

# Hearing Impairments

## Characteristics

*Hearing impaired* is a generic term and it could apply to the child with handicaps as well as to a child with a physical hearing loss, although it seldom is. For the deaf and hard of hearing, training in listening and interpreting sound is crucial not only to success in school but also to adjustment to life in a hearing world. The manifestations of faulty hearing, whether due to a malfunction of physical apparatus or of perceptual processing, are amazingly similar. Both types of problems result in inadequate assimilation of auditory information, and hence difficulties in language and speech. In fact, many young children with perceptual handicaps are often suspected of having learning disabilities once they start school.

Many people are not aware that there are two dimensions to the sense of hearing. First, the intensity, or loudness, with which sound is received (measured in *decibels*); and second, the quality, or clarity with which sound is received (measured in *frequencies* or *hertz*). Difficulties concerning only the loudness factor are due to *conductive* losses and can usually be helped, if not corrected, with the use of hearing aids. Difficulties with clarity, however, are due to *sensori-neural* losses. Such losses are usually caused by damage to nerve fibers in the inner ear. The result is faulty or no hearing at specific frequency levels and, at the present time, this is not correctable. It is important to keep in mind that many children with hearing impairments have *both* conductive and sensori-neural losses. In addition, the condition of *tinnitus* (head noises, like ringing or buzzing) is common in both types of losses. Head colds further reduce hearing, so that a child's hearing level often varies throughout the school year.

Not all individuals with hearing impairments use sign language. Those who cannot communicate without it usually have profound hearing losses of greater than 90 decibels (db). Individuals with losses of 60 decibels or less are considered *hard-of-hearing* rather than *deaf*, but most still require special education and hearing aids to learn to speak and understand language. Individuals vary in their ability to lip-read (sometimes called speech-reading). Some are quite competent even as young children, while others never seem to be successful. Children who have vision problems as well as hearing impairment will be unable to benefit from lip reading. Nearly all individuals with hearing-impairments have some residual hearing. Stone-deafness is very rare.

There are many approaches to educating deaf children, but basically they all stem from one of two philosophies – *manual* versus *oral* communication. Obviously, lack of communication is the most serious handicap of the deaf when considering education. Understandably, educators have been totally concerned with seeking the most effective and efficient method of developing both expressive and receptive language in the deaf. In the past all methods have focused on some kind of substitute for the impaired sense of hearing (e.g., lip-reading, signing, fingerspelling). Improvements in hearing-aid technology and teaching techniques have given rise to the *auditory-oral* method, which has

been well received in England, America, and Scandinavia. The thrust of this approach focuses on developing whatever residual hearing an individual has. Emphasis is on early detection and the use of proper hearing aids, parent education, and *continuous auditory training* for the child. Even children with profound hearing losses have been successfully trained in this method, which does not use manual communication in any form. These children are most easily mainstreamed into classes of hearing children. Music education can play a large part in both the pre- and post-lingual training of deaf children.

**Hearing aids** Recent theory and treatment tend to favor the early use of *binaural* (both ears) aids if a hearing aid is deemed appropriate. There are two basic styles of personal aids: (1) body and (2) ear level, usually worn behind the ear. Eyeglass aids may be worn by children with both vision and hearing impairments. Body aids are more often recommended for young children, and the unit that contains the microphone and amplifier is worn in a carrier on the chest. Occasionally, two of these units will be worn in specially sewn breast pockets, resulting in something like stereophonic reception as a separate signal is received in each ear. These units are connected by a thin wire to ear pieces that contain the receiver. Some facts about the performance of hearing aids that are important to the music teacher are the following.

1. The average personal aid, like the telephone, amplifies best within a frequency range of 300-3000 hertz (Hz). This is approximately middle C to three octaves above on the piano keyboard. Although most speech sounds fall within range, it should be pointed out that some speech sounds, such as *s*, *t*, and *sh*, are produced by higher frequencies. Some children may not respond as well to sounds above or below the normal hearing-aid range unless their aids are specifically designed to give more amplification to upper or lower frequencies.

2. Like all microphones, the hearing-aid microphone picks up best what is nearest to it. It also picks up *all* sounds indiscriminately.

3. Hearing aids amplify sound and are effective in correcting conductive losses only. Children who have sensori-neural losses will probably be hearing sounds better (i.e., louder) with an aid, but the sounds will continue to be distorted. It is often difficult to tell just what young children do hear in this respect.

4. Once a qualified specialist has determined the optimum volume control setting, the child is usually cautioned against readjusting it. This is important, as the hearing aid should be selected with the appropriate amount of amplification (called *gain*) relative to the individual's specific loss. The volume of a hearing aid is set to provide the optimum gain for *speech* sounds. When the volume is turned lower, speech comprehension may suffer. Similarly, as you increase the distance between you and the child, you decrease the volume at which she or he hears you speaking when the aid is at normal setting.

**Accommodating the child who wears an aid** Even children with severe to profound hearing losses are commonly being included in music in public schools today. Music teachers are often at a loss to know what a hearing-handicapped

child's potential is in music because so little information is available to them. What is available is often not particularly relevant to the music experience. For example, assessment of hearing is a quantitative score based on how loud an individual can hear at three basic frequency levels (i.e., 500, 1000, and 2000 hertz). These frequencies are chosen because they represent the frequency levels for most *speech* sounds. Therefore an assessment of a hearing loss of 85 decibels represents the average decibel loss of these three frequencies. Musically speaking, the quality of sound perception is at least as important as the quantity (decibel level), but the only way a music teacher has of assessing it for individual children is by trial and error. What would be more helpful for a music teacher to know is what the child's hearing ability is *with the aid*. With proper amplification some children can hear sounds at certain frequency levels as loud as individuals without impairment. Other frequency levels may always be too soft to perceive even with amplification. Fortunately for the music educator, the vast majority of individuals with hearing impairments do perceive sounds as well within the frequency range of classroom music activities, though perhaps in a distorted fashion. As with many other disciplines, the profession of audiology has traditionally been medically oriented, and testing techniques are geared to provide information that would most benefit the attending physician. Only recently has this profession begun to move in directions that might ultimately be more beneficial to professional educators who serve children with hearing handicaps.

If a child wears an aid, it would be wise to find out specifically to what extent it improves hearing. Unfortunately this is often a fuzzy area with parents, unless one is an electronics buff. A knowledgeable parent or professional should be able to explain how close to normal an aid brings up the child's hearing at the various frequency levels (i.e., 500, 1000, and 2000 hertz). If a child has a mild to moderate loss (i.e., 20-60 decibels), chances are good that the aid will bring him or her at least close to a normal level of hearing. Audiograms show this information graphically. However, audiometer tests are not normally given while children are wearing their aids. Therefore, they reflect only what a child does *not* hear. Also, these tests cannot evaluate how well the child hears what he or she does hear (clarity), nor do they evaluate how efficiently an individual uses residual hearing. Individuals with greater losses sometimes hear more than those with mild losses because they have learned to use their hearing better.

There are times when the music environment may create some problems for either the hearing-aid wearer or the teacher. Generally these are quite minor and do not interfere with music participation to any great extent. Following are some of the more common situations and some suggested solutions.

1. Most aids have an automatic gain cutoff at the pain threshold. In other words, the aid will amplify only as much as is needed. If an aid does not have this feature, or is malfunctioning, a child could experience discomfort or pain when exposed to loud sounds if the aid continues to amplify at the same rate as for speech sounds. This is sometimes a problem in music, as sensori-neural impairments is often characterized by a phenomenon called the *recruitment factor*. In this condition, once an individual's threshold of hearing has been

reached, there is a rapid increase in the sensation of loudness, so that the pain threshold is reached abnormally quickly. You should be suspicious if a child refuses to beat a drum or cymbal, or makes facial grimaces when playing them. If you determine this as the problem, your only immediate alternative is to have the child turn down the volume on the aid, but it should be returned to its normal setting once the activity is completed.

2. Occasionally a child's aid will give off a high-pitched squeal or whistling sound. This could be an indication that the aid is malfunctioning, but it is more likely that the ear mold has partially slipped out. This is a common occurrence with young children, when ear molds may not fit tightly. Inexperienced wearers or young children engrossed in a lively activity may need to be made aware of this problem.

3. Aids frequently give off feedback noise (buzzing, static) during music activities. Usually this is only audible to hearing individuals within the proximity of the child wearing the aid. The wearer is usually unaware of it, so we can assume that it neither interferes with sound perception nor creates discomfort.

4. Auxiliary amplification systems, such as loop induction, Phonic Ear, and Auditory trainers, are more effective than personal aids and are sometimes provided for children with hearing impairments for use during school hours. If your school is equipped with any of the auxiliary systems available, the hearing resource teacher can best explain what you need to know. While some systems substitute a different unit for the child's personal aid, others require that the child's personal aid be set at the microphone-telephone (MT) setting. Occasionally, when a child has been using auxiliary amplification in one classroom, he or she forgets to reset the aid back to the microphone position on arrival at the music class. If the aid appears to be "dead," this is the first thing you can check. Next, check for dead batteries. If it still isn't working, and everything looks connected, call for help.

Acoustic technology and research in deaf education have encouraged the use of hearing aids with very young children, even infants. Just as the teacher is in a good position to first detect a hearing problem, she or he is also likely to be the first to recognize when an aid is malfunctioning. Young children are naturally active, and the durability limits of an electronic device as delicate as a hearing aid are understandably stretched to the breaking point at times. New wearers or very young children often will not be aware that the aid is not performing as it should. Parents will welcome a note or call if you suspect that the hearing aid needs to be checked.

## **Learning Styles**

The importance of the mental age in relation to the chronological age has been stressed elsewhere in this book. When teaching people with hearing impairments, there are two additional "ages" to consider.

1. *Listening age* – often dated from the time the child began wearing a hearing aid.

2. *Linguistic age* – the level of language expression and comprehension.

It is important to bear in mind that although a child with hearing impairments may be far behind peers who have hearing in these later two ages, this is not an indication of inferior intelligence. Since IQ tests rely heavily on language, they are not accurate indicators of the intelligence of individuals with hearing impairments either.

The child with a hearing handicap often lags behind chronological peers in academic achievement because of slower acquisition of language skills. One unique characteristic of Piagetian theory is the belief that thought precedes verbalization. Piaget contends that normal individuals really don't have adequate verbal skills to explain thoughts until they have reached formal operations, the last stage of intellectual development. Lacking verbal skills to explain even one's most basic thoughts, needs, and fears is a constant source of frustration to the child with hearing impairments. Slower language development also affects social growth and maturity. Children with hearing impairments often are less attentive, find it difficult to concentrate, and can't sit still for very long. Language difficulties make common slang or vernacular expressions confusing to them, since their vocabulary comprehension is quite literal. "Don't get uptight" or "Hit it" may not convey what you intended to a child with a hearing loss.

Just as the sense of hearing is developed by necessity in the blind, children with a serious hearing loss tend to be very visual in their learning style. If they depend on lip-reading for receptive language, they will watch your mouth intently when you are speaking and singing. If you are showing a visual (e.g., picture or instrument) at the same time, try to hold it in the vicinity of your mouth so that both may be viewed together. Remember that when the children cannot see your face, they probably can't hear what you are saying. You should not, however, attempt to over-enunciate speech or raise your voice when speaking to them. Speech reading is not the most efficient way to understand speech. Less than 50 percent of speech sounds are visible. In addition, beards, moustaches, and nervous habits that bring the hands into the facial area all obscure speech for the lip-reader. Whenever possible, explanations are best made graphically to people with hearing impairments.

The child with hearing impairments and highly developed visual skills usually learns very quickly from visual demonstrations. Techniques in playing an instrument, movement activities, and reading scores are often memorized after one or two experiences. A child with hearing-impairments will depend on visual clues if possible. After an activity has become familiar, every effort should be made to remove visual clues in order to encourage more effective use of hearing.

Some individuals who are deaf are extremely sensitive to *tactile* clues in the environment, such as the movement of air currents. Move vibrating instruments, like drums, far enough away so that you are sure the child is using residual hearing when responding in an echo-type activity where audition is the goal. Drums and piano provide a handy tactile clue for other sounds as well, because of sympathetic vibration properties. When discrimination is the objective, keeping hands off the sound source is important to avoid the tactile input serving as a cue.

Children with hearing impairments are often quite expressive in body movement. If given the opportunity, many excel in creative movement and dance. Body movement offers many opportunities to strengthen and expand auditory skills, and many music concepts can be taught through this medium as well.

## **Learning Needs**

It is absolutely necessary to provide some nonverbal situations in which a child may demonstrate achievement of instructional objectives. For the music teacher, this should pose no problem. Music is first and foremost nonverbal communication, and if there exists any area in the school curriculum where lack of verbal skills is not a barrier, it should be music education. Music goals for people with hearing impairments, particularly in beginning activities, should relate to auditory perception and language development. The entire range of music experiences should be used in developing specific skills related to these areas (i.e., singing, playing instruments, listening, moving).

People with hearing impairments need constant practice in auditory skills. Although visual clues should be included to ensure success in beginning experiences, the goal should be to have the child perceive auditory information without being dependent on visual confirmation. A considerable amount of time may have to be spent in developing auditory awareness and localization before going on to specific discrimination skills. Research over the past sixty years has consistently shown that hearing-impaired children have very poor memories for even short auditory sequences. Songs, body movement, and instrumental and listening activities can all be planned with this important skill as the objective.

Speech and language are the biggest hurdles for the hearing impaired. Unintelligible speech often brands them as different, at best, or unintelligent, at worst. Children with hearing impairments in programs of inclusion are often more motivated to speak intelligibly and may have better speech because they are surrounded with more models of good speech than are children in special programs for the deaf. Patience and support are what these children need in order to be encouraged to persist in the eternal struggle to understand and to be understood.

Every teacher of a child who is deaf must be a language teacher. Not only does the child need activities for developing vocabulary, syntax, and grammar, but he or she also needs to consciously learn the pitches and rhythms of normal speech. Children who are deaf can learn them no other way except deliberately. In addition to songs and speech chants, you will find that rhymes and rounds are valuable resources. Care should be taken to select only material that reflects the *natural* pitches and rhythms of speech. In some songs, words may not be set in their natural speaking rhythm because the melody reflects rhythms characteristic of a specific style of music or folk culture. When working with children who have difficulty producing intelligible speech, it would seem wise to avoid songs with unnatural speech rhythms. It is always a good idea to ask children to explain the meaning of a word you suspect they don't understand, even if they say they do.

Consider the similarity in "giraffe" (said quickly) and "graph"; or "ice" and "eyes," which are impossible to differentiate when lip-reading. In teaching children with language handicaps, one quickly learns to read their faces, and their expressions will soon indicate when you have lost them.

Singing is an important activity for children with hearing handicaps. Even children who are profoundly deaf can learn to sing. The earlier they begin to experiment with the singing voice, the better the chances are for developing a speaking voice with a normal pitch range. The pitch range for speech in children who are deaf is often found to be between B-flat and E. If a singing voice is already established, it is generally within this same low, limited range. Frequently very young children, or children who have had no previous singing experiences, will have to be taught the difference between a singing and a speaking voice. Even very young children who are deaf will normally begin making sounds that are low in pitch, and one expert advises teaching the child to make high sounds immediately (e.g., the high-pitched sounds of animals such as mice, kittens, puppies). The feeling is that if this ability isn't developed from the outset, the child may never progress above the low register vocally. Singing activities will generally be most successful when confined within the octave above middle C. However, as with children who can hear at the primary level, every effort should be made to extend the vocal range both up and down. Wind instruments such as kazoos, Melodicas, and Pianicas, are also helpful in extending the vocal pitch range.

### **The Use of Musical Instruments for Children with Hearing Impairments**

Just about any classroom instrument is suitable for use with people with hearing impairments if one takes into consideration the acoustic properties of the instruments as related to the hearing abilities of the child who will play it. For example, a child with no hearing in the upper frequencies can hardly get much of a music experience in playing a triangle if he or she can't hear it. Some instruments are naturally softer (e.g., resonator bells, finger cymbals) or more resonant (e.g., wooden sources) than others. Often, the child is the best judge as to which instruments are the most musically satisfying.

Many children with hearing-impairments are capable of learning to play band and orchestral instruments. This is an area of the music education curriculum that is only now beginning to receive attention. Instruments with fixed pitches (e.g., keyboards) are generally recommended. However, there are reports of many competent string and wind players who have hearing losses. Evelyn Glennie is an excellent example of a person with a profound hearing loss who is at the top of the list internationally for percussionists in classical music orchestration. Among wind instruments, clarinets and saxophones have been very successfully taught to people who are deaf. Brass instruments are understandably more difficult for people who are deaf because of the overtone structure. The slide trombone and orchestral strings would seem to present overwhelming intonation problems, but little has been reported relative to teaching these instruments to people with hearing impairments. The harp and

guitar are not unrealistic choices, since the playing position brings the sounds close to the ear (or aid), and body contact with the instrument provides tactile reinforcement through vibration. Both have been successfully taught to children with hearing impairments. In selecting an instrument for a child with a hearing impairment, the degree and type of loss, the ability of the individual child to perceive sound, and the motivation of the child to learn a specific instrument should be the special considerations in addition to the traditional guidelines of natural embouchure, physical size, and so forth. Supervised practice is often necessary for success, particularly in the beginning stages. Usually, parents are willing to assume this responsibility if they feel they are capable. Recording the child's lesson on a cassette tape is one way of providing guidance for parents when they supervise practice time.

### **Miscellaneous Hints**

Children with hearing impairments present challenges, especially in the subject area of music because comprehension depends on auditory perception. Some teachers may find the following general techniques helpful in working with these children.

1. Avoid startling a child by approaching from behind. Since approaching footsteps are usually inaudible to the child, it is more considerate to approach within the line of direct or peripheral vision.
2. When speaking with small children, get down to their level physically, so that they are not trying to lip-read at an upward angle. Your mouth should be in a direct line of vision with their eyes.
3. Be patient when a child is trying to explain something to you. Have faith that you will become accustomed to that child's speech eventually.
4. Don't be afraid to correct a child's speech or to say that you cannot understand, but do it in a supporting rather than critical manner.
5. Praise a child for good listening and/or good speech whenever it is earned.
6. When teaching groups of children with hearing impairments, it is helpful to establish a visual signal to get everyone's attention. Classroom teachers may flick the light switch a few times.
7. Check the amount of gesturing you do when giving directions. Hearing-impaired children should be given every opportunity to respond to verbal directions before being given visual clues.
8. Remember that children with hearing impairments, like all children with handicaps, expend much more energy in routine tasks than non-afflicted peers. There are times, particularly later in the day, when energy reserves become exhausted and they have reached their saturation point for auditory concentration. Be sensitive to this problem and have an alternative activity planned.

Music educators are obliged to develop curriculums for people who are deaf and hard of hearing that will enable them to participate in the cultural



mainstream of a hearing world. They need to have the same kinds of music experiences as their hearing peers. These experiences include learning the traditional folk, patriotic, and popular music of their own and other cultures, as well as the same basic music concepts taught to all children through the music education curriculum. There is a danger in believing there are special music materials for people who are deaf or for any population of people with handicaps. Children who reside in special schools have an even greater need for a music education that will give them some common ground on which to musically interact with peers who have hearing. Music educators should also be cautioned that it is relatively easy to teach individuals who are deaf to achieve the motor precision necessary to play instruments successfully. However, it is very difficult, but possible, to teach them to understand and appreciate what they are playing. Although some social benefits may accrue from the former, only the latter can be considered music education.

Children with hearing impairments enjoy the participation aspect of music experiences – playing, singing, and moving to music. It is debatable whether some will ever covet listening to complex orchestral music as an enjoyable pastime. Given the realities of the distorted way most of them hear music, we must accept the fact that music appreciation takes on a different dimension for them and is no doubt unique for each individual. The important thing to remember is that children with hearing impairments do enjoy music activities and through these experiences can learn aesthetic concepts just as other children do. Since the practice of teaching music skills including singing, listening, and playing instruments is so new in the education of people who are deaf, there is no significant research yet to indicate whether this more comprehensive music education will enhance music listening as a pastime in their adult life.