ABSTRACT: Changes in the treatment of early childhood hearing loss have had a significant impact on the practice of deaf education. The combination of earlier diagnosis and intervention and improved access to sound have made it possible for deaf children to develop speech and language skills that approach those of their hearing age-mates. This article describes a model intervention program at the Moog Center in St. Louis, MO where children and families get an early start, have the benefit of the most up-to-date hearing technology, and receive intensive instruction that is focused on learning to talk. Data from 2 recent studies indicate that a majority of these students develop age-appropriate spoken language by 5 years of age.

KEY WORDS: children, hearing loss, cochlear implants, hearing aids, auditory skills, spoken language

Talking is more than the words we speak—it is a powerful enabler. It enables us to communicate and fully participate in the world around us. For children who are deaf or hard of hearing, spoken language opens opportunities that might not be available if they could not communicate by talking. Today, these children are talking better and achieving more than ever before. For deaf children, achieving high levels of competence with spoken language is a recent phenomenon. Historically, the most devastating effect of severe and profound hearing loss has been on spoken language—or learning to talk. We learn to talk by listening to the sounds of speech around us, and hearing loss reduces both the quantity and the quality of what is received. Until the last 15 years or so, learning to talk was a realistic goal for only a few. Although the oral approach for teaching deaf children to talk has been in existence for many centuries, until recently, outcomes for children with severe to profound deafness have been disappointingly low. Before the late 20th century, hearing aids did not provide enough access to sound for most children with limited residual hearing to learn to talk through listening. Acquiring competence with spoken language was difficult and required superb teaching, which was available at only a few schools specializing in oral deaf education or through skilled tutors. Furthermore, for those who did learn to talk, the process was typically long and tedious; conversing often required considerable effort on the part of the listener as well as the speaker. However, that is no longer the case. Remarkable changes in the field of deaf education are resulting in increased achievement by deaf children—more of them are learning to talk, and they are doing it faster and achieving at higher levels than ever before. Today, most deaf children who are fitted with appropriate sensory aids can learn to use their aided hearing well enough for listening to be the foundation of spoken language development, and most deaf children can learn to talk well enough for talking to be the way they communicate. The three factors most responsible for this change in the achievement level of deaf children are (a) newborn screening and early intervention, (b) advances in hearing technology, and (c) innovations in teaching that capitalize on the first two. This article will briefly address these three factors and then turn its focus to an exemplary educational program for infants and young children—The Moog Center for Deaf Education—the goal of which is to maximize a deaf child’s potential for learning to talk.

GETTING STARTED EARLY

Newborn hearing screening has now become a reality in most states, with more than 95% of infants currently being
screened nationwide, resulting in earlier identification of hearing loss for many children. However, for early identification to have optimum impact, most professionals believe that it must be followed by early intervention, which serves as a catalyst for maximizing the child’s potential for learning spoken language during this critical learning period. The Joint Committee on Infant Hearing (JCIH) recommends screening by 1 month, diagnosis by 3 months, and intervention by 6 months (JCIH, 2007).

It is important that intervention with deaf children and their families begins as soon as possible after hearing loss is identified because auditory pathways need to be stimulated to continue to function (Ponton et al., 1996), and this stimulation has an important influence on the organization of the auditory brain pathways (Berlin & Weyland, 2003; Boothroyd, 1997). The earlier that children are amplified and/or receive cochlear implants, the more they are likely to benefit from the relatively greater plasticity of the auditory pathways (Sharma, Dorman, & Kral, 2005). The most sensitive period for language learning occurs during the first 5 years of life (Lenneberg, 1967; Newport, 1990). Consequently, the earlier the child and family get started, the better the chance the child has of following the normal developmental sequence, thereby increasing the likelihood of catching up and keeping up with hearing peers.

**CAPITALIZING ON HEARING**

The improved technology of digital hearing aids and cochlear implants has given severely and profoundly deaf children increasingly more access to sound. When early educational intervention capitalizes on early access to sound, the result is faster acquisition of spoken language. It is as simple as this: The more young children hear, the better they talk. Both hearing aids and cochlear implants give greater access to sound so that children with hearing loss who are learning to talk progress faster and with less effort. With this increase in access to sound, these children can more easily develop complex language and intelligible speech.

Cochlear implants are often the device of choice for children who are severely or profoundly deaf, especially if spoken language acquisition is a goal. The U.S. Food and Drug Administration (FDA) has approved cochlear implantation for infants as young as 1 year once there has been a period of listening training with hearing aids and it has been determined that hearing aids are of little or no benefit. Today, an increasing number of children are receiving implants in both ears. The appropriate programming or mapping of the implant is a critical factor. How well the cochlear implant is programmed has an impact on how well the child hears, and how well the child hears has a big impact on how well the child learns to talk. Just as with hearing aids, the earlier the child receives a cochlear implant, the better chance he or she has to benefit from access to spoken language and learning to talk (Geers, 2004; Geers, Nicholas, & Moog, 2007; Nicholas & Geers, 2006). However, even with improved technology, hearing aids and cochlear implants do not yet provide a signal that is complete enough for most children with severe and profound hearing loss to learn to talk without specific teaching.

**AUDITORY–ORAL EDUCATION**

The goal of auditory–oral education is for children to learn to communicate using spoken language. Auditory–oral programs are *auditory* in the sense that an emphasis is placed on developing listening skills. These programs are *oral* in the sense that instruction is directed toward developing spoken language, understanding it, and producing it. Although the goal of all auditory–oral programs is for children to learn to listen and talk, not all are organized in the same way. For example, some have classes only for children with hearing loss, whereas some include children with typical hearing; some are located in special schools, some provide one or two classes within a school for hearing children, and some provide individual therapy for children who are completely mainstreamed.

Auditory–oral programs may provide varying levels of emphasis on the areas of spoken language development and use different styles of teaching and a different organization of the child’s day. Regardless of the organization or the specific teaching strategies of the program, all listening and spoken language programs provide spoken language instruction in a variety of activities throughout the day. Characteristics of a quality auditory–oral education program include the following (Moog, 2007):

- The program’s goal is for children to learn spoken language well enough to communicate effectively by talking and to develop age-appropriate reading skills.
- Children are immersed in spoken language throughout the day.
- Listening is supported through the management of well-fitted hearing aids and/or cochlear implants.
- Acoustics of the classroom are designed to provide a quiet listening environment.
- Teachers are knowledgeable about and trained in techniques for accelerating spoken language development in children with hearing loss.
- Classes are small.
- Programs are both family centered and child centered.
- Parents are considered a critical support in ensuring their child’s success in developing spoken language.
- Programs focus on preparing students to enter the mainstream early and with the skills needed for successful participation.

**THE MOOG CENTER FOR DEAF EDUCATION**

The Moog Center for Deaf Education is a nonprofit, independent center with a family school program for
children from birth to 3 years of age and their families; a school program for children from 3 to 8 years of age; and an outreach program for professional training, curriculum development, and research. Each year, the Moog Center serves approximately 65 children in the family school and school programs and provides audiology and audiologic habilitation services to approximately 50 of our alumni. Our mission is both to teach deaf children to talk and to teach others to make this possible.

At the Moog Center, we have developed an innovative auditory-based program that capitalizes on early intervention and advances in hearing technology for children birth to 8 years of age. This program incorporates all of the characteristics of auditory–oral programs as described above and, in addition, uses unique features and teaching strategies that have been shown to accelerate the learning of spoken language for deaf children. These features include instruction in all aspects of spoken language (i.e., language, speech perception, and speech production) that is direct, intense, focused, objective driven, and highly individualized as well as a focus throughout the day on helping each child to improve his or her spoken language. On-site audiology services provide consistent access to sound through optimum device management by skilled pediatric audiologists.

Following is a brief glimpse into the philosophy behind the teaching at the Moog Center. However, we refer the reader to Teaching Activities for Children Who Are Deaf and Hard of Hearing (Moog, Stein, Biedenstein, & Gustus, 2003) for a more detailed guide.

Developing Listening Skills
At the Moog Center, listening is a fundamental skill in the development of spoken language. The development of listening skills is an essential goal of the curriculum and is addressed through a combination of direct instruction in lessons and immersion in auditory experience.

Auditory lessons require a very high level of concentration and effort and are typically scheduled for approximately 15 min each day. During these lessons, listening is the main focus as the teacher works to stretch the child’s listening skills to make finer and finer auditory discriminations. In lessons, the teacher focuses on specific auditory objectives that have been selected from a developmental hierarchy, the Speech Perception Instructional Curriculum and Evaluation (SPICE; Moog, Biedenstein, & Davidson, 1995). The SPICE kit is intended to provide a framework for selecting and practicing targeted skills and evaluating progress along a continuum from discrete tasks such as discriminating and identifying words to more global skills focusing on understanding connected speech.

Auditory lessons tend to occur in ideal listening conditions, typically in a quiet room without distraction, and typically in individual instruction or with one or two other children of similar ability. However, lessons can also include practicing listening in less ideal conditions, such as in the presence of noise or in situations that are contrived to have distractions. Auditory lessons are organized to provide concentrated repetition or practice within a short time.

Auditory experience, on the other hand, is typically characterized as less focused and more “natural” than auditory lessons. By auditory experience, we mean the auditory stimulation that the child receives throughout the day. Even in these natural settings, the teacher has specific objectives for the child and attempts to capitalize on situations that provide practice of the specified skills. Children are expected to listen and respond throughout their participation in all activities during the day. In addition to lessons, this general attention to listening throughout the day helps to transition learned skills into real use and accelerates progress in auditory development.

Children who receive cochlear implants benefit from specific instruction in listening in order to make maximum use of the device and to accelerate the development of listening. Those who receive implants at a young age, by 2 years or younger, may be able to develop listening skills more holistically and require less time with the development of discrete skills. Children who receive a second implant some time after the first benefit from very specific training to develop bilateral use. As the technology of hearing devices continues to improve, teaching strategies, materials, and time spent at various levels need to be adjusted.

In addition to the materials available in the SPICE kit, a variety of other materials are available for working on auditory skill development with children, including Listening Games for Littles (Sindrey, 2006), Ready, Set...Listen! (Bruns, Anthony, Halfman, McMahon, & Mcioret, 1991), and Following Auditory Directions (DeGaetano & Newman, 1994). The Listening Room Web site (www.hearingjourney.com) also has materials that can be used to work on auditory skill development for children.

Developing Speech Skills
Part of communicating well through spoken language is having the skills to produce speech sounds clearly, accurately, and in the context of real communication. With recent changes in technology, developing natural-sounding speech has become an attainable goal for children with hearing loss. Increased access to sound significantly affects the ability to perceive speech well enough for many deaf children to develop intelligible speech if given appropriate help to do so. Because the easiest way to acquire speech skills is through listening, capitalizing on listening and the auditory access provided through children’s devices is a major focus. Other sensory avenues, such as speech reading and, sometimes, tactile cues, are added when listening is not enough.

In order to be optimally effective, speech improvement is addressed in the context of lessons, in contrived language activities, and in real use throughout the day. This comprehensive approach accelerates the development of speech skills and facilitates their transfer to spontaneous, independent use for real communication. Daily speech lessons are provided for each child individually or in a small group of two or three. During this time, the teacher develops new speech skills in the areas of articulation, suprasegmental...
skills, and pragmatics, in addition to working on listening skills (as described above). In the lesson setting, children get intense practice of speech skills as they are moved along a developmental hierarchy from the production of sounds in words to connected language, back down to syllables and single phonemes as needed. Work during the lesson is individualized based on the specific child’s skills and needs and is presented for repetitive practice in the context of topics that are meaningful to the child. A typical lesson may include the development of specific sounds, if necessary; work on speech in the context of vocabulary selected in conjunction with other cognitive and language activities as described below; practice of songs and rhymes; and discussion in areas of interest to the children.

In addition to lessons, speech use is essential to the child’s participation in all other activities. As children talk throughout the day, there continues to be a focus on helping them improve the accuracy and intelligibility of their speech. Teachers listen carefully to the child’s productions, providing the additional information needed to improve the child’s articulation and intonation. This practice of speech in communicative settings reinforces for the child that improving speech is important in all communications, not just in lessons. The expectation for using speech to communicate throughout the day is essential to facilitate the transfer of speech skills into real use and to speed up the child’s progress in developing spoken language competence.

Developing Language Skills

The goal of language instruction is to help the child be able to use spoken language to communicate clearly and accurately for a variety of purposes such as requesting information, commenting, asking questions, giving directions, conveying information, and expressing emotions. The linguistic sophistication of a child affects the accuracy and ease with which that child can communicate. Without the words and sentence structures to express him or herself, the child’s practical ability to communicate will be limited, which substantiates the value of direct language instruction.

At the Moog Center, all instruction throughout the day is directed toward helping children improve their spoken language skills. Getting children to talk comes first; then, it is the teacher’s job to help them talk better. Helping them talk better requires selecting language targets and developing appropriate activities to give children opportunities to practice those targets in a variety of settings (Moog et al., 2003). Through classroom activities and natural occurrences, the child learns that the value of language is its usefulness in communicating and interacting with others. The child is provided with opportunities and learning experiences that encourage and require communication. Teachers and others in daily contact with the child consciously create and maintain an atmosphere that rewards talking. Everything that happens at school and at home helps the child understand that talking is beneficial.

Settings for Instruction

From Lessons to Conversations

Teaching activities for developing spoken language span a continuum in terms of the context in which instruction is provided and the degree of repetition involved. At one end of the continuum is teaching within a lesson, using repetitive, slot-filling activities to practice a specific target structure. Further along the continuum is teaching within contrived conversational activities, which are designed by the teacher to obligate use of a variety of structures in the context of what appears to be naturally communicative interactions. At the far end of the continuum is teaching during “real talking” in real-life communications as the teacher capitalizes on a child’s spontaneous language during all communicative interactions throughout the day to help the child improve his or her language. Dividing language instruction in this way is artificial, but it is helpful for discussion purposes. Lessons can look more like conversational activities, and conversational activities often appear to be child directed and very much like real talking. Each setting has its own advantages and disadvantages. Most children benefit from some instruction in all of the settings, with emphasis on one setting or the other depending on the structures to be learned, the child’s facility with the structures, and the learning style of the child.

Lessons are teacher-directed instructional activities that are used to teach specific aspects of spoken language such as new syntactic structures, vocabulary, or improved articulation of speech sounds. Lessons are designed to provide extensive practice within a short time on a limited number of selected targets with the goal of developing automatic use in conversation. Although lessons may not be very representative of real-life use, when well designed, they may disguise this repetitive practice in fun and interesting ways. This concentrated practice helps the child “master” a target skill and accelerate the carryover to real use.

Although lessons serve a valuable purpose, it is not possible or even advantageous to directly teach in lessons all that a child needs to learn. Conversational activities are instructional activities that focus on a variety of selected targets in a more natural context. Because these activities are more meaningful and appear to be more child directed, they are highly motivating, making them effective for language learning. Conversational activities are specifically designed to provide opportunities to use a variety of language that is appropriate to the activity, more closely resembling what might naturally occur. Thus, they serve as an essential transition from work in lessons to use in real talking.

The more the child can learn in conversational settings, the faster he or she can move toward “catching up” to hearing peers in spoken language development. In order to accelerate conversational learning, children participate in instructional activities that are conversational, including show and tell; language experiences such as art, cooking, and pretend activities; and games. In these activities, children learn new vocabulary and syntactic structures as well as the pragmatics of conversation.
Real talking is the ultimate goal. Real talking is what a child is doing when he or she spontaneously talks to the teacher, to other children, to members of his or her family, and to anyone else with whom he or she wants to communicate. When the child is really talking, the teacher capitalizes on teachable moments, which are some of the best and most effective times for learning. Real talking focuses on the structures that children are trying to use when they are really communicating, allowing the teacher to capitalize on the children’s interests as he or she helps them say what they want to say better.

Instruction Is Objective Driven

In each area of spoken language (listening, language, and speech), objectives are specified by listing sequential skills in their expected order of development. Rating forms such as the Teacher Assessment of Spoken Language (Moog & Biedenstein, 2006) are used to keep a record of the skills the child has demonstrated, and the next skills on the list are targeted for instruction.

For each teaching activity throughout the day, the teacher takes responsibility for evaluating the degree to which the child is learning or has learned the targeted skill or knowledge. This focus on objectives ensures that teachers are aware of the child’s ongoing progress.

There are many activities from which children can learn. However, at the Moog Center, teachers select activities for the children based on the degree to which the chosen activity helps meet the children’s spoken language objectives. That is the overriding factor that guides decisions about what to teach and how to teach it.

Student achievement and success are directly related to the teacher’s accuracy in diagnosing student skills, prescribing appropriate teaching activities, structuring the lesson to ensure success, giving clear direction for what is expected, and giving feedback on the child’s responses.

Modeling and Imitation

Modeling and imitation is a teaching technique that has proven effective for accelerating the development of spoken language for deaf children. Getting the child to talk, and then giving the child guided practice in talking, is the crux of this strategy. Teachers use a variety of techniques to get children to talk. The best way to get children to talk is to listen to them. Teachers at the Moog Center believe that their students can learn to talk, and they convey this belief to their students in the way they speak to them and in the high expectations that they have for them to talk. The teachers’ attitudes and the learning environment they create in the classroom reflect this expectation. When teachers listen attentively, children like to talk and know they are expected to talk; consequently, they talk a lot. And, the more they talk, the better they get at talking. Once the child has expressed an idea, the teacher helps the child improve his or her spoken language using modeling and imitation techniques. The sequence of the modeling and imitation technique is as follows: (a) the child talks, (b) the teacher listens both to what the child says and how the child says it, (c) the teacher provides a model that expresses the child’s idea but improves the language or speech used, (d) the child imitates the model, and (e) the teacher uses various techniques to help the child include the targeted improvement in his or her imitated production.

The modeling and imitation technique requires children to talk and to imitate the model that is provided by the teacher. The critical feature is that the teacher targets some of the child’s initial production for improvement and then works with the child to get an improved production. A model may be provided to complete or fill in missing pieces; correct language, vocabulary, or articulation; or increase the length or complexity of the original utterance. Getting the child to imitate the improved model is an essential step in the process as it provides practice using the syntactic structure, vocabulary word, or speech sound that was targeted in the model. In addition, imitation helps the child learn to recognize and understand the new words or sounds the next time he or she hears them, and helps the development of auditory memory. Listening to the child’s imitation provides information to the teacher about the level of facility the child has with the targeted structures. Consistent use of this technique in communicative interactions has a significant impact on the development of spoken language skills. The more the teacher uses modeling and imitation, the more opportunity the child gets to practice producing correct language.

We believe that deaf children learn to talk by talking. The more children practice talking, the better they get, but just talking is not enough. With modeling and imitation, effort is directed toward getting children to talk better, with a focus on improving their use of syntactic structures, increasing their vocabulary, increasing the length and complexity of their sentences, and improving the intelligibility of their speech.

The Daily Schedule

The daily schedule is a signature element of the Moog Center’s school programs. It is the framework that allows for the implementation of instruction that is direct, intense, focused, and highly individualized. It is organized to provide opportunities for the continuum of teaching activities from lessons to real talking. It provides a balance for children, moving from periods of intense instruction in small groups to larger group activities with less intensity and an emphasis on other areas of development, such as cognitive and motor skills. This physical movement, alternating from space to space, from small group to large group, and from intense to less intense, makes it possible for the child to benefit from all aspects of a full day of instruction.

The schedule provides an ideal setting for individualization of instruction to the greatest degree possible without it being individual instruction. Children are organized in small groups of 2 or 3 for very focused spoken language instruction (i.e., listening, speech, syntax, vocabulary, and conversation). They are grouped according to ability in each of these subject areas. The small-group, therapy-like sessions provide many opportunities for talking. Small
groups also ensure that the teacher knows precisely each child’s skills and can gear the instruction to just the right level for maximum challenge and maximum success. This is individualization at its very best.

The daily schedule is designed to provide learning groups of various sizes for specific purposes. Small-group instruction makes it possible for children to get many opportunities to practice talking. Larger groups provide opportunities for learning conversational skills and for conversing with other children in a variety of situations and for a variety of purposes.

Instruction in small homogeneous groups of 2–3 children has a number of benefits (Moog et al., 2003):

- Small groups, in and of themselves, allow for more individualized instruction.
- The homogeneity of the groups means that the instruction can be more precisely targeted to each child’s learning ability and skill level.
- Children get more turns to talk, which is important because deaf children learn to talk by talking.
- In small groups, the teacher can make sure that each child is attending and understanding.
- There is increased opportunity for child-to-child interaction.
- Children are involved in participating all of the time, so there is less opportunity for distractions and minimal time spent on behavior issues.
- Teachers know very specifically each child’s language level and can gear the instruction to specific objectives.
- Teachers can evaluate each response of each child and use that information to guide the next steps in teaching.

Instruction in larger heterogeneous groups has additional benefits (Moog et al., 2003):

- Children enjoy a full curriculum of typical preschool experiences for children ages 3–5 years, including circle time, centers, art, motor activities, and cognitive activities.
- Children have the opportunity to use acquired language skills to communicate in a real-life environment.
- A teacher who is experienced in early education focuses on the “whole child” while providing a very language-enriched environment.
- Fewer demands are placed on the child for “stretching” spoken language. Rather, each child is encouraged and stimulated to incorporate the language that he or she knows into real communicative situations.
- There is more opportunity for communicating with a more diverse group of children with a wider range of language skills.
- Although the environment is highly language enriched, it is less structured, which helps children gain independence and learn to direct themselves.

Figure 1 illustrates a sample preschool schedule at the Moog Center. Individual children are represented by letters of the alphabet. Following M on the schedule provides a view of a child’s typical day. M starts the day in his homeroom, where his cochlear implant is checked by the teacher. He then stays in the room, and he and N work with the teacher on a syntax lesson. Next, M goes to the Discovery Room, which is set up as a preschool room, and the activity, which lasts 25 min, is Circle and Choice Time. Circle Time is a typical activity in preschools where children are gathered in a circle and engaged in various activities such as greeting each other, assigning “jobs” for the day, singing a good morning song, and talking about topics that interest them. During Choice Time, each child can choose what he or she wants to do from a select group of activities such as dramatic play, puzzles, games, blocks and manipulatives, or the sand table. After that, M goes back to his classroom for conversational language; this is followed by music and movement in the Discovery Room with 10 other children. Then, all of the children return to their homerooms for snack, after which all 21 children go to recess. M continues throughout the day alternating between small-group instruction for focused spoken language teaching and the Discovery Room for larger group preschool activities. With this type of schedule, each child receives approximately 2½ hr of direct, focused, intense instruction in the various aspects of spoken language each day in addition to benefitting from a full preschool curriculum.

Expert Audiologists Provide Optimum Access to Sound

Having expert pediatric audiologists on staff and on site reflects the value the Moog Center places on consistent access to sound for all children. At the Moog Center, our pediatric audiologists are skilled in working with infants and toddlers as well as in programming both digital hearing aids and cochlear implants. With the advent of newborn hearing screening, the majority of children first enrolled in our family school when they were under the age of 6 months, a significant number were under the age of 3 months, and a few were under 1 month of age. Testing and fitting children this young requires special skills.

To facilitate the audiologic testing, the family’s parent educator serves as an assist person in the sound booth, keeping the child engaged and helping to observe responses. In addition, the parent educator is present when the audiologist explains the results of the testing to the parents. Audiologic testing then becomes the jumping off point for coaching parents on how to work with their child to facilitate auditory development. As the audiologist, parent educator, and parents work together as a team, parents gain a fuller understanding of the impact that hearing aids can have on their child’s access to sound and how critical access to sound is for stimulating the auditory centers of the brain and developing spoken language. With this increased understanding, parents work hard to ensure that their infant wears the hearing device consistently, and they learn how to troubleshoot the device as needed.
Developing an excellent working relationship between families and their audiologists as they share information with each other is a benefit for everyone.

An additional advantage of having audiologists in our building, just down the hall from our classrooms, is the immediacy with which problems can be addressed. Because problems can be addressed easily and quickly, teachers learn to recognize even minor changes in the behavior or responses of children that may signify a need for adjusting their devices. For example, if a child pronounces the word...
books with a final /s/ that is less precise than is typical for that child, the teacher can send the child to one of our audiologists, who may make an adjustment to the child’s cochlear implant map or hearing aid setting that may then result in an improvement in the child’s speech production. Similarly, having quick and easy access to an audiologist helps our parents become skilled in detecting when there is a need for adjustments. As a result, our children are “tuned in” at optimal levels for virtually all of their waking hours.

The more the child hears, the faster and better the child learns spoken language, so our children are learning to listen and talk at much faster rates than children who were taught just a decade ago. For example, a recent study of vocabulary skills in children with cochlear implants who attended the Moog Center school program showed that, on average, these students made more than a year’s worth of vocabulary growth each year, effectively narrowing the language gap that exists between deaf and hearing children (Hayes, Geers, Treiman, & Moog, in press). Another recent study of children with cochlear implants who attended the Moog Center school program demonstrated that it is possible for deaf children to achieve language and literacy levels that are commensurate with their hearing peers: 65% of the children tested scored within the average range for language skills, and 70% were within the average range for reading (Moog, 2002). We believe that these results reflect how powerful the combination of intensive teaching and expert audiology services can be for learning language.

Family School Program for Children Ages Birth to 3 Years

The family school program at the Moog Center for Deaf Education serves children from birth to 3 years of age and their families. This center-based program, which provides focused and individualized instruction to both parents and children, has been shown to be a highly efficient and effective model for accelerating spoken language development for children with significant permanent hearing loss.

For children up to 18 months of age, the program is family centered, consisting of parent–infant sessions, direct child service, support groups, and weekly informational meetings. Individual sessions are focused on teaching parents, through coaching and demonstration, how to encourage spoken language growth in their child. For example, parents learn how to identify and teach their child common, everyday vocabulary such as names of household items, foods, toys, and so forth. Parents learn how to model words and language for their child at a level that is appropriate. Parent educators identify daily routines such as going to the grocery store; loading the dishwasher, getting dressed, and so on, and help parents use these activities to capitalize on auditory stimulation and language learning for their children (Brooks, 2002). Support groups provide opportunities for parents to discuss their concerns and challenges, such as explaining the child’s deafness and its impact to grandparents and gaining their support, or issues that arise regarding siblings and their feelings toward the deaf brother or sister. In support groups, parents help each other as they share concerns and discuss ways to deal with these challenges. In our weekly information meetings, the goal is to relay information to parents about hearing loss, language development, cochlear implants, hearing aids, and child development. Parents are guided through a curriculum based on My Baby and Me (Brooks, 2002) and using a variety of other resources, including The First Twelve Months of Life (Caplan, 1973), What to Expect: The Toddler Years (Eisenberg, Murkoff, & Hathaway, 1996), and various Web sites (Babyhearing.org, Hearingexchange.org, Listenup.org).

At approximately 18 months of age, children are eligible to participate in the toddler class several mornings a week. This typically includes 1 hr of individual listening and spoken language instruction for each child, as well as 2 1/2 hr of group experiences. One-on-one instruction is effective for teaching new vocabulary and language structures and is individualized according to each child’s level and learning style. Group experiences provide the child with opportunities to use new vocabulary, language, and concepts in a variety of learning environments. Parents of children in the toddler class continue to attend not only the weekly education and support groups, but also individual weekly sessions, with their child.

Recent Studies

A recent study at the Moog Center evaluated the effectiveness of our birth-to-3 parent education and toddler programs in terms of teaching deaf children to talk. Vocabulary skills of 43 children who had attended the family school program for 1 or more years, beginning in 2000 or later, were evaluated. Sixty-five percent of these children had cochlear implants. All children received assessments of receptive and expressive vocabulary shortly after leaving the family school program and entering a preschool classroom (mean age = 3 years, 3 months). Given that children enter the family school program at very young ages with little to no vocabulary, assessing the children shortly after leaving the program at 3 years of age provides evidence for the effectiveness of the program in terms of vocabulary development.

We measured receptive vocabulary using the Peabody Picture Vocabulary Test—Third Edition (PPVT–III; Dunn & Dunn, 1997) and expressive vocabulary using the Expressive One-Word Picture Vocabulary Test (EOWPVT; Brownell, 2000). The PPVT and EOWPVT have been standardized on large populations of hearing children. Thus, a score of 100 represents average performance as compared with hearing children of the same chronological age. Scores that range from 85 to 115 (representing 1 standard deviation above the mean of 100) are considered to be within the average range for hearing children. The mean standard scores of the children in the family school program were 93 for receptive vocabulary and 96 for expressive vocabulary, both of which are well within the average range for hearing age-mates. Table 1 shows that of the 43 children in...
the sample, 35, or 81%, scored within or above the average range in receptive vocabulary, and 37, or 86%, scored within or above the average range in expressive vocabulary when compared with hearing children of similar age.

Although not all children achieved age-appropriate vocabulary skills by age 3, the overwhelming majority of children in this study had vocabularies that were comparable in size to those of their hearing peers. We believe that these results provide strong evidence of the efficacy of the intense, focused instruction that these children received in the Moog Center family school program.

Although these results are impressive, we felt it important to investigate what happens to the children’s vocabulary skills as they get older. Thirty-four of these 43 children participated in a follow-up study at age 5. Children were evaluated in receptive and expressive vocabulary, receptive and expressive language, and verbal reasoning skills. The PPVT and the EOWPVT were again used to assess vocabulary, the Clinical Evaluation of Functional Language (CELF; Semel, Wiig, & Secord, 1987, 1995) was used to measure language skills, and the verbal portion of the Weschsler Preschool and Primary Scale of Intelligence (WPPSI; Wechsler, 2002) was used to measure verbal knowledge and verbal reasoning. Results are shown in Table 2.

In receptive vocabulary, 32, or 94%, scored within or above the average range; in expressive vocabulary, 33, or 97%, scored within or above the average range. In receptive and expressive language, 91% and 77%, respectively, had average or above skills as compared with hearing peers; 80% of the deaf children had verbal intelligence scores in the average or above range.

These results—from both the birth-to-3 study and the follow-up study at age 5 years—represent remarkable achievement for children with hearing loss. We believe that this level of achievement is evidence of the impact of a focused early intervention program such as the family school program at the Moog Center followed by the intense, focused preschool program described earlier. These extraordinary levels of achievement should serve to raise expectations and set a new standard for children with hearing loss.

Table 1. Results from the vocabulary testing of 3-year-olds who had attended the Moog Center family school program. Standardized scores are reported, and results are categorized based on below average, average, and above average performance by hearing peers of the same age.

<table>
<thead>
<tr>
<th>Standardized score</th>
<th>&lt; 85 (below average)</th>
<th>85–115 (average)</th>
<th>&gt; 115 (above average)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receptive vocabulary</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N children</td>
<td>8</td>
<td>34</td>
<td>1</td>
</tr>
<tr>
<td>Proportion of total sample</td>
<td>19%</td>
<td>79%</td>
<td>2%</td>
</tr>
<tr>
<td>Expressive vocabulary</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N children</td>
<td>6</td>
<td>35</td>
<td>2</td>
</tr>
<tr>
<td>Proportion of total sample</td>
<td>14%</td>
<td>81%</td>
<td>5%</td>
</tr>
</tbody>
</table>

Table 2. Results from follow-up language testing of 5-year-olds who attended the Moog Center family school program. Standardized scores are reported and results are categorized based on below average, average, and above average performance by hearing peers of the same age.

<table>
<thead>
<tr>
<th>Standardized score</th>
<th>&lt; 85 (below average)</th>
<th>85–115 (average)</th>
<th>&gt; 115 (above average)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receptive vocabulary</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N children</td>
<td>2</td>
<td>29</td>
<td>3</td>
</tr>
<tr>
<td>Proportion of total sample</td>
<td>6%</td>
<td>85%</td>
<td>9%</td>
</tr>
<tr>
<td>Expressive vocabulary</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N children</td>
<td>1</td>
<td>28</td>
<td>5</td>
</tr>
<tr>
<td>Proportion of total sample</td>
<td>3%</td>
<td>82%</td>
<td>15%</td>
</tr>
<tr>
<td>Receptive language</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N children</td>
<td>3</td>
<td>27</td>
<td>4</td>
</tr>
<tr>
<td>Proportion of total sample</td>
<td>9%</td>
<td>79%</td>
<td>12%</td>
</tr>
<tr>
<td>Expressive language</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N children</td>
<td>8</td>
<td>23</td>
<td>3</td>
</tr>
<tr>
<td>Proportion of total sample</td>
<td>23%</td>
<td>68%</td>
<td>9%</td>
</tr>
<tr>
<td>Verbal intelligence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N children</td>
<td>7</td>
<td>23</td>
<td>4</td>
</tr>
<tr>
<td>Proportion of total sample</td>
<td>20%</td>
<td>68%</td>
<td>12%</td>
</tr>
</tbody>
</table>
CONCLUSION

We believe that many more children could be achieving at these levels. The Moog Center program is now being replicated at seven other Moog Curriculum Schools in the United States, located in Albuquerque, NM; Buffalo, NY; Chicago, IL; Cincinnati, OH; Columbia, MO; Minneapolis/St Paul, MN; and Phoenix, AZ. The Moog Center program is also being implemented in a school in Buenos Aires, Argentina.

The current challenge for educating deaf children is that there is a critical shortage of professionals to provide the level of instruction and support needed for children with hearing loss to achieve their potential in learning spoken language. We hope that this article will inspire teachers, speech-language pathologists, and audiologists to consider a career working with these children and helping them acquire the truly life-changing skill of using spoken language to communicate.

REFERENCES


Contact author: Jean Sachar Moog, 12300 South Forty Drive, St. Louis, MO 63141. E-mail: jmoog@moogcenter.org.