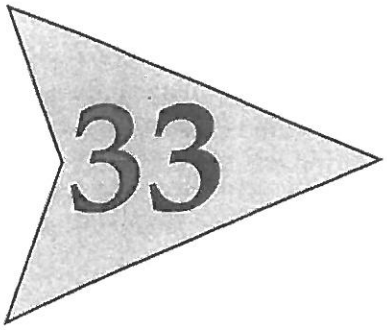

School-Aged Children

Carolyne Edwards

Introduction

When children reach school age, the focus of our audiologic attention changes in response to the different players involved. Assessment and management of school aged children demands a comprehensive view of their educational setting and the people who now enter their school life. On the professional side, those people include the classroom teacher, special education teacher, principal, teacher of the deaf and hard of hearing, educational audiologist, speech-language pathologist, and other support personnel as needed. On the personal side, children now must interact with a large group of other children, who may or may not have hearing loss depending on the school setting. Family members are the one constant throughout and therefore carry the history of where their child began and the direction for the future.

The audiologist must now focus on how to create the most optimal integration of children with hearing loss into the elementary school setting. Although educational audiologists are best known for their direct mandate in children's auditory needs in the school system, it behooves all audiologists to see themselves as vital contributors to children's educational progress and to ensure that the necessary steps are taken to provide for the learning needs of all children with hearing loss.

Creating Optimal Integration for Children With Hearing Loss

The audiologist contributes to the children's successful integration into the school setting in the following ways:

- assessment of children under a variety of listening conditions to provide:
  - an ongoing picture of the growth in children's listening abilities;
  - the communication strategies necessary for optimal understanding of speech in the classroom;
- description of children's auditory functioning in layperson terms so that all personnel who work with hearing-impaired children develop appropriate expectations of their auditory capabilities;
- description of the social-emotional impact of hearing loss so that personnel working with children with hearing loss can incorporate that knowledge into their strategies;
- evaluation of amplification needs on an ongoing basis in order to respond to the changing auditory demands of the classroom;
- communication with the team of key support personnel at the school level to ascertain concerns and issues that need to be addressed by the audiologist;
- addressing the counseling needs of children and their families as the school demands change.

Assessment of Listening Skills

Audiologic assessment has moved well beyond diagnosis and monitoring of hearing levels in the last 25 years. In the early years, the only audiologic information requested at school case conferences was the pure-tone audiogram and the degree of hearing loss. In recent years, educational and clinical audiologists alike have forwarded information to school personnel to describe:

- the type and degree of hearing loss,
- the child's auditory potential based on degree of hearing loss,
- the child's current auditory capacity to understand speech,
- predictors of the child's listening difficulty,
- the effects of middle ear function on the child's hearing levels and everyday functioning,
- the effects of the child's hearing loss on functioning within current school setting,
- the relationship of the child's hearing loss to overall functioning.

Although traditional testing protocols consisted of the pure-tone audiogram, middle ear measurement, speech awareness or reception thresholds and a word discrimination score, there is a wide variety of speech tests now available to measure understanding of speech under varying conditions. The audiologist is able to provide a comprehensive description of a child's listening skills and then measure changes over time. This information is critical to the school staff's understanding of the child's current and future needs in the classroom.

Degree of Hearing Loss

Degree of hearing loss is the most well-reported and understood characteristic of audiologic testing. Anderson's *Relationship of Hearing Loss to Listening and Learning Needs* (2007) continues to provide valuable descriptors of auditory functioning in layperson language for hearing levels ranging from unilateral hearing loss to bilateral minimal to profound sensorineural hearing loss (Appendix 33–A). Audiologists would be wise to include these descriptors in their reports to schools.

Type of Hearing Loss

Often the type of hearing loss is no longer prominent in audiologic reporting as the child enters the school years. However, it is useful to differentiate at the time of school entry the functional differences between the child with conductive hearing loss and the child with sensorineural hearing loss so that educators know what to expect with regard to speech perception and speech intelligibility.

Middle Ear Function

The presence of abnormal middle ear function is significant to educators for one or more reasons and can be reported as such:

- the pure-tone thresholds obtained on the audiogram do not reflect the child's optimal hearing levels;
- the child may perform more poorly than usual and need a higher volume setting or a different program on the hearing aid;
- the child may need more support and communication strategies in the classroom;
- if hearing levels are significantly poorer than typical levels, then the child may be more fatigued than usual.
- Normal middle ear function indicates that the pure tone thresholds reflect optimum potential for understanding of speech.

Speech Perception Ability

The original purpose of speech testing was to obtain a validation of pure tone thresholds and a measure of understanding of speech using speech perception tests. Unlike the adult population where the results are given directly to the individual with hearing loss, results of testing for children are sent to school settings so that educators can better understand the impact of hearing loss. Although speech perception testing continues to be commonly used in clinics, it does not necessarily give a direct representation of the child's ability to function in the classroom under the variety of listening conditions encountered in the school. Therefore, additional tests are useful and round out the audiologic results in order to increase relevance of speech testing to the educational environment.

Testing Different Modalities

The impact of hearing loss is well known to audiologists but those who work with children in the schools often have little background knowledge in the area of

audition. Therefore, when the audiologist can present speech perception scores that demonstrate the child's capacity to understand speech by listening only and by listening and speechreading, teachers have a better idea of the impact of various listening conditions.

SAMPLE SPEECH PERCEPTION SCORES	
Child #1	
By listening only:	92%
Child #2	
By listening only:	48%
By listening and speechreading:	92%
Child #3	
By listening only:	16%
By listening and speechreading:	76%
By speechreading only:	48%
Child #4	
By listening only:	0%
By listening and speechreading:	56%
By speechreading only:	60%

Although speechreading cues enhance comprehension of speech, child #1 will not be affected by the loss of speechreading cues to the same degree as the other three children in the above examples. When the teacher looks away or turns to the blackboard to write, child #2, #3, and #4 will lose critical information. Notice the difference between child #3 and child #4. Child #4 has little use for auditory information and is functioning primarily through visual information only. In contrast, child #3 improves speech perception with the combination of auditory and visual clues together.

Testing Different Intensity Levels and Speech-to-Noise Ratios

Classroom listening conditions vary considerably depending on the grade level, the classroom activity, the number of students in the class, the location of the student in the classroom and proximity to the teacher and the acoustical conditions of the classroom. Testing at speech-to-noise ratios of +5 dB or 0 dB will best replicate challenging acoustic conditions in most classrooms without the use of classroom amplification systems (Crandell & Smaldino, 2002; Hetu, Truchon-Gagnon, & Bilodeau, 1990).

SAMPLE SCENARIOS	
Child #1	
Word recognition at normal conversational speech:	92%
Word recognition at quiet conversational speech:	56%
Word recognition at normal conversational speech in background noise (S/N = + 5 dB):	68%
Child #2	
Word recognition at normal conversational speech:	56%
Word recognition at quiet conversational speech:	12%
Word recognition at normal conversational speech in background noise (S/N = + 5 dB):	16%

Notice that child #2 will have considerably more difficulty than child #1 when the teacher is at a distance (quiet conversational speech levels) or in the presence of background noise when the teacher is within close proximity.

Test results such as the above scenarios can highlight for the audiologist the importance of recommending other technologies such as an FM system, a boom microphone versus a lapel microphone, and strategies such as preferred seating locations in the classroom. The quantitative data offered by speech perception scores are useful in describing the child's auditory difficulties in the classroom, potential problems and recommended solutions to educators.

Testing Different Speech Materials

One of the easiest modifications for word recognition testing is to record the child's responses and then score the number of phonemes correct in addition to the number of words correct.

WORD VERSUS PHONEME SCORING	
Child #1	
Word recognition at 50 dB HL	32%
Phoneme recognition at 50 dB HL	66%
Child #2	
Word recognition at 50 dB HL	32%
Phoneme recognition at 50 dB HL	36%

Although the word recognition scores for both children is the same, the phoneme scores are significantly different, suggesting far more auditory perceptual errors for the second child. These difficulties will be apparent on spelling tasks and often will be reflected in the child's speech intelligibility.

For children with high-frequency hearing loss, Gardner's high frequency monosyllabic word list (Berger, 1977) continues to be useful to demonstrate to the child, teacher or parents the listening challenges that are not clearly seen with administration of a conventional word list that has no special emphasis on high-frequency phonemes.

Although word recognition testing is a more reliable and valid indicator of auditory perception, it does not represent the nature of the speech that a child faces in the classroom. The child is faced with sentence material, and often a series of sentences presented without pause in the classroom. It is difficult to standardize norms for children's performance on phrase or sentence material since it is highly language dependent. Therefore, testing that goes beyond word recognition is not used as a precise comparative measure of performance from year to year, but rather as an indication of the degree of enhancement in understanding speech when moving from word to sentence material using materials such as BKB sentences (Bamford, Koval, & Bench, 1979), or the Speech-in-Noise test (SPIN; Kalikow, Stevens, & Elliott, 1977).

In some cases such as precipitous hearing loss, the difference between word recognition and sentence recognition is great, often showing very low scores on word recognition of 30% or less and high scores on sentence materials ranging from 76 to 100% with the addition of the acoustic and contextual clues provided by connected speech. The child's functioning in the classroom can be better described by including both measures than either measure alone.

There are a variety of other speech materials using phrase or sentence recognition or comprehension tasks that can be used to gain a broader understanding of the child's auditory abilities (DeConde Johnson, Benson, & Seaton, 1997a; Edwards 1991, 1999). The reader is referred to these references for further elaboration of pediatric speech test batteries for school-aged children.

Description of Auditory Functioning

Many educators have little familiarity with the nature of audiologic testing. Therefore audiologic assessment and reporting that can translate clinical findings into meaningful descriptions of classroom functioning is essential to produce changes in educators' understanding of the auditory needs of the child.

The audiologist needs to describe the nature of the hearing loss in terms of implications for the classroom, specifically the challenges that the child will have in the classroom. The questions below can be used as a guide to the type of information valuable to educators.

- What is the child's capacity to understand speech?
  - by listening only?
  - by listening and watching the teacher's face?

  How much does the child rely on hearing alone? Will the child be able to understand the teacher when they are not facing each other? Is the child reliant on watching the teacher's face to understand speech?
- Which speech sounds are difficult to hear?
  Does the child have difficulty hearing high frequency speech sounds such as s, f, voiceless "th" or "ch" or t? The /s/ sound is a grammatically loaded sound in the English language that signifies plurals, possessives, and change in verb tense. If a child is unable to hear the /s/, it is useful for the teacher to know so the child can be provided with other grammatical clues instead.
- How will distance affect the child's understanding of speech?
  - without amplification?
  - with hearing aid(s)?
  - with classroom hearing technology?

  School situations such as classroom discussion, listening in the gymnasium during sports activities, gatherings of the whole school for assemblies, the playground and class trips involve distance listening. The degree of difficulty children experience for softer degrees of speech will affect their ability to

respond in these situations. Identifying the child's degree of difficulty in these situations will be helpful to the child's teachers. Furthermore, educators will need to know how much change to expect when a child uses a classroom hearing technology.

- How will noise affect their understanding of speech?
  - without amplification?
  - with hearing aid/s?
  - with classroom hearing technology?

  School situations such as small group work, seminar groups, and listening in the gymnasium during sports activities involve listening in noise. The degree of difficulty children experience in noise will affect their ability to respond in these situations. Again, educators need to know how much improvement will occur when classroom hearing technology is used.
- What modifications will assist the child in hearing better?
  - proximity to the teacher
  - use of FM system
  - repetition and buddy systems
  - visual supports—speechreading and written supplements

  For children not using an FM system who have difficulty listening at a distance, sitting close to the teacher during circle time for primary levels or row seating near the teacher for higher grades will be beneficial.

Most children with hearing loss will benefit from the use of classroom hearing technology of some kind IF there are large group teaching situations in which they are involved. Evaluation of candidacy for an FM system is best done at the school level where the educational audiologist and the teacher of the deaf and hard of hearing, and occasionally the speech-language pathologist, are in direct contact with the classroom teacher and can assess the nature of the classroom structure and its suitability for the use of such systems. The clinical audiologist can raise the issue of FM use for consideration with the parents and child as soon as the child enters school. Furthermore, the audiologist needs to ensure that hearing aid settings are compatible with FM use. See Chapter 26 for detailed discussion of FM system use.

Where the child has difficulty in quiet listening situations by listening only, it is wise to ensure that there are other strategies put into place to support comprehension, such as repetition of instructions by the teacher, or a buddy system where a classmate is selected to provide repetition of instructions as required by the child.

When a child is dependent on speechreading for accurate listening, the importance of speechreading needs to be underlined. Educators need to be aware that when they turn their backs to write on the blackboard or to address another child, the understanding by the child with hearing loss will be compromised. Writing key words or instructions on the blackboard, the overhead projector or on interactive white boards will assist the child by supplementing the loss of speechreading information.

In summary, audiologists must ensure that that the implications of audiologic testing are translated into concrete actions for those working with children in the classroom setting.

Social-Emotional Impact of Hearing Loss

Children's sense of difference from their family and friends starts to develop between ages 7 and 9 years (Rall, 2007). Even with the best technology available, we cannot change the fact that children with hearing loss will have more difficulty hearing under degraded listening conditions (such as noise and distance) than their hearing peers. However, what we can change is children's attitudes toward their differences.

Accurate perspective comes from acceptance of both the similarities AND the differences from others. Some children will imagine their difference as greater than it appears to others, and some children may imagine their differences as less than they appear to others. Without adequate input and feedback from others in their environment, either viewpoint can lead to inappropriate use of communication strategies due to an inaccurate perspective of auditory needs.

Children with hearing loss often identify their own listening difficulties, but do not know that normal-hearing peers also have difficulty listening in noise, with the resulting feeling that others will never understand their experience. That feeling of separation from others must be bridged in order to bring a greater sense of self worth.

The audiologist can encourage the classroom teacher to support sharing of listening difficulties by all students in the class so that children with hearing loss begin to understand that everyone, normal hearing or hearing impaired, has difficulty hearing in noise to varying degrees. When children with hearing loss understand that they are not alone in their experience of auditory challenges, it gives them more confidence

to ask for help and implement strategies to enhance communication. If the teacher can make all children in the class part of the solution, communication strategies become inclusive rather than isolating (Edwards, 1996, 2005).

Simulation of hearing loss using earplugs (Appendix 33–B) is an effective way to educate individuals about hearing loss (Edwards, 2005). Whether we give earplugs to a child's classmates, teachers, or to the child's parents for a personal experience of mild loss, the experience of simulated hearing loss is powerful and memorable for most people and can elicit a surprising empathy for the person with hearing loss.

Children need an opportunity to share their thoughts and feelings about hearing loss for acknowledgement and validation of their experiences. Sharing can reveal what is working and what is not working in the classroom, what strategies to continue, what strategies need to be discarded and what new strategies need to be implemented. Audiologists can use such tools such as the Listening Inventory for Education (LIFE; Anderson & Smaldino, 1998), Child Home Inventory for Home Listening Difficulties (CHILD; Anderson & Smaldino, 2000) or scales such as the Children's Peer Relationship Scale (English, 2002) to elicit comments on the ease or lack of ease of listening for the child. Alternately, audiologists can use open-ended questions and discussion such as:

- How do you feel about your FM system?
- What do your classmates understand about your hearing loss?
- What is difficult to explain to your classmates?
- What is frustrating about school right now?
- What is working in the classroom and what is not?

Such information can then lead to discussion of strategies that might assist students in the classroom and with their peers.

Audiologists can support the development of children's self-advocacy skills in the clinical setting and the educational setting. Children need to understand their own audiogram, and be knowledgeable about the cause of their hearing loss, the implications of their hearing loss, and any progression of hearin loss through the years. They must have an increasin understanding of their hearing technology and ho best to use it, and the types of hearing concerns th they should report to their audiologist: Audiologis can be effective teachers in these subject areas.

The educational audiologist in the school system can engage the child in decisions about the type of education to be provided to their classmates and teacher about hearing loss and the degree of involvement of the child in such programming. Often the student knows more about their hearing devices than their classroom teachers; it is important to encourage the classroom teacher to draw on the student's expertise when possible.

Having children teach others about their hearing loss builds confidence and empowers students to learn how to manage their hearing impairment. The ways in which we support children will change with their age. For younger children, they can show their classmates how their hearing aid works with support personnel such as the educational audiologist or the teacher of the deaf and hard of hearing present as support. Older students can teach others about their hearing loss through science projects, class presentations, lessons on sound, or being part of a hearing awareness day in the school where various booths are created to teach others about hearing loss and hearing aids. Giving children experiences in managing their own hearing needs teaches them what works and what does not, increases their awareness of options, improves their decision-making ability and their ability to negotiate solutions.

Audiologists also need to be aware of a child's educational placement in order to intuit the challenges that may be confronted. Children in the mainstream can feel the pressure to be the same as their peers and therefore may minimize any interventions that demonstrate their differences from others. Children in self-contained classes in the mainstream often feel more secure in their class with other hearing impaired peers, but may need more support for their visits to the general education classes. Children in schools for the deaf often are secure in their school setting with their deaf peers but face their greatest challenges in their social community at home, either as day students who by the time they arrive home on the bus have little energy to interact with people other than their family, or as residential students whose weekend visits with their families leave only brief opportunities to interact with the hearing world.

Ongoing Evaluation of Hearing Technology Needs

Most children with hearing loss are candidates for some form of classroom amplification. As described in detail in Chapter 26 of this volume, there are a myriad of FM system configuration options now available for children with varying degrees of hearing loss as well as for children with normal hearing. Table 33–1 shows many of the possible choices facing the audiologist in

Table 33–1. Selection of Amplification System

Type of Classroom Amplification System	
Personal FM System	***Sound Field System***
FM Receiver Options	*Nature of Signal Transmission*
∞ Ear level hearing aid with FM receiver attached to audio shoe	∞ FM system
∞ universal FM receiver and separate audio shoe	∞ conventional frequency
∞ integrated FM receiver and audio shoe	∞ ultrahigh frequency
∞ Ear level hearing aid and neckloop FM receiver	∞ Infrared system
∞ Ear level hearing aid and body worn FM receiver	*Type of Loudspeaker*
∞ Combined hearing aid—FM in ear level casing	∞ Totable
∞ FM receiver only in ear level casing	∞ Portable
∞ FM body-worn receiver	∞ Stationary
∞ with ear level hearing aid and audio shoe	∞ Single Speaker
∞ with earphones	∞ Multiple speakers
∞ Cochlear implant	• Wall mounted
∞ FM receiver with ear level processor	• Ceiling mounted
∞ FM receiver with body-worn processor	*Type of Transmitter Options*
∞ neckloop FM receiver	∞ Single-channel transmitter
FM Transmitter Options	∞ Dual-channel transmitter
∞ Single channel transmitter	∞ Pass around microphone
∞ Dual channel transmitter	*Type of Ear Coupling for Transmitter*
∞ Multichannel transmitter	∞ Over-the-ear microphones
∞ Pass around microphone	∞ Collar microphone
∞ Coupling Options for Transmitter	∞ Lapel microphone
∞ Lapel microphone	
∞ Boom microphone	
∞ Collar microphone	

order to make a recommendation for an FM system for a school child.

As the reader can see, audiologists must gather information on the child's hearing aids, the type of classroom setting, the structure and scheduling of the classroom setting, the type of instruction, the teacher's use of the system, and the child's willingness to accept a device, to select the optimal FM system for a child. Then these choices must be reviewed annually to ensure the equipment can be modified to include any additional amplification needs arising from changing classroom structure or demands.

The important questions that audiologists must ask to ascertain the need for change are:

■ *What has changed, if anything, in the classroom structure?*

If there is team teaching in the classroom, the FM system will have to provide multiple transmitters working within the same classroom without interference. Different manufacturers have different ways of addressing this. If the child has an educational assistant who does the primary work with the child, one must consider a second transmitter on a different frequency and determine who will wear the "master" transmitter. If there is small group work in the classroom, a pass-around microphone may be necessary. The child may prefer a different type of microphone (boom versus lapel) depending on the vocal characteristics of the teacher's voice.

- *Has the child changed from a single classroom to rotary classes?*

For children with sound field systems, a totable or portable system rather than stationary loudspeaker system, or change to a personal FM system, should be considered.

- *Are there any interference problems reported this year?*

Transmission frequency may need to be changed if the student reports interference. With a change in classrooms, the frequency that the child was previously using may no longer be suitable. Interference may occur in one area of the school and not in another area.

And, of course, any time that the child's hearing aids change, the FM system must be evaluated with the new amplification to ensure compatibility and transparency. The other outstanding issue that occurs with the use of FM systems is the monitoring and maintenance of such systems.

With sound field systems, it is immediately obvious to everyone when the system is not working. However, with personal FM systems, we are dependent on the child reporting a problem or one of the school staff checking the system to ensure adequate functioning. The historical data on adequate functioning of hearing aids are quite discouraging, so it is critical to ensure that a staff member has been trained to check the personal FM system in combination with the hearing aid(s) and does so on a routine basis.

Despite the enhanced speech-to-noise ratio when the FM transmitter is in use by the teacher, children with hearing loss are still acoustically challenged during small group work. Overhearing is an important part of language development for normal hearing children and children with hearing loss (Moeller, 2008), and yet children with hearing loss do not have many technological or acoustic options to assist with overhearing. The FM system is not a viable option for the rapid communication that occurs in small groups and so enhancement of classroom acoustical conditions is the only option available. Unfortunately, there has been less emphasis on improving classroom acoustics in recent years.

Carpeting the classroom is still the most effective way to reduce the noise of classroom chairs scraping on the floor and provide some absorption of children's voices, particularly if carpet underpadding is added (Crandell & Smaldino, 2005). Tennis balls placed on the bottom of chair legs will reduce the noise of chairs scraping against the hard floor surfaces but will not provide any absorption of the overall classroom noise. Precut tennis balls are commercially available through several companies in Canada and the United States. For acoustic design modifications to classrooms, readers are referred to Melancon, Truchon-Gagnon, and Hodgson (1990) for a comprehensive guide.

Working With Other Professionals

The audiologist's mandate within the educational setting is to ensure that every aspect of audition is addressed for the child with hearing loss. Depending on the extent of involvement, the audiologist can be seen on a continuum from a peripheral consultant to an integral part of the team of professionals working with the child with hearing loss.

What is unique about the audiologist's role in providing information regarding auditory perception? The audiologist can:

- Provide the school staff with a clear sense of expectations for the child's understanding of speech in the classroom;
- Identify the communication challenges that the child will have in the classroom;
- Determine the contribution of hearing loss to the child's reported academic, social or behavioral difficulties, especially for children with multiple learning challenges;
- Provide the information necessary for working with the child's hearing aids;
- Provide recommendations for classroom hearing technology;
- Educate the class regarding hearing loss and amplification devices;
- Meet with the child as needed regarding any hearing related concerns;
- Meet with parents regarding any hearing-related concerns;
- Support interactions between the child with hearing loss and other classmates;
- Meet with hearing resource staff regarding auditory programming.

It is important that the audiologist anticipate the areas of difficulty that might arise with school personnel to manage proactively. For example, for children with subtle hearing loss, school personnel often do not notice any obvious hearing difficulties with the child. It is useful to ask the staff if there are *any* areas that they have concern with first, prior to sharing information. That will allow the audiologist to build on staff information and align with them rather than creating

resistance at the beginning by assuming that others have also seen the problem.

When other personnel report other speech, language, emotional and learning concerns for the child, the audiologist must be prepared to state which of those issues are likely affected by hearing loss and which are unaffected by hearing loss. This is particularly helpful for teachers, parents, and other staff when too much or too little attention is focused on the effects of the hearing loss.

Counseling Needs of Children and Families

It is essential that children and parents have an opportunity to express their feelings related to the hearing loss as feelings arise. What feelings can emerge? Isolation can occur when the child feels different from his peers. Frustration and anger can occur when the child cannot change the environment, and the differences from his peers become evident. Denial of hearing loss or increased dependency can emerge as default strategies to cope with hearing loss. The child can feel lost or want to give up when there is not enough support available in the environment to cope.

Parents can experience similar feelings when they are unable to change their child's reality and make it better for their child and when they do not have other parents with whom to share. Luterman and Kurtzer-White (1999) found that when parents of preschool hearing-impaired children were asked what the most important factor was in their adjustment to the diagnosis of their child's hearing loss, they indicated that it was meeting other parents, specifically other parents of children with hearing loss.

Often, parents are not aware of the many areas of support that are available to them. The Family Needs Survey (DeConde Johnson, Benson, & Seaton, 1997b) can empower parents to ask for the support they need. By having the family fill out the survey before meeting with the audiologist, parents learn more about the questions they can ask relating to general information, specific information about hearing and hearing loss, communication, services and educational resources, family and social support, child care, and community services and financial support. By the time they see the audiologist, they are better informed as to the support services that could be useful to them at that time and are equipped to ask questions about those services.

Acceptance of the child's hearing loss is often presented as a one-time experience, but in reality, each time there is a new demand in the child's environment that is constrained by hearing loss, parents are faced with a new demand for acceptance of the hearing loss. Parents hold the balance and perspective between the child's current reality and the dream of who their child can be. Audiologists must be sensitive to these demands and be able to acknowledge and discuss both the reality of the current situation and the child's auditory potential in the context of the child's school performance.

Although much attention is given to the tutoring and academic support that parents provide, we must not forget their role in modeling an attitude and approach to hearing loss that will support the child through the school years. Through counseling at different stages of the child's development, audiologists can help parents to model principles essential for acceptance and growth of the child's individuality.

Perspective is key in facilitating a child's understanding of oneself both as a person and as a child with hearing loss. Parents can model perspective by acknowledging and naming difficult communicative situations for the child. When the child recognizes those situations, parents can then teach the child *choice* by discussing and modeling a variety of communication strategies to explore under acoustically challenging situations. When parents reinforce the child's use of strategies to improve listening, they support the development of the child's *decision-making* skills. The child learns that decision-making is an ongoing process in response to the communicative situation, and that there are no mistakes, but rather simply more opportunities to learn. Finally, parents can stand behind the child when the child begins to advocate for their own communicative needs—providing *independence with support.* That is a critical step prior to the child having to advocate independently. The audiologist can show the parents how to model each of these steps for their child in order to co-empower both the child and the family.

Summary

The audiologic management of the child with hearing loss through the school years is broad-ranging and multifaceted, and is directed by the child's clinical and educational audiologists. Audiologists must work with the child, the family, the educators, and other school personnel in order to ensure that the audiologic information is meaningful and relevant to the child's progress. The information from the school staff is essential to shape the audiologic recommendations for further assessment, changes in amplification, implications of

hearing loss, and directions for counseling for the child and family. Ease of communication among all of the personnel involved with the child can ensure that all the child's auditory needs are being addressed.

When we reach the stage where young adults with hearing loss who are graduating from high school no longer depend on their parents, clinical or educational audiologists, or the classroom teachers for the management of their communication needs, then we will have done our job well.

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APPENDIX 33–A

Relationship of Hearing Loss to Listening and Learning Needs

16-25 dB HEARING LOSS		
Possible Impact on the Understanding of Language and Speech	**Possible Social Impact**	**Potential Educational Accommodations and Services**
Impact of a hearing loss that is approximately 20 dB can be compared to ability to hear when index fingers are placed in your ears. Child may have difficulty hearing faint or distant speech. At 16 dB student can miss up to 10% of speech signal when teacher is at a distance greater than 3 feet. A 20 dB or greater hearing loss in the better ear can result in absent, inconsistent or distorted parts of speech, especially word endings (s, ed) and unemphasized sounds. Percent of speech signal missed will be greater whenever there is background noise in the classroom, especially in the elementary grades when instruction is primarily verbal and younger children have greater difficulty listening in noise. Young children have the tendency to watch and copy the movements of other students rather than attending to auditorily fragmented teacher directions.	May be unaware of subtle conversational cues that could cause child to be viewed as inappropriate or awkward. May miss portions of fast-paced peer interactions that could begin to have an impact on socialization and self concept. Behavior may be confused for immaturity or inattention. May be more fatigued due to extra effort needed for understanding speech.	Noise in typical classroom environments impede child from having full access to teacher instruction. Will benefit from improved acoustic treatment of classroom and sound-field amplification. Favorable seating necessary. May often have difficulty with sound/letter associations and subtle auditory discrimination skills necessary for reading. May need attention to vocabulary or speech, especially when there has been a long history of middle ear fluid. Depending on loss configuration, may benefit from low power hearing aid with personal FM system. Appropriate medical management necessary for conductive losses. Inservice on impact of "minimal" 15 – 25 dB hearing loss on language development, listening in noise and learning, required for teacher.

26-40 dB HEARING LOSS		
Possible Impact on the Understanding of Language and Speech	**Possible Social Impact**	**Potential Educational Accommodations and Services**
Effect of a hearing loss of approximately 20 dB can be compared to ability to hear when index fingers are placed in ears therefore a 26 – 40 dB hearing loss causes greater listening difficulties than a "plugged ear" loss. Child can "hear" but misses fragments of speech leading to misunderstanding. Degree of difficulty experienced in school will depend upon noise level in the classroom, distance from the teacher, and configuration of the hearing loss, even with hearing aids. At 30 dB can miss 25-40% of the speech signal; at 40 dB may miss 50% of class discussions, especially when voices are faint or speaker is not in line of vision. Will miss unemphasized words and consonants, especially when a high frequency hearing loss is present. Often experiences difficulty learning early reading skills such as letter/sound associations. Child's ability to understand and succeed in the classroom will be substantially diminished by speaker distance and background noise, especially in the elementary grades.	Barriers begin to build with negative impact on self-esteem as child is accused of "hearing when he/she wants to," "daydreaming," or "not paying attention." May believe he/she is less capable due to difficulties understanding in class. Child begins to lose ability for selective listening, and has increasing difficulty suppressing background noise causing the learning environment to be more stressful. Child is more fatigued due to effort needed to listen.	Noise in typical class will impede child from full access to teacher instruction. Will benefit from hearing aid(s) and use of a desk top or ear level FM system in the classroom. Needs favorable acoustics, seating and lighting. May need attention to auditory skills, speech, language development, speechreading and/or support in reading and self-esteem. Amount of attention needed typically related to the degree of success of intervention prior to 6 months of age to prevent language and early learning delays. Teacher inservice on impact of so called "mild" hearing loss on listening and learning to convey that it is often greater than expected.

Please Consider Indicated Items in the Child's Educational Program:

_____Teacher inservice and seating close to teacher _____Hearing monitoring at school every ____mos. _____Amplification monitoring

_____Contact your school district's audiologist _____Protect ears from noise to prevent more loss _____Educational support services/evaluation

_____Screening/evaluation of speech and language _____Note-taking, closed captioned films, visuals _____FM system trial period

_____Educational consultation/ program supervision by specialist(s) in hearing loss _____Regular contact with other children who are deaf or hard of hearing

_____Periodic educational monitoring such as October and April teacher/student completion of SIFTER, LIFE

NOTE: All children require full access to teacher instruction and educationally relevant peer communication to receive an appropriate education. Distance, noise in classroom and fragmentation caused by hearing loss prevent full access to spoken instruction. Appropriate acoustics, use of visuals, FM amplification, sign language, notetakers, communication partners, etc. increase access to instruction. Needs periodic hearing evaluation, rigorous amplification checks, and regular monitoring of access to instruction and classroom function (monitoring tools at www.hear2learn.com or www.SIFTERanderson.com).

Relationship of Hearing Loss to Listening and Learning Needs

41-55 dB HEARING LOSS

Possible Impact on the Understanding of Language and Speech	Possible Social Impact	Potential Educational Accommodations and Services
Consistent use of amplification and language intervention prior to age 6 months increases the probability that the child's speech, language and learning will develop at a normal rate. Without amplification, understands conversation at a distance of 3-5 feet, if sentence structure and vocabulary are known. The amount of speech signal missed can be 50% or more with 40 dB loss and 80% or more with 50 dB loss. Without early amplification the child is likely to have delayed or disordered syntax, limited vocabulary, imperfect speech production and flat voice quality. Addition of a visual communication system to supplement audition may be indicated, especially if language delays and/or additional disabilities are present. Even with hearing aids, child can "hear" but may miss much of what is said if classroom is noisy or reverberant. With personal hearing aids alone, ability to perceive speech and learn effectively in the classroom is at high risk. A personal FM system to overcome classroom noise and distance is typically necessary.	Barriers build with negative impact on self esteem as child is accused of "hearing when he/she wants to," "daydreaming," or "not paying attention." Communication will be significantly compromised with this degree of hearing loss if hearing aids nor worn. Socialization with peers can be difficult, especially in noisy settings such as cooperative learning situations, lunch or recess. May be more fatigued than classmates due to effort needed to listen.	Consistent use of amplification (hearing aids + FM) is essential. Needs favorable classroom acoustics, seating and lighting. Consultation/program supervision by a specialist in childhood hearing impairment to coordinate services is important. Depending on intervention success in preventing language delays, special academic support necessary if language and academic delays are present. Attention to growth of oral communication, reading, written language skills, auditory skill development, speech therapy, self esteem likely. Teacher inservice required with attention to communication access and peer acceptance.

56-70 dB HEARING LOSS

Possible Impact on the Understanding of Language and Speech	Possible Social Impact	Potential Educational Accommodations and Services
Even with hearing aids, child will typically be aware of people talking around him/her, but will miss parts of words said resulting in difficulty in situations requiring verbal communication (both one-to-one and in groups). Without amplification, conversation must be very loud to be understood; a 55 dB loss can cause a child to miss up to 100% of speech information without functioning amplification. If hearing loss is not identified before age one year and appropriately managed, delayed spoken language, syntax, reduced speech intelligibility and flat voice quality is likely. Age when first amplified, consistency of hearing aid use and success of early language intervention strongly tied to speech, language and learning development. Addition of visual communication system often indicated if language delays and/or additional disabilities are present. Use of a personal FM system will reduce the effects of noise and distance and allow increased auditory access to verbal instruction. With hearing aids alone, ability to understand in the classroom is greatly reduced by distance and noise.	If hearing loss was late-identified and language delay was not prevented, communication interaction with peers will be significantly affected. Children will have greater difficulty socializing, especially in noisy settings such as lunch cooperative learning situations, or recess. Tendency for poorer self-concept and social immaturity may contribute to a sense of rejection; peer inservice helpful.	Full time, consistent use of amplification (hearing aids + FM system) essential. May benefit from frequency transposition (frequency compression) hearing aids depending upon loss configuration. May require intense support in development of auditory, language, speech, reading and writing skills. Consultation/supervision by a specialist in childhood hearing impairment to coordinate services is important. Use of sign language or a visual communication system by children with substantial language delays or additional learning needs, may be useful to access linguistically complex instruction. Note-taking, captioned films, etc. accommodations often needed. Requires teacher inservice.

Please Consider Indicated Items in the Child's Educational Program:

_____Teacher inservice and seating close to teacher _____Hearing monitoring at school every ____mos. _____Amplification monitoring

_____Contact your school district's audiologist _____Protect ears from noise to prevent more loss _____Educational support services/evaluation

_____Screening/evaluation of speech and language _____Note-taking, closed captioned films, visuals _____FM system trial period

_____Educational consultation/ program supervision by specialist(s) in hearing loss _____Regular contact with other children who are deaf or hard of hearing

_____Periodic educational monitoring such as October and April teacher/student completion of SIFTER, LIFE

NOTE: All children require full access to teacher instruction and educationally relevant peer communication to receive an appropriate education. Distance, noise in classroom and fragmentation caused by hearing loss prevent full access to spoken instruction. Appropriate acoustics, use of visuals, FM amplification, sign language, notetakers, communication partners, etc. increase access to instruction. Needs periodic hearing evaluation, rigorous amplification checks, and regular monitoring of access to instruction and classroom function (monitoring tools at www.hear2learn.com or www.SIFTERanderson.com).

Relationship of Hearing Loss to Listening and Learning Needs

71-90 dB & 91+ dB		
Possible Impact on the Understanding of Language and Speech	**Possible Social Impact**	**Potential Educational Accommodations and Services**
The earlier the child wears amplification consistently with concentrated efforts by parents and caregivers to provide rich language opportunities throughout everyday activities and/or provision of intensive language intervention (sign or verbal), the greater the probability that speech, language and learning will develop at a relatively normal rate. Without amplification, children with 71-90 dB hearing loss may only hear loud noises about one foot from ear. When amplified optimally, children with hearing ability of 90 dB or better should detect many sounds of speech if presented from close distance or via FM. Individual ability and intensive intervention prior to 6 months of age will determine the degree that sounds detected will be discriminated and understood by the brain into meaningful input. Even with hearing aids children with 71-90 dB loss are typically unable to perceive all high pitch speech sounds sufficiently to discriminate them or benefit from incidental listening, especially without the use of FM. The child with hearing loss greater than 70 dB may be a candidate for cochlear implant(s) and the child with hearing loss greater than 90 dB will not be able to perceive most speech sounds with traditional hearing aids. For full access to language to be available visually through sign language or cued speech, family members must be involved in child's communication mode from a very young age.	Depending on success of intervention in infancy to address language development, the child's communication may be minimally or significantly affected. Socialization with hearing peers may be difficult. Children in general education classrooms may develop greater dependence on adults due to difficulty perceiving or comprehending oral communication. Children may be more comfortable interacting with peers who are deaf or hard of hearing due to ease of communication. Relationships with peers and adults who have hearing loss can make positive contributions toward the development of a healthy self-concept and a sense of cultural identity.	There is no one communication system that is right for all hard of hearing or deaf children and their families. Whether a visual communication approach or auditory/oral approach is used, extensive language intervention, full-time consistent amplification use and constant integration of the communication practices into the family by 6 months of age will highly increase the probability that the child will become a successful learner. Children with late-identified hearing loss (i.e., after 6 months of age) will have delayed language. This language gap is difficult to overcome and the educational program of a child with hearing loss, especially those with language and learning delays secondary to hearing loss, requires the involvement of a consultant or teacher with expertise in teaching children with hearing loss. Depending on the configuration of the hearing loss and individual speech perception ability, frequency transposition (frequency compression) aids or cochlear implantation may be options for better access to speech. If an auditory/oral approach is used, early training is needed on auditory skills, spoken language, concept development and speech. If culturally deaf emphasis is selected, frequent exposure to Deaf, ASL users is important. Educational placement with other signing deaf or hard of hearing students (special school or classes) may be a more appropriate option to access a language-rich environment and free-flowing communication. Support services and continual appraisal of access to communication and verbal instruction is required. Note-taking, captioning, captioned films and other visual enhancement strategies necessary. Training in pragmatic language use and communication repair strategies helpful. Inservice of general education teachers is essential.

Please Consider Indicated Items in the Child's Educational Program:

_____Teacher inservice and seating close to teacher _____Hearing monitoring at school every ____mos. _____Amplification monitoring

_____Contact your school district's audiologist _____Protect ears from noise to prevent more loss _____Educational support services/evaluation

_____Screening/evaluation of speech and language _____Note-taking, closed captioned films, visuals _____FM system trial period

_____Educational consultation/ program supervision by specialist(s) in hearing loss _____Regular contact with other children who are deaf or hard of hearing

_____Periodic educational monitoring such as October and April teacher/student completion of SIFTER, LIFE

NOTE: All children require full access to teacher instruction and educationally relevant peer communication to receive an appropriate education. Distance, noise in classroom and fragmentation caused by hearing loss prevent full access to spoken instruction. Appropriate acoustics, use of visuals, FM amplification, sign language, notetakers, communication partners, etc. increase access to instruction. Needs periodic hearing evaluation, rigorous amplification checks, and regular monitoring of access to instruction and classroom function (monitoring tools at www.hear2learn.com or www.SIFTERanderson.com).

Relationship of Hearing Loss to Listening and Learning Needs

UNILATERAL HEARING LOSS

Possible Impact on the Understanding of Language and Speech	Possible Social Impact	Potential Educational Accommodations and Services
Child can "hear" but can have difficulty understanding in certain situations, such as hearing faint or distant speech, especially if poor ear is aimed toward the person speaking. Will typically have difficulty localizing sounds and voices using hearing alone. The unilateral listener will have greater difficulty understanding speech when environment is noisy and/or reverberant, especially when normal ear towards the overhead projector or other competing sound source and poor hearing ear towards the teacher. Exhibits difficulty detecting or understanding soft speech from the side of the poor hearing ear, especially in a group discussion.	Child may be accused of selective hearing due to discrepancies in speech understanding in quiet versus noise. Social problems may arise as child experiences difficulty understanding in noisy cooperative learning, or recess situations. May misconstrue peer conversations and feel rejected or ridiculed. Child may be more fatigued in classroom due to greater effort needed to listen, if class is noisy or has poor acoustics. May appear inattentive, distractible or frustrated, with behavior or social problems sometimes evident.	Allow child to change seat locations to direct the normal hearing ear toward the primary speaker. Student is at 10 times the risk for educational difficulties as children with 2 normal hearing ears and 1/3 to 1/2 of students with unilateral hearing loss experience significant learning problems. Children often have difficulty learning sound/letter associations in typically noisy kindergarten and grade 1 settings. Educational and audiological monitoring is warranted. Teacher inservice is beneficial. Typically will benefit from a personal FM system with low gain/power or a sound-field FM system in the classroom, especially in the lower grades. Depending on the hearing loss, may benefit from a hearing aid in the impaired ear.

MID-FREQUENCY HEARING LOSS or REVERSE SLOPE HEARING LOSS

MID-FREQUENCY HEARING LOSS or REVERSE SLOPE

Possible Impact on the Understanding of Language and Speech	Possible Social Impact	Potential Educational Accommodations and Services
Child can "hear" whenever speech is present but will have difficulty understanding in certain situations. May have difficulty understanding faint or distant speech, such as a student with a quiet voice speaking from across the classroom. The "cookie bite" or reverse slope listener will have greater difficulty understanding speech when environment is noisy and/or reverberant, such as a typical classroom setting. A 25 – 40 dB degree of loss in the low to mid-frequency range may cause the child to miss approximately 30% of speech information, if unamplified; some consonant and vowel sounds may be heard inconsistently, especially when background noise is present. Speech production of these sounds may be affected.	Child may be accused of selective hearing or "hearing when he wants to" due to discrepancies in speech understanding in quiet versus noise. Social problems may arise as child experiences difficulty understanding in noisy cooperative learning situations, lunch or recess. May misconstrue peer conversations, believing that other children are talking about him or her. Child may be more fatigued in classroom setting due to greater effort needed to listen. May appear inattentive, distractible or frustrated.	Personal hearing aids important but must be precisely fit to hearing loss. Child likely to benefit from a sound-field FM system, a personal FM system or assistive listening device in the classroom. Student is at risk for educational difficulties. Can experience some difficulty learning sound/letter associations in kindergarten and 1st grade classes. Depending upon degree and configuration of loss, child may experience delayed language development and articulation problems. Educational monitoring and teacher inservice warranted. Annual hearing evaluation to monitor for hearing loss progression is important.

Please Consider Indicated Items in the Child's Educational Program:

_____Teacher inservice and seating close to teacher _____Hearing monitoring at school every ____mos. _____Amplification monitoring

_____Contact your school district's audiologist _____Protect ears from noise to prevent more loss _____Educational support services/evaluation

_____Screening/evaluation of speech and language _____Note-taking, closed captioned films, visuals _____FM system trial period

_____Educational consultation/ program supervision by specialist(s) in hearing loss _____Regular contact with other children who are deaf or hard of hearing

_____Periodic educational monitoring such as October and April teacher/student completion of SIFTER, LIFE

NOTE: All children require full access to teacher instruction and educationally relevant peer communication to receive an appropriate education. Distance, noise in classroom and fragmentation caused by hearing loss prevent full access to spoken instruction. Appropriate acoustics, use of visuals, FM amplification, sign language, notetakers, communication partners, etc. increase access to instruction. Needs periodic hearing evaluation, rigorous amplification checks, and regular monitoring of access to instruction and classroom function (monitoring tools at www.hear2learn.com or www.SIFTERanderson.com).

Relationship of Hearing Loss to Listening and Learning Needs

HIGH FREQUENCY HEARING LOSS		
Possible Impact on the Understanding of Language and Speech	**Possible Social Impact**	**Potential Educational Accommodations and Services**
Child can "hear" but can miss important fragments of speech. Even a 25-40 dB loss in high frequency hearing may cause the child to miss 20%-30% of vital speech information if unamplified. Consonant sounds t, s, f, th, k, sh, ch likely heard inconsistently, especially in noise. May have difficulty understanding faint or distant speech, such as a student with a quiet voice speaking from across the classroom and will have much greater difficulty understanding speech when in low background noise and/or reverberation is present. Many of the critical sounds for understanding speech are high pitched, quiet sounds, making them difficult to perceive; the words: cat, cap, calf, cast could be perceived as "ca," word endings, possessives, plurals and unstressed brief words are difficult to perceive and understand. Speech production may be affected. Use of amplification often indicated to learn language at a typical rate and ease learning.	May be accused of selective hearing due to discrepancies in speech understanding in quiet versus noise. Social problems may arise as child experiences difficulty understanding in noisy cooperative learning situations, lunch or recess. May misinterpret peer conver-sations. Child may be fatigued in classroom due to greater listening effort. May appear inattentive, distractible or frustrated. Could affect self concept.	Student is at risk for educational difficulties. Depending upon onset, degree and configuration of loss, child may experience delayed language and syntax development and articulation problems. Possible difficulty learning some sound/letter associations in kindergarten and 1st grade classes. Early evaluation of speech and language skills is suggested. Educational monitoring and teacher inservice is warranted. Will typically benefit from personal hearing aids and use of a sound-field or a personal FM system in the classroom. Use of ear protection in noisy situations is imperative to prevent damage to inner ear structures and resulting progression of the hearing loss.

FLUCTUATING HEARING LOSS		
Possible Impact on the Understanding of Language and Speech	**Possible Social Impact**	**Potential Educational Accommodations and Services**
Of greatest concern are children who have experienced hearing fluctuations over many months in early childhood (multiple episodes with fluid lasting three months or longer). Listening with a hearing loss that is approximately 20 dB can be compared to hearing when index fingers are placed in ears. This loss or worse is typical of listening with fluid or infection behind the eardrums. Child can "hear" but misses fragments of what is said. Degree of difficulty experienced in school will depend upon the classroom noise level, the distance from the teacher and the current degree of hearing loss. At 30 dB can miss 25-40% of the speech signal; child with a 40 dB loss associated with "glue ear" may miss 50% of class discussions, especially when voices are faint or speaker is not in line of vision. Will frequently miss unstressed words, consonants and word endings.	Barriers begin to build with negative impact on self esteem as the child is accused of "hearing when he/she wants to," "daydreaming," or "not paying attention." Child may believe he/she is less capable due to understanding difficulties in class. Typically poor at identifying changes in own hearing ability. With inconsistent hearing, the child learns to "tune out" the speech signal. Children are judged to have greater attention problems, insecurity, distractibility and lack self esteem. Tend to be non-participative and distract themselves from classroom tasks; often socially immature.	Impact is primarily on acquisition of early reading skills and attention in class. Screening for language delays is suggested from a young age. Ongoing monitoring for hearing loss in school, communication between parent and teacher about listening difficulties and aggressive medical management is needed. Will benefit from sound-field FM or an assistive listening device in class. May need attention to development of speech, reading, self esteem, or listening skills. Teacher inservice is beneficial.

Please Consider Indicated Items in the Child's Educational Program:

_____Teacher inservice and seating close to teacher _____Hearing monitoring at school every _____mos. _____Amplification monitoring

_____Contact your school district's audiologist _____Protect ears from noise to prevent more loss _____Educational support services/evaluation

_____Screening/evaluation of speech and language _____Note-taking, closed captioned films, visuals _____FM system trial period

_____Educational consultation/ program supervision by specialist(s) in hearing loss _____Regular contact with other children who are deaf or hard of hearing

_____Periodic educational monitoring such as October and April teacher/student completion of SIFTER, LIFE

NOTE: All children require full access to teacher instruction and educationally relevant peer communication to receive an appropriate education. Distance, noise in classroom and fragmentation caused by hearing loss prevent full access to spoken instruction. Appropriate acoustics, use of visuals, FM amplification, sign language, notetakers, communication partners, etc. increase access to instruction. Needs periodic hearing evaluation, rigorous amplification checks, and regular monitoring of access to instruction and classroom function (monitoring tools at www.hear2learn.com or www.SIFTERanderson.com).

APPENDIX 33–B

Simulation of Hearing Loss Handout (Edwards, 2005)

Simulation of Hearing Loss: An In-Service Training Tool

Direct experience often produces optimum learning. Most teachers who are faced with the prospect of a child with hearing loss in their classroom for the first time, express concern about their ability to address the child's needs in their class. By giving the teacher some direct experience with hearing loss, you can provide them with

- an empathetic understanding of the communication demands on the child with hearing loss in the classroom.
- an understanding of the teaching strategies that are detrimental to communication in the classroom.
- an understanding of the teaching strategies that are beneficial to the child with hearing loss in the classroom.

Use of foam earplugs can simulate a mild conductive hearing loss of approximately 25 to 35 dB. The following points are important to emphasize to school staff.

- The simulation only creates a mild hearing loss, and so students with moderate, severe, or profound hearing loss will experience greater difficulty than that experienced with the earplugs.
- The simulation reflects what children with mild hearing loss may hear without a hearing aid, or what children with moderate or moderately severe hearing loss may hear with the hearing aid on.
- Use of the earplugs simulates a conductive rather than a sensorineural hearing loss, as the earplugs are simply impeding the passage of sound through the external ear. This is an important distinction, as the staff must realize that the distortion of speech sounds and the susceptibility to noise seen with children with sensorineural hearing loss cannot be simulated through the use of earplugs alone.
- The simulation produces an accurate perception of the hearing loss often seen with children with recurrent otitis media. Although many teachers may not have experiences with children with sensorineural hearing loss, all primary teachers will have a number of children in their classes each year with histories of recurrent otitis media (Otitis media is the single most common reason for a child to visit the family physician, and the most common cause of hearing loss in children).

Suggested Procedure

After explaining the purpose of the exercise, hand out a pair of foam earplugs to each group member. Ask the participants to hold the plugs by the rounded edge and roll them between their fingers to compress them to approximately 1/3 to 1/4 of their original size. Then have everyone insert the compressed plugs into their ear canals so that the canals are completely occluded. If the participants do not hear a clear difference in the loudness of the sound after inserting the plugs, the

plugs have not been inserted correctly. Have the individuals remove and reinsert the earplugs. Then ask the participants to get out a sheet of paper and pencil to write down what you say. There are a number of concepts that you want to demonstrate during the simulation.

- The farther away the speaker is from the listener, the more difficult the listening task.
- Restricting speechreading cues makes the listening task more difficult.
- Presence of background noise increases the difficulty of the listening task.
- The type of material presented will vary the difficulty of the task. Single words are much more difficult to identify than is sentence material, where contextual clues can provide a great deal of information.
- The intensity of vowels is greater than that of consonants, thus increasing the ease of vowel recognition.
- High frequency consononants such as /s/, /f/, /ch /, /k/, /t/, and the voiceless /th/ are usually the most difficult sounds to hear, particularly the /f/ and voiceless /th/, since they are the softest of all of the consonants.
- Listening under difficult conditions is fatiguing, resulting in a tendency to tune out or daydream.
- Listening can be very frustrating when speakers are far away, or are covering their mouth, or when background noise is present. The listener may experience anger or frustration towards the speaker or towards the sources of background noise.
- Additional visual supplements such as writing on the blackboard or the overhead projector can be of great assistance in following the conversation, and reduce the strain of listening.

Ask participants to write numbers 1 to 15 on the side of the page. In order to demonstrate the above concepts, present words and sentences in the following way.

Write the word . . .

1. please BY HEARING ALONE
2. great (MOUTH COVERED);
3. sled QUIET CONVERSATIONAL LEVEL;
4. pants MOVE AROUND WHILE YOU ARE
5. rat TALKING

Write the word. . .

6. bad BY HEARING ALONE
7. pinch (MOUTH COVERED);
8. such CREATE BACKGROUND NOISE
9. bus (PAPERS RUSTLING, KEYS JINGLING,
10. need BOOK DROPPING ON FLOOR.);
    QUIET CONVERSATIONAL LEVEL;
    MOVE AROUND WHILE YOU ARE TALKING

Write the word . . .

11. ways BY HEARING AND SPEECHREADING
12. five (MOUTH UNCOVERED);
13. mouth QUIET CONVERSATIONAL LEVEL;
14. rag BACKGROUND NOISE SPORADIC
15. put

Now ask the participants to number their page from 1 to 10 and tell them that you will now say some sentences.

1. Walking is my favorite exercise.
2. Here's a nice quiet place to rest.
3. Somebody cleans the floors every night.
4. It would be much easier if everyone would help.
5. Open your window before you go to bed.

   BY HEARING ALONE
   (MOUTH COVERED);
   BACKGROUND NOISE SPORADIC

6. Do you think that she should stay out so late?
7. How do you feel about beginning work at a different time every day?
8. Move out of the way.
9. The water is too cold for swimming.
10. Why should I get up so early in the morning?

    BY HEARING AND SPEECHREADING
    (MOUTH UNCOVERED);
    BACKGROUND NOISE SPORADIC

- It is important to use a quiet conversational voice level rather than a normal conversational level for maximum effect.
- Because sentences are considerably easier to identify than are single words, they are presented through hearing alone in noise, rather than in quiet.
- The background noise can be sporadic or continuous; the listeners will experience the frustration in either situation.
- When moving around, ensure that you rotate around the entire room so that everyone can experience both optimal and least desirable listening conditions.

Then have the participants take up their answers WITH THE EARPLUGS STILL INSERTED. When a person gives his or her answer, ensure that the rest of the group has heard it. If not, ask the person to change the way that he or she has presented the answer so that others will understand better (such as repeating the response, saying the word or sentence louder, facing the group, spelling the word, or adding an accompanying gesture). Write down the various answers on a chartboard or overhead to provide a visual supplement. Underline the correct answer from all of the choices provided by the participants.

Once all of the words and sentences have been reviewed, HAVE THE GROUP TAKE OUT THE EARPLUGS. Initiate a group discussion of the following issues:

- their emotional reactions to the overall experience.
- the causes of specific frustrations experienced.
- insights about the experiences of children with hearing loss in the classroom.
- ways in which they could change their teaching strategies to address the needs of children with hearing loss.

The discussion deepens the experience of the simulation of hearing loss and allows participants themselves to determine the necessary changes in teaching strategies.