

Teaching Phonological Awareness With Deaf and Hard-of-Hearing Students

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Developing phonological awareness skills with students who are DHH is a possibility. Unequivocally recognized as a critical dimension for reading success with hearing students, phonological awareness skills are now receiving more attention for students who are DHH. Researchers in deafness and the education of students who are DHH are exploring issues related to accessibility, coding, and storage of phonological information (e.g., Dyer, MacSweeney, Szczerbinski, Green, & Campbell, 2003; Harris & Moreno, 2004; LaSasso, Crain, & Leybaert, 2003; Musselman, 2000). Currently, however, there is limited research on actually *developing* phonological awareness skills with students who are DHH and documenting how to apply those skills in reading and spelling (Trezek & Malmgren, 2005).

With this empirical evidence, and promise from anecdotal and related research, this article provides strategies teachers and related services professionals can use in the classroom to help develop phonological awareness skills with their students who are DHH.

Phonological awareness is the overarching term for skills such as rhyming, alliteration, onset and rime, and syllabication. Most children who can hear have a sensitivity to speech sounds that is acquired naturally. Phonological awareness encompasses specific *phonemic* awareness skills such as sound identification, sound blending, segmenting, and sound manipulation. Skills and activities within these domains have been described and illustrated in other publications (see Gerber & Klein, 2004; Smith, 1998).

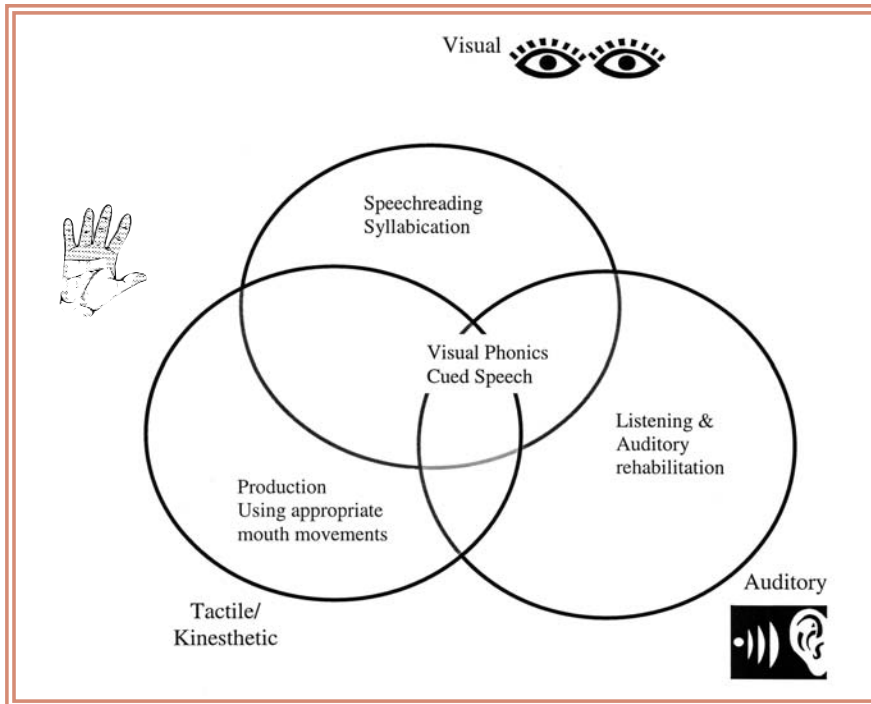
Mikela is a deaf itinerant teacher of students who are deaf and hard of hearing (DHH) within a large urban school district. She has nine students on her caseload, all of whom have moderate to profound hearing losses. The students on Mikela's caseload are included in general education classrooms with interpreters who use American Sign Language (ASL). Seven of her students are kindergarten through fourth grade; two are in sixth grade. Mikela has struggled for many years with the low reading achievement of her students and how to help them access the general education curriculum in reading and language arts.

Mikela felt that she balanced her reading instruction by focusing on meaningful reading and writing activities, filling her classroom with authentic literature, and providing specific vocabulary instruction and word identification strategies for students. She also knew phonological awareness, a sensitivity to speech sounds in spoken language, was important for hearing students, but she could not understand how these skills applied to her deaf/

hard-of-hearing students. Explicit skills instruction and the contribution of phonics seemed at odds with her reading instruction. However, she continued to tackle problems with improving the consistently low reading and spelling levels of her students. She provided a good language model through ASL and tried to provide her students with rich language input.

Due to changes in state standards and the No Child Left Behind Act, Mikela and her students were facing an increasing emphasis in instruction on spoken language skills, specifically phonological awareness and phonemic awareness. Phonemic awareness is a set of specific skills involving sound identification, sound blending, segmenting, and sound manipulation. These skills seemed virtually inaccessible to her students due to their hearing losses. At the same time, Mikela recognized that these skills might be part of unlocking the print code for DHH students. She set off to explore different avenues of instruction of these skills with her students to see how they worked.

Figure 1. Cues You Can Use



When hearing students struggle with the natural process of acquiring phonological awareness skills, they receive varying degrees of more structured teaching to help build the skills. Numerous studies have found that intensifying teaching strategies with hearing students who have difficulty with phonological awareness skills yields positive results for later reading achievement (see National Reading Panel [NRP] Report, National Institute of Child Health and Human Development, 2000). Similarly, students who are DHH can be taught to develop phonological awareness through explicit, systematic, and structured strategies (Trezek & Malmgren, 2005). To date, these strategies have not been widely researched, perhaps because researchers and teachers have thought them neither plausible nor possible.

Building Internal Phonological Representations

As young hearing children develop phonological awareness, they are able to internalize the sound-based properties of words that allow sound-letter associations to be made. They are building internal phonological representations by realizing that sounds in words can be manipulated to create new

words; they internalize rules and patterns associated with these sound-based properties, and subsequently can effectively decode novel words. Hearing students also have the ability to associate the words they are decoding with words stored in their already expansive word banks. They can do this because the language they are using to communicate is the same language they are reading. Comprehension and true reading occurs when students easily decode words and apply word meanings to the context of what they are reading.

Internal representations of phonemes are mental images of the sounds within words that hearing or DHH students can develop. When students who are DHH develop phonological awareness skills, they are presumed to process, store, and later recall sound-based information using a mental image, or an internal representation (see Leybaert & Alegria, 2003 for further discussion on mental representations). The internal representations do not need to be externalized for them to be meaningful (Hanson, 1989). In other words, it seems that students who are DHH do not need to use spoken language to understand and use phonological awareness.

The process of building internal phonological representations may be more “transparent” for students who are hard of hearing (HH) than for students who are deaf. Students who are HH likely have some access to sounds in spoken language through use of their residual hearing. Consequently, they may be able to hear and understand speech sounds. This auditory accessibility allows more immediate internalization of the phonological properties of words. Because many students who are HH also use spoken language to communicate, the way they are coding and storing the information matches their internal lexicons. It must be emphasized, however, that not all students who are HH have complete access to the sounds in spoken language through audition alone. They will frequently need to supplement the development of their phonological representations through visual, tactile, and kinesthetic cues. Cues that can be used with these students are illustrated in Figure 1 and are described later in this article.

The application for students who are deaf is more complex. Students who are trained through oral/aural methods have learned to maximize their residual hearing thereby enabling, or optimizing, auditory access. Students who rely upon sign-based communication, either through simultaneous communication or ASL, frequently have limited or no auditory access to sounds in spoken language. Similar to some of their peers who are HH, they will need to establish the development of their phonological representations through visual, tactile, and kinesthetic cues (see Figure 1).

Information about the phonological (sound-based) properties of words must be complete for accurate internal representations to be formed. Researchers have discussed the perils of inadequately developed internal representations that result in the weak development of phonological awareness skills (Leybaert & Alegria, 2003). Therefore, strategies that provide complete information about phonological aspects of spoken language seem to be advisable in instruction. Similar to instruction with hearing students who require skill development in phonological awareness

(NRP, 2000), deaf students should be taught using explicit, systematic, and meaningful instruction.

One of the challenges for students who are DHH is the connection between the internal phonological representations that create words and meaning. For students who use sign-based systems for communication, the ability to decode words and connect those words to their internal lexicons could be problematic. There may not be an immediate connection between the blended sounds, /k/ /a/ /t/, and the small furry house pet. *The link between the phonological information contained within the word and the meaning must be explicit during instruction.* The semantic and phonological analysis of vocabulary must occur simultaneously (Stanovich, 1994).

Why Bother?

The National Reading Panel (2000) explicitly defines phonological awareness as a critical building block for successful reading achievement. Teachers should include the development of phonological awareness skills as part of their reading curriculum because of the strong research support for its implementation with hearing students. Studies with deaf students indicate a positive correlation between phonological awareness and reading (Dyer et al., 2003; LaSasso et al., 2003). Luetke-Stahlman and Nielsen (2003) state “whether they are deaf or hearing, monolingual or bilingual, normally developing or experiencing cognitive or learning disabilities, beginning readers must learn how sounds of the spoken language are represented by letters or letter sequences within words” (p. 469). People who are DHH *can* have access to phonological information (Hanson, Goodell, & Perfetti, 1991) and *can* develop phonemic awareness (Leybaert & Alegria, 2003).

A manual or visual coding process may seem more natural for people who use sign-based communication systems. Research and discussions on this topic, however, argue that these strategies may not be as efficient as phonological coding processes for individuals who are DHH (Hanson et al., 1991; Mussel-

man, 2000). Information stored phonologically seems to be retained longer and recalled more effectively than information that is processed through other coding strategies such as orthography or fingerspelling (see reviews by Musselman; Paul, 2003). This point, however, continues to be debated (Ronnberg, 2003).

How Is Phonological Awareness Taught to Students Who Are DHH?

Figure 1 provides an overview of strategies that can be taught within several sensory domains. Strategies that are auditory, visual, and tactile/kinesthetic seem to be effective methods for developing phonological awareness skills with students who are DHH. Different strategies would need to be emphasized depending on the strengths of individual students. Some students will access information through their residual hearing, whereas others will benefit from visual or tactile/kinesthetic strategies. Many of the strategies are multi-modal.

Auditory Cues

When appropriate, use of a student’s residual hearing can be utilized to gain phonological information about spoken language. Use of residual hearing can be maximized by encouraging students to wear their amplification systems in the classroom. Parents can help by making sure teachers are supported by having new batteries available for students’ personal hearing aids. Educational audiologists can provide their expertise by assuring students have maximum benefit from their hearing aids or FM systems. Teachers should know how to troubleshoot and care for assistive listening devices and monitor and encourage their use daily.

Teaching Tip: An auditory cue you can use is acoustic highlighting. With *acoustic highlighting*, you emphasize your target sound(s) by

- Making that sound louder within a word (i.e., *home*).
- If it’s a voiceless consonant, whisper the whole word (i.e., *cake*).
- Or place increased stress on a syllable (i.e., *homework*).

Visual Cues

Two ways to completely represent spoken language visually include Visual Phonics and Cued Speech. Both are visual, auditory, and tactile/kinesthetic systems that represent the phonemes of spoken English, yet are distinct in their implementation. Table 1 shows the similarities and differences between Visual Phonics and Cued Speech at a glance. Both of these methods require specialized training for those who would like to incorporate them into their instruction.

Visual Phonics. See-the-sound/Visual Phonics was developed in 1982 by the International Communication Learning Institute (Waddy-Smith & Wilson, 2003). It consists of 45 hand and grapheme cues. The hand cues provide visual and kinesthetic information that can be associated with the way a sound is produced verbally. For example, the /p/ sound is represented with a hand cue that simulates the “plosiveness” of /p/—the air being released from the lips. The grapheme cues are unique symbols that when paired with letters provide students with a visual correlate for the sound a letter might “make” in a particular word.

Students who are DHH learn Visual Phonics in meaningful contexts such as reading and spelling. They learn to associate the Visual Phonics hand and grapheme cues with phonemes. The student then has the means to internally represent and store the phonemic information related to a word. Because the information is taught in context, the representations are built using meaningful referents. Some teachers who use Visual Phonics as an integral part of their instruction have reported anecdotally that students who are DHH learn to “decode” or sound-out novel words and apply meaning to them over time. The exact nature of this process has not yet been explained scientifically. In their experience, students also seem to retain spelling words more effectively. An example lesson using Visual Phonics is presented in Table 2.

Cued Speech. Cued Speech was developed by Orin Cornett in 1964 as a

Table 1. Similarities and Differences Between Visual Phonics and Cued Speech

<i>Visual Phonics</i>	<i>Similarities</i>	<i>Cued Speech</i>
<ul style="list-style-type: none"> • Developed in 1982 to provide visual cues for phonemes for students who are DHH. • Is not used, nor advocated, as a communication system. • Uses 46 unique tactile/kinesthetic hand cues that were designed to reference the “way a sound is produced in the mouth.” • The minimal unit of a cue is the phoneme. • Uses unique graphic symbols that correspond with phonemes. • Lack of empirical research base that supports its use for reading development with students who are DHH. • Used with students who have other difficulties learning to read (i.e., learning disabilities) and who are not DHH. <p>Implementation</p> <ul style="list-style-type: none"> • Used frequently by speech-language pathologists to facilitate speech development. • Is being used by some teachers in classrooms to make the phonological and phonemic elements in reading acquisition more accessible for their DHH students. • Is used as an “overlay” to existing reading curricula. 	<ul style="list-style-type: none"> • Complete visual representation of all phonemes in English 	<ul style="list-style-type: none"> • Developed in 1964 as a communication system. • Originally used to facilitate acquisition of spoken English (oral language) with students who are DHH. • Uses 8 hand shapes to cue consonants and 4 placements to cue vowels, along with lip movement cues. • The minimal unit of a “cue” is the syllable. • Strong research that demonstrates students who are DHH and have been in Cued Speech programs tend to have better reading and spelling skills than their non-cuing peers. <p>Implementation</p> <ul style="list-style-type: none"> • Is used in oral programs serving students who are DHH as a communication system. • The speaker cues to students providing complete access to phonemes in spoken language. • Students learn spoken language receptively and expressively. • The connection to reading is similar for hearing students because students who are DHH have developed oral language skills through a mode that allows access to complete information.

method to facilitate spoken language communication with students who were DHH (Cornett & Daisey, 2001). Cued Speech consists of 8 hand shapes and 4 locations around the mouth that, when paired with spoken language, represent 45 phonemes of spoken English. Cues used in Cued Speech are provided at the level of the syllable and the phonemic information contained in spoken language is conveyed during typical discourse, much like running speech. Because Cued Speech is used as a communication system, students are exposed to the cues regularly throughout their school day and often at home. Students learn about the phonological information inherent in spoken English as they learn spoken language. They internalize the phonological information (and externalize it through speaking) and use it while reading. There is strong research that indicates students who are educated using Cued Speech read and spell on levels similar to their hearing peers (Leybaert & Alegria, 2003).

Despite this evidence, many educators in the field of deaf education find limited application of Cued Speech for students who are not developing spoken language skills. On the other hand, some educators do support the use of Cued Speech for students who use sign-based communication.

There are other ways to provide visual information to build internal phonological representations. While they lack the complete access provided by Visual Phonics and Cued Speech, when combined and used strategically, they can be helpful in building the internal representations necessary for students who are DHH. These include speechreading and syllabication.

Speechreading. Speechreading cues are available to all students who are DHH. Teachers provide speechreading cues strategically during reading and spelling lessons, and frequently during typical discourse using either sign-based communication or spoken language. Students can be taught (and many do this “automatically”) to use speechreading cues to make inferences about the phonemic information in words. Using this information, they build their inter-

Table 2. Visual Phonics Lesson

Content	Instructional Objective	Instructional Procedure	Materials/ Equipment	Assessment/ Evaluation
California Language Arts Standard 1.5: Distinguish long-and short-vowel sounds in orally stated single-syllable words (e.g., <i>bit/bite</i>).	<ol style="list-style-type: none"> 1. Identify grapho-phonemic differences between long "a" words and short "a" words to establish a rule. (review). 2. Recognize differences between long "a" and short "a" words phonemically (<i>using Visual Phonics</i>) and make connections between words such as <i>mad</i> becomes <i>made</i>. 	<p>Word Sort: Long "a"/ Short "a" Teacher provides models as needed.</p> <ol style="list-style-type: none"> 1. Student sees the word in context (in print), and determines if it's long or short. 2. Student sees <i>and</i> says/produces (<i>using Visual Phonics</i>) the word, determines if it's long or short. 3. Student provides signs for each word after determining if it's long or short and then uses the word in context. <p><i>Challenge:</i> Teacher gives only <i>Visual Phonics</i> cues and student determines if it's long or short and identifies the word with meaning.</p>	Books to provide context.	<p>"Pahh" (break-through) moment for the student today. During the word sort activity, which was only recently introduced yesterday focusing on grapho-phonemic recognition of long "a" and short "a," he was able to classify almost all words correctly through <i>Visual Phonics</i> cues alone AND provide me with the appropriate sign.</p> <p>(Note that these words were different than the words used in previous activity).</p> <p>I began the activity moving quickly through the review same as yesterday. This tells me he is decoding using the phonological cues.</p>

nal representations to develop phonological awareness.

Teaching Tip: You can work on phoneme identification and speechreading when providing information about how a word is spelled using the *sandwich technique*. Begin by signing and saying (or mouthing) the whole word. Next, instead of fingerspelling or writing the whole word for a student, fingerspell or write most of the word, omitting the target phoneme. Say (or mouth) that phoneme (not the letter name). Then sign and say (or mouth) the word again.

Syllabication. Phonologically, the internal structure of a word has rhythm, often associated with syllabication. Syllabication is a well-documented phonological awareness skill and is a precursor to more sophisticated phono-

mic awareness skills such as phoneme segmentation and blending. Syllabication can be an effective cue at any time in reading and spelling instruction. There are three underlying features of syllabication that make it a particularly powerful cue for students who are DHH:

- Rhythmic information is low-frequency information. The beat of a drum, the rhythm of a song, and syllabic information in words is carried through low frequencies. It is common for students who are DHH to have more residual hearing in the low frequencies. Subsequently, this information is frequently available to these students.
- Syllables are highly visible on the mouth. Each syllable in spoken

English contains a vowel. Vowels by nature are unrestricted phonemes. They require the mouth to open and the jaw to drop during coarticulated speech. Therefore, speechreaders can more easily determine the number of syllables in a word, regardless of audition.

- Syllables can be easily conveyed through fingerspelling by chunking a word. This strategy fosters working memory recall by encouraging students to memorize (and hopefully learn) words in chunks, rather than discrete and unrelated letters—a decidedly more difficult task. Syllabic information inherent in words is stored as part of the phonological information students use as they are building internal phonological representations. It provides

another tool for students to use to “crack the code” embedded within written English.

Teaching Tip: Start fingerspelling multisyllable words to your students in chunks. If your students are used to copying spelling words letter-by-letter, you may need to instruct them to watch for several letters, hold those letters in memory, and then write them down (i.e., *te-le-vi-sion*, or *ham-bur-ger*).

Tactile/Kinesthetic Cues

Two highly kinesthetic cues that teachers can use with students who are DHH are production cues and mouth movement cues. Students learn about phonemes by producing them. Although previously emphasized, production is not necessary for students to build internal representations of phonemes, however it can facilitate the process. When appropriate, and in isolated opportunities, students can be encouraged to produce, or approximate, phoneme production. Students who do not use their voice or any spoken language for communication can be encouraged to use appropriate mouth/lip movements for phonemes and words.

This strategy is not incompatible with signed-based communication, or more specifically, ASL. It is often feasible for ASL users to use mouth movements that correspond with word production while signing (Valli & Lucas, 1995). The kinesthetic nature of this strategy facilitates word identification and spelling (LaSasso, 1996).

Teaching Tip: Use naturally occurring, quick, and “teachable” moments to work on mouth movement or production. If a student spontaneously moves his mouth, or tries to produce a word, give feedback about his or her production through a model. Repeat the word and ask him or her to watch your mouth while you sign and say the word.

Final Thoughts

Building strategies to decipher English print will enhance students’ reading and spelling skills. All teachers must have a variety of tools they can use to actively teach their students. The tools should be used easily and effectively within language arts curricula and phonologi-

cal awareness must be taught within meaningful contexts, particularly with students who are DHH. Phonological awareness skills are critical to the reading process and these skills should be taught as part of a well balanced reading curriculum.

Regardless of the mode of communication or the language of instruction, students who are DHH must be taught these strategies to build internal representations to be subsequently used during reading and spelling. As internal representations are created, the “link” to meaning will come from the language that students hear/see/feel daily. Although previously perceived as counterintuitive, developing phonological awareness skills with students who are DHH is both plausible and possible.

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