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Challenges of Children Who Are d/Deaf and Hard of Hearing While Learning to Read

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Abstract: Deaf and hard of hearing students (d/Dhh) encounter many challenges while learning to read. Unfortunately, students who struggle with literacy are at high risk for school failure overall and also may encounter lifelong problems finding employment. The purpose of this article was to review the greatest impediments d/Dhh children face in learning to read with respect to the five major components of the English language: phonology, morphology, syntax, semantics, and pragmatics and code-related skills, including print concepts, alphabet knowledge, emergent writing, and phonological-awareness skills. The results showed that d/Dhh children are able to learn just as their hearing peers do, but at a slower speed. Further, they achieve smaller incremental results in the learning process and, therefore, require additional services to help them learn to read.

Keywords: d/Dhh Students, English Language Proficiency, Code-related Skills, English Reading

Learning to read is not always an easy task…it is not an ability that is naturally acquired, like learning to speak or sign" (McCardle et al. 2001, 183). However, although it may not be simple, learning to read is a fundamental skill that affects students’ ability to prosper academically, socially, and economically. If students fall behind in reading from the outset, their lack of skills will continue to influence their performance as they advance from one grade to the next (Howell and Luckner 2003). Unfortunately, students who struggle with literacy are at high risk for failing school overall and also may encounter lifelong problems with employment. These academic challenges may reduce a child’s self-esteem (Luckner and Handley 2008), which can compromise his/her self-assurance and self-confidence and decrease the desire to work harder to learn to read and write on grade level.

A large body of research has documented that deaf and hard of hearing students’ (d/Dhh) reading achievement is poor. For example, many studies have reported that the average d/Dhh student graduates from high school with reading skills at or around the fourth-grade level. In more extreme circumstances, some d/Dhh students leave school with reading skills at or less than the second-grade level (Luckner and Handley 2008; Paul, Wang, and Williams 2013; Trezek, Wang, and Paul 2011), and their annual development rate is roughly 0.3 grade levels each year compared to approximately 1.0 grade level for students who learn literacy typically (Trezek et al. 2011).

There are many reasons that some d/Dhh students perform poorly, including a lack of relevant knowledge or experience, restricted vocabulary development, and limited skills in deriving meaning from English texts (Howell and Luckner 2003). Luckner et al. (2005/2006, 444) listed five factors that hinder d/Dhh students’ development of reading skills. These include: “a) lack of access to the phonological code, b) limited fluency with the language prior to attending school, c) lack of early literacy experiences prior to entering school, d) a delay in the acquisition of vocabulary, and e) difficulties with lower level reading skills.”

The goal of this study was to highlight the most significant challenges that d/Dhh children encounter when learning the five major components of the English language—phonology, morphology, syntax, semantics, and pragmatics—and code-related skills, without which it is impossible to read. Therefore, a thorough review will help researchers understand the most challenging aspects of learning English that make it difficult to develop reading skills and take steps to build effective instruction.

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Phonology

The phonological system is a vital instrument in the development of English literacy. For example, learning English literacy skills requires an understanding of the fundamental alphabetic principle that depends on familiarity with phonology (Trezek et al. 2013). In addition, many studies have attempted to determine which factors are related to the acquisition of reading skills, and phonology appears to be quite important. According to Stahl and Murray (1994), many studies have asserted that there is a strong correlation between phonemic awareness and success in reading. With this in mind, the following section focuses on phonology and its role in developing reading skills.

Phonology is a spoken language’s sound system (Wang et al. 2008) and is an important component that constitutes a language (McGuinness 2005). Specifically, it is one of the first and most essential components of language, in which learners must begin to follow the rules of spoken language with respect to speech sounds’ structure, distribution, and sequence, as well as develop an understanding of syllable shapes to organize sounds into spoken language (Paul 2009).

The National Reading Panel (NRP) (2000) has indicated that phonics is a crucial support to children who are learning to read. Phonics instruction refers to training children to perceive the connection between sounds and letters, which, in turn, helps them learn how to spell. Therefore, a teacher instructs children in the way to connect letters (and later combinations of letters) with individual sounds. Further, phonics instruction improves the decoding skills that children require to develop phonological and phonemic awareness (Paul 2009). With respect to phonics’ importance for these purposes, Adams (1990) indicated that letter knowledge and phonological awareness are the strongest predictors of children’s reading success.

Phonological awareness is defined as the recognition and understanding of a language’s sound system. By concentrating on vocabulary’s internal structures, children are able to access the sound visually or aurally to recognize sounds’ chunks and patterns, such as syllables and rhymes. One demonstration of phonological awareness can be observed in the way children use vocabulary words by repeating them and by the rhymes that children either make up or remember based on the words that they acquire (Paul 2009). In contrast to phonological awareness, phonemic awareness refers to the understanding that words are comprised of phonemes (e.g., cat consists of /c/ /a/ /t/). Many scholars believe strongly that this awareness is the most critical factor that precedes conventional spelling and reading development. Further, it is related to a general understanding of the alphabetic system upon which English writing is based (Paul 2009; Trezek et al. 2010).

Accordingly, children who lack phonological and phonemic awareness encounter difficulties in learning to read. Vellution and Scanlon (1987) stated that 75 percent of children who had poor phonological and phonemic awareness at the kindergarten level had more difficulty reading in the first grade compared to children who did not lack such awareness in kindergarten. Therefore, phonological and phonemic awareness are essential for children in the process of learning to read because these skills help them “to map letter sounds onto speech sounds” (Stahl and Murray 1994, 222); thus, children who cannot recognize a word’s sound or associate a segment of a word to its corresponding phonemes are likely to face difficulties learning to read. Therefore, phonological and phonemic awareness are strong indicators of children’s success in the acquisition of literacy skills as well as orthographical abilities.

d/Dhh Children’s Challenges in Phonology

It is known widely that d/Dhh children have poor reading skills, and many approaches have been implemented to help them overcome these challenges and achieve this goal; however, poor reading skills are still an issue for this particular student demographic. One of the reasons for these poor reading skills is attributed to their limited access to English phonology, which
consequently delays language development (Kyle and Harris 2006). However, d/Dhh children are still able to access phonology through different methods, such as Visual Phonics or Cued Speech/Language, because phonological units can be understood as cognitive units (Trezek et al. 2010). Therefore, the ability to access sounds and vocalize them is not deemed crucial, and the fundamental goal of acquiring phonological knowledge is simply to recognize the sounds, whether through visual or auditory means, and to understand that they are the building blocks of language (Wang et al. 2008).

**Morphology**

Morphology is the study of morphemes (Paul 2009). A morpheme is defined as the smallest unit of speech that conveys meaning. It can be a whole word (e.g., *rigorous*), a prefix or suffix (e.g., *de-, -ing*), or even a pluralization (*/s/ /es/*: McGuinness 2005). For example, the word *dogs* consist of two morphemes: */dog/ and */s/; however, phonemically, it consists of four phonemes: */d/o/g/s/. Thus, morphology is associated with phonology with respect to words’ underlying structure. Stated differently, phonemes are the building blocks that lead to the production of morphemes when learning a language, and their understanding is also important to develop spelling skills (Paul 2009).

Children use their morphological and syntactical awareness to infer new words’ meanings (Paul and Wang 2012). Morphological awareness can be defined as the conscious awareness of vocabulary’s morphemic structure and the learner’s ability to reflect on, and manipulate, that structure. It also includes knowledge of both inflectional morphemes (those that do not change the word’s meaning, such as *slow-slowly*) and derivational morphemes (in which the meaning might change, such as *clear-unclear*: Paul 2009; Paul and Wang 2012).

Morphological awareness improves during a child’s time in school (Nagy, Berninger, and Abbott 2006). For example, it has been shown that, at the ages of two and three, children can create compound words to indicate meaning, such as *Sarah’s cat, I am singing,* and *birds fly* (Paul and Wang 2012). Moreover, preschool-age children are able to recognize both inflectional and derivational morphemes (Carlisle 2003). In the third grade, knowledge of morphological derivation grows quickly, extending to more complex forms of words, such as *happiness* and *unhappy* from the root word *happy* (Anglin 1993). Nagy, Diakidoy, and Anderson (1993) also pointed out that morphological complexity tends to increase during high school. Consequently, morphological awareness can predict reading comprehension skills.

Many correlational studies have found associations between morphological awareness and significant improvements in reading. For example, Carlisle and Nomanbhoy (1993) obtained a correlation of 0.46 (*p < 0.001*) in a sample of first-grade students; Singson, Mahoney, and Mann (2000) found a correlation of 0.58 (*p < 0.001*) in a sample of third and sixth graders, and Nagy et al. (2006) obtained a correlation of 0.65 (*p < 0.001*) in a sample of sixth and seventh graders. Further, Ku and Anderson (2003) pointed out that morphological awareness is a significant predictor of reading skill, while Bowers, Kirby, and Deacon (2010) reviewed several experimental studies and concluded that morphological instruction develops the ability to read and spell words.

**d/Dhh’s Children’s Challenges in Morphology**

Whether they communicate with American Sign Language (ASL) or another signing system (Signing Exact English, Signed English, or English Signs), d/Dhh children first produce signs and sign combinations to represent the functions of first words and two-word pronunciations similar to the ways in which hearing children first begin to communicate. Thus, d/Dhh children’s development of sign language appears to be identical to hearing children’s development of spoken language. However, there are some approaches that cannot represent the morphological level as well as oral communication can, because certain terms (e.g., *-s, -ed, ‘s*) are difficult to
recognize as they are unstressed in utterance. The case differs in ASL because it does not use English morphemes (Paul and Wang 2012).

Sign systems, including the Rochester Method (RM), have been used to represent the basic structure of English so that d/Dhh children can learn English in the same way as do hearing children who learn English as a spoken language. These sign systems attempt to represent the morphology of written English by using handshapes rather than the phonology of spoken language (Paul 2009).

Syntax

Syntax refers simply to the rules that govern word order and sentence organization (Paul 2009), which facilitates understanding the correlation between words within and between sentences. Syntax is a significant factor that plays a vital role in language comprehension (Paul 2009; Trezek et al. 2010). When children develop their spoken language skills, their understanding of grammar evolves naturally. Therefore, they develop syntactical knowledge of English through daily communication with parents and adults in spoken language (Paul and Wang 2012).

Syntax is one of the domains researched most in literacy and deafness because of the difficulties it poses for d/Dhh learners (Paul 2009; Trezek et al. 2010; Paul and Wang 2012). However, while relatively little attention seems to have been paid to hearing students’ acquisition of syntactical knowledge, except for studies on second language learners, hearing children seem to acquire their first language naturally (Paul and Wang 2012).

**d/Dhh Children’s Challenges in Syntax**

Manually Coded English (MCE) systems (e.g., Rochester Method, Signed English, Seeing Essential English [SEE I], Signing Exact English [SEE II], Conceptually Accurate Sign English [CASE], pidgin sign English, contact signing, etc.) were designed to expose d/Dhh children to English syntactic structures via signing. However, d/Dhh students encounter massive difficulty with hierarchical structure because they are exposed continuously to linear structure. Linear structure involves simply the application of a subject-verb-object (SVO: e.g., *the girl hit the ball*), while hierarchical structure is more complex and cannot be interpreted in a simple SVO form (e.g., *the girl was hit by the ball*) (Paul 2009).

Paul (2009) discussed the research Quigley and his colleagues conducted on English syntactic structures. Deaf children between the ages of ten and nineteen years with profound hearing loss understand. However, they discovered that the majority find it difficult to learn sentences with a hierarchical structure, in particular those with verb inflectional processes and auxiliaries (e.g., *The cat was bitten by a dog*) or with embedded structures, such as relative clauses (e.g., *The boy who kissed the girl ran away*). Therefore, the researchers concluded that deaf children are able to acquire syntactic structures in the same manner as their hearing peers who are native speakers because they make the same errors, go through similar stages, and use the same strategies; however, they simply are delayed quantitatively. Unfortunately, few experimental and interventional studies have investigated d/Dhh learners’ levels of syntactic knowledge (Trezek et al. 2010).

Semantics

Semantics is “the content or sequence of words in phrases that conveys meaning.” In linguistics—the study of how language represents meaning” (McGuinness 2005, 442). Semantic language skills include many practices, such as stating labels, recognizing, understanding, and using descriptive words, comprehending and stating functions, recognizing words by their definition, and defining words. Semantic understanding also includes vocabulary knowledge, such as synonyms, antonyms, words with multiple meanings, and figurative language. Semantic
language skills are critical to develop and understand language expression in a clear and meaningful way (Trezek et al. 2010). Therefore, it is clear that a low vocabulary level can lead to difficulties with syntax and semantics (McGuinness 2005). Moreover, as McGuinness has indicated, longitudinal studies have revealed that if a child encounters severe delays in developing core language functions, such as expressive vocabulary, syntax, and semantics, this puts him/her at high risk for difficulties with more advanced reading skills, such as comprehension. Therefore, semantic knowledge, such as vocabulary knowledge, is significantly dynamic in the process of learning to read as well as in reading comprehension. Without vocabulary knowledge, reading comprehension essentially is impossible. Because vocabulary provides the building blocks for higher-order cognition, it has been noted that it contributes significantly to reading comprehension (Luckner and Cooke 2010).

**d/Dhh Children’s Challenges in Semantics**

It has been documented well that the majority of d/Dhh students experience delays in reading skills. Spencer and Tomblin (2009) indicated that more than 30 percent of d/Dhh students in the United States leave high school illiterate. One of the many obstacles d/Dhh students face in reading and comprehending written content is their delayed acquisition of vocabulary, because most learning, particularly in the first years, takes place through indirect conversations with parents, playing with peers, accidental listening, and watching TV (Luckner and Cooke 2010). Because they cannot participate in auditory learning, d/Dhh students are deprived of these beneficial experiences through which language develops typically. In turn, this limited vocabulary presents difficulties in the learning process. However, some d/Dhh students learn to read at the appropriate grade level. Moreover, some become successful writers (Luckner et al. 2005/2006). Therefore, it is important to understand the way in which some achieve such success, while many others do not.

In general, d/Dhh learners’ English acquisition is increasingly similar to that of children who are typical learners (William 2012). Paul and Lee (2010) stated that d/Dhh children acquire vocabulary knowledge that is qualitatively similar to that of children who are native speakers of English and have normal hearing. Consequently, it can be said that d/Dhh children are able to learn like their hearing peers, but at a slower speed; they also achieve smaller incremental results in the learning process and, therefore, require additional services to help them learn to read.

**Pragmatics**

Pragmatics refers to the daily use of language in social interactions, either in verbal or nonverbal communication (Paul 2009). Pragmatic skills are necessary to use language appropriately and effectively in daily interactions to communicate and transfer meaning in various conversational contexts, such as taking turns in conversation, continuing a topic, adding information, or asking questions (Most, Shina-August, and Meilijson 2010). Pragmatics is distinct from phonology, syntax, or semantics, because pragmatic errors do not necessarily break the rules of the latter (Crystal 2006).

**d/Dhh Children’s Challenges in Pragmatics**

d/Dhh children are slow to develop pragmatic skills. For example, Jeanes, Nienhuys, and Rickards (2000) investigated two groups of twenty students’ pragmatic abilities, one with profound hearing loss and another with normal hearing. They concluded that the students with profound hearing loss had difficulty using: 1) appropriate productive pragmatic behaviors, 2) requesting clarification, and 3) responding to requests for clarification. As they reported, there may be numerous reasons for this lack of ability, but a significant contributing factor is the
reduced number and quality of interactions, in that profoundly deaf children have fewer chances to apply their skills in meaningful settings.

In contrast, Lederberg and Everhart (2000) conducted a longitudinal study of mothers’ communication with their profoundly deaf children between twenty-two and thirty-six months of age and found quite different results. They reported that both groups exhibited similar development with respect to the amount of communication, the child’s replies to the mother’s communication, the joint attention between mother and child, and the initiation of interactions overall. However, the deaf children’s skills were poor with respect to their ability to maintain a conversation topic and use more instructions and fewer questions, thus exhibiting limited pragmatic communication functions.

As a result of these findings, it can be said that d/Dhh children’s lack of pragmatic ability may result from a lack of exposure to the natural communicative interactions that hearing children engage in on a daily basis, which in turn contributes to limited opportunities to acquire the relevant set of pragmatic skills (Most et al. 2010). However, overall, d/Dhh students learn through sign language in the same way that hearing students learn via spoken language.

**Code-related Skills**

Code-related skills play a critical role in learning to read and write in early English literacy. Therefore, both these skills and an understanding of spoken language are prerequisites in a child’s transformation from a pre-reader into a reader. According to Cabell, Justice, Konold, and McGinty (2011, 2), “code-related skills enable young children to ‘break the code’ and acquire early understanding of the alphabetic principle. These include abilities such as print concepts, alphabet knowledge, emergent writing, and phonological awareness skills.” Children have to develop code-related skills as well as an understanding that spoken words consist of phonological components; they also must understand that letters represent these sounds, and comprehend the systematic correspondence between sounds and spellings, and thus be able to identify familiar words that can be recognized easily and automatically (McCordle and Chhabra 2004; McCordle, Scarborough, and Catts 2001).

Chall (1996) has suggested that children develop their reading skills in six phases, beginning with pre-reading skills, decoding skills, and understanding print. In the pre-reading stage, children learn significant skills such as identifying print, letter knowledge, and phonemic awareness. The second phase, the onset of learning to read, takes place between the first and second grades, because children in this phase have evolved decoding skills (e.g., letter/word recognition and letter/sound correspondence). The third phase occurs when children are in the second and third grades; at this point, they can begin to understand what they read by using their decoding skills and identifying sight words, which in turn promotes reading fluency. In the fourth phase, which occurs generally between the fourth and eighth grades, children change their focus from learning to read to reading to learn. In the fifth phase, children are able to comprehend and read text in different ways but may be unable to synthesize these perspectives until the sixth phase. Thus, to attain a high level of skill, children first must develop certain skills shown in the first and second stages, as Chall proposed, beginning with so-called emergent literacy, which is the root of English literacy.

Therefore, phonemic awareness prepares children to become readers (Trezek et al. 2010). According to the NRP (2000), there are eight different types of methods to teach phonemic awareness and contribute to children’s process of learning to read. The first is phonemes in isolation, in which children must identify and isolate particular sounds. For example, when a teacher asks what the first sound is in “fat,” the child must respond with /f/. The second method is discrimination, in which children must recognize that words and phonemes are not identical. For example, children might be asked which words among man, sat, or sip sound alike, and which of them does not belong. The third is blending, in which children are required to create a word that consists of phonemes, such as p/i/n, and state that p/i/n is pin. The fourth method is
segmentation; in this activity, children are asked to break a word into its phonemes, such as *cat*, by responding with */kæt/. The fifth is deletion, in which children are asked to remove the first phoneme in a word such as *chin* and respond with *in*. The sixth is addition, where children must identify a word and add a phoneme. For example, for *ring*, children will be asked to add *b* before the word, so the response will be *bring*. In the seventh method, substitution, children are asked to change either the first or last sound in a certain word, such as changing the last sound in *pig* to *n* to make *pin* or changing the first sound in *fat* to *s* to make *sat*. Finally, the last method is identify, which requires children to identify the common phonemes in different words. For example, students might be asked to identify the same sounds in *pin*, *pig*, and *pretty* (*p*/).

The NRP (2000) has indicated that teaching children phonemic awareness skills can help them learn phonics. Therefore, the essential goal of phonics instruction is to help children learn about, and use, the alphabetic principle to understand the ways in which letters (graphemes) and sounds (phonemes) are related. As a result, children will be able to form letter-sound correspondences and begin spelling, which then allows them to apply this knowledge in reading and writing. These systematic and predictable relations between written letters (graphemes) and spoken sounds (phonemes) that contribute to understanding and knowledge of these correlations allow children to identify known words, decode unknown words, and spell words (through the identification of sound-letter correspondences).

As the NRP has explained, there are numerous approaches to teaching children phonics, the first of which is analytic phonics. In this strategy, children learn to identify letter-sound relations in certain words, as well as how not to pronounce sounds in isolation. The second is synthetic phonics, in which children learn the way to transform letters or letter combinations into phonemes, and then the way to blend the phonemes together to form identifiable words. With the third strategy, phonics through spelling, children learn how to segment words into phonemes and then write the words based on phonemes they heard. The fourth is embedded phonics, in which children are taught letter-sound relations while reading connected texts; because children face different letter-sound relations as they read, the embedded phonics approach is not systematic or explicit. In the fifth, analogy-based phonics, children learn to use portions of word families that they know already to determine words that they do not know that have similar portions. In this case, children use their prior knowledge in conjunction with existing knowledge to learn new words. Finally, the sixth strategy is onset-rhyme phonics, where children learn to determine the sound of the letter before the first vowel (the onset) in a one-syllable word and the sound of the remaining part of the word (the rhyme).

**d/Dhh Children’s Challenges in Code-related Skills**

Therefore, the evidence shows that the primary distinction between good and poor readers lies in good readers’ phonological processing ability. Further, phonological processing and word identification are correlated strongly, and thus the development of phonological processing skills promotes strong word recognition skills (Paul et al. 2013). Nonetheless, d/Dhh readers’ limited access to phonology makes it difficult for them to acquire phonological representations. However, phonological processing does not depend on sound necessarily, and therefore, d/Dhh children can access phonology through sight and motion using alternative means, such as Cued Speech/Language or Visual Phonics to improve their phonological knowledge, which consequently improves their English reading skills (Paul and Wang 2012; Trezek et al. 2010). Finally, according to Paul et al. (2013), a set of studies conducted with d/Dhh students showed that their learning processes bear qualitative similarities and that they simply are delayed quantitatively.
Conclusion

It can be concluded that during the early literacy period, children need to develop metalinguistic awareness of text (pragmatics), sounds (phonemes), letters (graphemes), the relations between letters and sounds (phonics), parts of words (morphology) and word order (syntax), and connected text structures (Paul and Wang, 2012). However, d/Dhh children’s development of early literacy has not been studied widely and rigorously (Paul et al. 2013), although some studies have presented empirical evidence that d/Dhh children’s development of English language and literacy skills is qualitatively similar to that of those who have normal hearing and simply is delayed quantitatively. It has been said that, “High thought is not possible without high language” (Paul 2009, 201). Therefore, d/Dhh children must improve linguistically and cognitively to achieve higher levels of language ability and forms of cognition.

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