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MOUTH TIME AT RIVER SCHOOL

Phonological Awareness for Preschoolers with Cochlear Implants

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Fluent reading is a dynamic process. The reader seeks information from printed material, as the print reveals the message one letter or punctuation mark at a time. Probst has noted that, "...the relationship between reader and text is much like that between the river and its banks, each working its effects upon the other"[1]. Sadly, the reading level of the average 18- to 19-year old student with a severe to profound hearing loss is comparable to a typically developing 9 to 10 year old student. The reading progress rate of a child with a severe to profound hearing loss is approximately one-half of one school grade per year, with a plateau at third or fourth grade for most students.[2]

But, there is reason for optimism. The use of cochlear implants in young children, combined with techniques that optimize early reading foundations, are changing outcomes. In this issue, we review reading acquisition progress and discuss some important precursors, notably phonological awareness, that lead to later reading success. We describe our early phonological awareness program used at the River School, and outline the elements of the program.

The Development of Reading

Normal-hearing children benefit from reading with their parents beginning in infancy. Without prompting or formal instruction, parents naturally incorporate strategies such as joint attention, topic maintenance and questioning. Children begin to learn the basic components of reading, including story sequence, character development, prediction, and conclusion. Unfortunately for children born with a hearing loss, those early opportunities for literacy development are negatively affected by poor audition and limited language abilities.[3]

Reading is a complicated, developmental process that requires a firm foundation be in place for new skills to be achieved. Basic vocabulary related to the topic must be established. Phonemic awareness and sound-symbol relationships must be understood. The semantics of oral language must be firmly grasped before written syntax is comprehensible; such as word order, negation, and basic word meaning. Finally, punctuation must be understood to interpret the meaning of a sentence and the separation of ideas within the printed text.

Decoding at the word level is important to begin reading. To make sense of the decoding process, the child must understand three things: that the continuous speech signal may be broken into individual sounds (or phonemes); that those sounds are represented by letters; and that strings of letters recombine to become words. Two points are important here. First, many traditional curricula begin reading instruction with the assumption that children already understand these three things and do not provide explicit teaching of these skills. Second, note that the skills mentioned above are highly auditory in nature. Due to the lack of access to the phonemes of spoken language, deaf students' association of phonemes with alphabet letters is often poor. Children with cochlear implants also may struggle with this sound-letter association because their access to the sound system of spoken English is incomplete. Therefore, a concerted effort to solidify phonemic development is the first step toward reading readiness.

PHONOLOGICAL AWARENESS

Phonology encompasses the aspect of language that governs the structure, distribution, and sequencing of speech sounds.[4] A *phoneme* is the smallest linguistic unit of sound that can signal a difference in meaning. English is comprised of approximately forty-five phonemes. The phonemes /p/ and /t/ are two examples. They are distinct, but hold no meaning when standing alone. When contrasted in a word pair, such as ***P****ack* and ***T****ack*, it is easy to see the weight carried by each phoneme to convey meaning. *Phonological awareness* refers to the reader's sensitivity or explicit awareness of the sounds (phonemes) in words. Separating words into sounds is essential to later reading proficiency. Fluent reading and comprehension depend upon a reader's relatively rapid and effortless identification of words in print.[5] Well-developed phonological awareness skills enable readers to decode new words strategically and successfully.

Experimentation with speech sounds is the beginning of phonological awareness. By six months, typically developing hearing infants babble

strings of consonants and vowels with varying pitch, volume and rate. The infants are reinforced with auditory, tactile and kinesthetic feedback. A stark contrast is seen in infants who are deaf. Around eight months, infants who are deaf significantly decrease babbling and vocal play, participate in fewer periods of babbling over the course of the day, and produce a smaller repertoire of phonemes (especially consonants).[6]

Later in connected speech, children who are deaf or hard-of-hearing present with delayed articulatory development. Articulation targets are chosen based upon each child's production of early developing phonemes, for example, one should initially introduce vowels, then consonants.[7] Lack of access to a clear auditory signal impedes clarity of production, which leads to errors of omission, substitution, distortion, and addition.[8] Once the auditory signal is accessible through hearing aids or a cochlear implant, teaching children to be aware of speech at the sound level is imperative. The first step is awareness of phonemes as individual elements within words, the next is the manipulation of those phonemes to eventually read a word effortlessly and interpret a written message seamlessly. For example, the word "shoe" is comprised of four letters, but we hear only two phonemes "sh" and "oo". Familiarity with phonemes and knowledge of letter combinations allow readers to decode and read the message, then relate the word to an internalized concept of the noun.

For children who are deaf, the auditory pathway is an underdeveloped system when compared to visual, tactile, and kinesthetic systems. Therefore, a practical approach to strengthen the auditory system is through a visual, hands-on, dynamic program. When teaching phonemic awareness, children with hearing loss need an innovative system that supports individualized learning. Attaching speech sounds to developmentally appropriate symbols creates a connection between print and sound. A visual system gives children a concrete image of speech sounds that were previously intangible. The River School Early Phonological Awareness Program is an innovative approach to teaching children about sound-symbol associations and strategies to understand printed information. The program encourages all children in their role as emergent readers.

RIVER SCHOOL EARLY PHONOLOGICAL AWARENESS PROGRAM (RSEPAP)

The River School is an independent, not-for-profit day school, which pairs the best practices of early childhood education with oral deaf education. The goal of the school is to provide successful educational experiences for children and their families, infants through third grade. The population of the school comprises 90% typically developing children and 10% deaf and hard-of-hearing children. Many of the children with hearing loss have cochlear implants. Deaf students who have cochlear implants benefit from the social and language modeling provided by typically developing peers in classes and the full-time collaboration of a speech pathologist and master's level educator in the classroom.

Mouth Time

The RSEPAP begins when the children enter the preschool program at 18 months of age. Developmentally, children at that age are not ready to comprehend English graphemes. The arbitrary symbols that comprise the alphabet are too

abstract for a toddler to interpret as a speech sound. However, when the sound such as "mm" is linked to a mouth shape and familiar language ("Put your lips together"), children are able to comprehend the symbol. River School speech pathologists help children make a connection between sounds they hear, the movements they use to make a sound, and a symbolic system. Unlike graphemes, the symbols represent placement of articulators; therefore, the children are able to decode easily by matching the symbol with the placement of their lips, tongue and teeth. To highlight production, speech pathologists often use mirrors to show each child his reflection during sound production. Symbols are drawn and explained to the children using familiar and consistent language. For example the speech pathologist would say, "When you make the 't' sound, your tongue is up and your voice is off. Feel the air."

Exploration and repetition are used to foster understanding of the premise of the program. While looking at a mirror with a student, the speech pathologist will encourage the child to round his lips, then draw a small circle on the mirror and model a small circle with her lips, saying "oo". In contrast, the speech pathologist will draw a large oval on the mirror and model a large open mouth posture, saying "ah". When students show a basic understanding of the premise of the program, they spontaneously analyze symbols and move their articulators to match the posture.

Mouth Time is an integral part of the River School program. All students participate in a session daily, which is led by the classroom speech pathologist. Because babbling is delayed in deaf and hard-of-hearing infants, oral motor skills are often delayed. Consistent therapeutic exercises are needed for oral stimulation, muscle strengthening, and coordination of articulators to create speech sounds. Typically developing children also benefit from daily exercises to strengthen and coordinate oral motor movements. The River School program capitalizes on the natural curiosity of the children and their inherent inclination to move. Novel items are introduced and the children explore the items to gain maximum sensory input. Then exercises are led by the speech pathologist for children to imitate gross and fine motor movements. Following are creative ideas used to target developmental oral-motor goals:

ORAL SENSORY-MOTOR EXERCISES

- Imitate mouth postures (open, closed; tongue in, out)
- Use toothbrush to stimulate cheeks, lips, tongue
- Explore frozen metal spoons on cheeks and inside mouth
- Rub lotion on cheeks
- Rub lemonade or cherry powder on lips
- Imitate tongue movements (elevate, depress, lateralize)
- Practice controlled airflow by blowing feathers, cotton balls, tissue paper
- Lick lollipops
- Imitate sequence of oral positions ("ooee, ooee")
- Recall 2 or more speech sounds in order ("mm-ah-sh")
- Hold articulatory position for a few seconds
- Sequence back ("k") and front ("t") sounds

The goal of the program is to support early developing skills that are crucial to literacy development. Those goals include auditory perception, competence with spoken language, and the ability to conceptualize and manipulate the segments of the linguistic stream as individual elements.[9] Daily exercises are led to provide intensive practice in developmentally appropriate activities. The skills build upon one another and work toward the end goal of fluent reading.

Research shows the poor literacy achievement in children who are deaf and hard-of-hearing. Due to their poor rate of improvement using traditional reading methodologies, innovative measures are needed. Similarly, a significant

percentage (20%) of typically developing children experience unexpected difficulty learning to read. The River School model supports the literacy development of both populations, the deaf and hard-of-hearing children and their typically developing peers. We believe it is imperative to build a strong foundation of reading fundamentals, beginning at the sound level.

The River School Early Phonological Awareness Program (RSEPAP) is cleverly disguised in Mouth Time. The program incorporates *development of vocabulary and concepts, oral sensory motor development, auditory processing, speech production,* and *phonological awareness*.[10]

• **Auditory processing:** Children with hearing loss inherently have difficulty processing auditory information. When children are newly aided or implanted, they are introduced to the world of sound and need support to make sense of environmental and speech signals. During Mouth Time, the goal is to tune each child in auditorially to the discrete sounds of speech. Children are taught to perceive individual sounds in words, discriminate between sounds, and retrieve sound patterns from memory.

• **Development of vocabulary and concepts:** Children who produce more complex oral language are often more accomplished readers. Therefore, the development of vocabulary and concepts is necessary to build a larger language base (vocabulary) and an understanding of descriptors (concepts). During Mouth Time, exact labels are taught related to articulators (lips, teeth, jaw) and vocabulary targets (first, middle, last). To improve conceptual language, descriptors are used to explain movements and enhance understanding (fast/slow, up/down).

• **Oral sensory-motor development:** Deaf and hard-of-hearing children miss the early benefits of babbling, because their exposure lacks auditory input, leaving the experience incomplete. However, speech production is dependent upon clear oral sensory information and precise oral motor movements. To improve oral sensory-motor development, the speech pathologist introduces highly sensory materials (ice, lemonade powder, marshmallow fluff) to raise awareness of each articulator. To improve oral motor skills, routine exercises are led by the speech pathologist to isolate and coordinate articulatory movements (tongue lateralization, jaw elevation & depression, and coarticulation of sounds "ooee, ooee, ooee").

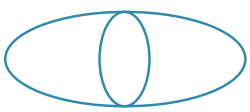
• **Speech production:** Children develop intelligible speech gradually, in a relatively standard progression. Easier to produce phonemes are acquired with apparent ease (/m/, /b/, /d/) and simplified productions are used for harder to produce sounds (/w/ for /r/). By six years old, most typically developing children produce 90% of phonemes consistently within words. To capitalize on the developmental progression of speech sound mastery, River School speech pathologists use early developing phonemes to introduce the fundamentals of the program (/u/, /m/, /t/). The children are also introduced to later developing phonemes, such as "sh" to shape early articulatory postures and incorporate relevant vocabulary ("shoes", "she").

• **Phonological awareness:** The most important part of Mouth Time is phonological awareness. The above listed objectives lead to preparedness for auditory perception of sounds, understanding of vocabulary related to nouns and descriptors, sensing and moving articulators, and producing discrete speech sounds. When children are able to segment sounds within words and manipulate those sounds, they have a true grasp of phonological awareness.

The Symbol System

The simple graphic designs of the symbols used in the River School Early Phonological Awareness Program (RSEPAP) are basic representations of articulatory postures. As stated earlier, a small circle represents "oo", a large oval represents "ah", and a flat line represents "mmm". These symbols are introduced individually, then paired for contrast. Simple, descriptive language is used with each symbol to solidify further the visual, auditory, and kinesthetic association of the production. For example, labeling the square symbol as "box lips" and reminding the children to "push the air out with your teeth together" helps them to produce "sh" and associate the square symbol with the sound. The premise is for the child to label a symbol consistently with its corresponding sound. If that is accomplished, the child shows a basic understanding of the sound-symbol relationship, which is a cornerstone of reading.

As an overview, the following is a list of some of the RSEPAP symbols and the corresponding sounds. Keep in mind that not all English phonemes are represented in the program. The goal is not to encode every phoneme into a symbol, rather the goal is to familiarize children with commonly occurring sounds and offer them a systematic and predictable way to organize the sounds into understandable printed information. Below is an abbreviated list of the RSEPAP symbols, with corresponding sounds and words. Once the children have mastered the symbols in isolation, the symbols can be used in combination.

SYMBOL	SOUND	EXAMPLE
	"oo"	shoe
	"ee"	tea
	"ah"	box
	"mm"	me
	"sh"	she
	"l"	leaf

Early reading skills are taught using sound symbols. Children learn to:

- Repeat individual phonemes
- Repeat strings of phonemes
- Label individual symbols
- Identify symbols as same or not the same
- Match words with associated pictures
- Identify the first, middle, and last sounds in words
- Clap the correct number of syllables within words
- Reproduce a series of sounds from memory
- Segment sounds within words
- Substitute one sound for another to create new words
- Identify and create rhymes
- Distinguish between true and non-sense words
- Blend symbols to "read" true words
- Define words

The Leap to English Letters

Knowledge of and familiarity with the letters of the alphabet are important predictors of reading success. Children who are able to label letters quickly and reliably become aware of the unique sequences and patterns of letters within words. When children are developmentally ready to process English letters, the Mouth Time symbols are used as a bridge. This usually occurs when the children are between four and five years old.

Children familiar with the RSEPAP have a strong foundation of sound-symbol association. A systematic approach is used to teach children to make letter-sound correspondences, blend sounds, practice reading words, and identify word families. To become fluent readers, children must employ strategies effortlessly. Initially examining letters at the sound level, then letters within words builds a strong foundation. Later children will employ strategies to "attack" words with success. Explicit instruction is necessary to draw children's attention to the phonemic rules of the English language. The instruction must also follow a systematic approach, so children gradually learn the basic elements and more complex patterns.

Naturally, writing is another end goal of the RSEPAP. It is essential that phonological awareness and the phonetic rules of English are reinforced in the context of reading and writing activities. Initially invented spelling is encouraged for children to actively engage in the process of reflecting upon sounds in words. Their written responses lend insight into their phonetic development. As the child's knowledge of letter-sound association improves, rules are introduced and reinforced, such as long vs. short vowels; spelling of consonant blends; and the spelling and meanings of prefixes, suffixes, and root words. The primary goal of written instruction is "to instill the general logic and regularities of the English rule-based system and its conventions".[10]

To assess the progress of each student participating in the RSEPAP, we administer the **Phonological Awareness Literacy Screening (PALS)**.[11] The screening assessment measures the knowledge base of each child related to emergent literacy fundamentals. Tasks include rhyme awareness, beginning sound awareness, alphabet knowledge, letter sound knowledge, concepts of print and name writing. Two versions of the screening tool are available, one for children enrolled in pre-kindergarten and kindergarten and a second for first through third grade students. Annual assessments will measure the success of each student related to individualized goals and track each child's progress toward independent reading abilities. The **PALS** is normed for children beginning at four years. Although the students at the River School begin the phonemic awareness training at 18 months, formal testing is not available for the young age group. Informal assessments are used to track the rate of progress of each child and progress reports are written quarterly.

Conclusion

The River School is committed to the education of young children in a supportive and enriching environment. We strive to provide a comprehensive reading program to our students, both typically developing and deaf. Research historically identifies deaf and hard-of-hearing children as well below the expected norms for literacy skills. By offering an innovative reading program, beginning at 18-months, we hope to dramatically improve the reading success of our students. To become competent readers and writers, the fundamental skills of phonemic awareness are taught as a precursor to reading. Letter-sound pairs, true words, and eventually sentences are analyzed to teach children to *discover* the meaning in print. The organized, systematic approach to reading employed by the River School opens the door to knowledge and allows access to all students.

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