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Curriculum and Instruction for Deaf and Hard of Hearing Students: Evidence from the Past—Considerations for the Future

Maria C. Hartman *, Elaine R. Smolen  and Brynne Powell

Department of Health and Behavior Studies, Teachers College, Columbia University, New York, NY 10027, USA

* Correspondence: mch33@tc.columbia.edu

Abstract: Improving educational outcomes for d/Deaf and hard of hearing (d/Dhh) students has long been a focus of d/Dhh education. This article reviews historical efforts to improve outcomes through specialized curriculum and instruction and explores the instructional needs of current d/Dhh students in light of the field's evolving landscape. Evidence for historical and current curricula developed specifically for d/Dhh students, particularly in the areas of language and literacy, is systematically reviewed. While many of these curricula were developed for use in specialized classrooms and schools for the deaf, most d/Dhh learners are now educated in mainstream settings using the spoken language(s) of their local communities. The instructional needs of this growing population of d/Dhh students, including the need for systematic, evidence-based instruction in reading, are discussed. Finally, the current and future roles of teachers of the deaf in facilitating effective instruction for d/Dhh learners are explored.

Keywords: deaf; hard of hearing; deaf education; instruction; curriculum



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1. d/Dhh Education: A Changing Landscape

What do d/Deaf and hard of hearing (d/Dhh) children need to learn, and how do they need to learn it? The field of d/Dhh education has grappled with these questions since the earliest days of formal schooling for d/Dhh students. Apart from the age-old debate over communication modality and language access for d/Dhh children lies an essential question that spans the visual/auditory divide: Do d/Dhh children need specialized curricula and/or instruction to develop language, literacy, and academic skills? If so, what should these educational programs look like? In this article, we review the efforts to develop specialized curricula and programs for d/Dhh learners, from the early 20th century to the present, including the research base to the extent that it exists, for each, before offering recommendations for the future of instruction for d/Dhh learners within the context of our ever-changing field. We begin with a brief overview of the historical and present context of d/Dhh education in North America.

For the better part of the twentieth century, d/Dhh children in the United States were educated in schools for the deaf, in classes of exclusively d/Dhh learners led by teachers of the deaf [1]. While the official mode of communication used in classrooms often emphasized English—whether through speechreading, a signed English system, or a combination thereof—American Sign Language (ASL) flourished in residence halls and through cultural and recreational programming [2]. Students often lived on campus, contributing to the prevailing notion that d/Dhh education encompassed more than simply academics to include social-emotional development and cultural and linguistic transmission [3]. Because infants' hearing acuity was not routinely screened, many children were identified as d/Dhh at age 2 or later, and d/Dhh education services often began only with entry into formal schooling in kindergarten [4]. Most instruction in schools for the deaf necessarily emphasized learning visual strategies, as early hearing technology often did not provide adequate access to the speech spectrum required for most d/Dhh children to learn through audition [5,6].

The passage of Public Law 94–142 in 1975 [7], and its subsequent reauthorizations as the Individuals with Disabilities Education Act (IDEA), have shifted the emphasis in special education from self-contained schools and classrooms to inclusion in community schools whenever possible [8]. While the notion of what represents the “least restrictive environment” (LRE) for d/Dhh learners remains hotly contested [9], the trend in d/Dhh education has followed that of the broader field of special education. Today, more than 85 percent of d/Dhh children in kindergarten through 12th grade are enrolled in public schools where they are fully or partially mainstreamed [1]. Many d/Dhh children are identified at or shortly following birth through universal newborn hearing screening and subsequently fitted with digital hearing aids or cochlear implants during infancy [10]. Approximately 85 percent of d/Dhh students now utilize this technology to use listening and spoken language as their primary modes of communication [11]. No matter which spoken and/or language(s) families choose for their d/Dhh children, education may now start well before kindergarten through family-centered early intervention [12]. These shifts toward early identification, intervention, and inclusive education may have wide-reaching implications for the curriculum and instructional needs of d/Dhh learners today.

2. What Is Curriculum?

The general term *curriculum* has been used to refer to the educational experiences of students in schools, including both explicit and implicit, or hidden, instruction in academic and non-academic subjects [13]. In the context of planned instruction, the singular *curriculum* most precisely refers to an evidence-based, pre-planned set of learning activities including detailed scope and sequence information, materials, assessments, and guidance for educators regarding its implementation [14]. However, the term *curriculum* is often used colloquially also to refer to instructional *programs* that are designed to teach specific skills but may not meet all the quality indicators for a formal curriculum. The overall quality of a particular curriculum or program may be evaluated by examining the qualifications of those who developed it, the robustness of the evidence base of its methods, and the purposes for which it is promoted [15]. The implementation of the curriculum, i.e., how teachers use it in the field, is also a critical measure of its quality and effectiveness. As we will discuss, many programs, particularly those developed in the early decades of formal d/Dhh education, may have a limited research base or lack details regarding their alignment with state or national standards. Recognizing historical disagreement over these terms, and the widespread use of *curriculum* and *program* to refer to the same sets of instructional methods, we use both terms interchangeably in this paper. Given the historical focus on language and literacy development in d/Dhh education, we also limit our review to curricula and programs designed to promote literacy or signed and/or spoken language acquisition for d/Dhh students (i.e., children and adolescents with reduced hearing acuity who may identify as culturally deaf, medically deaf, hard of hearing, or d/Dhh in many other ways).

3. Curriculum in Context: A Historical Perspective

Curriculum development in education has always reflected society’s larger historical, political, and philosophical trends. For example, in the United States, curriculum content was heavily influenced by major global events such as the Cold War and the launch of Sputnik. During this race to space, American investment in science, technology engineering, and mathematics (STEM) grew steadily, and organizations such as the National Science Foundation (NSF) were initiated and strengthened, generating new ways of thinking about teaching and learning in STEM areas [16]. In the twenty years following Sputnik, and with funding from the NSF, curriculum content and teacher training in the sciences was almost completely revamped.

Curriculum content may be partially or entirely guided from outside of schools by overseeing bodies such as school boards or state education departments where state statutes or regulations may either require or recommend that local schools use state-approved

curricula in the classroom. This is the case in Louisiana, where a state board approval of the local curriculum is required [17], and in Maryland, where local public schools are required to use Universal Design for Learning (UDL) principles in their curriculum development [18]. Since the beginning of 2022, at least 17 state-level laws have been passed restricting what teachers can say about gender, race, sexuality, American history, or inequality in K-12 schools and in some colleges/universities. In many other states, laws have been passed requiring K-12 instructional materials to be more inclusive [19].

In d/Dhh education, the curriculum has largely been influenced by competing paradigms related to whether d/Dhh children should use and learn in a signed language or spoken language, but it has also been influenced by societal leanings, developing understandings of child language acquisition, and understandings of child development in general. What follows will highlight the larger curriculum trends and the historical eras and educational philosophies from which they emerged.

3.1. Early Deaf Education (Pre-1950s)

Up until 1867, most d/Dhh children in the United States attended state schools that had been heavily influenced by the work of Thomas Hopkins Gallaudet and Laurent Clerc [20]. Though little is known about the formal curriculum used, what students learned was delivered through ASL. In 1867 the Clarke Institute for Deaf-Mutes, the first oral school, was established in Northampton, Massachusetts, and, subsequently, numerous other institutions that promoted the use of the oral method came into existence. During this time, many factors in U.S. society coalesced to provide both the means and the motive for educating d/Dhh children regardless of the communication mode. The national notion of self-reliance and the belief that religious salvation was possible through an understanding of scripture gave rise to a quest for universal literacy and vocational training. Whether instruction was conducted in signed or spoken language, the goals of deaf education centered on imparting literacy, training for productive labor, and Christian salvation [20].

If economic independence and religious salvation were to be reachable goals, d/Dhh children would need to be literate in order to attain them. Early training in reading in most American schools at the time involved rote methods of instruction and analytical approaches to teaching English grammar; curricula developed for d/Dhh children followed suit. The programs next reviewed all involved presenting structural aspects of the language (parts of speech, syntactic rules, etc.) that a student was intended to use to learn language deductively: all involved visual cues to generate or correct production, formal instruction, teaching by rote, repetition, and drill.

3.1.1. Analytic Approaches

The first and perhaps longest-running curriculum was invented by George Wing, a teacher at the Minnesota Institute for the Deaf from 1872–1885. His system, referred to as the *Wing Symbols for Teaching English Syntax*, involved a system of symbols used for written language instruction that was in practice at the school until 1976 [21,22]. The symbols (letters, numbers, and line figures) represented the forms and functions of words in a sentence. The Wing system emphasized the explicit instruction of English syntax through the grammatical position of words in sentences. The goal of the symbols was to provide teachers with a tool for teaching the various positions and forms of words. The students were then expected to memorize the forms and then generalize them in the correct order to create novel sentences.

Another structured and grammatical approach to teaching English was the *Five Slate System*, later known as the *Barry Slate System*, published in 1899 by Katherine Barry, which according to Schmitt [23] was widely used in the early 1900s at many schools for the deaf. At the time, Barry was a teacher at the Colorado School for the Deaf. Her purpose was to present a visible sentence skeleton to the students in which the students could place simple language forms. The five “slates”, set up as columns, refer to the different parts of speech: subject, verb, object of the verb, preposition, and object of the preposition [24]. Eventually,

a sixth slate was added for time and time phrases. Initially the “slates” used students’ names and familiar objects and events to teach the system, and then students were expected to rely less on the slate headings, having internalized each sentence structure. Barry’s curriculum was one of the first published curricula for the deaf and hard of hearing and was used at nearly every school for the deaf in the country during the early twentieth century [22].

Following Barry’s system, another program, *Straight Language for the Deaf: A System of Instruction for Deaf Children* (1926), was published by Edith Mansford Fitzgerald, who was deaf herself and a teacher at the Virginia School for the Deaf and Blind. In it, she introduced the *Fitzgerald Key* which also presented a six-column scheme designated by interrogative words and symbols to represent parts of speech and sentence function [25]. She suggested that d/Dhh children be taught the basic headings and after the child mastered these basic headings, they would go on to proceeding columns and thus develop language by “building the Key”. She proposed that the Key was to be used as a tool for teachers and a reference for sentence construction and for self-correction as the students went through instruction. Considered groundbreaking at the time, the book went through numerous editions with the final one issued in 1980 [26,27].

Each of the systems constructed by Wing, Barry, and Fitzgerald emphasized the use of visible cues to indicate parts of speech and how to use them to form simple English sentences. The ultimate goal for each curriculum was to enable d/Dhh students to understand English sentence structure and then to be able to generate meaningful sentences independently. Although the Wing Symbols, The Five Slate System, and the Fitzgerald Key were widely accepted by deaf educators and used for generations in the schools, it is questionable whether this goal of generalization was fully achieved for most d/Dhh children, and there was no research base to formally document their success other than anecdotal acclaim or critique [21,22].

By the early 20th century, the United States had undergone decades of accelerating immigration and was becoming more and more a heterogeneous society. Between 1850 and 1920, 34 million immigrants had entered the country, mostly from poorer areas of Europe, each with their own language and customs. As they entered the country and made their way into various cities and towns, they encountered mixed reactions from existing Americans. U.S. involvement in World War I, and European hostilities in particular, intensified awareness of the “foreigners” in their midst and the societal push toward assimilation escalated. In May 1915, the National Americanization Committee was established to promote the idea of “Americanization”, the process by which an immigrant to the United States becomes a person who shares American culture, values, beliefs, and customs by assimilating into the American nation. Schools were just one of many institutions to promote Americanization through curriculum content, and at the core of the curriculum was the English language, American history, and the governmental structure of the United States [28].

It was during the early stages of the Americanization movement that Zenas Westervelt, then superintendent of the Rochester School for the Deaf, introduced the *Rochester Method* [29], a method designed to replace signed language and encourage English-only communication through manual spelling and speech. In Westervelt’s own words, according to Padden and Gunsauls [30]: “It were better for every child who is to spend his life among the American people that he should be brought up an American and not a foreigner”. What differentiated the Rochester Method from the three previously discussed programs was Westervelt’s idea that d/Dhh children could learn language naturally like typically hearing children as long as they had access to that language. In his work with young d/Dhh children, Westervelt used games, toys, and the daily routines of childhood as his “curriculum” for language development, presenting vocabulary and phrases through fingerspelling [31]. Words were introduced and repeated until the child began to use the words and phrases independently. The *Rochester Method*, Westervelt believed, rendered English completely transparent, and through that, full access d/Dhh individuals would be able to read, write,

and reason [30]. Though tedious and time-consuming, the Rochester Method was used at various institutions through the 1960s.

3.1.2. The Natural Approach

In the period between the end of World War I and the 1950s, there was not yet a full-fledged understanding that child language acquisition might be a different and separate, though related, area of study from adult language processes. As a result, the goal of most research on language acquisition was, for the most part, focused on establishing norms [32]. Large-scale investigations focused on accumulating data on when children articulate different speech sounds, the size of their vocabularies at various stages, and the length of their sentences at different ages. Behaviorist orientations still dominated thinking on how to design curriculum, and this was reflected in the programmatic instruction used in most schools for the deaf. Throughout the 1930s and 1940s though, there was an increasing influence on the field that came from a growing knowledge base in both child psychology and the psychology of learning, along with a sense that the structured language programs of the previous century had not achieved documented success.

During this period, Mildred Groht, a teacher of the deaf and ultimately the principal of the Lexington School for the Deaf in New York, began to outline her theories of language as a natural process evolving through interaction with others rather than a subject to be taught in school. The principles she promoted in her 1958 book, *Natural Language for the Deaf* [33], veered away from the prior analytic approaches focusing on exercises, repetition, and drill that Groht felt produced a patterned and stereotypic use of language. Her thinking instead was to encourage language the way hearing children acquire it by exposure to correct language patterns and through the child's guided use of language in meaningful situations. Groht felt that the child's needs and interests should direct vocabulary and language input, and when formal structures needed to be taught, they should be introduced in natural situations that are relevant to the child's experience and developmental level. Groht also emphasized the use of residual hearing and phonological development, both following typical developmental norms. Groht did not develop a curriculum for use with d/Dhh children but was insistent that teachers of deaf children have strong preparation and understanding of the principles of language development and that they be able to transfer this knowledge to the natural learning environments of young children. While this was considered radical thinking at the time, Groht's approach was consistent with emerging ideas in the nascent field of child language research.

3.1.3. Combined Approaches

The mid-1950s have been characterized as a revolutionary period in the field of psycholinguistics, the study of the relationships between linguistic behavior and psychological processes, including the process of language acquisition. Chomsky's [34] work in transformational grammar in adult language inspired new design studies and explorations into the fledgling field of child language research. Beginning in 1962 at Harvard University, Roger Brown embarked on a longitudinal study of three young children that laid the foundation for developmental psycholinguistics and the specific study of children's language acquisition. The results of Brown's research published in his 1973 book, *A First Language: The Early Stages* [35], challenged popular behaviorist notions that the ability to learn languages was determined by external stimuli and through a child's imitation of adult utterances. Instead, he showed that language is acquired on a fixed schedule and that children develop different levels of language competence as they learn to understand morphemes or parts of words. The natural approach of Groht, and new thinking about child language acquisition fueled by Chomsky, Brown, and colleagues, ushered in a new era of looking at language development among d/Dhh children.

The psycholinguistic perspective that human beings have an innate capacity for language and that d/Dhh children, given both the opportunity to learn and sufficient exposure to language, could acquire language like typically hearing children led to the

work of Jean Moog [36] and Alice Streng [37] at the Central Institute for the Deaf (CID) in St. Louis and the work of Peter Blackwell [38] at the Rhode Island School for the Deaf. The 1970s may be seen as the era of the “combined approach” to curriculum, as the language learning programs developed at these institutions all reflected a move away from the box-like construction of sentences and contrived teaching of vocabulary associated with the earlier systems of Wing, Barry, and Fitzgerald. Though each continued to advocate for a structured approach to teaching, it was emphasized that the teaching should occur during natural experiences and at the child’s developmental level. In particular, the *Rhode Island Curriculum* [38] used naturally occurring instances such as subject area topics, current events, and children’s own narratives to generate an understanding of language through a transformational grammar framework [34].

Another extensively used program that emerged during this period was the *Apple Tree* curriculum [39,40] developed by teachers at the Iowa School for the Deaf. A **P**atterned **P**rogram for **L**inguistic **E**xpansion **T**hrough **R**einforced **E**xperiences and **E**valuation is still commercially available and advertised not only for use with d/Dhh children but for other special education populations and for English language learners. The curriculum includes a set of ten workbooks presenting ten basic sentence patterns and additional transformation forms. Though these workbooks were intended only to supplement other more natural language learning experiences, many schools for the deaf in the U.S. adopted them as a complete language program for language instruction. This restricted use of the *Apple Tree* curriculum in effect likened instruction to the earlier more rigidly structured programs of the previous era and will be addressed further in this article.

Finally, through the *Reading Milestones* series developed and updated throughout the 1980s, Quigley and King [41,42] applied the combined approaches of natural language and structured exposure to a basal reading series for d/Dhh children. At the time, *Reading Milestones* was the only reading program specifically designed for d/Dhh students and was thus widely used. The series still exists today but markets itself to a larger audience as an alternative, language-controlled program designed to take readers to a fifth-grade reading level [43]. Its original purpose was to introduce grammar structures and vocabulary gradually, from simple to complex, through illustrated stories that were expected to be of interest to the reader. Figurative language was introduced in the later levels. Much like the traditional series of basal readers, the series came as a kit and included a teacher’s manual, placement assessments, children’s readers, and accompanying workbooks. Unlike many of the earlier curricula, the development of *Reading Milestones*’ scope and sequence was based on what was considered at the time to be extensive research by its authors [44].

3.2. Special Education Law and the Emergence of Early Intervention

The 1970s brought significant change to the field of special education. In 1975, the Education for All Handicapped Children Act [7] was passed to guarantee equal access to public education for children with disabilities. This act of legislation designated that all children had a right to education and to full inclusion in mainstream education classes unless a satisfactory level of education could not be achieved due to the nature of the child’s disability. The Education for All Handicapped Children Act was renamed the Individuals with Disabilities Education Act (IDEA) in 1990, which further elaborated on the inclusion of children with disabilities into regular classes but acknowledged the rights of parents to be involved in the educational decisions affecting their children [45,46]. IDEA requires all students with disabilities to be provided access to the general education curriculum so that they might make progress in the same grade-level curriculum as their peers. In 1986, Congress established the program of early intervention for infants and toddlers with disabilities [47], acknowledging the acute and considerable need to enhance early intervention services. These laws collectively led to two marked changes in where and when students with disabilities, particularly d/Dhh students, received mandated services.

The first large-scale change was related to placement. As mentioned above, at the current time only 12 to 15 percent of d/Dhh children are educated in segregated schools,

while close to 85 percent attend local public schools where they are educated either fully or partially in the mainstream [1,48]. The more these children are included in these non-segregated environments, the more exposure they have to the general curriculum versus a specialized curriculum for d/Dhh students. The passage of the early intervention laws in the mid-1980s led to a second big change related to *when* children with disabilities should start to receive services. Early intervention (EI) is the term used to describe the services and supports that are available to babies and young children with developmental delays and disabilities and their caregivers. Currently, all states in the US and eligible territories participate in the federal Part C program, which provides annual funding to each state based on census figures of the number of children, from birth through age 2, in the general population. As of 2023, every state in the US has an Early Hearing Detection and Intervention (EHDI) program charged with identifying infants and young children who are d/Dhh. As hearing loss can affect a child's ability to develop speech, language, and social skills, the earlier a d/Dhh child begins receiving services, the more likely the child's speech, language (signed and/or spoken), and social skills will reach their full potential [49]. Expanding options in school placement and the growing availability of EI so that children might not be restricted to separate schools brought to the fore the need to reassess traditional ideas about curriculum and instruction for d/Dhh children.

During the earlier part of the twentieth century, questions regarding child development were framed within relatively simple paradigms that reflected the competing influences of nature and nurture. Subsequent research, particularly that of Piaget [50] and Vygotsky [51], promoted more global theories of children's cognitive and language development, while also introducing the notion that a child's early relationships with caregivers could significantly impact development. These understandings began to shape the overall design of the early childhood curriculum being developed on a large scale for programs such as Head Start and, ultimately, the evolving structure for early childhood services for children with disabilities [52].

One of the first specialized curricula to be developed for the d/Dhh field was *SKI-HI* [53], an EI and training model that debuted in 1972. The *SKI-HI* program was one of the first in d/Dhh education to acknowledge the role of caregivers and to promote a reconsideration of parent–professional relationships. The curriculum emphasizes a coaching model that supports families in learning how to promote communication and language with their child in ways that best match the child's needs. The curriculum is inclusive of all communication choices (i.e., visual/sign and spoken language) and addresses child development in literacy, cognitive, and social-emotional development. Families are offered choices; oriented to possibilities; provided information, skills, and resources; and are positively reinforced for their agency in their child's progress. The curriculum itself was last published in 2004. The program is associated with the SKI-HI Institute, a unit of the Research and Evaluation Division of the Center for Persons with Disabilities at Utah State University. *SKI-HI* has been through a validation study, is research-based, and has been revised numerous times since its inception [54–57]. The *SKI-HI* Model is a companion program to the Deaf Mentor Model Program, another curriculum used to train deaf mentors to work with children and families who choose to learn more about early visual communication, American Sign Language, and deaf culture [58].

Another curriculum widely used in early childhood programs but not specifically created for d/Dhh children and families is *HighScope*, developed in 1962 by James Weikart and influenced by Piagetian concepts of active participatory learning [59]. *HighScope* describes itself as a comprehensive curriculum model that addresses all areas of development and parallels five dimensions of school readiness identified by the National Education Goals Panel [60]. The *HighScope* manual notes that longitudinal studies of children who were enrolled in *HighScope* preschool programs indicate that these children have performed better in school, have needed fewer special education services, and have had a stronger commitment to schooling than children with no preschool or those who participated in a direct instruction model program [61]. The adoption of *HighScope* by many early childhood

programs serving with d/Dhh infants and toddlers gives a significant nod to the idea that, even in the presence of certain additional disabilities, d/Dhh children do develop according to typical developmental patterns, though perhaps more slowly than children without disabilities or perhaps needing additional support.

3.3. Standards-Based Education Movement

Revisions to IDEA continued to occur throughout the 2000s, consciously reflecting larger movements in education reform. The standards movement in U.S. education was born as a result of the 1983 publication of “*A Nation at Risk*” [62], a review of the inadequacies of the American public school system in preparing students, including students with disabilities, for future demands of either college or the workplace. In 1989, President George Bush convened an education summit at which six broad goals were set for the year 2000. Among these goals was one that said American students would complete grades four, eight, and twelve “having demonstrated competency in challenging subject matter, including English, mathematics, science, history, and geography” [63] (p. 7). As a result, states were charged with developing performance standards that could be used to measure competency in these subjects culminating in the establishment of the Common Core Standards. Standards-based education can be defined as a process for planning, delivering, monitoring, and improving educational programs where clearly defined academic content standards provide the basis for content and assessment [63]. A standards system is intended to ensure that all students, including students with disabilities, learn what is deemed important rather than allowing textbooks or a particular curriculum to dictate classroom practice. For students with an Individualized Education Program (IEP), academic goals must be aligned to grade-level standards even if the child is performing below grade level. Standards-based education does allow for instruction that includes accommodations, modifications, assistive technology, and supports that facilitate participation with peers but specifically requires that children with disabilities be exposed to grade-level content along with expectations for success.

Embedded within the standards movement was the idea of evidence or research-based curriculum and instruction, the proposition that education practices should be based on the best available scientific evidence, rather than tradition, personal judgment, or historical conventions.

A research-based curriculum is meant to promote teaching practices and learning experiences that are consistent with research on how children develop and learn. In 2002 the US Department of Education founded the Institute of Education Sciences (IES) to provide scientific evidence to guide educational practice and to share that information through the What Works Clearinghouse (WWC), a digital library of educational research on evidence-based instruction [64]. Concerns have been raised about WWC’s ability to keep up with the research in its reporting and about the validity of its ratings of curricula; nevertheless, it holds promise as a central and trusted source of scientific evidence for what works in education [65].

In the midst of standards-based education and the call for evidence-based instruction, programs for d/Dhh children continue to emerge, some with less of a research base than others. The *Fairview Learning Program* [66], developed at the Mississippi School for the Deaf, describes itself not as a curriculum but as a literacy intervention for d/Dhh children who use ASL. The program incorporates phonemic awareness activities, literature-based instruction with an emphasis on comprehension, memorization of 220 Dolch words (along with their 520 ASL translations), and memorization of 265 idiomatic phrases (with their accompanying 600 ASL translations). A fifth aspect of the program involves a translation component where students express themselves in ASL and teachers assist them in translating the stories into English and writing them correctly. Though the program refers to research that supports its principles, there is very limited evidence of its effectiveness, and it is not listed on the WWC website [67]. Notwithstanding the lack of a solid evidence base, the program

maintains a large Facebook following and is often referred to by teachers of the deaf and hard of hearing in social media groups [68].

The *Bedrock Literacy Curriculum* [69] states that it was designed specifically for teachers of d/Dhh children as they create a language arts program for their students. The manual is written for teachers of beginning literacy students (K-2); however, teachers of older students who do not have solid foundational literacy abilities may find the strategies, discussions, and tools useful. It is not a curriculum in the traditional sense, but rather a way to provide teachers with information about literacy development—especially for those students who are at high risk for not developing strong literacy skills. Similar to the *Fairview* program, specific research on its efficacy is sparse, though many teachers of d/Dhh report using *Bedrock* in their classrooms [70].

Fingerspelling Our Way to Reading (FOWR) [71] and Foundations for Literacy: An Intervention for Young Children Who Are Deaf and Hard of Hearing [72] are two recently developed supplementary literacy programs from the Center for Literacy and Deafness (CLAD), a consortium funded through a grant from IES. FOWR was designed to enhance phonological awareness of fingerspelled words for d/Dhh children who use ASL to increase expressive and receptive fingerspelling skills and identification of printed words [71]. Foundations for Literacy was specifically designed to teach d/Dhh students the basic skills found necessary for reading proficiency in hearing children [72]. It incorporates a variety of modifications, including visual supports such as visual phonics, pre-teaching, and scaffolding techniques. Leveled activities, stories, and vocabulary are also used to address the diverse language abilities of DHH children. As these programs were specifically funded through the IES, there is somewhat more documented evidence of their effectiveness than other programs mentioned in this section [72–76].

Finally, the *Strategic and Interactive Writing Instruction (SIWI)* technique, an instructional technique created for bilingual d/Dhh learners, scaffolds writing in English through visual and systematic instruction in ASL. Developed by Wolbers and colleagues [77], the system employs graphic organizers and checklists as visual tools to support students in planning and organizing their writing. *SIWI* is based on evidence in strategy instruction, interactive writing instruction, and second language learning and has been investigated through two IES grants [77–83].

To close this section, we interpose that without doubt, the most important person in the curriculum implementation process is the teacher, whose knowledge of content, classroom practice, and learning principles are perhaps tantamount to any program that on its own claims to be the answer for all learners. Effective teachers encourage learning by delivering content in intelligent, creative, and impactful ways, regardless of the quality of the individual program or curriculum.

4. Specific Populations and Unique Challenges

While the overall arc of d/Dhh education has shifted toward meeting the needs of children and families who have accessed early identification, EI, and hearing technology use, there exists considerable individual variation among the diverse population of d/Dhh students in North America [84]. Federal and state EHDI programs endeavor to screen hearing levels by 1 month of age, identify deafness by 3 months of age, and begin intervention (including fitting with hearing technology, as desired by the family) by 6 months of age [85]; the Joint Committee on Infant Hearing has recently proposed lowering these “1–3–6” benchmarks to “1–2–3” months of age [85]. However, according to the most recent data available, approximately 40 percent of d/Dhh infants are not identified by 3 months and are not enrolled in EI by 6 months [86]. Families of these children often face linguistic, economic, geographical, and other systemic barriers that lead to late identification and challenges in accessing culturally and linguistically appropriate family-centered EI [87,88]. As early identification and intervention are linked to stronger language, literacy, social-emotional, and academic skills, children whose deafness is identified later in infancy or toddlerhood are at risk for delays across developmental domains [49,89,90]. Although the

extent to which these children are “late identified” varies widely, children who do not begin receiving an intervention, including access to a language, until preschool or kindergarten (or even later) may more closely resemble the pre-UNHS population of d/Dhh students than their contemporaries. They may thus require more specialized instruction using d/Dhh-specific curricula designed for students with significant delays in accessing language and literacy. The strategies contained in *FOWR* [71], *Foundations for Literacy* [72], and *SIWI* [77] may be especially beneficial for this group of d/Dhh learners.

Similar to children who are late identified and/or new to formal schooling, d/Dhh children with disabilities may require special consideration with regard to curriculum and instruction. The share of d/Dhh children who have disabilities is significant, as approximately 40 to 50 percent of d/Dhh students have another identified or suspected condition, including autism spectrum disorder (ASD), specific learning disability, and other sensory and/or developmental disabilities [48]. This group, while diverse, has been shown to be at an overall greater risk for language and academic delays than the general d/Dhh population [91]. Children who are d/Dhh with ASD, cerebral palsy, and/or developmental delay are particularly at risk for a decline in their language scores year over year; that is, although they can develop spoken and/or signed language, their progress often does not keep pace with that of their d/Dhh peers without disabilities [91]. These children may require specialized curricula tailored to their pace and style of learning delivered by instructors with expertise both in deafness and special education. As teachers of the deaf largely feel un- or underprepared to work with d/Dhh students with disabilities, effective intervention for this population might include not only specialized curricula but also specific training for the professionals who serve them [92].

5. Conclusions

Teachers of the deaf have played a key role in curriculum and instruction from the very beginning of formal d/Dhh education. In their traditional roles of leading classes in self-contained schools for the deaf, teachers of the deaf observed first-hand the challenges that their students had in developing language and literacy. In response, they experimented with specialized strategies to make concepts explicit and visually accessible to their students. Indeed, many of the early curricula specifically designed for d/Dhh children were originally developed by teachers and administrators at schools for the deaf for use with their own students [24,29,38]. While these programs were borne out of and addressed the teacher-creators’ practical needs, there is limited evidence that the programs were effective once published and implemented more widely. Most early language and literacy curricula for d/Dhh learners were widely distributed and adopted before high-quality research—or, in some cases, any research—demonstrated their effectiveness [21,24,25,29]. Several more recent programs have been studied more extensively [43,53,72,78]; although, it is not yet clear whether any d/Dhh-specific curriculum meets the criteria for an evidence-based practice [93]. Without a strong evidence base for a particular intervention, it is not possible to determine whether implementing the intervention will have the desired positive outcome on students’ learning; ineffective curricula may at best waste precious instructional time or at worst actively impede students’ progress [94].

The lack of strong evidence behind most d/Dhh-specific curricula also means that there exists little research on implementation fidelity or the extent to which practitioners can or do implement a curriculum as its developers intended. Without a rigorous development process, including piloting and modifying the curriculum in a variety of real-world settings, many curricula in the field of d/Dhh education have been implemented in very different ways by individual teachers. This has led to the misuse and overuse of curricula beyond what the developers intended. *Apple Tree* [39], for example, was created to provide direct syntax instruction within the context of what the authors envisioned as immersive natural language experiences. When teachers used *Apple Tree* not to supplement, but in place of, these natural experiences, the curriculum became the sort of rigid, ineffective

language program that Anderson and colleagues were attempting to replace. In this way, a curriculum, however thoughtfully developed, is only as effective as those implementing it.

In the contemporary context—early identification and intervention, widespread mainstreaming, and access to sound through cutting-edge hearing technology—more d/Dhh children than ever before have access to typical curricula and are succeeding with them. Our lab’s longitudinal research, for example, has found that culturally and linguistically diverse d/Dhh children who use spoken language, on average, achieve age-appropriate reading skills in elementary school through the use of general-education literacy programs [95]. Several other recent studies have yielded similar results [96,97]. As early as the 1950s, Groht [33] and other proponents of natural language emphasized the importance of effective teaching based upon the principles of general language development over the use of any one prescriptive curriculum. In their view, d/Dhh children need to develop the same knowledge and skills as typically hearing children, though they may need more explicit and intensive instruction to do so. With the majority of d/Dhh children using the spoken language(s) of their homes and communities to learn alongside their hearing peers, this view seems even more relevant today. What many d/Dhh students may need is not necessarily a specialized curriculum, but specialized instruction delivered by teachers of the deaf and other professionals with a deep understanding both of deafness and of the science of learning.

6. Recommendations

Even with growing enrollment in mainstream settings and the increasing use of listening and spoken language, d/Dhh students continue to need specialized support to access general education curricula. Family-centered intervention in early childhood that emphasizes natural language acquisition through routines and play builds the auditory and/or visual language foundation that children will later need to develop literacy skills [12,49]. When children enter formal schooling, language access to both the explicit and hidden curriculum is key. Following the principles of Universal Design for Learning (UDL), considering co-enrollment programs, and designing the learning environment to maximize auditory and/or visual learning may all facilitate access to, and success with, the general education curriculum [98]. The effective and consistent use of hearing technology, including remote microphone systems, for children who use listening and spoken language can also help to overcome the learning challenges inherent in large and noisy mainstream classrooms [99].

Beyond the physical environment, high-quality, well-prepared professionals are the key to effective instruction for d/Dhh learners, no matter the language they use, their prior access to intervention, or their identification with disabilities beyond deafness. All teachers require expertise in professional knowledge, instructional planning, instructional delivery, assessment, learning environment, and professionalism [100]. Teachers of the deaf additionally need a strong knowledge of deafness, speech acoustics, language acquisition, and the science of reading [101]. Perhaps even more crucial is the ability to apply this foundational knowledge to collaborations with families and general educators that facilitate full access to the academic curriculum, whether it was specifically developed for d/Dhh learners or not. University d/Dhh education programs must prepare teachers of the deaf who can apply the lessons of the past to the challenges of the future in an ever-changing field. After all, curricula, however well-developed, do not teach students, teachers do.

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