip-relay.com>) rather

than contacting the relay service by telephone/TTY. Video relay services allow ASL users to use their native language, not English, to communicate. Through the use of an inexpensive camera and a high-speed Internet connection, the caller connects to a video communication assistant—a certified interpreter—who voices for the ASL user and signs the responses given by the hearing person. Many states are establishing their own VRS component under their telecommunications relay service, allowing consumers the choice of a state-owned TTY or a camera and the required software to access VRS. Communication Services for the Deaf has recently announced nationwide VRS service (<http://www.csdvrs.org/VRSIndex.asp>). As DSL and other high-speed Internet connection formats become more available and affordable, the popularity of these services will only increase.

### **Using “High Tech” to Make “High Accessibility”**

Communication with your client/student is not limited to in-person contact. Often communication must happen more quickly than an appointment can be scheduled. In these cases, use of readily available technology is an ideal solution.

Email and instant messaging programs (e.g., AOL Instant Messenger, MSN Messenger) have become incredibly popular and useful for the hard of hearing and deaf communities. Email allows the person to take as much time as needed to read and understand the sender’s message. Instant messaging programs are much like a TTY conversation, but are conducted on the computer. Most messaging programs also allow for group discussions (similar to a conference call on the telephone) and for file transfers. Both email and instant messages can be saved and printed for review or reference at a later date.

Videoconferencing through NetMeeting or other PC software is also an increasingly attractive and effective accommodation. With a high-speed connection, it is now possible to clearly view ASL through this medium. Videoconferencing allows users with hearing loss to see the expressions and body language of the person with whom they are speaking, which helps add to their understanding of the conversation.

“High Tech” tools aren’t limited to PCs! Many portable options are readily available as well:

- PDAs (e.g., Palm Pilots) have numerous applications as accommodation technology. With Internet access, users can utilize email, instant messaging and other applications. It’s also possible to use a PDA to receive remote CART captioning.

- Pagers, especially with alpha/numeric displays, have long been used as accommodations. Two-way pagers allow users to reply to text messages via email, as well as use the device as a traditional numeric pager.

- Cellular phones have been able to send and receive text messages for several years now. The cost and availability of text messaging and two-way text messaging vary by service provider and calling plan. Hard of hearing people and Cochlear Implant users may also be able to benefit from neckloops or patch cords specifically designed to allow them to hear when using a cellular phone. This permits them to avoid reliance on others or the relay service to complete telephone calls.

- The Pocket Speak-and-Read VCO device has also enabled hard of hearing people to greatly increase their independence in using the telephone. To use this device, the individual calls the telephone relay service and asks to place a VCO call. The device is then attached to the earpiece of the telephone with an elastic and velcro strap. The TTY tones from the relay operator are picked up by the device, converted to text and shown on a small screen integrated into the face of the device. The individual reads what is being said and responds using his or her own voice, which the other party hears. The Pocket VCO is portable, works on a variety of telephone handsets, and operates on battery power.

### **Not the Usual Bells & Whistles: Using Sound, Light and Motion Alerts**

A large number of systems are available to alert hard of hearing and deaf people to doorbells, ringing phones, alarms, etc. Some of these systems are based on sound; tones may be adjustable and volume can frequently be amplified. Some are based on tactile alerts, such as vibrating wristwatches, timers, pagers, and pillow/bedshakers. Others are based on visual alerts for household sounds such as the phone or doorbell, and can be paired with lamps or other light sources. Some systems can alert the user in any room in the house. They may be remote, wireless systems or hardwired into the house or office electrical system.

No discussion of alerting devices would be complete without including hearing dogs for the deaf. Like guide dogs used by blind individuals, these dogs have legal access to public places. They physically alert their owners to sounds and lead them to the source (e.g., doorbell, phone, kitchen timer, baby crib). They also respond when someone calls their owner's name or to noises in the environment that may pose a danger.

### **Conclusion**

As can be seen from the above discussion, there are a number of possible options for accommodations for any given situation. Remember that there are also a number of resources available to you so that you don't have to be an expert on all of this technology! While space allowed us to only skim the surface of all of these accommodation options, more in-depth information can be found at <http://www.wou.edu/wrocc> under 'Training Materials' and at <http://2www.pepnet.org> under 'Resource Center' and 'PEPNet Products'. Don't forget

that there is a PEPNet resource center serving your area, no matter where you are in the US or its territories. Above all, share information about assistive technology and other accommodations with others. Remember, consumers often aren't aware of the options, either.

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### **Website Resources**

<http://www.wou.edu/wrocc> and click on 'Training Materials':

Demystifying Assistive Listening Devices

You Don't Know what You've Been Missing (Alerting Devices)

Defining Communication Access: Speech-to-Print Options

For Whom the Bell Flashes (Telecommunications Options)

Beyond Hearing Aids (This training module)

Internet Resources Related to Hearing Loss: equipment companies

NETAC Tip Sheets: <http://netac.rit.edu/publication/tipsheet/>

CART: <http://cart.ncraonline.org/>

Cartwheel: <http://www.cartwheel.cc/>

C-Print: <http://cprint.rit.edu>

TypeWell: <http://www.typewell.com>

Test Equality website: <http://gri.gallaudet.edu/TestEquity/index.html>

Technology Access Program: <http://tap.gallaudet.edu>