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Universal Design for Learning: Promoting Access in Early Childhood Education for Deaf and Hard of Hearing Children

Katie Taylor, Raschelle Neild, & Michael Fitzpatrick

Abstract

The following article is a literature review of the guiding principles for universal design for learning (UDL) specifically for early childhood education with implications for children who are deaf and hard of hearing (DHH). In recent years, early childhood education has become more inclusive for *all* children with and without disabilities. Given that educators need to plan lessons and design their classrooms with every child in mind prior to meeting them, guidance on the UDL framework is warranted. DHH children present unique barriers in the classroom. This article walks through the three guiding principles, engagement, representation, and expression along with integration of assistive technology for DHH children and their educators. Three future directions for integrating the UDL framework into the classroom are included. They are (a) educator preparation programs, (b) school district's professional development, and (c) select available technology web-based resources.

Keywords: *deaf education, deaf/hard of hearing, early childhood education, universal design for learning*

Introduction

The fundamental premise of universal design is to help ensure individuals—with and without disabilities—have access to all products, buildings, and exterior spaces to the maximum extent possible (Mace, Hardie, & Place, 1996) and serves as the model for universal design for learning (UDL) (Stockall, Dennis, & Miller, 2012). However, unlike universal design, the foundation of UDL extends beyond physical access and provides educators a set of guidelines for curriculum development, planning, and implementation that gives all learners equal opportunities to learn (Meyer, Rose, & Gordon, 2014). Additionally, UDL employs the following three guiding principles: (a) providing multiple means of engagement, (b) providing multiple means of representation, and (c) providing multiple means of action and expression (CAST, 2020). From these perspectives, UDL provides teachers a framework to deliver flexible instruction, materials, and assessments to meet the unique educational needs of students with and without disabilities.

The development of these founding principles were a result of ongoing research across several fields of education and learning theories (see Stockall et al., 2012; Grazzaniga, Ivry, & Mangun, 1998; Vygotsky, 1978) and emphasizes educators being proactive in order to teach to the edges of the child's abilities (Nepo, 2017). Further, UDL is directly aligned with Vygotsky's theory of constructivism (Trudge & Winterhoff, 1993) and Piaget's theory of cognitive thinking (Trudge & Winterhoff, 1993). Although UDL deviates from their stance by encompassing technology, given their theories have practical applications in pre-k-12 classrooms, both psychologists are often taught in teacher preparation programs.

The purpose of this article is to focus on using the three primary principles of UDL in preschool environments to support deaf and hard of hearing (DHH) children and provide a structure for implementation. Additionally, this article will provide background information related to policies and research related to UDL in early childhood education (ECE) settings, an overview of UDL in preschools, and the

practices for implementation for DHH children in ECE. The following section provides a historical foundation for special education (SPED) laws and policies.

Laws & Policies Related to UDL in Preschools

In 1986, the reauthorization of the *Education for All Handicapped Children's Act* (P.L. 94-142) required schools to provide children from the age of three to receive services in the least restrictive environment (LRE) to the maximum extent possible (see P.L. 99-457). Moreover, for more than forty years, the *Individuals with Disabilities Education Improvement Act* (IDEIA, 2004) and federally funded ECE programs, such as Head Start, mandated preschool children with disabilities to receive educational services alongside their nondisabled peers in the LRE (Barton & Smith, 2015; Turnbull, Turnbull, & Wehmeyer, 2010). Part C of IDEIA (2004) also ensured states would be supported as they developed early intervention plans for providing services for infants and toddlers (i.e., birth-to-three) and their families (Odom, Bysse, & Soukakou, 2011).

Unfortunately, despite the spirit of SPED laws, children with disabilities continue to encounter significant barriers and struggle to receive equitable access to educational opportunities (see Fitzpatrick, 2010; Fitzpatrick & Theoharis, 2014; Walraven, Fitzpatrick, Velarde, Allen, & Rodriguez, 2010). However, the United States educational system has continued to evolve by passing increasingly strenuous laws and reforms focused on accountability, assessment, and research with the express goal of increasing student learning outcomes. For example, the *No Child Left Behind Act* (NCLB, 2002), which replaced the *Elementary and Secondary Act* (ESEA, 1965), created the need for research-based interventions, core curriculum, standardized testing, and highly qualified educators (see Fitzpatrick & Knowlton, 2007).

According to Nepo (2017), the implications and impact of NCLB (2002) were significant because the educational needs of children with disabilities were largely unmet due to the one-size-fits-all nature of the Act. More recently, in 2015, the *Every Student Succeeds Act*

(ESSA) was established to replace NCLB to provide high-quality education to all children, including those with disabilities. Unlike NCLB, ESSA provided educators a modicum of flexibility regarding when and how to conduct evaluations. It also provided multiple means of assessment including portfolios, projects, and evidence-based teaching strategies. In addition, it widened its provisions to preschool services (Nepo).

These federal mandates address access to the general education curriculum for children and youth with disabilities. A key phrase and concept included in IDEIA (2004), Part B, stated, “participation and progress in the general education curriculum” (Federal Register, 2006). It is clear from the statute that the expectation is for *all* students to (a) be held to high standards, (b) have access to challenging curriculum, and (c) attain meaningful learning outcomes (Agran, Alper, & Wehmeyer, 2002). These expectations extend beyond Part B and encompass Part C. Ensuring compliance with federal mandates (i.e., access to the general education curriculum & documentation of progress) requires teachers to make sure each child has access and learns essential content, concepts, and skills from the general education curriculum children in ECE programs (Nolet & McLaughlin, 2005).

One of the primary factors which went unaccounted for when these and other laws were enacted is the nation’s changing demographics. Since these laws were enacted, the demographics of preschool students in the United States have drastically changed. Compared to the past, there is an increase in ethnic, language, economic diversity, and family circumstances (Forum on Child & Family Statistics, 2011). While this group of children is modestly growing; however, in addition to the increase in cultural and linguistic diversity, many preschool children live in poverty.

Further, educators, policymakers, and researchers have noted preschoolers arrive with significant differences in their prior learning experience and background knowledge, which would naturally be expected given the statement mentioned above. Professionals

can document and have collected data showing high quality ECE programs help all children succeed across all domains and areas (Brown, Knopf, Conroy, Gooze, & Greer, 2013). Despite SPED laws, these factors elevated the difficulty for early childhood teachers—and other professionals—to ensure effective inclusion is happening (Odom et al., 2011). NAEYC (2009) reported that these circumstances are unlikely to change, and preschoolers need a greater variety of learning experiences than in the past.

Research Related to UDL in Preschools

Currently, the discrepancy model is still being used to determine student eligibility for special education services. Based on inclusionary and exclusionary criteria, not all children qualify or have access to SPED. Given educators are still operating under the *wait-to-fail* model, UDL provides a proactive approach for differentiating instruction. For example, UDL gives educators a variety of adaptive resources, curricular units, and other resource materials designed to maximize accessibility. Additionally, Nepo (2017) suggested that UDL allows multiple means of engagement, representation, and expressions in which educators can teach to the edges of their children's abilities.

UDL in Preschools

As noted above, UDL helps ensure support is provided to meet the needs of *all* children. Additionally, Horn and Banerjee (2009) recommended incorporating UDL into preschool classrooms, which promotes the inclusion of *all* children by creating a healthy, rich, and nurturing environment. Incorporating UDL requires preschool teachers to give careful thought to the environment and curriculum concerning the principles of UDL, as well as children with and without disabilities. Rather than teaching to *middle abilities*, educators can expand their instruction to teach to the edges of the child's abilities.

The genesis of inclusion for students with disabilities can be traced back to the *Education for All Handicapped Children's Act* (1975), which, as noted above, was reauthorized in 1994 and 2004 (Nepo,

2017). However, the movement to provide students with disabilities greater services and increase their access to the general education curriculum—with their same aged nondisabled peers—continues to be a struggle. Yet, with increased advocacy groups and professional development focused on inclusion, it has created a positive impact and subsequent success stories shared all over the United States.

For DHH children, the impact of inclusion takes on a new light because they make up approximately 0.1 percent of children in SPED. Mapepa and Magano (2018) stated, “For curriculum to be effectively implemented, it has to be flexible and accessible to all children, including children who are deaf” (p. 2). Sadly, more often than not, special educators in the field of deaf education are left to their own devices to adapt the general education curriculum and assessments to be accessible for DHH children.

DHH children have the opportunity to be evaluated by the public school system as part of the transition from birth-to-three services or anytime between the ages of three-to-five to be determined eligible for services under IDEIA Part C (2004). Services provided to young DHH children include but are not limited to: (a) language/speech, (b) audiological management, (c) academic support, (d) language interpretation, (e) occupational and physical therapy, and (f) expanded core curriculum.

Multiple Means of Engagement

The first principle of UDL is to engage children and create momentum that sustains them (i.e., involvement) throughout the lesson. There are multiple means of engagement within the field of SPED that support children’s interests and provides adequate motivation and challenges for learning. In the preschool setting, the focus is on creating appropriate environments and instruction that encourages the overall development and support of *all* children and their needs within the classroom community (Darragh, 2007).

Providing multiple means of engagement is achievable throughout the planning process because UDL includes the physical layout

(i.e., design) of the classroom environment. Specifically, classroom arrangement is critical to fostering student learning through interactive lessons, movement, play, and manipulating objects around the room. For DHH children, educators need to plan for a low student-to-teacher ratio. DHH children typically perform higher when the class size is smaller compared to when they are in a large class (Mapepa & Magano, 2018).

Additionally, DHH children need the classroom acoustics to be optimal because they often struggle with typical classroom background noise such as chair feet moving on a hard surface, music played in the background during a lesson, fluorescent lights, HVAC systems, reverberation of speech and sounds on hard surfaced walls, etc. Therefore, it is important to create an environment where the educator's voice is at least 15-to-20 decibels (dB) above the classroom noise level at the level of the child's ear. Optimal speech to noise ratio (SNR) aid in minimizing speech perception, language comprehension, and the child's listening fatigue concerns (Nelson, Poole, & Munoz, 2013).

Young children engage in their classroom environment through their senses. Thematic lessons with multiple ways to engage in the topic and concepts through the room through touch, smell, sound, and taste provide a way for the learner with options to engage in the key concepts of the lesson. Similarly, DHH children benefit from multi-sensory language lessons, including turn taking, peer to peer interaction, movement and action (Darragh, 2007).

In the United States, a child can enter the public school system at the age of five if their birth date falls within the local public school district's cutoff date in the fall. Before attending kindergarten, parents have the opportunity to enroll their child into a variety of preschool and pre-kindergarten programs. Preschool options range from half day to full day, 1-2 days to five days a week, community-based, private and public academic settings, non-trained and non-licensed staff to fully trained and licensed educators. For DHH children, the classroom setting needs to be a language rich environment with typical language models (Huang, Smith, Spreen, & Jones, 2008)

Multiple Means of Representation

The second principle of UDL focuses on how educators present their content in multiple methods. In addition to interactions that occur daily (e.g., calendar time, centers, sensory tables, learning stations, etc.), teachers can differentiate their instruction by having materials available in a variety of formats. For example, they can read a storybook in hardcopy or digitally, introduce the concept of sharing with pictures or videos, and teach the alphabet using sand or shaving cream.

For DHH children, Mapepa and Magano (2018) recommend using visual representations of all materials (i.e., pictures, diagrams, & illustrations) to enhance their understanding of the lesson. Therefore concepts, vocabulary, or language targeted in the lessons should have an accompanying visual representation. For example, a lesson about tigers should include a story about tigers, pictures of tigers, spelling of tiger, and sign language representation of tiger.

Multiple Means of Actions & Expressions

The last principle of UDL enables multiple ways for children to demonstrate what they have learned. In the preschool setting, teachers focus on observing, documenting, and assessing skill achievement across time. Students are then typically rated on a continuum ranging from *introductory-to-mastery*. Therefore, it is important to note that every student's need for expression can vary greatly and Darragh (2007) suggested that teachers use various assessment strategies that support every learner's unique educational needs. Please note that educators observing DHH children may discover they have a skill in a different context.

Providing Equal Access Through Technology

In the field of Deaf education, the three most commonly thought of technologies include (a) bone-anchored hearing systems, (b) hearing aids, and (c) cochlear implants. These technologies help DHH individuals access spoken language, environmental noises,

and other auditory information through audiological pathways. Other available technologies are often referred to as *hearing assistive technology*, which includes but is not limited to: (a) ear level or soundfield, (b) frequency modulation (FM) / digital modulation (DM) systems, (c) induction loops, (d) videophones, (e) alternative and augmented communication devices, and (f) live/open/closed captioning. Regardless of the technology, young children will need to be introduced and taught how to utilize this technology to interact with the world around them (IDEIA, 2004).

When young DHH children enter the preschool setting they may only have experience utilizing their personal hearing aids or cochlear implants. They have yet to be introduced to other *hearing assistive technologies*. To date, the most prevalent technology in the preschool setting is the introduction and utilization of FM/DM systems.

Historically, it has been thought to reach the goal of students being good reporters of their device's functioning prior to using FM/DM technologies. However, now that technology has progressed into digital modulation and performs at high levels of accuracy the practice introduces and utilizes this technology while simultaneously working on their reporting skills. The digital modulation technology performs at such a high level that home use is also encouraged in preschool and younger (Bacic, 2019).

Young DHH children entering into public preschool may not have been exposed to an accessible language. As noted above, many factors can contribute to this occurring including but not limited to: (a) lack of knowledgeable birth-to-three service professionals; (b) lack of parent education; (c) family cultural, ethnicity, and language differences; (d) social-economic factors; (e) lack of follow up from universal newborn hearing screening; (f) late or not yet identified or diagnosed; (g) limited access to technology such as properly fit hearing aids or bone-conduction hearing system; and (h) underutilized technology. The multidisciplinary team must consider the students' needs of assistive technology (AT) and provide their

access to the system (Nepo, 2017). Continuous assessment of the educational setting, the learner's language acquisition, and familial needs are required to ensure adequate progress is being achieved.

Managing audiologists and educational audiologists recommend and fit AT, such as FM/DM systems, for the classroom. It is the public school system's responsibility to provide equitable access to the curriculum at the same time as peers are accessing the content. Educators of children who are DHH will assist the Educational Audiologist with setting up the technology, introduction utilization, and maintaining the function of the technology (DeConde Johnson et al., 2014).

Learning to use Assistive Technology. The onus of responsibility is on both the DHH child and their parent(s) or guardian(s) to learn how to use hearing AT hardware and software devices. Similarly, it is important for educators, paraprofessionals, ancillary staff, and other members of the academic community to be aware of how to operate and troubleshoot AT because, more often than not, preschool children are *not* placed in a classroom with dedicated educators who have training or experience working with DHH students and their accompanying technologies. Therefore, educators who learn how to utilize AT effectively greatly enhance the DHH child's ability to learn to communicate, acquire language, and excel academically, socially, emotionally, and behaviorally.

Given their limited knowledge and training, preschool educators must consciously plan to integrate technology—including AT—throughout the day to ensure DHH students have access to the general education curriculum. They must also learn when not to utilize the technology. Therefore, educators should develop a system with the preschooler to communicate when the technology should be used, when it should be muted, or should not be utilized. Developing a system takes time and often requires a strong partnership between home and school.

Educators may notice a benefit of the technology for other students not identified as DHH. The benefit may occur when using

closed captioning or the soundfield FM/DM system. For example, Morris et al. (2016) suggested closed captioning can aid students who are not identified as DHH with attention/focus, learning a second language, and emergent literacy skills (i.e., reading). Another benefit educators may notice when using soundfield systems is that it aids in their voice quality and preservation and benefits young children with attention/focus and auditory processing (da Cruz et al, 2016).

Assistive Technology Evaluations. Recommendations for hearing AT should come from the student's managing and educational audiologist. However, under the provisions of IDEIA (2004), parents have the right to request or inquire about AT. Therefore, it is not uncommon for school systems to receive requests and subsequent recommendations from parent(s) or guardian(s) to provide access to AT devices (e.g., hardware & software) to help maximize their DHH child's ability to access the general education curriculum.

Formal AT evaluations are typically aligned with the student's goals, benchmarks, and objectives delineated in their *individualized education plan*. Although the school (i.e., multidisciplinary team, case manager, etc.) is conducting the AT evaluation, the educator and student should begin utilizing the technology at the onset of the evaluation timeline and through the evaluation (DeConde Johnson et al., 2014).

SETT Framework. As outlined in the National Association of State Directors of Special Education's (NASDSE), ensuring successful outcomes for DHH: Educational Service Guidelines suggests the utilization of the Student Environment Tasks Tools (SETT) Framework (Zabala, n.d.) for gathering data and tool selection for AT in the educational setting. This framework will aid the AT team in looking for desired features and functions of the technology as well as determining usability for the young learner. The tools trialed must be matched to the features and functions for the desired outcomes for access to the curriculum and achievement in instruction (NASDE, 2018).

Table 1
UDL Tools & Strategies for DHH Preschool Students

Feature	Tools & Strategies	Summary
Hearing AT	Ear level Digital Modulation Systems: Transmitter, Receiver(s), Soundfield Speaker, Induction Loop, & Streamer	Educational audiologist paired with educators for the Deaf can assess and set up hearing assistive technology for the optimal SNR
	SETT Framework: Student, Environment, Tasks & Tools (NASDE, 2018)	Framework to guide assistive technology evaluations for feature and function matching of tools
Curriculum Planning	UDL Lesson Plan Creator (PATINS, 2017)	Guide to create a comprehensive UDL lesson plan
	Thematic Units of Study	Incorporating concepts throughout all aspects of the environment & lessons with repeated exposures to content
Environment	U-Shaped Tables, Centers, Learning Stations, and Seating Arrangements	Allows students visual access to peers and educators, direct communication, optimal acoustics
	Minimize all Background Noise/Music	Optimize acoustics
Instruction	Repetition of Vocabulary	Reinforces neuropath ways and promotes language development
Visual Representation	Real Pictures with English Words and the Corresponding Sign	Reinforces neuropath ways, promotes language development and exposure to multiple languages
	Real Objects Representation of Concepts	Strengthens concepts and promotes language development
	Closed/Open Captions on all Media	Considered time spent reading, aids in emerging reading skills, and access to English language

UDL Tools & Strategies

Table 1 contains various UDL tools and strategies to use with DHH preschool educators. It is important to note that this is not intended to be an exhaustive list; rather, these serve as a truncated analysis of common preschool age/grade appropriate functions for DHH children.

Future Directions

Given the advances and exponential growth of technology, it is important for preschool educators to maintain their competency and currency of AT for DHH children. From this perspective, the following three recommendations focus on AT integration into educator preparation programs, site-based professional development, and pertinent information from select technology web-based available resources (see Table 2).

Teacher Preparation Programs. Although UDL has a long-standing history, it appears to have received increased attention since ESSA was signed into law in 2015, and the framework has found its way back into preservice educator preparation programs. Preservice preschool educators need exposure to education on how to design and plan their classrooms and lessons universally. Preservice educator preparation programs need to include learning how to develop lesson plans, conduct observations assessments, and complete practicums with educators mastering UDL in the classroom. Programs should focus on integrating courses with special education and general education preservice educators working together to ensure universal design for DHH children.

School District Professional Development. School districts provide professional development and strategic planning to move each building into planning universally for all children from the start of the academic school year. Connecting with state resource networks is a great way to obtain technical assistance at low to no-cost for the districts. National organizations such as CAST also work with states to build and amend policies related to UDL.

Table 2
Technology Resources for Educators in Deaf Education, Early Childhood

Resource	Website	Summary
Early Childhood Technical Assistance Center (ECTA)	ECTAcenter.org	State contacts and guidance on assistive technology
Assistive Technology Industry Association (ATiA)	ATiA.org	Up-to-date information about assistive technology research results, guidelines, government programs, and communities
Optimizing Outcomes for Students Who are Deaf or Hard of hearing Educational Service Guidelines	NASDE.org	Guidelines for the wide range of services and supports for children who are deaf or hard of hearing

Conclusion

This article specifically focused on using the three primary principles of UDL in preschool environments to support DHH children and provided a framework for implementation. The article also provided a truncated analysis related to policies and research related to UDL in ECE settings.

Planning and implementing for children who are DHH has made its way through being included in preschool settings to be taught to the edges of their abilities. With the framework and guiding principles of UDL, we can continue the push for all educators to plan for all children before they walk into the classroom. Finally, all educators need to remove barriers that hinder DHH student access to the general education curriculum.

Authors Note

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