Chapter 14
Deaf/Hard-of-Hearing Students with Disabilities

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The population of students who are deaf/hard of hearing (D/HH) has changed dramatically over the past 60 years. Students that teachers were accustomed to seeing in their classrooms in the 1960s, 1970s, and 1980s were predominately children deafened during the rubella outbreak of 1964-1965 and had few disabilities in addition to deafness (Marazita, Ploughman, Rawlings, Remington, Arnos, & Nance, 1993; "Rubella," 2016). Students that teachers of the deaf (TOD) see in their classrooms now present more complex needs—with many students who are D/HH also having additional disabilities.

Photo courtesy of NCHAM

Case Study Example #1

Kelli, a recent graduate from New State University's deaf/hard of hearing education program, just accepted her first teaching position. The classroom was described to her during the interview as being new to the district and having students ages 4 to 9 who were deaf and had additional needs. Excited to prepare for the beginning of the school year, Kelli sat down in her new classroom to review her caseload. A sinking feeling overwhelmed her. On her caseload were three girls and two boys, none of whom used sign language for communication. Two of the students were deaf with visual impairments, one student had deafness and autism spectrum disorder, one was medically fragile and had both a cognitive impairment and a seizure disorder in addition to deafness, and the last student had deafness and cerebral palsy. As she looked around the empty classroom, she wondered, "Where do I ***even*** begin?"

The purpose of this chapter is to:

1. Describe the current population.
2. Provide an overview of service provision.
3. Discuss a guidance framework for professionals supporting students who are deaf with disabilities.

Describing the current population of students who are deaf with disabilities is a challenging task and one that has been attempted by several authors in the past (Ewing & Jones, 2003; Guardino, 2008). Inevitably, many subgroups will not be addressed, as the possible combinations of disabilities are almost limitless. While some specific subgroups [deaf students with autism spectrum disorders (ASD)] may allow for detailed discussion, we will approach our conversation within the framework of individualized approaches based on student strengths and needs.

We will also discuss the challenges that this population of students bring to the classroom and the impact of teacher training and pedagogical frameworks. Unfortunately, while most teachers report having experience with this population, there is limited research that parents, teachers, and professionals can access for guidance. This chapter will capitalize on knowledge and experience garnered through adjacent fields that have perhaps not been utilized during past discussions.

Various terms have been used in the field and classrooms (not particularly in written research) to describe this particular population of students who are D/HH with additional disabilities. Some examples include "deaf plus," "deaf with additional disabilities," "deaf and diverse," and "complex deaf." Paul (2015) posited the term "deaf with disabilities" (DWD) in his special editorial of *American Annals of the Deaf* as a way "to be as inclusive as possible and to recognize (read: respect) that there is a range of perspectives on the use of labels in our field" (p. 339). In order to demonstrate our respect for cultural differences embraced by readers approaching this text, we will use the same terminology in the remainder of this chapter.

We will also discuss the challenges that this population of students bring to the classroom and the impact of teacher training and pedagogical frameworks.

Paul's (2015) editorial points to the consistent difficulties present in this discussion. Questions posed in the 1970s regarding this population still exist today, and little progress has been made in addressing several of the issues. Paul cited previous work (Paul & Quigley, 1990, p. 234) to illustrate that the discussion has changed very little over the past 25—or frankly 50 years *(terms in brackets were changed to reflect current terminology)*:

Previous Discussion of DWD Population

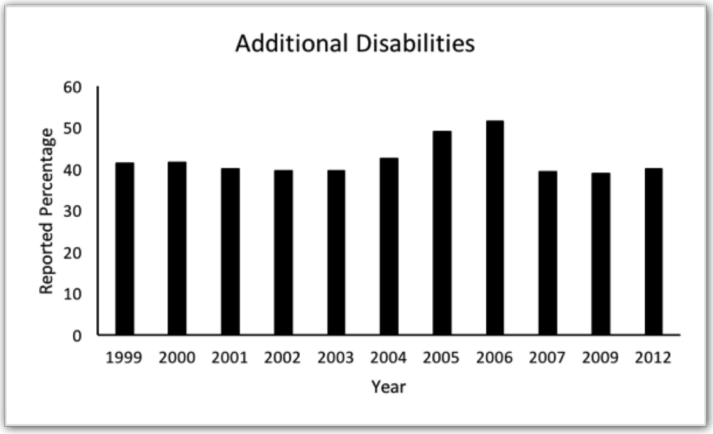
> The nature and extent of educational problems of [students who are D/HH with disabilities] have not been systematically investigated. Historically, this has been a very complicated task. For example, Stewart (1971) stated several problems in developing adequate programming that are still evident today:
>
> - Incomplete descriptions of the population.
> - Little use of effective training procedures, such as behavior modification techniques (cf. Jones, 1984).
> - Lack of sufficient instructional and curricular materials.
>
> There is also a need for adequately trained professionals (Konar & Rice, 1982; Shroyer, 1982). The difficulty of providing adequate training and establishing effective programming cannot be overemphasized. As stated aptly by Mencher and Gerber (1983): The special nature of multiple [disabilities] is that their effects are not simply additive, but rather they interact with each other in ways not thoroughly understood to create a complex array of secondary consequences (p. 2). Thus, [students who are D/HH with disabilities] complicate the tasks of identification, classification, assessment, selection of instructional and curricular activities, management, and educational goals (Paul, 2015, p. 340).

Prevalence of Additional Disabilities

The Gallaudet Research Institute (GRI) conducts periodic surveys on the current population of students who are D/HH in the U.S. Survey results were posted annually from 1999-2007 and have only periodically been published since (once in 2009 and once in 2012; see https://research.gallaudet.edu/Demographics/ for data published).

Figure 1 illustrates the consistent prevalence of DWD since 1999, with percentages falling around 40-50%.

Figure 1
Percentage of Reported D/HH Students With Additional Disabilities Across GRI's Annual Reports



There are many authors who would disagree with this prevalence. Reported prevalence rates vary across studies. Recently, Guardino and Cannon (2015a) illustrated that the inconsistencies in reporting across agencies make the overall prevalence a difficult number to calculate. While research reports numbers of DWD around 40-50%, classroom teachers view this as a large underestimation of the students who are actually represented in their classrooms. Teachers stated that the numbers of DWD students in their classrooms were one and a half to six times higher than that reported on the GRI across disability areas (Guardino, 2015). In addition to the number of students who are D/HH reported with additional disabilities, there is also a wide range of disabilities experienced in this population. Borders, Bock, and Szymanski (2015) reported that TOD were seeing students in their classrooms that fell across all 13 disability categories with specific learning disabilities, cognitive impairment, and ASD listed after deafness, hearing impairment, and speech/language delay.

Possible Medical Factors Impacting Prevalence

Prematurity has a direct impact on cochlear development. Babies often survive now even if they are born at 22 weeks' gestation (Rysavy et al., 2015). The fact is, more babies survive congenital disorders (e.g., congenital heart defects, digestive system anomalies) and birth trauma now than ever before. With medical advances comes an increase in complex medical needs. In fact, many premature infants or children with complex medical needs have disorders that are indicative of in utero developmental disruption. During this gestational period, the cochlea is not fully developed. While the cochlea is formed during weeks 10-12 of pregnancy, it is not functionally mature until between weeks 30-35 (Pujol, Lavigne-Rebillard, & Uziel, 1991). Hepper and Shahidullah (1994) indicated that fetuses were first observed to respond to sounds at the 500 Hz level at around 19 weeks' gestation. While response was indicated at 19 weeks, hearing was observed to develop downward in frequencies (e.g., 250 Hz and 100 Hz) before developing up into the higher frequency levels. Fetuses did not consistently show response to the full range of frequencies until 35 weeks' gestation, with no fetuses showing response to 1000 Hz or 3000 Hz even at 27 weeks' gestation.

Coupled with premature babies' survival rates is the intensity of medical intervention often required. When babies are in the neonatal intensive care unit for complex medical conditions (e.g., respiratory failure frequently associated with neonates with underdeveloped lungs), they often receive a number of different medications to combat infection and certain disorders (i.e., diuretics for liver transplantation). It is important to note that several medications needed for these conditions are ototoxic—or those that destroy components of the cochlea (Berg, Spitzer, & Garvin, 1999; Bucuvalas et al., 2003; Cooper et al., 2011; Robertson, Juzer, Peliowski, Philip, & Cheung, 2006). It is clear why babies born at premature gestational ages will have a higher rate of hearing loss than those who are delivered full term.

Available Information

Recent interest in DWD students is evident. Special issues of *Seminars in Speech and Language* (2014), *American Annals of the Deaf* (Guardino & Cannon, 2015b), and the *Journal of Developmental and Physical Disabilities* (2017) have been published on this topic. Even

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more specific, special issues of *Odyssey* (2008) and a series in *Loud and Clear* (2015) on deafness and autism have been published as well. Guardino and Cannon (2015a) expanded previous work (Guardino, 2008) to illustrate that there has been a recent increase in the number of articles related to the DWD population. Even with new information, much of what is available is non-empirical and does not offer a clear direction for parents and professionals.

Parents/Guardians

Parents/guardians of DWD students often feel isolated in the educational process (Sass-Lehrer, Mertens, & Meadow-Orlans, 2001). As a result, they have developed their own support groups on social media (e.g., Facebook group *Sharing Our Journey with Autism*) and have worked to create a retreat (*Deaf Autism Retreat*), so they can gather together and share concerns and successful approaches. To address parent/guardian needs, organizations have developed websites devoted to supporting them in their search for information (see *Table 1*).

Teachers/Professionals

TOD are equipped to discuss issues related to deafness but may not feel confident in their advice on additional disabilities (Guardino, 2015). They have reported their lack of familiarity with practices outside of the field of deaf education (Borders, Bock, et al., 2015; Guardino, 2016). The concerns expressed by TOD have led to changes in the professional standards for the Council for Exceptional Children. While specific standards were not written for this particular population of DWD, the preface sets the stage for the professional standards, indicating they are inclusive of DWD students as well as students who are D/HH with multiple language learning needs.

With the pervasiveness of newborn hearing screening, hearing loss is often the initial diagnosis for DWD with mild or language-impacting disabilities.

A focus on the DWD student population can also be seen at the international level with the 22nd International Congress on the Education of the Deaf's (2015) theme, "Educating Diverse Learners: Many Ways, One Goal." The program (http://www.iced2015.com/en/index.php) is evidence of the importance of this topic around the world.

Differential Diagnosis

Comorbidity complicates diagnosis of DWD, as it is not merely additive in terms of symptomology but rather multiplicative. With the pervasiveness of newborn hearing screening, hearing loss is often the initial diagnosis for DWD with mild or language-impacting disabilities. In the case of severe disabilities present at birth, the opposite may occur with some documented difficulties and inconsistencies in the neonatal intensive care unit hearing screening (Jacobs, Roush, Munoz, & White, 2010).

Table 1
Organization Websites Providing Information on the Students Who Are DWD

Resource	Website
Cincinnati Children's Hospital Medical Center, Cincinnati, OH	https://www.cincinnatichildrens.org/service/e/ear-hearing/more-than-hearing-loss
University of Northern Florida*	http://understandingdad.net/
Illinois Service Resource Center, Northbrook, IL	http://www.isrc.us/deaf-plus
Clerc Center, Gallaudet University	http://deafwdisabilities.grou.ps/home

**NOTE:* Collaborative effort.

For years, many authors have articulated difficulties associated with assessment and diagnosis of additional disabilities in deaf students (Cawthon, 2015; Daneshi & Hassanzadeh, 2007; Easterbrooks & Handley, 2005, 2006; Guardino, 2008; Hoevenaars-van den Boom, Antonissen, Knoors, & Vervloed, 2009; Roper, Arnold, & Monteiro, 2003; Schum, 2004). Wiley and Moeller (2007) published a seminal work to guide the decision-making process for parents/guardians, TOD, and medical professionals when trying to decide if an additional disability may be present. The authors' combined background in developmental pediatrics, deafness, and focus in DWD makes their experiences and perspective on the population unique. They detailed "red flags" for disabilities across several domains, including the following:

- Gross motor
- Sensory integration
- Receptive and expressive language.

To assist with concerns in differential diagnosis, they provided the following framework for innovative assessment:

Assessment, Evaluation, & Programming System (AEPS)

"A system for developing functional and coordinated cycles of assessment, goal development, intervention and evaluation of outcomes; ecological assessments (e.g., observations in real settings, checklists, language samples); and monitoring learning rates over time" (p. 28).

Guardino (2008) presented a detailed review of 25 years of literature that described the identification practices of some specific disabilities in DWD. She discussed the identification, incidence, and educational placements for students who are D/HH with ASD, emotional/behavioral disorders, attention deficit disorder/attention deficit hyperactivity disorder, and intellectual disability (termed mental retardation in the article). Particularly poignant is Guardino's statement:

Guardino's Statement . . .

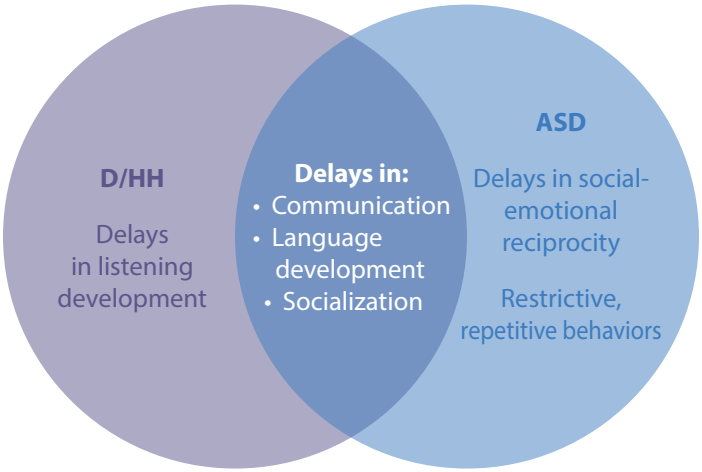
"The literature discussed in the present review shows that if researchers continue to repeat the practices of the past, the education system for deaf students with multiple disabilities will not advance, now or in the future" (p. 62).

ASD

One area receiving recent attention has been DWD with a specific comorbid diagnosis of ASD.

One area receiving recent attention has been DWD with a specific comorbid diagnosis of ASD. Diagnosis of ASD is complicated by overlapping symptomology with deafness (Borders, Bock, & Probst, 2016). While ASD is typically characterized by deficits in the areas of language, socialization, and sensory integration, deafness characteristics overlap in two of the three characteristic areas (language and socialization). *Figure 2* illustrates the described overlap.

Figure 2
Overlap of Characteristics Between D/HH & ASD



ASD has a range of severity depending on the level of impact. A child may receive an initial diagnosis anywhere between the ages of 2 and 8 (Christensen et al., 2016). Research on comorbid diagnosis of D/HH and ASD is limited, and therefore the typical age of diagnosis is difficult to estimate. However, in a recent study conducted by Meinzen-Derr et al. (2014), the median age of an ASD diagnosis for children with permanent hearing loss was 66.5 months. They also concluded that children who had a diagnosis of severe to profound hearing loss were diagnosed with ASD earlier than those with lesser degrees of hearing loss.

The delays in diagnosis are likely a direct result of . . .

". . . complexities of determining whether speech, language, and social delays are fully attributed to hearing loss or whether these delays might be indicative of the comorbid ASD diagnosis" (p. 117).

Differential diagnosis is difficult but possible. Teasing out what is ASD and what are characteristics of deafness relies on individuals or a team of individuals with professional training in each area. This team must work together to identify normal and disordered patterns of development in each of the related fields. Even though there is a lack of diagnostic tools to aid in the diagnosis of a child with DWD in the area of ASD, Mood and Shield (2014) suggest using ASD assessment tools with task and scoring modifications, not merely adapting the tool using sign language. Differential diagnosis across all individuals with DWD, regardless of the comorbidity, is challenging and must begin with an understanding of patterns of development associated with deafness as well as those of the additional disability.

Service Provision

Regardless of diagnosis, children between the ages of 3 and 21 are eligible for special education services if they meet eligibility requirements as a "student with a disability" according to the Individuals with Disabilities Education Act (2004). Services available to students are vast and vary by need. Interestingly, Borders, Meinzen-Derr, Wiley, Bauer, & Embury (2015) found that services differed across students according to their primary educational label. Educational labels were also found to change over time. With shifting labels, subsequent changes in educational supports and related services also changed. While the needs of the students remained the same, services appeared to be related to the educational label and therefore placement.

Consider the extension of our case study (see *Case Study Example #2*). We, as authors, often refer to the placement changes that Evan underwent as "the zipper trajectory"—one that goes back and forth often thus limiting the amount of academic, language, and behavioral growth over time. The zipper still results in an upward increase, but the path is slow and altered as opposed to a steady, positive growth trajectory. It is similar to the familiar adage of "two steps forward and one step back." Students learn a little in each environment. But it likely does not "stick," and they potentially lose ground. This trajectory impacts the rate at which students' academic, language, and behavioral goals are met. In Evan's case, the focus of instruction and interventions (language focus versus behavioral focus) changed with each

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Case Study Example #2

Evan, the oldest student in Kelli's classroom, has a comorbid diagnosis of deafness and ASD. He is coming to her classroom after several changes in educational placement. When he was 4 years old, he was placed in a D/HH classroom with a TOD. The teacher in that classroom became increasingly concerned about his negative behaviors of biting, hitting, and throwing objects (including his hearing devices) in spite of the heavy language focus and sign instruction she was providing. After consultation with a behavioral specialist, Evan was transitioned to a communication and behavioral disorder (CBD) classroom. He was the only child with hearing loss in the new classroom environment. After a few weeks, the special education teacher began to recognize characteristics associated with ASD, and a subsequent educational diagnosis was made. She also began to implement evidence-based interventions from the field of ASD. In turn, Evan began to successfully communicate his wants and needs, and his negative behaviors decreased. At the conclusion of that school year, Evan's negative behaviors were almost completely gone. The educational team decided he could return to the original placement within the deaf education classroom. Upon return to the deaf education classroom, the teacher did not implement the previously successful behavioral interventions. After two weeks in the classroom, all negative behaviors reappeared, and Evan's communication patterns decreased. The educational team heard about the new program starting (Kelli's classroom), and Evan's team decided to transition him again with the hope that Kelli's classroom would blend interventions from the two different fields to result in Evan's success.

placement. The classrooms act as silos, implementing their own field's strategies and seeming unaware of interventions from other areas. For more information on professional collaboration, see the *Developing a Disposition for Reflective Practice That Sustains Continuous Professional Learning* chapter.

Proposed Framework for DWD

Educational decision-making for DWD can be complex and difficult, because placement is often changed based upon labels and behavior. Parents/guardians, teachers, and related professionals must consider student strengths and needs across all developmental domains rather than merely focus on hearing and language—the framework often addressed by TOD. We propose a more comprehensive framework for development of educational programming for DWD. This framework is borrowed from the adjacent field of special education, specifically severe and multiple disabilities.

Figure 3 illustrates the framework we would propose for approaching educational decision-making for DWD students. This framework provides a broad, comprehensive way to view education for students who are DWD.

We have often heard the following comment related to DWD in the classroom . . .

> "If we could just give him more language, his behavior would improve."

We, as authors, have offered this response . . .

> "If we could improve his behavior, he can gain access to language."

These statements may not seem that different at first glance, but illustrate the differing frameworks that underlie decision-making. Our thinking is that if TOD and educational teams were to use this framework, educational placement changes might decrease as teachers approach student needs differently.

Figure 3
Proposed Educational Decision-Making Framework for DWD

Lifespan Perspective

The overarching approach to this framework is the concept of lifespan perspective. Thinking about the future can be difficult for parents/guardians and professionals when so much seems unknown. Many students with disabilities (e.g., intellectual disabilities, ASD) learn through routines. For those learners, it is particularly important to consider that how we teach from the beginning impacts the future. One example we have referenced many times is teaching a young student to communicate wants and needs. While it seems appropriate for a young child (say, a 3-year old) to grab your wrist and pull you to the cabinet to get a snack, one must consider if this is learned as a routine. That same behavior (pulling someone by the wrist) is viewed very differently (perhaps as abuse or physical aggression) if this student engages in this behavior at 17 or 25 years of age. Teachers of DWD must consider how the behaviors they are teaching to young children will be viewed later in the lifespan, since shaping behaviors that are engrained as routines becomes more difficult over time than teaching it in the appropriate (for adult life) manner from the beginning.

Person-Centered Planning

While parents/guardians, teachers, and related professionals consider lifespan perspective in their intervention planning, they must also keep in mind the desires and strengths of the students for whom they are planning. One method for starting this thought process is person-centered planning (PCP). PCP is often discussed as a method of transition planning—required when students reach the age of 14 (Luft, 2015). PCP can occur earlier in the educational process and guide the team's overall approach to planning. As interests, strengths, and needs change over time, this process is fluid and will change with the student. During PCP meetings, teams create a long-term vision and action plan for the student that centers around the student's interests, strengths, and needs. Throughout the transition process, the PCP meeting links families with community support systems that students will require when they eventually transition to adulthood. For more information on transition, see the *Career Development & Adult Life* chapter.

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A PCP meeting—typically done separate from an annual Individualized Education Program or reevaluation—includes participants that are part or will be part of the student's life (e.g. student, parent/guardian(s), speech and language pathologist, hearing specialists, counselors, organization team members, and community agency personnel). A facilitator and/or recorder helps guide the meeting by asking questions and recording information and participant responses. Questions relate to the student's history (e.g. medical, educational), strengths/weaknesses, visions for the student, and barriers that prevent the student from reaching those visions (e.g. transportation, finances). The meeting concludes with development of action plans/steps that the school system and parents need to take in order to fulfill those goals that are set. These meetings are conducted approximately every 3 years in order to provide information to parents and schools to ensure the appropriate direction for the student.

There are several different resources available to teams wanting to use PCP. Two particular resources we would recommend include Planning Alternative Tomorrows with Hope (PATH; Forest & O'Brien, 1993) and Making Action Plans (MAPS; Forest & Pearpoint, 1992; Vandercook, York, & Forest, 1989). Both PATH and MAPS offer a structured format for the team to use when developing a PCP.

Approaches

As a field, deaf education has a long history that is rich in a strong focus on language, literacy, speech, and listening. However, the field of deaf education does little to train TOD in academic, social, or behavioral interventions to use with DWD. There are adjacent fields to deaf education that warrant investigation, as they have expertise that may be appropriate to use with DWD. We highly recommend TOD learn some basic

special education practices and approaches often used with students with disabilities, particularly severe to profound intellectual or multiple disabilities.

Developmental approach. While TOD are provided general information on child development within training programs (likely in general educational psychology courses), the focus of most training programs is on development of the specific skills of language, literacy, speech, and listening. While the learning of typical development across other domains is critical, it is often quickly reviewed and only discussed in relation to a "typical rate" of development within general courses. Students who are DWD will have disordered development of skills and progress at a much slower rate. They may be in a stage of development for an extended period of time and require parents/guardians, teachers, and related professionals to redefine success into achievement of smaller steps. Understanding each of the small steps required is critical to viewing and planning programming for DWD. We have talked and worked with many TOD who are missing this approach.

Consider the extension of our case study (see *Case Study Example #3*). What Evan's TOD did not understand was the fact that moving her instructional materials and focus to pictures was not moving back far enough. The picture on the card did not convey meaning to Evan. Evan was still at the stage of cognition where he could not match a picture to an object. Expecting him to process the vocabulary at a higher cognitive level was never going to work, unless she broke down the task even more.

TOD working with DWD are charged with the task of learning early development and understanding it on a skill-to-skill basis. Teachers have to conduct a task analysis of each skill and ask themselves, "What does this skill require?" on a regular basis when developing this particular approach to learning. Evan's teacher would have had to recognize that he was unable to match a picture to a picture and an object to a picture and move her instructional input back to object-to-object matching. Once that skill was acquired (where he was developmentally), she could move back up that developmental chain to work with Evan.

Knowing the student's strengths and interests and their particular personal characteristics is critical to success.

In addition to understanding the developmental steps required in skill development, those working with DWD must also take their idiographic development into account. Idiographic development refers to individual characteristics. Knowing the student's strengths and interests (see *PCP* section) and their particular personal characteristics is critical to success. Parents/guardians are the main source of this information for the educational team. The input they can provide on "what makes him tick" is imperative to success in the classroom. The collaboration of the educational team and parents/guardians cannot be overemphasized with any child, particularly DWD.

Behavioral approach. As illustrated in Paul's (2015) editorial, Borders, Bock, et al. (2015), and Guardino (2015), TOD lack training in behavioral modification. However, they understand how important language is for all children. They recognize that without language, students will engage in challenging or negative behavior. The typical approach is to increase language input. We consider this dilemma from a different angle—a behavioral approach. Both approaches (language focus versus behavioral focus) recognize the relationship of language and behavior but consider the core functions from different sides of the same coin. A language focus results in instruction highlighting increased amounts of language input (illustrated by Evan's TOD).

Case Study Example #3

In Evan's initial deaf education placement, the TOD was confused about why Evan just couldn't learn the vocabulary in their garden unit. The other students in the class picked up on this vocabulary quickly. The TOD provided direct instruction on each of these words, labeled every item in their dramatic play area, and provided many opportunities to engage with the vocabulary in meaningful ways (they grew their own garden, cooked with each one, and visited the grocery store on a field trip). Evan's TOD decided to increase his one-on-one instructional time and add in even more time to go over vocabulary. She pulled out her picture vocabulary cards, which Evan consistently threw across the room. Evan was not learning the vocabulary after several weeks.

While taking the developmental approach would change instructional focus, there is also the need to consider behavior. Remember that Evan's behavior was challenging. He was noted to kick, hit, and throw objects frequently within the classroom. A behavioral approach to instruction would focus on remediation of behavior in order to allow access to language instruction.

Functional approach. Fundamental to a behavioral approach is understanding functions of behavior. While this chapter will not discuss this in detail, there are several resources available on the subject (see *Table 2*). The most important shift in thinking is related to teachers learning to watch a behavior and immediately ask, "What is the function of this behavior?" Teachers will learn through a functional behavioral assessment (FBA) what is reinforcing the behavior or causing it to continue and can then decide how to intervene through the development of a behavioral intervention plan (BIP). Identifying what is acting as reinforcement in the environment is important and often outside of the lens of many individuals.

Consider one of Evan's behaviors (see *Case Study Example #4*).

Case Study Example #4

Evan kept running away from circle time, table work, and snack time. He would run to the bathroom every time. Evan's TOD knew that he didn't need to go to the restroom but was unsure why he kept running into the bathroom.

Through the process of an FBA, Evan's teacher could have learned that he was engaging in this behavior for multiple reasons. One reason he was running away was to escape tasks that were difficult for him. Another reason he was running to the bathroom was to gain sensory input. Evan was particularly interested in drains and loved to watch water go down the drain in the sink. An FBA and subsequent BIP would allow him access to his preferred reinforcer (i.e., watching water go down the drain) after he completed a modified task.

The most important shift in thinking is relatedto teachers learning to watch a behavior and immediately ask, "What is the function of this behavior?"

Selection of reinforcers is critical for a behavioral approach. Parents/guardians, teachers, and related professionals must identify what a student is willing to work for in order to increase skills. Since behavioral theory teaches us that a behavior will only continue if it is reinforced, we must plan for and offer reinforcement for each task we would like them to complete (e.g., sitting in circle time or stating a vocabulary word). While you must start with reinforcing immediately and often for brand-new skills, teachers will eventually be able to reduce and vary the amount of reinforcement required. *Table 3* includes a listing of tools teams can use to assist in identification of reinforcers.

Table 2
Functional Behavioral Resources

Resource	Website
Educate Autism	http://www.educateautism.com/behavioural-principles/functions-of-behaviour.html
May Institute	https://www.mayinstitute.org/news/topic_center.html?id=1564
The IRIS Center	https://iris.peabody.vanderbilt.edu/module/fba/
Center for Effective Collaboration & Practice	http://www.air.org/project/center-effective-collaboration-and-practice-cecp

NOTE: These are a few resources available on functions of behavior and functional behavioral assessment.

Table 3

Resources for Reinforcer Selection

Resource	Website
New York State Institute for Basic Research in Developmental Disabilities	https://opwdd.ny.gov/opwdd_community_connections/autism_platform
Intervention Central	http://www.interventioncentral.org/behavioral-interventions/special-needs/forced-choice-reinforcer-assessment-guidelines
Vanderbilt University	http://vkc.mc.vanderbilt.edu/ebip/preference-assessments/
Virginia Commonwealth University	http://www.worksupport.com/research/viewContent.cfm/952

NOTE: These are a few resources available on different methods for selecting student reinforcers.

Instructional Practices

Another component of our framework is the use of strong instructional practices. While the field of deaf education has limited evidence base (Ferrell, Bruce, & Luckner, 2014), there are many evidence-based practices in the field of special education that may be appropriate for DWD.

Structure. One of the first recommendations we would make for TOD working with DWD is the use of structure within their classrooms and instructional approaches. The use of structure capitalizes on student need for routine and allows for increased independence in the classroom via decreased cognitive load. In other words, the student is not required to hold multiple directions in their working memory and access receptive language to move throughout the classroom routines. The TEACCH model developed by researchers at the University of North Carolina, Chapel Hill (https://www.teacch.com) provides structure in several areas (physical environment, scheduling, independent work systems, routines, and visual schedules). For example, TOD can incorporate clear physical boundaries in the environment that allow DWD students to know what is expected in each area of the classroom without a need for language. Adding visuals to schedules and academic work can increase comprehension without adding additional language requirements.

Systematic instruction. We also recommend a specific type of instruction called systematic instruction. One of the most important components of systematic instruction is the planned and organized use of prompting and reinforcement. Specific practices used and recommended within systematic instruction include most-to-least prompting, simultaneous prompting, constant time delay, and chaining. This terminology is likened to a foreign language to many TOD. However, these practices support skill acquisition and use strong behavioral principles of reinforcement to increase learning while decreasing negative behaviors.

Systematic instruction has been used with students with multiple disabilities to increase their independence and learn academic content (Browder & Xin, 1998; Head, Collins, Schuster, & Ault, 2011; Swain, Lane, & Gast, 2015). Systematic instruction is a teaching practice that allows students to learn academic and functional tasks without error (i.e., errorless learning). It provides a structure to teach discrete and chained skills. Pointing to objects, identifying numbers and letters, and naming pictures are examples of discrete skills. Washing hands, making food, and grooming are examples of chained skills. Both types of skills can be developed and are necessary for a DWD to be successful across home, school, and community environments.

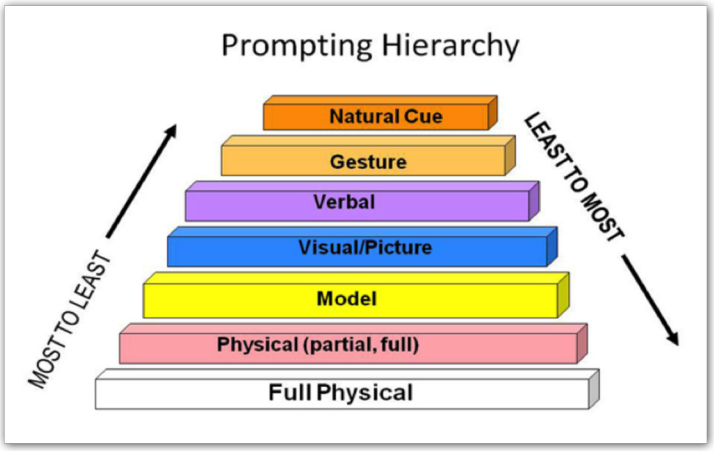
The basis of all systematic instruction is prompting and reinforcement. As strong behavioral strategies are implemented, teachers provide supporting prompts to allow students to be successful and

One of the first recommendations we would make for TOD working with DWD is the use of structure within their classrooms and instructional approaches.

subsequently receive reinforcement. As discussed above, behavioral theory instructs us that behaviors must be reinforced to continue. Therefore, when providing instruction, the teachers plan for the prompts required in order to allow for student reinforcement. Prompts fall along a hierarchy based on the level of support (see *Figure 4*). While most typically developing students with normal hearing can be successful in classrooms with classwide, verbal directions and prompts, students with even mild hearing loss require higher levels of prompting in order to be successful (Borders, Barnett, & Bauer, 2010). DWD will likely require high levels of prompting when initially learning a skill.

Most-to-least prompting. The systematic instructional procedure of most-to-least prompting is implemented when students with multiple disabilities are learning a new skill. Most-to-least prompting is not a natural delivery of prompts teachers use in the classroom. Teachers typically deliver the least-intrusive prompt (giving a verbal direction), and then increase prompting until the student can be successful. This system is called a least-to-most system of prompting. When using least-to-most prompting for a student with DWD, the student would likely need to wait through a series of prompts before the teacher reached the level required for success and reinforcement. There is also a higher level of error involved in least-to-most prompting. The increase of errors in the learning process creates student confusion regarding what led to reinforcement. Without a clear distinction between the behavior and the reinforcement, learning may be obstructed.

Figure 4
Prompting Hierarchy



Ease of fading a prompt is an essential first consideration when determining the order or type of prompt delivery. For example, a teacher can easily take away hand-over-hand prompts and move to touching a hand, whereas fading of a verbal prompt is very difficult. We recommend using most-to-least prompting with students who are DWD based on efficiency with which the student can gain reinforcement and planned fading of prompts.

Ease of fading a prompt is an essential first consideration when determining the order or type of prompt delivery.

Implementation of most-to-least prompting relies on the teacher's knowledge of the prompting hierarchy and understanding of schedules of reinforcement. The teacher presents a task and gives the student the opportunity to complete the task independently. For example, the teacher would like the student to greet a peer by waving. If the student cannot complete the task independently, the teacher provides a hand-over-hand prompt for the action of the wave and then delivers reinforcement. After the student demonstrates emerging ability to initiate the first step of the wave, the level of prompting is faded to partial physical, visual sign, and then proximity. It is critical that reinforcement be delivered after student success.

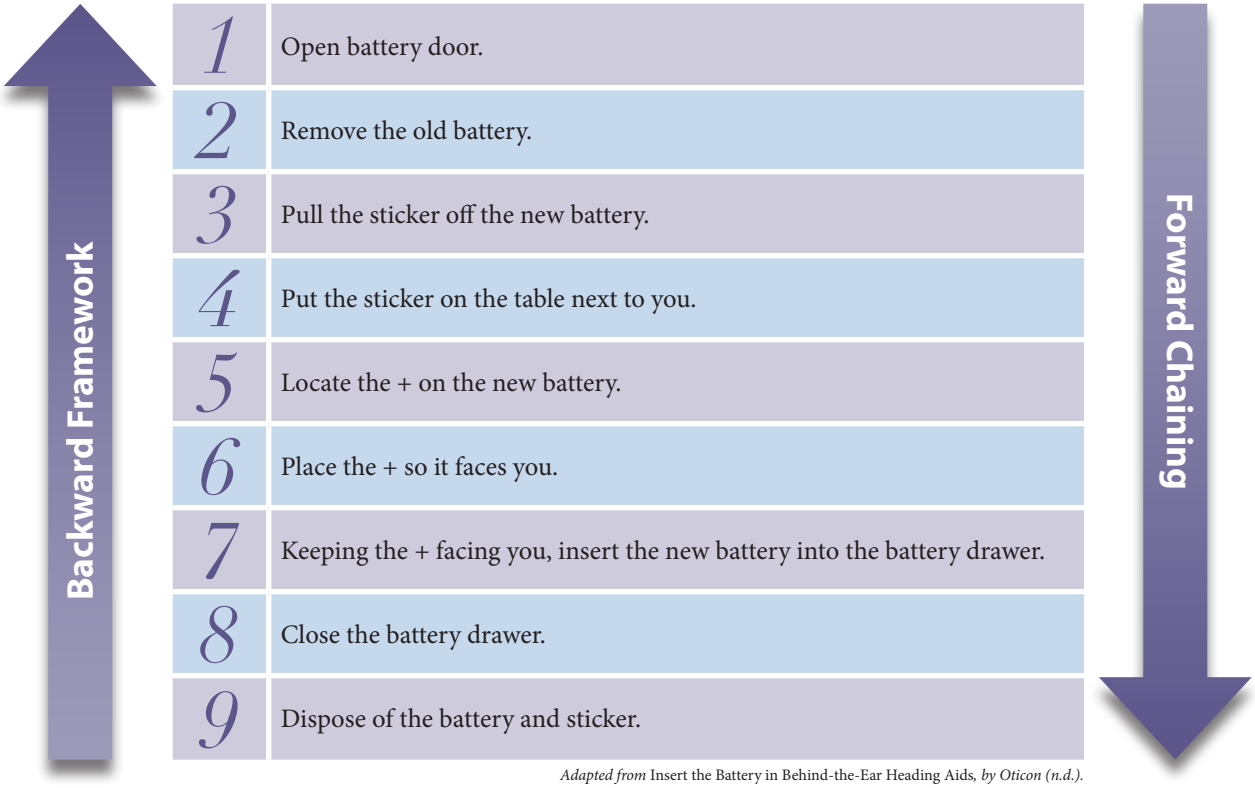
Simultaneous prompting. Teachers can also use a simultaneous system of prompting to teach discrete and chained tasks. Simultaneous prompting involves the use of one prompt—the controlling prompt—to set the learned behavior in action. Simultaneous prompting involves the use of two different types of sessions—probe and instructional. A probe session involves a student completing a discrete or chained task independently without reinforcement or support from the teacher. The teacher collects data on the steps the student can achieve independently. After the data is collected, the teacher implements the instructional sessions by using a prompt and simultaneously completing the task with the student. During each session, the student is reinforced for steps completed correctly. This allows the student to understand the expectations of the task through errorless learning, because the task is performed at the exact same time as the teacher (Brown, McDonnell, & Snell, 2016). For additional information on steps of implementation, see http://csesa.fpg.unc.edu/sites/csesa.fpg.unc.edu/files/ebpbriefs/Prompting_Steps-Simultaneous.pdf.

Constant time delay. Constant time delay is a systematic instructional practice that allows students to understand each component of a task—starting with immediate instruction using errorless learning (Alberto, Fredrick, Hughes, McIntosh, Cihak, 2007; Browder, Ahlgrim-Delzell, Spooner, Mims, & Baker, 2009; Kurt & Tekin-Ifter, 2008). Like simultaneous prompting, the instruction and reinforcement is immediate after the controlling prompt is given during the initial phase. As instructional sessions progress, the teacher will gradually increase the length of time between the task presentation and the prompt (e.g., waiting 3 seconds before prompting, then increasing the time to 5 seconds, etc; Downing, 2010; Snell & Brown, 2011). The result of successful implementation of constant time delay is a student completing and maintaining the specified task independently and with greater fluency. A free online module on time delay can be found at http://afirm.fpg.unc.edu/time-delay.

Forward/backward chaining. When a student learns a task that involves multiple steps (e.g., changing batteries in a hearing aid), teaching through chaining is beneficial. Chaining procedures have historically been useful when teaching students with multiple disabilities (Cihak, Moore, Wright, McMahon, Gibbons, & Smith, 2016). Chaining allows student success by approaching more complex tasks in small steps. First, a completed task is broken down into numbered steps/task analysis.

Figure 5 illustrates the backward and forward chain for the task of changing batteries in a hearing aid. Using a backwards-chaining design, the teacher helps the student with each step of the task analysis except for the final step. For example, the teacher helps prompt all steps, and at the last step—disposal of the battery and sticker—the teacher withholds prompting until the student successfully disposes the sticker and battery. After the student successfully initiates this step and disposes the sticker and battery, the student is verbally or physically praised (e.g., "Good job" or given a high-five) and provided any other selected reinforcer. During subsequent instruction, the teacher waits for the last two steps in a sequence—close the battery door and dispose

Figure 5
Task Analysis for Changing Batteries in a Hearing Aid



Adapted from Insert the Battery in Behind-the-Ear Heading Aids, *by Oticon (n.d.).*

of the battery and sticker. The process continues in a stepwise fashion until the student can independently complete each step in the behavioral chain.

When using forward chaining, the task is initially broken into small parts/task analysis. The teacher waits for the student to complete the first step of the chain and then provides reinforcement. The process continues, adding one step at a time, until each step in the task analysis is independently performed by the student.

These chaining and systematic instruction techniques are just a few examples of evidence-based strategies that have been shown to be successful with students with multiple disabilities/severe disabilities (Godsey, Schuster, Lingo, Collins, & Kleinert, 2008; Ulke-Kurkcuoglu, 2015). The main purpose of these instructional techniques is for students to gain independence and success with academic and functional skills. We recommend that TOD teaching students that are DWD receive training in implementing systematic instruction.

The main purpose of these instructional techniques is for students to gain independence and success with academic and functional skills.

Evidence-Based Practices

In addition to the instructional approaches noted in this section, TOD should be aware of additional evidence-based practices that may be used with DWD. *Table 4* includes a list of available resources related to evidence-based practices and professional development for special educators.

Conclusion

In this chapter, we have discussed prevalence of DWD students, difficulties with differential diagnosis, provided resources, and proposed a framework for approaching educational planning. It is imperative that teacher training programs (including professional development) include teaching methods, assessment, and accommodations appropriate for DWD learners.

Topics Addressed in Teacher Training

It may seem difficult to make the jump to training teachers to work with the DWD population when so much is left to be established (sociodemographic information, diagnostic procedures), but there is a clear mismatch between pedagogical approaches currently employed and the population of students in classrooms (Paul, 2015). Traditional teacher training programs in deaf education often focus content on teaching students who are deaf without comorbid conditions. Borders and Bock (2012) presented data indicating that when reviewing program course titles, only 16% of deaf education training programs included coursework that covered the topics of behavior management, additional disabilities, and academic or behavioral interventions outside of deafness. Further, 39% had one course

Table 4

Evidence-Based Practices & Professional Development Opportunities for Special Educators

Resource	Website
National Professional Development Center on Autism Spectrum Disorder	http://autismpdc.fpg.unc.edu/
OCALI	http://www.ocali.org/
The IRIS Center	https://iris.peabody.vanderbilt.edu/
Understanding DAD	http://understandingdad.net/
National Association of Special Education Teachers	http://www.naset.org/2701.0.html#c13080

NOTE: Free or membership-based opportunities for teachers are listed above for additional information on EBPs or instructional strategies for DWD students.

(predominately academic and behavioral interventions), 19% had two courses, and 26% did not include any courses with these topics. One limitation of that work was that it was only a review of course titles, and further investigation could reveal embedded content.

Guardino (2015) concurred that teachers' training was lacking in the topics of additional disabilities through her survey of 264 TOD. Teachers indicated that they did not receive disability-specific training for:

Attention-deficit hyperactivity disorder/ attention deficit disorder (ADHD/ADD)	35%
ASD	73%
Emotional behavior disorder	58%
Intellectual disability	51%
Learning disability (LD)	37%
Visual impairment	61%

Less than 50% of TOD reported using academic, social, or behavioral interventions for DWD, with the exception of the high-incidence, mild disabilities of ADHD/ADD and LD.

We recommend the inclusion of strategies and interventions from adjacent fields discussed above into training programs for TOD. Training TOD on the use of lifespan perspective, person-centered planning, instructional approaches, and practices mentioned in this chapter increases teacher self-efficacy when working with the DWD population. For teachers currently in the field teaching DWD every day, we recommend gathering information on each of these topics (see *Table 4*).

Finally, it is important that future research be conducted that focuses on DWD students, as there is a lack of research in this area. Collaborating with experts from adjacent fields can help scholars from the field of deafness discover effective practices that may be modified to meet the needs of DWD students. Moreover, using previously collected data sets can be utilized to identify and describe the population of individuals who are DWD. By obtaining a clearer picture of this population of learners, researchers can address the needs of teachers and focus research accordingly.

As the population of DWD students continues to grow and change, a response from the field is necessary. Providing high-quality educational experiences to all children is possible through increased research, practice, and modifying teacher training programs. In recent years, there has been a cry from practicing teachers for help in teaching this population of students. Answering this plea through changing teacher preparation programs and collaborative research is imperative.

Providing high-quality educational experiences to all children is possible through increased research, practice, and modifying teacher training programs.

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