

Helping Students Who Are Deaf or Hard of Hearing Succeed

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Manny is a 10-year-old boy with a bilateral profound sensorineural hearing loss that was identified at birth from a newborn hearing screening. At 12 months of age, he received a cochlear implant in his left ear. He wears a behind-the-ear hearing aid in his right ear at home and uses a myLink FM system in the classroom. Manny is currently in fourth grade at Shady Lane Elementary School and spends most of his day in the general education classroom. The other students in his class are all hearing. Spoken English is his primary mode of communication. Manny is athletic and outgoing, and he makes friends easily. He receives response to intervention Tier 2 support for reading in class with a couple of other classmates for 30 minutes each day. In addition, he works with Ms. Iyer, a speech-language pathologist (SLP), 2 days a week for 30 minutes each day on speech and auditory training. Also, he works with Mrs. Castillo, an itinerant teacher of students who are deaf or hard of hearing, for 45 minutes a day, 2 days a week on language, reading, and self-advocacy. His classroom teacher, Mrs. Reitz, and Mrs. Castillo work together using many of the accommodations described in this article to assure that all students in the class, including Manny, have access to the academic content and social interactions.

This article describes many concrete and specific actions teachers can take to promote the learning of their students who are deaf or hard of hearing, including the use of a captioned media web site (www.dcmp.org) for topics to pump up students' background knowledge. In addition, the article provides strategies for enhancing the social skills of both hearing students and those with hearing losses as they work together in inclusive classrooms.

We live in a sound-oriented society. Extensive amounts of information are conveyed both deliberately and incidentally through interactions with others. Through these interactions, children refine their communication skills, develop language, acquire information about the world (i.e., background and domain knowledge), learn concepts, become literate, develop social skills, and participate in the daily activities of life (Hart & Risley, 1995, 2003; Luckner & Friend, 2011). A hearing loss of any degree or type affects the quantity as well as the quality of interactions with others, which in turn may adversely affect language, academic, social, emotional, and career development. Table 1 briefly summarizes the different types of hearing loss, potential effects, and relevant citations.

Challenges for Educators

The U.S. Department of Education (2009) reported that about 87% of students who are deaf or hard of hearing spend a portion of the school day in general education classrooms. The challenge for both general and special education teachers who have not received specialized training to work with students who are deaf or hard of hearing is in knowing how to provide quantity and quality of services needed to access the academic content and social interactions of the general education setting. As noted by the U.S. Department of Education (1992)

Because deafness is a low incidence disability, there is not widespread understanding of its educational implications, even among special educators. This lack of knowledge and skills in our education system contributes to the already substantial barrier to deaf students in receiving appropriate educational services. (p. 49274)

As shown in Table 1, a hearing loss of any type or degree may affect development and functioning in many ways. This article highlights five specific chal-

lenges that often occur as byproducts of a hearing loss and that interfere with typical ways of learning (see Figure 1):

1. Language, vocabulary, and literacy delays.
2. Gaps in background and domain knowledge.
3. Inadequate knowledge and use of learning strategies.
4. Social skills deficits.
5. Reliance on assistive technology.

In this article, we provide examples of supplementary instruction and services to address each area. In addition, we advocate for direct as well as consultative services from teachers of students who are deaf or hard of hearing.

1. Language, Vocabulary, and Literacy Delays

Language acquisition is a natural process that occurs without effort for most hearing children (Owens, 2010). Most hearing students begin school with good language skills and strong background knowledge (Federal Interagency Forum on Child and Family Statistics, 2009). Educators use these essential skills to teach children to read and write, acquire content knowledge, and develop social skills. Quite simply, oral and written language is the media through which educators teach academic content. As well, oral and written language serves as the primary way that students demonstrate their knowledge of subject matter (Lemke, 1988). As explained by Bransford, Darling-Hammond, and LePage (2005)

Virtually all school learning occurs through the medium of language. Not only do people need to acquire strong language skills to communicate with others, the very use of language enables people to acquire concepts and ideas and to sharpen their thinking. (p. 34)

The majority of children who are deaf or hard of hearing, however, seldom

Table 1. Types of Hearing Losses, Potential Educational Implications, and Research Citations

Type of Hearing Loss	Educational Implications	Research Citations
Chronic middle ear infections (i.e., Otitis Media)	May negatively affect speech and language development	Friel-Patti, 1990; Gravel & Wallace, 1992
Hearing loss in one ear (i.e., unilateral hearing loss)	May negatively affect speech and language development, academic progress, and behavior	Culbertson & Gilbert, 1986; Lieu, 2004
Hard of hearing (i.e., mild or moderate hearing loss)	Person may experience auditory perception problems, speech and language development delays, academic failure, and self-esteem and social deficiencies	Bess, Dodd-Murphy & Parker, 1998; Davis, Elfenbein, Schum, & Bentler, 1986
Severe and profound deafness	May negatively affect speech, language, literacy, academics, and employment	Karchmer & Mitchell, 2003; Traxler, 2000

arrive at school with the same language skills as their hearing peers (National Association of State Directors of Special Education, 2006).

The reduction in the quantity and the quality of interactions with others, negatively affects all aspects of language acquisition, including the essential area of vocabulary development. Deficits in vocabulary knowledge of students who are deaf or hard of hearing exist early and grow increasingly larger each year. As noted by Kame'enui, Carnine, Dixon, Simmons, and Coyne (2002), "The consequences of vocabulary deficits are extreme. Vocabulary knowledge plays a causal role in successful reading throughout an individual's lifetime and greatly impacts performance in many academic subject areas" (p. 46).

Vocabulary development is strongly related to academic achievement because content subject instruction includes a large number of new and technical words and concepts (e.g., Biemiller, 2005). Students who are deaf or hard of hearing are delayed in their level of vocabulary knowledge, have smaller lexicons, acquire new words at slower rates, and have a narrower range of contexts that result in word learning that is less than their hearing peers (e.g., Lederberg, 2003; Luckner & Cooke, 2010). Consequently, many stu-

dents who are deaf or hard of hearing may not have learned the academic language and key vocabulary necessary for understanding content information.

der, 2000). As a result, most students who are deaf or hard of hearing need supplementary instruction in language, vocabulary, and literacy.

**To promote vocabulary development, provide enjoyment:
Identify students' areas of topical interest and then collect
a diverse array of reading materials on those topics.**

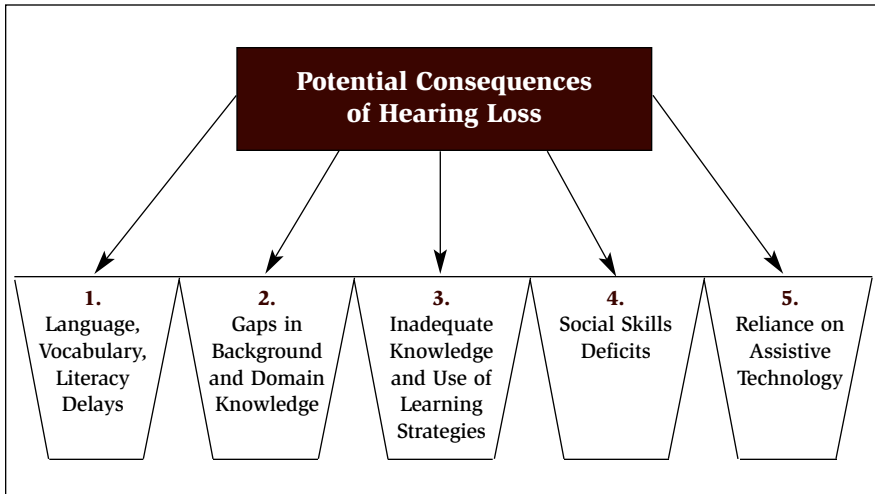
As a result, they are likely to have difficulty with the vocabulary and concept demands of many content-area discussions, lessons, and material presented in textbooks. Moreover, receptive vocabulary knowledge in kindergarten is predictive of reading comprehension skills in the fourth and seventh grades (Tabors, Snow, & Dickinson, 2001); and receptive vocabulary in first grade has a substantial relationship with reading comprehension in the 11th grade (Cunningham & Stanovich, 1997).

Because literacy development depends on language competence, as evidenced by the high correlation between students' overall language abilities and their reading achievement (e.g., Metha, Foorman, Branum-Martin, & Taylor, 2005), it is not surprising that the majority of students with a hearing loss struggle to become skilled readers (e.g., Karchmer & Mitchell, 2003; Trax-

ler, 2000). As a result, most students who are deaf or hard of hearing need supplementary instruction in language, vocabulary, and literacy.

- Teachers can provide needed instruction by using concrete activities, such as the following:
- *Preteaching*: Review the material to be learned, select several key terms/concepts and systematically describe how the term/concept is used within the context of the lesson.
- *Enjoyment*: Identify students' areas of topical interest and then collect a diverse array of reading materials on those topics.
- *Engagement*: Use topical reading materials to conduct brief, informal conversations with students that focus on the ideas and information contained in the readings.
- *Linking*: Use students' statements about the reading topic to link their prior experiences with the reading content and encourage students to

Figure 1. Potential Consequences of Hearing Loss



consider if their experiences are consistent with the information in the reading materials.

- *Modeling*: “Think aloud” as you infer meaning from pictures, key words, graphics, and text and include information regarding how you check to determine if your inferences are correct.
- *Purpose*: Identify how students are currently inferring text-based meaning within their preferred out-of-school activities (e.g., playing computer games, use of captions with their favorite TV shows, sending/reading text messages, etc.), the problems they frequently encounter, and then “brainstorm” how those problems can be addressed.
- *Direct Instruction*: Provide direct instruction concerning sight words, root words, prefixes/suffixes/morphemes, phonics, fluency, and narrative and expository reading strategies.

Additional instructional strategies are available on the www.deafed.net web site. Click on the “Instructional Resources” link. Also, consider examining the texts titled *Evidenced-Based Practice in Educating Deaf and Hard-of-Hearing Students* by Spencer and Marschark (2010) and *Effective School Interventions: Evidence-Based Strategies for Improving Student Outcomes* by Rathvon (2008).

2. Gaps in Background and Domain Knowledge

Background or domain knowledge refers to the prerequisite facts, skills, and concepts that students must already know in order to learn a new strategy, system, concept, or content (Kame’enui et al., 2002). Many studies have confirmed the relationship between background knowledge and achievement (e.g., Dochy, Segers, & Buehl, 1999; Tobias, 1994). Background or domain knowledge provides a basis for understanding, learning, and remembering facts and ideas found in stories, academic content, and textbooks (Wery & Nietfeld, 2010). People who have knowledge of a topic have better recall and are better able to elaborate on aspects of the topic than those who have limited knowledge of the topic (e.g., Brown, 2008). As explained by Ormrod (2006), “What learners already know provides a knowledge base on which new learning builds” (p. 34).

In general, people who already know something about a topic, learn new information about that topic more effectively than people who have little relevant background. (Similarly, how easily and accurately people remember what they have previously learned depends on how they learned it initially, as well as how often they have recalled and used it in the past (Ormrod, 2006).

The amount of background or domain knowledge that students have

can greatly influence whether they can understand or read subject matter. Often, students who are deaf or hard of hearing do not have sufficient general background or domain knowledge because they have limited opportunities to access information incidentally (i.e., overhearing conversations, radio, television), have had limited experiences, and are not avid readers. As a result, studies have indicated that students who are deaf or hard of hearing demonstrate both qualitative and quantitative differences in world knowledge (Hauser & Marschark, 2008; Marschark & Wauters, 2008). To offset the cumulative effect that often occurs when students develop gaps in the background knowledge due to concepts not being adequately learned, students who are deaf or hard of hearing may need instruction and accommodations in activating background knowledge, organizing how content is presented to them, and direct instruction in important concepts.

Because background knowledge has such a significant effect on students’ ability to encode and store new information on a topic, Mayer (2011) suggests that assessing learners’ prior knowledge about the topic to be taught is one of the most important forms of assessment that educators undertake. Examples of quick assessments that teachers can conduct before beginning a unit of study include asking students to write down everything they know about the topic of study for 1 minute, asking students to develop a web about the topic, or engaging the class in a discussion of the topic using the K-W-L strategy (Ogle, 1986; discussing what they Know about the topic, what they Want to learn about the topic, and coming back at the end of the unit to report what they Learned about the topic). Following are some additional suggestions for building and activating background knowledge before initiating a lesson or a unit:

- Use graphic organizers to introduce the material and to show how key concepts are related (Luckner, Bowen, & Carter, 2001).

- Make available conceptually related books that span a wide range of reading levels and allow students to use them as they please.
- Start a blog about the topic of study and have the students extend it through group discussion.
- Include virtual experiences such as viewing captioned educational media (e.g., Described and Captioned Media—www.dcmp.org) and conduct group discussions about the topic (Marzano, 2004).

3. Inadequate Knowledge and Use of Learning Strategies

Most students who know how to learn, have a set of strategies for how they learn best and evaluate their performance, making adjustments as needed. Research indicates that students who are deaf or hard of hearing are less aware than their hearing peers when they do not comprehend (Schirmer, 2003), and that they often lack an awareness of learning strategies or don't know how to use strategies effectively (Strassman, 1997). Learning strategies are "techniques, principles, or rules that enable a student to solve problems and complete tasks independently" (Friend & Bursuck, 2009, p. 528). Learning strategies are directly related to individual learning tasks, and people use them when they mentally or physically manipulate material, or when they apply a specific technique to a learning task (Slater & Horstman, 2002). Examples of learning strategies that many people use to enhance their understanding are prediction, rehearsal (e.g., verbal, repeated reading, selective underlining), self-questioning, elaboration (e.g., mental imagery, creating analogies), organizing (e.g., outlining, graphic organizers), and summarizing (Muth & Alvermann, 1999).

The process of purposefully monitoring our thinking is referred to as metacognition. Metacognition is characterized by (a) matching thinking and problem-solving strategies to particular learning situations, (b) clarifying purposes for learning, (c) monitoring one's own comprehension through self-

questioning, and (d) taking corrective action if understanding fails. (Echevarria, Vogt, & Short, 2010). Research with students who are both hearing and who are deaf or hard of hearing indicates that when teachers use explicit metacognitive strategies with students, reading comprehension, as well as content knowledge, is improved (e.g., Duffy, 2002; McLaughlin, 2003; Schirmer & Woolsey, 1997; Snow, Griffin, & Burns, 2005). Consequently, many students who are deaf or hard of hearing require a combination of indirect and direct instruction and guided practice in the use of learning strategies. Examples of strategies and their sequential use within day-to-day instruction are as follows:

- *Prior to instruction.* Turn Taking, Topic Establishment, Engagement, and Expectations: Prior to conveying new information, establish classroom turn-taking routines that ensure students are aware who has been selected to share; also, provide sufficient time for the class to look at the selected student, before he or she responds. Teachers engage students in informal interactions to draw out their experiences and questions concerning the focus of the lesson. These strategies enable students to participate in class discussions that activate students' prior knowledge, while

words, then use concept maps to identify word meanings and the progression of key lesson concepts. Teachers also identify specific questions that students should consider as they read course material. These strategies serve to focus students' attention, increase their conceptual comprehension, and enhance retention (Lang, 2006; Martin, 2006; National Research Council, 2000).

- *During instruction.* Dialogic Interactions, Thinking Aloud, and Wait Time: As the lesson begins, ask students open-ended questions, with appropriate wait time, to which they are expected to respond and share how they derived their answers. Teachers scaffold students' use of increasingly sophisticated reasoning strategies by explaining their own learning strategies. In this process teachers emphasize such skills as comparing, identifying patterns, and sequencing, while pointing out the text-based cues that can be used to infer meaning. These strategies provide students sufficient time to identify how they learn, add new learning strategies, and develop a better understanding of the targeted lesson content. The strategies also provide teachers with critical information concerning how students learn and the misconceptions they bring to the learning process (Mar-

To teach learning strategies, establish classroom turn-taking routines that ensure students are aware who has been selected to share; also, provide sufficient time for the class to look at the selected student, before he or she responds.

increasing their motivation and expectation to learn (Lang, 2006; National Research Council, 2000; Spencer & Marschark, 2010; Williams, 2009).

- *At the onset of instruction.* Vocabulary Identification, Graphic Organizers, and Adjunct Questions: During the initial lesson, teachers and students look through lesson material to identify unknown

schark & Hauser, 2008; Marschark & Wauters, 2008; Martin, 2006; Williams, 2009).

- *Conclusion of instruction.* Problem Solving, Summarizing, and Linking Learning With Living: Use performance-based assessments in which students demonstrate their comprehension of the lesson's key knowledge and skills through collaborative, small-group, and problem-

solving activities. In these activities, students use their notes to first identify, then summarize and use lesson content to understand, and possibly address topical interests and problems they encounter outside of the classroom. These strategies increase students' self-efficacy, conversational competencies, and problem-solving skills, while simultaneously increasing their motivation and confidence (Lang, 2006; Spencer & Marschark, 2010; Williams, 2009).

Teachers can also provide supplementary learning strategies to students who are deaf or hard of hearing in five essential areas: gaining information, storing and retrieving information, expressing information, self-advocating, and managing time (Ellis & Lenz, 1996). Teachers can use active reading strategies that have been demonstrated to be effective with students with learning disabilities and preliminary research suggests may be also appropriate for students who are deaf or hard of hearing (Luckner & Handley, 2008). Some of these strategies include

- RAP (Schumaker & Deshler, 1984), which helps students learn to identify main ideas and details as well as how to paraphrase:
 - R**— Read a paragraph.
 - A**— Ask yourself, “What were the main ideas and details of this paragraph?”
 - P**— Put the main idea and details in your own words.
- RCRC (Richards, 2003), which encourages students to question themselves as they move through the text:
 - R**— Read a small part of the material.
 - C**— Cover the material.
 - R**— Retell yourself what you read.
 - C**— Check to see if you remembered correctly.
- PARS (Cheek & Cheek, 1983), which is a simplified textbook reading strategy:
 - P**— Preview the material by scanning the chapter and surveying

the introduction, headings, graphics, and chapter summary to identify the main ideas.

- A**— Ask questions that relate to the main ideas identified while previewing the chapter.
- R**— Read the chapter to answer the questions developed.
- S**— Summarize the main ideas of the chapter.

4. Social Skills Deficits

Students who are deaf or hard of hearing are often at risk for not developing social relationships because they may not have the language skills or have not learned how to engage in socially appropriate behaviors, such as carrying on conversations, making friends, and dealing with conflict (Hauser & Marschark, 2008; Stinson, Whitmore, & Kluwin, 1996). A large and growing body of research indicates that the possession of adequate social skills is necessary for maintaining social, psychological, and occupational well-being (Segrin & Givertz, 2003). Simultaneously, a positive correlation has been

social perception and interpretation, and the use of speech or sign language, as well as body language and appropriate timing of behaviors to interact effectively (Lieberman, DeRisi, & Mueser, 1989). Most of our social skills are acquired through informal observational learning, opportunities to practice social skills, and feedback from significant others (Segrin & Givertz, 2003).

As a result, students who are deaf or hard of hearing may benefit from direct instruction and coaching in social skills and the pragmatics of language, as well as adult facilitation of peer interaction. Antia and Kreimeyer (2003) list a number of social skills interventions that enhance social interactions between hearing students and students who are deaf or hard of hearing. Suggestions include teaching students who are deaf or hard of hearing interaction skills, teaching hearing students sign language for use in social skills activities when communicating with their peers who are deaf or hard of hearing, teaching hearing students about hearing loss, and designing

To promote social skills, teach students who are deaf or hard of hearing interaction skills, teach hearing students sign language, teach hearing students about hearing loss, and design classroom environments that promote communication and interaction among classmates.

found to exist between social skills and academic performance (e.g., Malecki & Elliott, 2002). Conversely, research suggests that poorly developed social skills during early childhood were the single best predictor of significant problems in adulthood (e.g., Strain & Odom, 1986) and that people who lack social skills are often rejected by others and are at risk for developing mental health problems during adulthood, such as depression, social anxiety, and alcoholism (Elksnin & Elksnin, 2006).

Social interaction is challenging because it depends on human communication that requires cognitive processes, such as decision making,

classroom environments that promote communication and interaction among classmates. Teacher-mediated instruction to develop social skills is also recommended and includes “developing greeting skills, cooperation, sharing materials, assisting others, initiating and maintaining conversation, complimenting and praising” (p. 170).

5. Reliance on Assistive Technology

Students who are deaf or hard of hearing use an array of hearing technology to access sound. Examples include cochlear implants, programmable digital hearing aids, bone-anchored



hearing aids (BAHA), contralateral routing of signal (CROS) hearing aids, tactile communication devices, personal-worn frequency-modulated (FM) amplification systems, and classroom amplification systems. Accompanying peripherals include microphones, earmolds, and chargers. Knowledge of the

use and maintenance of the equipment is important to the academic success of this population of students. In addition, with the interest in and success of cochlear implants, postimplant therapy is an increasingly important area of expertise for teachers working with students who are deaf or hard of hear-

ing. To presume that, once implanted, students are able to hear like the typical hearing person is a wrong assumption. Like other equipment, cochlear implants require training for the students to use and preparation on the part of the teacher to help students use them effectively. Consequently, stu-

dents need professionals who can troubleshoot technology problems and teach them how to use technology and support services, as well as how to self-advocate about technology and support service issues.

We recommend that the general education teacher work collaboratively with the teacher of students who are deaf or hard of hearing to determine the correct forms of assistive technology to use. If enough general and special education professionals need assistance, it is suggested that they request the teacher of students who are deaf or hard of hearing conduct an inservice workshop to define terms and explain how to use the equipment. The following are specific actions that teachers can take to increase the effectiveness of assistive technology:

- Check daily to make sure the assistive technology is working appropriately.
- Help students learn how to properly take care of the assistive technology.
- Establish contacts and procedures for managing the assistive technology when it malfunctions.
- Consistently use the assistive technology.
- Face the students when speaking.
- Ensure the classroom is adequately lit.
- Reduce the background noise in the classroom.
- Establish and use routine attention-getting strategies (e.g., flick the lights, count down from 10).
- Provide sufficient wait time.
- If an FM system is used, pass the microphone around to all speakers.
- Use overhead projectors, VCRs, LCDs, and Smart Boards to provide visual supplements to spoken messages.
- Post a visual schedule identifying daily routines and expectations for students.

In addition, assistive technology services may include the use of sign language interpreters, tutors, and note takers. In this case, it is appropriate to

request that the interpreter or supervisor of the tutors and note takers provide professional development training of their appropriate use on request. Following are suggestions for maximizing the effectiveness of an interpreter:

- Do not assume that an interpreter is a teacher or tutor, although they may serve as a tutor if it is part of their formal job description.
- Directly address and look at the student who is deaf or hard of hearing, but not the interpreter when conveying a message to the student who is deaf or hard of hearing.
- Keep in mind that the interpreter will not answer questions directed to the student who is deaf or hard of hearing.
- Assume that interpreters will interpret everything they hear, including noises in the class and hallway.
- Provide interpreters with textbooks used in your class so that they can become familiar with the material being taught.
- Be aware that it is permissible for an interpreter to ask for clarification of spoken messages.

Final Thoughts

Technological advances such as newborn hearing screenings, cochlear implants, and improved hearing aids, as well as federal mandates such as the Individuals With Disabilities Education Act (IDEA) of 2004, suggest that increasing numbers of students who are deaf or hard of hearing will receive the majority of their education in general education settings. As a result of their special needs, researchers (e.g., Luckner & Muir, 2001; Reed, Antia, & Kreimeyer, 2008) suggest that students who are deaf or hard of hearing in general education settings benefit from direct services from a licensed teacher of students who are deaf or hard of hearing to supplement instruction and to teach additional specialized curriculum content (e.g., learning strategies, social skills, self-advocacy). Concomitantly, students benefit when teachers of students who are deaf or hard of hearing provide indirect serv-

ice, including consultation with special education and general education teachers, so they can make specific adaptations and modifications in their instruction and assessment practices that help students with a hearing loss have access to the curriculum as well as to social interactions that occur in the classroom.

As noted by Horowitz et al. (2005), "The core purpose of formal education is to enable the development of *all* children to take their place in adult society with the competencies to be positively contributing members to the society" (p. 125). Placement is not synonymous with receiving an appropriate education. A variety of teacher factors, such as teaching style, the content being taught, and how the educational environment is managed, as well as student factors such as language, cognition, motivation, behavior, and social skills, affect learning.

Although many people with a hearing loss have overcome obstacles, achieved happiness, and attained life success, educators need to understand that the majority of children who are deaf or hard of hearing enter school with (1) language, vocabulary, and literacy delays; (2) gaps in background and domain knowledge; (3) inadequate knowledge and use of learning strategies; (4) social skills deficits; and (5) reliance on assistive technology. In addition to considering these five challenges, educators must keep in mind that when students with a hearing loss are served in general education classrooms, access to the information transmitted during classroom discourse may be significantly reduced. This often occurs because of the rapid rate of discussions, continuous turn taking, quick change of topics, the large number of speakers involved in a discussion, the tendency for more than one student to talk simultaneously, and the challenge for educational interpreters to convey essential classroom communication accurately for those students who rely on sign to communicate (Luckner & Friend, 2011; Schick, 2008). Consequently, the majority of students who are deaf or hard of hearing require accommodations and modifications in

the educational environment, as well as supplementary instruction in order to benefit from receiving educational services in general education settings. Optimally, an educational team provides these services, working collaboratively to plan, teach, assess, and evaluate the efficacy of the placement as well as the services that each student with a hearing loss receives.

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