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What Is Different About Deaf Education? The Effects of Child and Family Factors on Educational Services

Pamela Luft, PhD[1]

Abstract

Deaf education is characterized by several distinctive aspects, beginning with qualities unique to deaf and hard-of-hearing (DHH) children and their families. Consisting of approximately 1.2% of the special education K-12 population, educational and disability systems often struggle to meet the unique challenges that these children and their families present. The result is that services and practices may be atypical and unlike those found to be successful with other populations. Despite new technological and personnel accommodations, far greater numbers placed in general education classrooms, and access to the general education curriculum, these children remain unable to perform commensurate with their abilities or at levels equivalent to their peers either with or without disabilities. Achievement has improved little over four decades, further attesting to the complexity of successfully mitigating the effects of early childhood hearing loss and that educating DHH children is different.

Keywords

deaf, hard of hearing, achievement, access, language delay

Introduction

Although deaf education represents only 1.2% of the special education population (U.S. Department of Education, 2011), its inception was concurrent with some of the earliest European and U.S. efforts to establish schools for children with disabilities. Since that time, a variety of social, political, and educational efforts to improve the lives of all individuals with disabilities have affected the nature, scope, and locale of its services. A number of these efforts have substantially improved the access to supports and services for deaf and hard-of-hearing (DHH[1]) individuals. However, some have had less positive outcomes in delineating the education and disability services that they have received. To some educators, researchers, and Deaf community members, the placement of deaf education within, and as a subset of, special education seems incongruous as well as undesirable. This article examines several of the distinctive aspects of deaf education including the reasons for ideological and service differences. Despite several decades of programming changes and accommodation improvements, this very unique but small population continues to demonstrate achievement that is not commensurate with their abilities and is not equal to that of their peers with or without disabilities, providing further evidence of ongoing challenges in providing appropriate services.

What Makes DHH Children Different?

The differences in deaf education and disability services begin with those factors that make DHH children unique from every other child population. The most serious consequence of hearing loss for very young children is not their limited access to environmental sounds and signals. Most significant is their lack of consistent neurological access to the stimuli that result in language development. The acquisition and refinement of the syntactic, semantic, and pragmatic language skills occur through listening and hearing for most children. Quite importantly, this linguistic achievement is largely accomplished within the first 3 years of life (U.S. Department of Health and Human Services, 2010). These abilities subsequently result in fluent interpersonal communication and, therefore, access to the immensity of sociocultural and academic learning that serves as the foundations for successful adulthood.

When early access to these stimuli is compromised, the innate linguistic acquisition processes cannot occur: The brain is receptive and acts upon what it receives, but it cannot compile indistinct signals into a complete and functioning linguistic system. Brainstem and forebrain maturation processes demonstrate significant physiological patterns of differentiation at very early ages (Lenneberg, 1967). These processes are universal and peak quite early: By the end of the first year, the infant brain is no longer universally

[1]Kent State University, OH, USA

Corresponding Author:
Pamela Luft, Kent State University, 405 White Hall, 150 Terrace Drive, Kent, OH 44242-0001, USA.
E-mail: pluft@kent.edu

prepared for all languages but instead is primed to acquire the language(s) to which he or she has been exposed (Kuhl & Rivera-Gaxiola, 2008). By 36 months, all typically developing children exhibit the ability to carry on sophisticated conversations. Progressive cerebral lateralization leads to increasing neural stabilization by age 7 as the brain prepares for preoperational thought, concrete reasoning, and the formal operations required of adulthood (Lecours, 1975; Mayberry, Chen, Witcher, & Klein, 2011; Scheetz, 2001). The extent of this patterning is seen in substantially reduced recovery from damage to linguistic functions by age 14.

This neurological timetable allows for rapid language acquisition in very young children but creates barriers for DHH children and those unable to fully access their linguistic environment (Kuhl & Rivera-Gaxiola, 2008; Mayberry, Lock, & Kazmi, 2002; Penicaud et al., 2013). Inadequate stimulation during this most active and receptive period can result in substantial lifelong language impoverishment with concomitant deficiencies in literacy skills and academic achievement (Boudreault & Mayberry, 2006; Karchmer & Mitchell, 2003; Lederberg, 2003; Marschark & Lukomski, 2001; Mayberry, 2007; Mayberry & Lock, 2003; Traxler, 2000). Although some may believe that aggressive and targeted school-based services can remediate these deficits, DHH children with substantial delays at age 7 are unlikely to acquire the language fluency they need to engage in advanced learning and reasoning. In contrast, DHH children with full access to language, whether it is signed or spoken, evidence the same developmental milestones, in the same sequence, and at the same rate, with some variation due to distinctive language structures (Anderson & Reilly, 2002; Mayberry & Squires, 2006).

The importance of early and complete access to the language of one's environment cannot be overstated. Acquisition of a fluent primary language supports the development of perceptual schemata that become the basis for further cognitive development (Paul & Whitelaw, 2011; Zwiebel & Mertens, 1985). In addition, socially mediated learning that results from interaction with adults and peers becomes the foundations upon which much of curricular content is built (Bransford, Brown, & Cocking, 2000). This includes culturally situated acquisition of world schemata, cultural beliefs, and knowledge typically assimilated through social roles, race, class, gender, and ethnic affiliations. The DHH child's imperfect access to the language of his or her environment is the most significant characteristic that affects future development, and subsequent adaptation and achievement. Like many other children in the United States today, 53.4% are ethnic minorities, yet knowledge of their family's culture and values is often limited. In addition, 38.9% have additional disabilities (Gallaudet Research Institute, 2011), which may also complicate their language learning and processing capabilities.

The Effects of DHH Children on Their Families

All families function as the *de facto* language development interventionists for their children. Yet hearing loss frequently requires modifying the family's typical interactions and communication so that they are accessible to their DHH infant. The majority of these children's parents (85%-95%) has normal hearing and is unaware of the substantial barriers to communicating with their child (Gallaudet Research Institute, 2011; Mitchell & Karchmer, 2004). An important and confounding issue is that many of the early language milestones are neurologically determined, and occur regardless of hearing status to include crying and startle responses, cooing, and early babbling (Easterbrooks & Baker, 2002). Parents may, very naturally, misinterpret these behaviors as evidence that their child is developing normally despite failing hearing screening and follow-up audiological tests.

The result is the frequent and substantial delays in language development that have been documented for several decades (Anderson, 2006; Carney & Moeller, 1998; Davis, Elfenbein, Schum, & Bentler, 1986; Friedmann & Szterman, 2005; Gilbertson & Kamhi, 1995; Gregory & Hindley, 1996; Lederberg, 2003; Marschark & Lukomski, 2001; Marschark, Schick, & Spencer, 2006; Mayne, Yoshinaga-Itano, & Sedey, 1998; Moeller, 2000; Moeller, Osberger, & Eccarius, 1986). Early communication patterns become the interactional foundations of early bonding and relationships with parents and family members (Altshuler, 1976). When an infant cannot or does not respond in expected ways, early relationships can be negatively affected.

What Makes Service Delivery Systems Different?

The relationships that service providers establish with families and their DHH children are critical in supporting early communication decisions and their effective implementation in the home. These decisions often must occur before assessments can provide definitive data on the child's preferences and learning strengths. Many parents rely on teachers and intervention staff for learning the skills, services, and supports they need to become competent and confident in dealing with their DHH child's needs (Zaidman-Zait, 2007). These professionals have a critical role in helping parents accommodate their child's need for ongoing access to language.

The Universal Newborn Hearing Screening legislation provides early identification of hearing loss and subsequent services to minimize language delays. A majority of states in the United States have these regulations and provide early intervention services for families (Anderson, 2006). Research indicates that DHH children identified by 6 months tend to have better language development scores especially in conjunction with family-centered, in-home

interventions and full access to either spoken or sign language (Mayne, Yoshinaga-Itano, & Sedey, 1998; Mayne, Yoshinaga-Itano, Sedey, & Carey, 1998; Yoshinaga-Itano, 2000, 2004). A concern is that many children and families do not utilize these services at the recommended timelines (Holte et al., 2012).

Children age out of these early intervention services at 3 years and typically transition into preschool services provided through Part B of the Individuals With Disabilities Education Act (IDEA, 2011). Programs often include in-home services to support families' key roles, as well as full- or part-day school-based services (Abrams & Gallegos, 2011; Aguilar, Breese, Olson, Sinnott, & Westmaas, 2011; Corwin, 2011; Dicker, 2011; Lawrence, 2011). In addition, IDEA (2004) requires states to address the unique language and communication needs of DHH students; however, 68% of states achieved ratings of below 50% in meeting these requirements suggesting that many of these needs remain unmet (Luft & Amiruzzaman, 2014).

New Technologies and Accommodations

The past 20 years have seen remarkable changes in hearing technologies, with one of the most widely recognized being cochlear implants. School data show convincing trends: In 1999-2000, 5.3% of DHH K-12 students used cochlear implants. Within 10 years, this had increased to 15.0%, with 23.6% of these students receiving a second implant (Gallaudet Research Institute, 2001, 2011). Hearing aid technology has also improved personal and group or classroom amplification systems (Paul & Whitelaw, 2011). In 2000, 62.9% of DHH students used a hearing aid for instruction, whereas in 2010, 58.4% used hearing aids for instruction and 45.0% used a group assistive listening device in the classroom (Gallaudet Research Institute, 2001, 2011).

These developments have led to optimism that DHH student achievement would finally reach levels equivalent with those of their typical peers, yet this has not been realized. Early gains of implant users typically are not maintained during later childhood and adolescence (Archbold & Mayer, 2012). Some content areas are improved, but reading achievement remains substantially below that of their normal-hearing peers (Marschark, Rhoten, & Fabich, 2007; A. M. Vermeulen, van Bon, Schreuder, Knoors, & Snik, 2007). Blamey et al. (2001) compared users of hearing aids with implants finding very little difference between the two groups on measures of speech perception, production, and language. Barker et al. (2009) also found that implanted children displayed significantly more language, attention, and behavioral difficulties when compared with normal-hearing peers.

It remains a significant conundrum that DHH students continue to struggle academically despite these new technologies, increasing placement in inclusion classrooms, and use of additional accommodations that include captioning and sign language interpretation. Even with these developments and guarantees of full access to the general education curriculum and classroom, hearing loss continues to have a negative impact on academic achievement. The result is that student eligibility to receive special education services has remained stable. From 1993 to 1999, the proportion of DHH students was 1.3% of the special education population; this dropped slightly to 1.2% where it has remained from 2000 to the present (U.S. Department of Education, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011). Therefore, regardless of state and federally supported services and a host of technological and accommodation developments, DHH students continue to need specialized services and do not achieve at levels commensurate with their abilities.

Long-Term Sequelae of Inadequate Language Access

IDEA services are designed to remediate achievement difficulties, yet they occur too late in a DHH child's development to exploit peak language learning capabilities (Lenneberg, 1967; Mayberry, 1993). In addition, assessment of these children requires diagnosticians to have competencies using a range of communication modalities and languages. The low incidence of hearing loss means that few professionals have such skills. Therefore, DHH children's linguistic deficits often remain poorly documented by conventional instruments using standardized norms, none of which account for inadequate environmental access to language (Hamers, 1998). Most importantly, few professionals are trained to recognize linguistic and academic behaviors that result from incomplete linguistic access in that no other population shares this characteristic.

Another important consequence of delayed language development for DHH children is that they cannot engage fully with their peers who have achieved full linguistic fluency or with general education instructional staff or academic curriculum. They may be unable to fully comprehend or participate in the activities whereby the standard curriculum is acquired, processed, and assessed. They are substantially disadvantaged initially by their inadequate language, which also becomes a nearly insurmountable barrier to further learning. Technological devices and other accommodations provide access to content but do not compensate for the missing foundations needed to comprehend and process this material. The same language that facilitates curriculum learning for most remains largely unavailable to DHH children.

Beyond the primary years, academic content increasingly utilizes abstract symbols and concepts, requiring higher-order thinking to examine relationships between principles and constructs. The cognitive constructs necessary to comprehend, manipulate, and respond to curricular content also depend upon linguistic abilities to describe comparisons, sequences,

and causation. Typically, these are expressed using compound and complex sentence structures in English. In that DHH students achieve 7-year-old levels of sentence comprehension skills at around age 12 (Blamey et al., 2001), this leaves much of even primary-grade content inaccessible until their middle school years or beyond. Secondary content may never be completely acquired, as shown by decades of poor academic achievement (Qi & Mitchell, 2012).

The instructional challenge in deaf education is to identify and develop strategies for activating and engaging the students' intact intellectual abilities while minimizing the impacts of inadequate language, language-mediated cognitive skills, and foundational sociocultural understandings. Although cognitively capable of acquiring complex subject matter, the DHH child's linguistic capabilities become stabilized by adolescence and, essentially, remain deficient. The Common Core provides a hierarchical organization of curriculum content standards, with increasing focus on higher-order relationships and generalizations between and across content areas. Research supports this approach as enhancing learning and retention in that cross-disciplinary instruction deepens and broadens higher-order understandings (Bransford et al., 2000). Yet much of this academic content requires linguistic fluency that is largely not present in DHH students (Lederberg, 2003; Marschark et al., 2006). Superficially, they may acquire simplistic content explanations through memorization; however, they will struggle to manipulate or expand these learnings to accomplish the cognitive operations required throughout secondary and postsecondary education. This typically severely compromises their academic achievement and requires substantially greater effort to attain outcomes similar to those of their peers.

These cognitive and achievement skill deficiencies of DHH individuals have been documented across several decades. Psychologists have variously labeled this population as intellectually inferior or intellectually equal but "concrete" and lacking in abstract thinking abilities, and only recently have these been shown to be largely due to linguistic-based testing issues and bias (Martin & Mounty, 2005; Moores, 1978; Weinstock & Mounty, 2005). Although more recently DHH individuals have also demonstrated weak abstract thinking, there are indications that they can continue to advance and ultimately match their peers (Edwards, Figueras, Mellanby, & Langdon, 2011; Sharpe, 1985; Zwiebel & Mertens, 1985).

Academic Achievement

Long-term patterns of lower achievement are also characteristic of comparisons with typical peers. Results from the Gallaudet Research Institute's norming of the Stanford Achievement Test on DHH students are a representative sample that is weighted across dimensions that include special and segregated programs in local or public programs and full- or part-time integration into general education (Traxler, 2000). Therefore, outcomes reflect trends in placement and inclusion as well as new supports, services, and use of assistive technologies. Results from 1974 to 2003 show mean reading comprehension scores for 18-year-olds as below the fourth grade and dropping slightly from 1996 (≈3.8) to 2003 (≈3.4). Only those DHH students at the 80th percentile scored at the sixth-grade level or higher (Traxler, 2000), meaning that few demonstrate secondary-level reading skills. From the second to eighth grade, only those students performing at the ninth decile achieved near or slightly below the *median* score of their normal-hearing peers (Karchmer & Mitchell, 2003). The near-fourth-grade SAT reading scores also represent a long-standing plateau that was noted in 1966 by Furth. Interestingly, language abilities of DHH students have been found to predict 35% of the variance in their reading proficiency scores (Mayberry, del Giudice, & Lieberman, 2011). This suggests again the importance of achieving full linguistic fluency to improve reading outcomes.

Academic achievement in other curricular areas indicates slightly better outcomes but is still far below typical peers. SAT median scores of mathematics grade-level performance for *problem solving* of 18-year-olds ranged from 5.6 to 7.3 between 1974 and 2003; however, the 1996 and 2003 scores were at their lowest during this time. Median scores for *mathematics procedures* ranged from 3.7 to 5.6 across these same years, although more positively, the 1996 and 2003 were the highest (Qi & Mitchell, 2012). Overall, most DHH students leave high school with academic achievement within or close to elementary grade levels and far below their normal-hearing peers.

Comparisons with other disability populations also show disappointing academic performance (Wagner, Newman, Cameto, & Levine, 2006). DHH students' mean scores for passage comprehension ranked seventh across 12 disability groups that included learning disability, speech/language impairment, mental retardation, emotional disturbance, hearing impairment, visual impairment, orthopedic impairment, other health impairment, autism, traumatic brain injury, multiple disabilities, and deafblindness. These students ranked seventh for social studies and ninth for science. Mathematics calculation was stronger with a rank of third and fifth for applied mathematics problems. In general, they were not among the higher-achieving groups of students with disabilities: Students with visual impairments had two rankings as first and second.

Another analysis of DHH students examined scores for the Woodcock–Johnson III. Although only 2% of the general population scored at more than two standard deviations below the mean, 35% of DHH students scored at −2 *SD* for reading passage comprehension, 27% did so for social studies, and 35% did so for science (Shaver, Newman, Huang,

Yu, & Knokey, 2011). All of the remaining subtests showed more than 20% scoring at greater than −2 *SD*. Score comparisons by level of hearing loss showed that mean scores for students with little or no hearing loss were the lowest among five of six subtests, with one that was equal to students with substantial or profound losses (Shaver et al., 2011). This again is evidence that better hearing does not result in higher academic performance: It is the presence of a hearing loss, rather than its degree, that remains the critical factor.

Not only does poor academic achievement affect adult potential, but it has more immediate impacts on DHH students due to the No Child Left Behind (NCLB, 2001) and state requirements to pass grade-level and graduation tests. Those who cannot pass are ineligible for an academic diploma, thereby limiting potential employment and postsecondary education options. Although the intent of these tests is to increase student performance through high-quality teaching and well-prepared educators, the law does not accommodate the foundational deficiencies of these DHH students that, by school age, are too late to be addressed.

The Context of School Placements

Historically, individuals with intellectual and behavioral disabilities in the United States have more often been targeted with negative societal beliefs and subsequent restriction of opportunities. The schools where they received services more often were custodial in nature and sometimes brutal in their treatment (Osgood, 2008; Winzer, 1993). In contrast, schools for the deaf maintained a stronger educational focus and were more highly regarded. Part of this may be due to an early history characterized by high levels of involvement of deaf faculty and administrators, which continued through the late 19th century (Parasnis, 1998). Attendance at residential schools remained strong throughout the 1970s.

The conditions that led to deinstitutionalization and the promotion of integration and inclusion for individuals with intellectual and behavioral disabilities were not significant issues for DHH students. As a result, deaf education has experienced much less consensus in support of mainstreaming and inclusion placements than has been true of other areas of special education. In addition, the issues of access are much different for these students and quite unlike others with disabilities. Even with supportive technologies and personnel for accommodations, DHH students often struggle with acquiring content: The language of the classroom is often years above their linguistic fluency. The social implications of this situation are that they often report feeling more isolated in general education classrooms than in classrooms with their DHH peers (Gannon, 1981; C. D. Johnson, DesGoerges, & Seaver, 2013; Ramsey, 1997).

Over the past 150 years, deaf education has experienced its own periods of intense interest in integration and inclusion, yet programs have rarely been successful. Bavaria established an integrated school in 1821, which later failed and by 1854 was no longer an educational option (Moores, 1978). In 1871, Prussia educated 40% of its deaf children in public schools, which ended by 1881. France established several integrated schools in Paris beginning in 1848, but this effort was no longer endorsed by the ministry as of 1859. Russia attempted integration after the revolution; however, results were poor and the system was replaced by segregated facilities that focused on specially developed curricula (Moores, 1978). What is perhaps a clear choice between segregated/self-contained and local/integrated school placements for those with intellectual or behavioral disabilities is much less clear for DHH students.

More recent studies have examined the effects of placement on academic achievement, often finding little difference for DHH students. In contrast, other students in special education more often demonstrate higher achievement or experience greater impacts as a result of inclusive placements (Freeman & Alkin, 2000; Peterson & Hittie, 2010). Carlberg and Kavale's (1980) meta-analysis of general classroom placement across disabilities found an effect size of greater than +1.0 for students with cognitive delays and an effect size of greater than −1.0 for students with emotional-behavioral disorders. However, the effect size was very weak for the DHH students and explained less than 5% of the variance in achievement scores (Carlberg, 1979).

Stinson and Kluwin (2003) reviewed placement outcomes of DHH students, finding that between 65% and 80% of the variance in academic achievement was unexplained. For studies finding differences, placement only explained between 1% and 5% of achievement. In contrast, 25% or more of the explained variance was from student characteristics: gender, level of hearing loss, age of onset, presence of other disabilities, prior achievement, speech skills and sign communication, family home language, socioeconomic status (SES), size of family, and ethnicity. Kluwin and Moores (1989) found that some unexplained variance was due to student characteristics and from teaching quality. Stinson and Kluwin's (2003) review concluded that across studies, placement consistently explained only 1% of the total variance in achievement, whereas student characteristics contributed more than 95% to the explained variance or between 20% and 25% of the overall variance in achievement. Thus, for DHH students, and in contrast to other students with disabilities, educational placement contributes much less to achievement than instruction that addresses individual student characteristics.

Recent studies of inclusion. Few studies of inclusion or coenrollment of DHH students have examined impacts on academic achievement. Antia, Jones, Reed, and Kreimeyer

(2009) reported that for 63% to 79% of DHH students in their study, standardized scores were average to above average in math, for 48% to 68% of the students in reading, and for 55% to 76% in language/writing. Vosganoff, Paatsch, and Toe (2011) examined science and mathematics achievement in an inclusive high school finding that 88% of the DHH students performed below the state average. Most research has focused on other factors including student participation, friendships, and social skills (Antia, Jones, Luckner, Kreimeyer, & Reed, 2011; Antia, Sabers, & Stinson, 2007; Martin & Bat-Chava, 2003); attitudes of DHH students and teachers (Byrnes, 2011; de Andrade & Ross, 1999; Hadjikakou, Petridou, & Stylianou, 2008; Hsin-Ling & Paul, 2006; Sari, 2007; J. A. Vermeulen, Denessen, & Knoors, 2012); communication and instructional strategies (Kelman & Branco, 2004; Stein, 2005); teacher perceptions and needs (Eriks-Brophy & Whittingham, 2013); and coenrollment teaching roles (Litchfield & Lartz, 2002).

A number of studies have identified instructional challenges faced by DHH students in general education settings. H. Johnson and Griffith (1986) found that interactions of a typical fourth-grade classroom consisted of rapid conversational shifts and complex language structures embedded within challenging academic tasks that were difficult for these students. Kluwin (1992) described several differences between inclusion and self-contained classrooms, including more oral presentations by effective general education teachers in contrast to more individualization by effective deaf education teachers.

Other research has identified instructional challenges in providing equal access to content. Ramsey (1997) described several common classroom practices that disadvantaged DHH students to include writing on the board while explaining information or asking students to read the text silently while teachers read aloud. Both depend upon simultaneous auditory-plus-visual processing, leaving DHH students to choose which visual stimulus to watch and which to ignore. Another concern was the lack of direct communication and participation with their peers and that many DHH students lacked fluent use of basic communication skills to advantage themselves of potential language learning opportunities.

Inclusion at postsecondary levels has also revealed difficulties. Foster (1998) identified persistent language and communication barriers including teachers who turned away from students, as well as barriers to participating in groups or teacher-led question and answer sessions. Group and laboratory situations were especially difficult, and many students described inclusion experiences as being both academically and socially isolating.

Overall, few studies have shown that DHH students experience higher academic achievement as a result of inclusion or integration. This again contrasts with studies of improved academic achievement for many students with other disabilities. Ongoing barriers to communication result from dual and multimodality instructional delivery. Many DHH students use visual channels for speech reading or to watch American Sign Language (ASL) interpreters, during which time, all other visually presented information is lost. When focusing on visual material, they may lose verbal explanations that accompany the stimulus. When asked to write responses or take notes while watching a visual model, chart, or video presentation, also accompanied by auditory explanations or instructions, DHH students are able to access only part of this content. And while transitioning between visual signals, they lose even more. The traditional class model unfairly increases the cognitive load for these students by requiring them to constantly engage in splitting their visual attention and overloading their working memory (Mather & Clark, 2012).

Segregated schools. At several points in deaf education's history, residential and segregated schools have been valued for providing specialized training and content that is targeted to DHH students' unique learning characteristics (Moores, 1978; Osgood, 2008). Several comparisons of program outcomes have found that residential schools have better results and more desirable practices. Bull and Bullis (1991) reported that DHH students from residential schools had higher rates of positive postschool activities (employment, postsecondary attendance) than those attending public schools. Similarly, Moores (2001) described many small-to-moderate-sized public school programs as not offering appropriate services to meet DHH student needs. Deaf residential schools also provide services and social supports not found in public school settings (Padden, 1998). These include opportunities for student leadership and strong role modeling, with higher numbers of deaf faculty, staff, and school superintendents (Moores, 2001). The preference for ASL in many residential programs allows students with significant hearing loss to have open and continuous access to communication among peers and adults, which is highly valued by the Deaf community (Gannon, 1981). Others have noted that academic needs of DHH students require modification or alteration best implemented by specially trained professionals who have insight into the depth and breadth of linguistic and conceptual differences. Such needs are often masked in students with milder hearing losses because of greater but often superficial abilities with speech (Punch, Hyde, & Creed, 2004; Schroedel, Watson, & Ashmore, 2003).

A placement pattern that has unduly affected comparative outcomes of segregated and residential schools is a tendency to use these as locations of last resort: DHH students who fail out of other placements often end their K-12 education at these schools. Such students often have very poor academic skills and other potentially problematic behavioral and learning challenges (Gannon, 1981; Moores, 2001). These students typically enter segregated schools at

secondary grades leaving little time to improve their achievement before they age out of the system. Criticism of poor student achievement at these schools therefore reflects a much longer history of failure across the students' entire educational trajectory. However, these poor outcomes are having impacts on how segregated and residential schools are evaluated using state report cards.

Overall, the educational experiences and outcomes of DHH students in school environments are very different from that of their typical peers and peers with disabilities. They do not benefit from the inclusion environment or access from the general curriculum in the same ways that other students do. In fact, the general education environment and typical discourse patterns of teachers and other students often create barriers that cannot be ameliorated by assistive technologies or personnel. Such accommodations provide access to content but cannot address linguistic and sociocultural deficits that result from hearing loss. Also important is that the typical classroom utilizes simultaneous visual-plus-auditory learning often with multiple stimuli and co-occurring learning tasks. Although optimal for strengthening retention for normal-hearing children, for DHH children, this often results in a substantial reduction of academic learning and increased cognitive load.

Despite a range of legislative actions and guarantees, these students do not achieve at levels equivalent to their typical peers, nor are they among the top performers when compared with students with other disabilities. Because of innate neurological development patterns, DHH children who enter school without fluency to express and comprehend complex grammatical structures typical of their peers are unlikely ever to catch up. This subsequently limits their access to the general academic curriculum with long-term and often lifelong impacts.

Conclusion

This examination of the characteristics of the DHH children, families, and the K-12 service systems that educate these students describes a number of fundamental differences. Despite preschool legislation and supports, as well as technological, accommodation, and educational placement and program improvements, academic achievement of DHH students remains below levels commensurate with their abilities. The innate neurological timetable for the linguistic centers creates a perfect storm of factors that still remain largely resistant to new developments and practices. Despite a range of supports and services, DHH students typically struggle to acquire a complete and fluent language by the time they arrive at school.

A number of programs and methodologies found to be effective with other populations have not evidenced comparably successful outcomes for DHH children. Performance remains at levels much below their normal-hearing peers and among some of the lowest for those with disabilities. These students require special education services at approximately the same rate that they always have, and initial optimism about accommodations and program improvements have not led to long-term or consistent growth. Rather than focusing on educational placements, research suggests that interventions need to be customized and specialized, and evaluated based on each individual DHH child's characteristics (Stinson & Kluwin, 2003).

What is different about deaf education begins with the children, who are unlike any other population. The nature of their hearing loss, regardless of level, results in barriers that remain substantial as well as resistant to a multitude of attempted remedies. Advancements still are unable to compensate for incomplete foundational skills upon which subsequent academic learning and curricular content is built. Neither do they ensure equal access to multimodality learning environments within typical classroom environments, barriers that also affect their success in adult environments.

DHH children and their families continue to need aggressive and effective early intervention services. Until they can consistently achieve language fluency by age 3, these students are likely to remain deficient in achievement and will struggle to attain adult success commensurate with their abilities and peers. Their teachers will continue to face challenges in engaging their cognitive abilities in ways that reduce the barriers of inadequate linguistic abilities and sociocultural knowledge. For these reasons, deaf education is different, and will remain so until the environments in which DHH children live and learn are able to provide consistent and comprehensive access equivalent to that available to their peers.

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Note

1. This article uses the terminology *DHH children* and comparable references, placing the descriptor prior to the noun. This is the usage preferred by the Deaf community, which considers itself to be a minority group and therefore referred to similarly as are Latino students, African American children, and so on (Lane, Hoffmeister, & Balan, 1996).

References

Abrams, S., & Gallegos, R. (2011). Deaf role models making a critical difference in New Mexico. *Odyssey: New Directions in Deaf Education*, *12*, 24–28.

Aguilar, K., Breese, M., Olson, G., Sinnott, C., & Westmaas, M. (2011). Reaching out to families of deaf and hard of hearing children in Illinois: A collaborative effort. *Odyssey: New Directions in Deaf Education*, *12*, 6–9.

Altshuler, K. A. (1976). Psychiatry and problems of deafness. In B. Bolton (Ed.), *Psychology of deafness for rehabilitation counselors* (pp. 109–124). Baltimore, MD: University Park.

Anderson, D. (2006). Lexical development of deaf children acquiring signed languages. In B. Schick, M. Marschark, & P. E. Spencer (Eds.), *Advances in the sign language development of deaf children* (pp. 135–160). Oxford, UK: G.B. Oxford University Press.

Anderson, D., & Reilly, J. (2002). The MacArthur Communicative Development Inventory: Normative data for American Sign Language. *Journal of Deaf Studies and Deaf Education*, *7*, 83–106.

Antia, S. D., Jones, P. B, Luckner, J., Kreimeyer, K. H., & Reed, S. (2011). Social outcomes of students who are deaf and hard of hearing in general education classrooms. *Exceptional Children*, *77*, 489–504.

Antia, S. D., Jones, P. B., Reed, S., & Kreimeyer, K. H. (2009). Academic status and progress of deaf and hard-of-hearing students in general education classrooms. *Journal of Deaf Studies and Deaf Education*, *14*, 293–311.

Antia, S. D., Sabers, D. L., & Stinson, M. S. (2007). Validity and reliability of the classroom participation questionnaire with deaf and hard of hearing students in public schools. *Journal of Deaf Studies and Deaf Education*, *12*, 158–171.

Archbold, S., & Mayer, C. (2012). Deaf education: The impact of cochlear implantation? *Deafness & Educational International*, *14*, 2–15.

Barker, D. H., Quittner, A. L., Fink, N. E., Eisenberg, L. S., Tobey, E. A., & Niparko, J. K. (2009). Predicting behavior problems in deaf and hearing children: The influences of language, attention, and parent–child communication. *Development and Psychopathology*, *21*, 373–392.

Blamey, P. J., Sarant, J. Z., Paatsch, L. E., Barry, J. G., Bow, C. P., Wales, R. J., . . .Tooherr, R. (2001). Relationships among speech perception, production, language, hearing loss, and age in children with impaired hearing. *Journal of Speech, Language, and hearing Research*, *44*, 244–285.

Boudreault, P., & Mayberry, R. I. (2006). Grammatical processing in American Sign Language: Age of first-language acquisition effects in relation to syntactic structure. *Language and Cognitive Processes*, *21*, 608–635.

Bransford, J. D., Brown, A. L., & Cocking, R. R. (2000). *How people learn: Brain, mind, experience, and school: Expanded edition*. Washington, DC: National Academy.

Bull, B., & Bullis, M. (1991). A national profile of school-based transition programs for deaf adolescents. *American Annals of the Deaf*, *136*, 339–348.

Byrnes, L. J. (2011). Listening to the voices of students with disabilities: What do adolescents with hearing loss think about different educational settings? *Deafness & Education International*, *13*, 49–68. doi:10.1179/1557069X11Y.0000000003

Carlberg, C. G. (1979). Meta-analysis of the effects of special classes, resource rooms and other treatments on exceptional children. *Dissertation Abstracts International*, *40*, 1998A–1999A.

Carlberg, C., & Kavale, K. (1980). The efficacy of special versus regular class placement for exceptional children: A meta-analysis. *The Journal of Special Education*, *14*, 295–309. doi:10.1177/002246698001400304

Carney, A. E., & Moeller, M. P. (1998). Treatment efficacy: Hearing loss in children. *Journal of Speech, Language, and Hearing Research*, *41*, 61–84.

Corwin, J. (2011). Effective partnering of state agencies to achieve early hearing detection and intervention benchmarks. *Odyssey: New Directions in Deaf Education*, *12*, 20–23.

Davis, J. M., Elfenbein, J., Schum, R., & Bentler, R. A. (1986). Effects of mild and moderate hearing impairments on language, educational, and psychosocial behavior of children. *Journal of Speech and Hearing Disorders*, *51*, 53–62.

de Andrade, V., & Ross, E. (1999). Attitudes of a group of deaf adolescents towards educational inclusion. *South African Journal of Education*, *19*, 327–340.

Dicker, M. (2011). The time is now: Wisconsin's journey towards improving early intervention services. *Odyssey: New Directions in Deaf Education*, *12*, 38–43.

Easterbrooks, S. R., & Baker, S. (2002). Language learning in children who are deaf and hard of hearing: Multiple pathways. Boston, MA: Allyn & Bacon.

Edwards, L., Figueras, B., Mellanby, J., & Langdon, D. (2011). Verbal and spatial analogical reasoning in deaf and hearing children: The role of grammar and vocabulary. *Journal of Deaf Studies and Deaf Education*, *16*, 189–197.

Eriks-Brophy, A., & Whittingham, J. (2013). Teachers' perceptions of the inclusion of children with hearing loss in general education settings. *American Annals of the Deaf*, *158*(1), 63–97.

Foster, S. B. (1998). Communication experiences of deaf people: An ethnographic account. In I. Parasnis (Ed.), *Cultural and language diversity and the deaf experience* (pp. 117–135). Cambridge, UK: Cambridge University.

Freeman, S. F. N., & Alkin, M. C. (2000). Academic and social attainments of children with mental retardation in general education and special education settings. *Remedial and Special Education*, *21*, 3–26.

Friedmann, N., & Szterman, R. (2005). Syntactic movement in orally trained children with hearing impairment. *Journal of Deaf Studies and Deaf Education*, *11*, 56–75.

Furth, H. G. (1966). A comparison of reading test norms of deaf and hearing children. *American Annals of the Deaf*, *111*, 461–462.

Gallaudet Research Institute. (2001, January). Regional and national summary report of data from the 1999-2000 annual survey of deaf and hard of hearing children and youth. Washington, DC: Gallaudet Research Institute, Gallaudet University. Retrieved from http://research.gallaudet.edu/Demographics/2000_National_Summary.pdf

Gallaudet Research Institute (2011, April). Regional and national summary report of data from the 2009-10 annual survey of deaf and hard of hearing children and youth. Washington, DC: Gallaudet Research Institute, Gallaudet University. Retrieved from http://research.gallaudet.edu/Demographics/2010_National_Summary.pdf

Gannon, J. R. (1981). *Deaf heritage: A narrative history of deaf America*. Silver Spring, MD: National Association of the Deaf.

Gilbertson, M., & Kamhi, A. G. (1995). Novel word learning in children with hearing impairment. *Journal of Speech, Language, and Hearing Research*, *38*, 630–642.

Gregory, S., & Hindley, P. (1996). Annotation: Communication strategies for deaf children. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, *37*, 895–905.

Hadjikakou, K., Petridou, L., & Stylianou, C. (2008). The academic and social inclusion of oral deaf and hard-of-hearing children in Cyprus secondary general education: Investigating the perspectives of the stakeholders. *European Journal of Special Needs Education*, *23*, 17–29. doi:10.1080/08856250701791211

Hamers, J. F. (1998). Cognitive and language development of bilingual children. In I. Parasnis (Ed.), *Cultural and language diversity and the deaf experience* (pp. 79–98). Cambridge, UK: Cambridge University.

Holte, L., Walker, E., Oleson, J., Spratford, M., Moeller, M. P., Roush, P., . . .Tomblin, J. B. (2012). Factors influencing follow-up to newborn hearing screening for infants who are hard of hearing. *American Journal of Audiology*, *21*, 163–174.

Hsin-Ling, H., & Paul, P. V. (2006). Inclusion of students who are deaf or hard of hearing: Secondary school hearing students' perspectives. *Deafness & Education International*, *8*, 62–74. doi:10.1002/dei.190

Individuals With Disabilities Education Act. (2011). *IDEA 2004: Building the legacy, Part C (birth–2 years old)*. Washington, DC: U.S. Department of Education. Retrieved from http://idea.ed.gov/part-c/search/new

Individuals With Disabilities Education Act of 2004. 20 U.S.C. § 1400 *et seq*.

Johnson, C. D., DesGoerges, J., & Seaver, L. (2013). *Educational advocacy for students who are deaf or hard of hearing*. Boulder, CO: Hands & Voices.

Johnson, H., & Griffith, P. (1986). The instructional patterns of two fourth-grade spelling classes: A mainstreaming issue. *American Annals of the Deaf*, *131*, 331–338.

Karchmer, M. A., & Mitchell, R. E. (2003). Demographic and achievement characteristics of deaf and hard-of-hearing students. In M. Marschark & P. E. Spencer (Eds.), *Oxford handbook of deaf studies, language, and education* (pp. 21–37). New York, NY: Oxford University Press.

Kelman, C. A., & Branco, A. U. (2004). Deaf children in regular classrooms: A sociocultural approach to a Brazilian experience. *American Annals of the Deaf*, *149*, 274–280.

Kluwin, T. N. (1992). What does "local public school" program mean? In T. M. Kluwin, D. F. Moores, & M. G. Gaustad (Eds.), *Toward effective public school programs for deaf students: Context, process, and outcomes* (pp. 30–48). New York, NY: Teachers College.

Kluwin, T. N., & Moores, D. F. (1989). Mathematics achievement of hearing impaired adolescents in different placements. *Exceptional Children*, *55*, 327–335.

Kuhl, P., & Rivera-Gaxiola, M. (2008). Neural substrates of language acquisition. *Annual Review of Neuroscience*, *31*, 511–534.

Lane, H. L., Hoffmeister, R., & Bahan, B. J. (1996). *A journey into the deaf-world*. San Diego, CA: DawnSignPress.

Lawrence, C. (2011). ISD outreach: Building connections to empower Indiana families with young deaf and hard of hearing children. *Odyssey: New Directions in Deaf Education*, *12*, 10–13.

Lecours, A. R. (1975). Myelogenetic correlates of the development of speech and language. In E. H. Lenneberg & E. Lenneberg (Eds.), *Foundations of language development: A multidisciplinary approach* (pp. 121–135). New York, NY: Academic Press.

Lederberg, A. R. (2003). Expressing meaning: From communicative intent to building a lexicon. In M. Marschark & P. E. Spencer (Eds.), *Oxford handbook of deaf studies, language, and education* (pp. 247–260). Oxford, UK: Oxford University Press.

Lenneberg, E. H. (1967). *Biological foundations of language*. New York, NY: John Wiley.

Litchfield, S., & Lartz, M. N. (2002). Role analysis of teachers certified in teaching students who are deaf/hard of hearing who team-teach in co-enrollment classrooms. *Teacher Education and Special Education*, *25*, 145–153.

Luft, P., & Amiruzzaman, S. (2014, February 11). *Meeting IDEA regulations that address "special considerations" of DHH students: How states vary in their response*. Presentation at the forty-first annual conference of the Association for College Educators of the Deaf and Hard of Hearing, St. Louis, MO.

Marschark, M., & Lukomski, J. (2001). Understanding language and learning in deaf children. In M. D. Clark, M. Marschark, & M. Karchmer (Eds.), *Context, cognition, and deafness* (pp. 71–87). Washington, DC: Gallaudet University Press.

Marschark, M., Rhoten, C., & Fabich, M. (2007). Effects of cochlear implants on children's reading and academic achievement. *Journal of Deaf Studies and Deaf Education*, *12*, 269–282.

Marschark, M., Schick, B., & Spencer, P. E. (2006). Understanding sign language development of deaf children. In B. Schick, M. Marschark, & P. E. Spencer (Eds.), *Advances in the sign language development of deaf children* (pp. 3–19). Oxford, UK: G.B. Oxford University.

Martin, D., & Bat-Chava, Y. (2003). Negotiating deaf–hearing friendships: Coping strategies of deaf boys and girls in mainstream schools. *Child: Care, Health & Development*, *29*, 511–521.

Martin, D. S., & Mounty, J. L. (2005). Overview of the challenge. In J. L. Mounty & D. S. Martin (Eds.), *Assessing deaf adults: Critical issues in testing and evaluation* (pp. 3–10). Washington, DC: Gallaudet University Press.

Mather, S. M., & Clark, M. D. (2012). An issue of learning: The effect of visual split attention in classes for deaf and hard of hearing students. *Odyssey: New Directions in Deaf Education*, *13*, 20–24.

Mayberry, R. I. (1993). First-language acquisition after childhood differs from second-language acquisition: The case of American Sign Language. *Journal of Speech and Hearing Research, 36, 51–68*.

Mayberry, R. I. (2007). When timing is everything: Age of first-language acquisition effects on second-language learning. *Applied Psycholinguistics*, *28*, 537–549.

Mayberry, R. I., Chen, J.-K., Witcher, P., & Klein, D. (2011). Age of acquisition effects on the functional organization of language in the adult brain. *Brain and Language*, *119*, 16–29. doi:10.1016/j.banl.2011.05.007

Mayberry, R. I., del Giudice, A. A., & Lieberman, A. M. (2011). Reading achievement in relation to phonological coding and awareness in deaf readers: A meta-analysis. *Journal of Deaf Studies and Deaf Education*, *16*, 164–188.

Mayberry, R. I., & Lock, E. (2003). Age constraints on first versus second language acquisition: Evidence for linguistic plasticity and epigenesist. *Brain and Language*, *87*, 369–384.

Mayberry, R. I., Lock, E., & Kazmi, H. (2002). Linguistic ability and early language exposure. *Nature, 417*, Article 38.

Mayberry, R. I., & Squires, B. (2006). Sign language: Acquisition. In K. Brown (Ed.), *Encyclopedia of language & linguistics* (2nd ed., pp. 793–743). Oxford, UK: Elsevier.

Mayne, A., Yoshinaga-Itano, C., & Sedey, A. L. (1998). Receptive vocabulary development of infants and toddlers who are deaf or hard of hearing. *The Volta Review*, *100*, 29–52.

Mayne, A., Yoshinaga-Itano, C., Sedey, A. L., & Carey, A. (1998). Expressive vocabulary development of infants and toddlers who are deaf or hard of hearing. *The Volta Review*, *100*, 1–28.

Mitchell, R. E., & Karchmer, M. A. (2004). Chasing the mythical ten percent: Parental hearing status of deaf and hard of hearing students in the United States. *Sign Language Studies*, *4*, 138–163.

Moeller, M. P. (2000). Early intervention and language development in children who are deaf and hard of hearing. *Pediatrics*, *106*, 1–9.

Moeller, M. P., Osberger, M. J., & Eccarius, M. (1986). Receptive language skills. In M. J. Osberger (Ed.), *Language and learning skills of hearing impaired children* (pp. 41–53). Rockville, MD: American Speech-Language-Hearing Association.

Moores, D. F. (1978). *Educating the deaf: Psychology, principles, and practices*. Boston, MA: Houghton Mifflin.

Moores, D. F. (2001). *Educating the deaf: Psychology, principles, and practices* (5th ed.). Boston, MA: Houghton Mifflin.

No Child Left Behind Act of 2001, P.L. 107–110, Title IX, Sec 9101(23)(A&B).

Osgood, R. L. (2008). The history of special education: A struggle for equality in American public schools. Westport. CN: Praeger.

Padden, C. A. (1998). From the cultural to the bicultural: The modern deaf community. In I. Parasnis (Ed.), *Cultural and language diversity and the deaf experience* (pp. 79–98). Cambridge, UK: Cambridge University.

Parasnis, I. (1998). On interpreting the deaf experience within the context of cultural and language diversity. In I. Parasnis (Ed.), *Cultural and language diversity and the deaf experience* (pp. 3–19). Cambridge, UK: Cambridge University.

Paul, P. V., & Whitelaw, G. M. (2011). *Hearing and deafness: An introduction for health and education professionals*. Sudbury, MA: Jones & Bartlett.

Penicaud, S., Klein, D., Zatorre, R. J., Chen, J. K., Witcher, P., Hyde, K., & Mayberry, R. I. (2013). Structural brain changes linked to delayed first language acquisition in congenitally deaf individuals. *NeuroImage*, *66*, 42–49.

Peterson, J. M., & Hittie, M. M. (2010). *Inclusive teaching: The journey towards effective schools for all learners* (2nd ed.). Boston, MA: Pearson.

Punch, R., Hyde, M., & Creed, P. A. (2004). Issues in the school-to-work transition of hard of hearing adolescents. *American Annals of the Deaf*, *149*, 28–38.

Qi, S., & Mitchell, R. E. (2012). Large-scale academic achievement testing of deaf and hard-of-hearing students: Past, present, and future. *Journal of Deaf Studies and Deaf Education*, *17*, 1–18.

Ramsey, C. L. (1997). *Deaf children in public schools: Placement, context, and consequences*. Washington, DC: Gallaudet University Press.

Sari, H. (2007). The influence of an in-service teacher training (INSET) programme on attitudes towards inclusion by regular classroom teachers who teach deaf students in primary schools in Turkey. *Deafness & Education International*, *9*, 131–146.

Scheetz, N. A. (2001). *Orientation to deafness* (2nd ed.). Boston, MA: Allyn and Bacon.

Schroedel, J. G., Watson, D., & Ashmore, D. H. (2003). A national research agenda for the postsecondary education of deaf and hard of hearing students: A road map for the future. *American Annals of the Deaf*, *148*, 67–73.

Sharpe, S. L. (1985). The primary mode of human communication and complex cognition. *American Annals of the Deaf*, *130*, 39–46.

Shaver, D., Newman, L., Huang, T., Yu, J., & Knokey, A.-M. (2011). *Facts from NLTS2: The secondary school experiences and academic performance of students with hearing impairments*. Washington, DC: Institute of Educational Sciences, National Center for Special Education Research, U.S. Department of Education. Retrieved from http://ies.ed.gov/ncser/pubs/20113003/

Stein, E. O. (2005). Researching classroom processes of inclusion and exclusion. *European Journal of Special Needs Education.*, *20*, 167–178. doi:10.1080/08856250500055651

Stinson, M. S., & Kluwin, T. N. (2003). Educational consequences of alternative school placements. In M. Marschark & P. E. Spencer (Eds.), *The Oxford handbook of deaf studies, language, and education* (pp. 52–64). Oxford, UK: Oxford University Press.

Traxler, C. B. (2000). The Stanford Achievement Test, 9th edition: National norming and performance standards for deaf and hard-of-hearing students. *Journal of Deaf Studies and Deaf Education*, *5*, 337–348.

U.S. Department of Education. (1995). *17th annual report to Congress on the implementation of The Individuals with Disabilities Education Act*. Washington, DC: Author. Retrieved from http://www.ed.gov/pubs/OSEP95AnlRpt/index.html

U.S. Department of Education. (1996). *18th annual report to Congress, Parts B and C*. Retrieved from http://www2.ed.gov/about/reports/annual/osep/index.html#2008

U.S. Department of Education. (1997). *19th annual report to Congress, Parts B and C*. Retrieved from http://www2.ed.gov/about/reports/annual/osep/index.html#2008

U.S. Department of Education. (1998). *20th annual report to Congress, Parts B and C*. Retrieved from http://www2.ed.gov/about/reports/annual/osep/index.html#2008

U.S. Department of Education. (1999). *21st annual report to Congress, Parts B and C*. Retrieved from http://www2.ed.gov/about/reports/annual/osep/index.html#2008

U.S. Department of Education. (2000). *22nd annual report to Congress, Parts B and C*. Retrieved from http://www2.ed.gov/about/reports/annual/osep/index.html#2008

U.S. Department of Education. (2001). *23rd annual report to Congress, Parts B and C*. Retrieved from http://www2.ed.gov/about/reports/annual/osep/index.html#2008

U.S. Department of Education. (2002). *24th annual report to Congress, Parts B and C*. Retrieved from http://www2.ed.gov/about/reports/annual/osep/index.html#2008

U.S. Department of Education. (2003). *25th annual report to Congress, Parts B and C*. Retrieved from http://www2.ed.gov/about/reports/annual/osep/index.html#2008

U.S. Department of Education. (2004). *26th annual report to Congress, Parts B and C*. Retrieved from http://www2.ed.gov/about/reports/annual/osep/index.html#2008

U.S. Department of Education. (2005). *Deaf students education services*. Retrieved from http://www2.ed.gov/about/offices/list/ocr/docs/hq9806.html

U.S. Department of Education. (2006). *28th annual report to Congress, Parts B and C*. Retrieved from http://www2.ed.gov/about/reports/annual/osep/index.html#2008

U.S. Department of Education. (2007). *29th annual report to Congress, Parts B and C*. Retrieved from http://www2.ed.gov/about/reports/annual/osep/index.html#2008

U.S. Department of Education. (2008). *30th annual report to Congress, Parts B and C*. Retrieved from http://www2.ed.gov/about/reports/annual/osep/index.html#2008

U.S. Department of Education. (2009). *31st annual report to Congress, Part B*. Retrieved from http://www2.ed.gov/about/reports/annual/osep/2009/parts-b-c/index.html

U.S. Department of Education. (2010). *32nd annual report to Congress, Parts B*. Retrieved from http://www2.ed.gov/about/reports/annual/osep/2010/parts-b-c/index.html

U.S. Department of Education. (2011). *33rd annual report to Congress, Parts B*. Retrieved from http://www2.ed.gov/about/reports/annual/osep/2011/parts-b-c/index.html

U.S. Department of Health and Human Services. (2010). *NIDCD fact sheet: Speech and language developmental milestones*. (NIH Publication No. 10-4781). Washington, DC: U.S. Department of Health and Human Services, National Institute on Deafness and Other Communication Disorders, National Institutes of Health. Retrieved from http://www.nidcd.nih.gov/staticresources/health/voice/SpeechLanguageDevelopmentalMilestonesEnglishFS.pdf

Vermeulen, A. M., van Bon, W., Schreuder, R., Knoors, H., & Snik, A. (2007). Reading comprehension of deaf children with cochlear implants. *Journal of Deaf Studies and Deaf Education*, *12*, 283–302.

Vermeulen, J. A., Denessen, E., & Knoors, H. (2012). Mainstream teachers about including deaf or hard of hearing students. *Teaching and Teacher Education*, *28*, 174–181. doi:10.1016/j.tate.2011.09.007

Vosganoff, D., Paatsch, L. E., & Toe, D. M. (2011). The mathematical and science skills of students who are deaf or hard of hearing educated in inclusive settings. *Deafness & Education International*, *13*, 70–88.

Wagner, M., Newman, L., Cameto, R., & Levine, P. (2006). The academic achievement and functional performance of youth with disabilities: A report from the National Longitudinal Transition Study-2 (NLTS2). Washington, DC: Institute of Educational Sciences, National Center for Special Education Research, U.S. Department of Education. Retrieved from http://www.nlts2.org/reports/2006_07/index.html

Weinstock, R. B., & Mounty, J. L. (2005). Test-taking for deaf and hard of hearing individuals: Meeting the challenges. In J. L. Mounty & D. S. Martin (Eds.), *Assessing deaf adults: Critical issues in testing and evaluation* (pp. 27–36). Washington, DC: Gallaudet University Press.

Winzer, M. A. (1993). *The history of special education: From isolation to integration*. Washington, DC: Gallaudet University Press.

Yoshinaga-Itano, C. (2000). Successful outcomes for deaf and hard-of-hearing children. *Seminars in Hearing*, *21*, 309–326.

Yoshinaga-Itano, C. (2004). Levels of evidence: Universal newborn hearing screening (UNHS) and early hearing detection and intervention systems (EHDI). *Journal of Communication Disorders*, *37*, 451–465.

Zaidman-Zait, A. (2007). Parenting a child with a cochlear implant: A critical incident study. *Journal of Deaf Studies and Deaf Education*, *12*, 221–241.

Zwiebel, A., & Mertens, D. (1985). A comparison of intellectual structure in deaf and hearing children. *American Annals of the Deaf*, *130*, 27–31.