

English Literacy in Deaf Education

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Abstract

The purpose of this paper is to discuss the factors influencing the English literacy development of signing deaf children. The literacy rates of deaf high school graduates have been consistently reported as equivalent to that of an average 3rd or 4th grade hearing child (Mayer, 2009, p. 326). The factors contributing to this gap in literacy rates revolve around language acquisition and development. Issues in first language access, exposure and quality as well as differences in deaf and hearing language development are discussed. Theories of bimodal language and literacy development show unique qualities of ASL-English bilingual-bimodal that may begin to explain the cause of difficulty in English literacy skills among signing deaf children in the academic setting. Further research much be conducted in order to further develop educational programs for literacy development that are effective for deaf students.

Keywords: communication disorders, deaf studies, deaf education, bilingualism, literacy, language, reading, writing

The development of English literacy skills is a vital and fundamental aspect of education for all students both deaf and hearing. Literacy skills, such as reading and writing are fundamental to society as they are a means of communication and the transmission and sharing of ideas. For deaf children the acquisition of these literacy skills does not come as easily as it does to hearing children. This is exemplified in the consistent underperformance of deaf children in literacy tasks to the degree that deaf high school graduates have performed at literacy achievement levels equivalent to those of 3rd or 4th grade hearing students (Mayer, 2009, p.326). It is estimated that approximately 0.2-0.3% of children born each year have an identifiable degree of hearing loss (NIDCD). Deafness, as opposed to hearing loss, is defined by the Individuals with Disabilities Education Act as, “a hearing impairment that is so severe that the child is impaired in processing linguistic information through hearing, with or without amplification that adversely affects a child's educational performance” (U.S. Department of Education). Despite several approaches to literacy education for deaf students, this gap in literacy achievement has persisted. In the discussion of literacy learning for deaf students, it is essential to discuss the factors that contribute to deaf children’s ability to readily acquire literacy skills in the school setting. Though there are several methods of intervention for hearing loss in children, the focus of this paper is on the literacy issues surrounding deaf children who were born deaf or had become deaf before the acquisition of language and whose first language is that of American Sign Language.

Deaf children often experience delayed exposure to language due to delayed identification of hearing loss and subsequent delayed intervention measures. Delayed language exposure often leads to delayed language acquisition which has implications for further language and literacy development for deaf children. Education and learning of English print literacy skills

upon entrance into the formal school setting differs greatly for deaf and hearing children, as deaf children must learn an entirely new language in an entirely new mode before the development of literacy skills can occur. American Sign Language (ASL) being the first language of deaf children, written English is a new language that children must learn in order to develop English literacy skills. Deaf children are thus bilingual and should be thought of as such in the English literacy education as principles of bilingual language acquisition apply to their subsequent literacy learning. The first step in understanding the differences in the way deaf and hearing children develop literacy skills is through the lens of language development.

Language Development in Deaf Children

Before we are able to address the issue of the perpetual gap in the literacy rates of deaf and hearing children in the contemporary educational setting, it is necessary to understand the ways in which deaf children process language for literacy learning as well as how these processes differ from those of their hearing peers. In the 'hearing' world, it is not widely known, how deaf children learn, process and relate to language. There are several common misconceptions regarding language acquisition and experience for deaf children. It is a common assumption that children who are prelingually deaf -- meaning that they are born deaf or become deaf before developing a first language -- are unable to develop language and achieve language milestones on par with their hearing peers. In contrast to this assumption, it is also commonly assumed that in the event children do exhibit typical language development, that they learn and experience language in a similar manner to hearing children.

While it is true that, deaf children often have delays in language development, it is false that they are unable to develop language via similar processes and at a similar rate as their

hearing peers. According to Meier (1991), children show a strong predisposition to learning language and though this predisposition is biological in nature, it is flexible as to include language modalities other than speech, such as sign (p. 60). Humans show a natural inclination to develop language and given adequate exposure to a given language and the absence of a language disorder, will develop language in a predictable way. Though 30-40% of school-age children identified as deaf have an additional disability contributing to difficulties in language or literacy learning (Ye, 2014, p. 321), deafness alone is not inherently a disorder of language. Deafness is an absence of adequate hearing to perceive enough spoken language for speech development.

Hearing loss is an invisible disability. Deafness does not manifest with any visible symptoms and for parents of an unidentified deaf child, any indications of hearing loss are subtle if present at all. Therefore, though it is a misconception, the idea that deaf children do not develop language as well or as quickly as their hearing peers, does hold some truth. The development of language, whether it be in the signed or spoken modality relies on the child's consistent access and exposure to the language as well as the quality of the language model. For hearing children of hearing parents, this does not often pose an issue due to the constant exposure to speech both directed towards them and in the environment around them. In the case of deaf children of hearing parents, there is often a delay in access to language due to factors limiting the linguistic environment.

According to Dougherty (2017), between 90 and 95% of deaf children are born to hearing parents. The majority of those parents are unlikely to know American Sign Language, nevertheless feel competent enough to teach their deaf child. These parents must learn ASL with their child in order to teach them language. Whereas hearing children have constant exposure to

native spoken language in the world around them, deaf children do not. More likely than not, in the first few years of life, the only access to ASL that deaf children will receive is in direct interactions with their parents and/or caregivers. Hearing parents of deaf children are unlikely to use ASL when they are not directly communicating with their child, thus environmental exposure to native language models of ASL are often not provided.

Communication and language development in the first six months of an infant's life are nearly identical in deaf and hearing children. According to Dubeif (2013), approximately 15-18 hours per day of an infant's first months of life are spent sleeping. Several more hours of an infant's day are spent eating. Only a few hours of the day are left for caregiver and child interaction thus it is very difficult for one to notice any behavioral indications of hearing loss. In the first six months of life, both deaf and hearing children exhibit similar pre-linguistic and preverbal behaviors (ASHA, My Smart Hands) such as differentiated cries based on needs, making verbal pleasure sounds and responding to a caregiver's attentive facial expressions (ASHA, ASHA, My Smart Hands). Both deaf and hearing children tend to respond to stimuli in similar ways. Due to the fact that visual and auditory stimuli are not often presented in complete isolation from each other, it is often difficult to determine which stimulus an infant is responding to.

For deaf children of hearing parents, language development begins at the time of accessible language exposure which varies greatly based on the age of identification and intervention. Limited access and exposure to language has been proven to have a significant impact the language development of deaf children (Humphries et al, 2016, p. 606). According to Canala (2006) et al. the average age in which infants are identified as having hearing loss categorized as deafness is 20.5 months. This means that intervention measures, on average, are

not initiated until after this time. This also means that children may miss out on up to two years of spoken language exposure. This is a significant if not the most significant factor contributing to delayed language development and subsequent literacy skill development that is so pervasive among deaf students. In order to develop language at a typical rate, a child must be provided and exposed to rich, consistent and accessible language models. Due to the fact that deaf children do not possess the hearing ability to perceive spoken language, the spoken modality of language is not adequately accessible to deaf children and thus a deaf child cannot develop spoken language alone without additional sensory input.

Though it is unfortunately the case for many deaf children that language exposure, access and quality are not ideal, and it is not the case for all. It has been shown that, given early language exposure to American Sign Language or another signed visual language, deaf children are able to achieve language development milestones at the same rate and in the same sequence as their hearing peers. It is important to remember that many of the factors affecting the language access of deaf children are external environmental factors and do not diminish deaf children's innate capacity to develop language. In fact, in the case of deaf children of deaf parents, more ideal environmental language conditions are exemplified for ASL development in children. Children, both deaf and hearing, of deaf parents are immersed in native or near native sign language environments in which ASL is the primary language and thus the first language that these children are exposed to. It is in these near ideal language accessibility conditions that the potential for language acquisition can be best exemplified in both deaf and hearing children.

In a comparison of the language and communication milestones of deaf children in ASL and hearing children in spoken English, both similarities and differences in development can be

seen. Both cases assume adequate exposure and access to quality language models. In the first 3 months of life, both the receptive and expressive language characteristic of hearing and deaf children are very similar (ASHA, My Smart Hands). For both deaf and hearing infants, communication in the first few months of life is intended to get basic needs met and bond with their parent and/or caregiver. Both deaf and hearing children respond to touch from a caregiver, look around their environment with alertness as well as attend to a caregiver's face and smile in response to attentive expressions (ASHA, My Smart Hands). Both deaf and hearing children respond to movement and changes in light in their environment though deaf children tend to be more sensitive to these visual environmental changes as their attention is not split between visual and auditory stimuli as in hearing babies (My Smart Hands, Stephenson). Hearing babies tend to rely less on visual stimuli to learn about their environment as they also attend to auditory stimuli (ASHA). Hearing babies tend to startle to loud noises, quiet or smile when spoken to and change behaviors such as crying or sucking in response to sound (ASHA).

Around the age of six months, deaf babies begin to show a strong preference for visual stimuli such as hand and finger play with or without a caregiver. Around this age deaf babies tend to show a preference for being held facing outward towards visual stimuli and are attracted to moving and colored objects. Deaf children tend to be more receptive to movements and facial expressions at this age (My Smart Hands). Both deaf and hearing babies at this age smile, laugh and make eye contact with their caregivers (ASHA, My Smart Hands). Hearing babies additionally attend to sound stimuli, responding to a caregiver's tone of voice as well as music and toys that make noise. Hearing children tend to use more vocalizations in play as they are reinforced by

caregivers. Babbling sounds tend to sound more like speech and vocalizations are used to express excitement and displeasure (ASHA).

By the age of 6 to 9 months, the characteristics of many expressive and receptive behaviors of deaf and hearing children become more distinct and linguistic elements begin to emerge in communication. At this age both deaf and hearing children enjoy simple repetitive games such peek-a-boo and patty cake though deaf children are more attentive to movement and touch and hearing children are much more tuned into sound (ASHA, My Smart Hands, Stephenson). By this age both deaf and hearing children are tuned into language behaviors and their function in communication. Around the age of 9 months both deaf and hearing children begin to imitate communication in their respective languages as well as recognize words, names or signs for common people and objects in their environments (ASHA, My Smart Hands). Deaf children do this by attending to signing adults as well as imitating simple sign movements, often the directionality aspect. Additionally, hand babbling during play is common among deaf children at this age (My Smart Hands). Hearing children around 9 months of age tend to be particularly attentive to sounds, attending to environmental sounds and speech when spoke to. Hearing children tend to babble orally using phoneme groups of varying lengths, in patterns similar to speech. Hearing children attempt to imitate speech sounds and use speech sounds to get and keep a caregiver's attention (ASHA).

According to Anderson and Rielly (2002), deaf children's first signs emerge between the ages of 8-12 months of age as simple hand shapes primarily composed of nouns. By a deaf child's first birthday, they possess a vocabulary of approximately 10 signs (My Smart Hands). For hearing children first words emerge around a child's first birthday or between 11 and 14 months of age

(Anderson and Reilly, 2002) For both deaf and hearing children, gestures with communicative intent develop between 9 to 12 months of age (ASHA & My Smart Hands). The difference between the gestures of deaf and hearing children is that those of deaf children are primarily linguistic in nature and those of hearing children are often more communicative in nature meaning that they support and supplement oral communication (Meier, 1991, p. 67) . Deaf children point to themselves and other things with linguistic intent whereas hearing children point as a means of clarifying or supplementing oral language (p. 67). Around their first birthday, hearing children begin to respond to requests and engage in conversational turn taking behavior (ASHA).

By the age of 12 to 18 months, deaf children begin to combine signs into simple 2-word sentences and ask simple questions using facial expressions as well as use gestures and touch to get caregivers' attention and indicate needs (My Smart Hands). Hearing children at this age are similarly able to follow simple commands such as identifying parts of their bodies by pointing and understand simple questions (ASHA). Around the age of 18 months for both deaf and hearing children, print awareness begins to emerge. Deaf children show recognition of alphabetic letters by pointing to and subsequently signing them (My Smart Hands). Hearing children exhibit this by recognizing that words correlate to verbal stories. Hearing children also point out pictures in books when they are named (ASHA).

Around the age of 18 months deaf children possess an expressive vocabulary of as many as 40 signs with a receptive vocabulary of many more (My Smart Hands). Around the age of 20 to 24 months, hearing children rapidly develop new vocabulary words as well as oral motor skills allowing them to use several different phonemes in the initial position of words (ASHA). Both

deaf and hearing children at this age consistently combine words or signs to create simple sentences and/or questions (ASHA & My Smart Hands). Around 24 months, deaf children develop conversational turn taking and possess a vocabulary of 200 or more words. Deaf children at this age show an affinity towards both telling ASL stories in the present and seeing ASL stories told from books (My Smart Hands). Around the age of 24-36 months, deaf children begin to use fingerspelling and express the emotions of themselves and others through signs. Also, around this age, deaf children begin to regularly use ASL to tell stories and share their daily life and experiences with others (Enns & Price (2013), p. 4). Hearing children at this age have a vocabulary word for nearly everything in their environment and frequently use 2-3-word sentences to talk about, name and ask for things. By this age hearing children's speech has become more intelligible (NIDCD, 2017).

Between the ages of 3 and 5 years (36-60 months), both deaf and hearing children develop and refine the ability to ask and answer 'what', 'where', 'how' and 'why' questions (Enns & Price, 2013, p. 4 and NIDCD, 2017). Around the age of 4 years, deaf children show developed conversational turn taking skills including maintaining visual attention during conversation and appropriate gaze shifting. For deaf children complex sentences forms emerge with subject-verb-object grammatical structures. Children at this age use language to discover how things work and play games (Enns & Price, 2013, p. 4).

Bilingualism in Deaf Children

While language development of ASL among deaf children in deaf families and spoken English development of hearing children in hearing families parallel each other well, it is not often the case that the circumstances of language acquisition are so straightforward and distinct.

Approximately 90-95% of deaf children are born to hearing parents who often do not expect to have a deaf child and often do not know sign language (Ye, 2014, p. 321). Most deaf children must inevitably engage and interact with members of the 'hearing' or non-deaf culture as it is the dominant culture in society. Parents, regardless of the hearing status of their child, always strive to provide the best language environment for their children's development. Since no two deaf children's abilities, experiences, or resources are identical, and thus cannot be compared, the best language approach for each child must be unique to their individual language and communication needs. Though there are many different approaches that parents may employ to provide the best language condition for their deaf child, the focus of this paper is on deaf children whose first and primary language is American Sign Language regardless of the hearing and/or language status of their parents. This stands as opposed to other signing methods that are commonly used and are not recognized as official languages with the defining characteristics of a fully developed language that ASL possesses.

When discussing bilingualism among deaf children, it is important to differentiate between spoken language bilingualism and sign language bilingualism due to the social and linguistic implications of these different modalities. Bilingualism is defined as the regular use of two languages regardless of the proficiency level in each language (Fish & Morford, 2012, p.2). In most cases of bilingualism there are different levels of proficiency in each language, dependent upon language function, use, and age of initial acquisition. As previously discussed, American Sign Language is its own unique and complex language with its own linguistic characteristics independent and distinct from English. Therefore, the ability of Deaf children to use both ASL and written English for communication in daily life complies with the definition of bilingualism.

According to Fish and Morford (2012), the majority of the world population, approximately 50-75%, can be considered bilingual though in the United States a much lower incidence has been reported (p. 2).

In the United States, the most common type of bilingualism is that of proficiencies in two oral languages, such as English and Spanish. In the case of bilingualism in two oral languages, the second language, or L2 is developed based on the first language or L1. According to Jim Cummin's Theory of Linguistic Interdependence, there is a common proficiency underlying all languages. According to this theory, proficiency in one's first language provides a foundation in which the development of a second language is based. This means that the quality of first language input and development impacts the ability to learn the second language. The quality and quantity of language development in the second language is based on that of the first language. In support of the Linguistic Interdependence Theory, research has shown that the level of proficiency in one's first language is a powerful predictor of their development and proficiency in a second language (Mayer, 2009, p. 332).

Cummins' linguistic interdependence theory was initially developed based on the premise that all languages are auditory-oral in modality. Since Cummins' does not explicitly state the exclusion of manual-visual languages, the concept of linguistic interdependence has been adapted by proponents of Deaf education to form the basis of the bilingual/bicultural approach currently utilized in contemporary deaf education practices. When discussing bilingualism in deaf individuals, there is an additional component of bimodality, as the two languages being considered are American Sign Language and written English. Bilingualism of these two languages is unique in the sense that individuals are learning the written form of a second language in the

academic setting without exposure to the oral form of the language (Mayer, 2009, p. 326). According to Connie Mayer (2009), in the sequence of typical language development, conversational language in the oral modality precedes the development of academic language in the written modality (p. 327-328). For both monolingual and oral bilingual children, this process is exhibited by the development of verbal conversational language in the first five years of life followed by the development of academic language when learning literacy skills of reading and writing upon entering school (Mayer, 2009, p. 327-328).

For children to develop language bilingually, they must be exposed to the second language before school age or upon entering school in order for language acquisition to occur during the optimal language acquisition period. According to the Linguistic Interdependence theory, sufficient development of a second language cannot occur in the absence of a solid first language foundation. For most deaf children, ASL is their first language though in some cases, oral methods are utilized in language development. In cases of these children, a solid foundation in oral English must precede written language development similar to those whose first language is ASL. According to Connie Mayer (2009) it is not possible for deaf children to fully establish oral English as a first language due to the fact that they are unable to be sufficiently exposed to it via aural means even with the use of amplification devices (p. 328). Mayer (2009), states that oral English in deaf children cannot be established as a primary language, and that sign languages are the natural language of deaf individuals, and are thus the only languages in which a solid foundation for second language acquisition can be developed (p. 328).

Though there are many ways in which the structure of the current education system provides challenges to the effective education of deaf students, there are several benefits of

bilingualism that aid in deaf children's' adaptations to these challenges and may provide linguistic advantages over monolingual hearing peers. Development of bilingual language acquisition most readily during the critical language acquisition period of childhood, between birth and 8 years of age. After this time, the ability to become fluent in a second language diminishes with age (Purves, 2001). As two languages are acquired simultaneously, the language processing abilities of bilingual children develop differently than their monolingual peers. It has been shown that bilingualism promotes the development of cognitive control (Fish, 2012, p. 4) in order to navigate the use of two languages. With this cognitive control comes increased attention and inhibitory control which are beneficial for learning in the structured educational environment especially when one's sense of hearing is significantly diminished or absent.

Another benefit of bilingualism is more developed working memory and metalinguistic awareness (Fish, 2012, p.4). According to Alan Baddeley, working memory is defined as, "the temporary storage and manipulation of information that is ... necessary for a wide range of complex cognitive activities" (p. 189). Metalinguistic skills are concerned with one's ability to think about language. Deaf children with developed bilingual abilities are more aware of their communication partner's linguistic intent in conversations and are able to more readily recognize and manipulate the parameters of words and signs for reading development (Fish, 2012, p. 4). The concept of more sophisticated metalinguistic skills as a result of developed bilingualism is congruent with Cummins' theory of linguistic interdependence in that it shows that bilingual abilities support the further development of both languages via the experiences in both languages, as it has been shown that bilingual individuals are able to acquire more vocabulary in

both languages faster than hearing peers outside of the initial language acquisition period (Fish, 2012, p. 4).

Literacy Development in Deaf Children

Though in the field of educational research, several effective methods of teaching literacy practice have been established, there is no method of literacy development and education found to be universally effective across all learning styles, environments, and hearing statuses. In the contemporary field of literacy education and among scholars, there are several theories regarding the development of literacy for children. These theories, when applied to the pervasive issue of deaf children's consistent underperformance in literacy tasks, contribute to the development of ideas and practices for the implementation of programs and curricula intended to bridge this perpetual literacy gap.

It has already been readily established that the development of literacy whether in one's first or second language, is heavily reliant on the quality and quantity of consistent language acquired. Both deaf and hearing children, given adequate access to language and typical language development, will achieve relative fluency in the conversational aspect of language by the age of five (Mayer, 2009, p. 327). It is at this age that children typically enter the formal school environment and literacy education is initiated. It is important to note that while language development is an innate and naturally occurring process in which humans are biologically inclined to communicate in an organized manner, reading, writing and comprehension are not. Mastery of reading and writing skills for both deaf and hearing children are undoubtedly essential for success not only in the classroom, but in the wider world. According to Moores (2006), literacy skills must be taught as compared to language skills that are learned (p. 42). By this Moores

means that without education in reading and writing skills, these skills will not develop as there is no innate inclination to develop reading and writing.

It is common for both deaf and hearing children in the early years of formal education to struggle with the concepts of reading and writing as the development of print literacy can be equated to learning an entirely new language, especially for deaf children. In addition to his theory of linguistic interdependence in bilingualism, Jim Cummins also theorizes about the ways in which conversation and academic language develop for bilingual individuals. In her article, *Issues in Second Language Literacy Education with Learners Who are Deaf* (2009), Connie Mayer discusses Jim Cummins ideas. According to Mayer (2009), basic interpersonal communication skills or BICS, are those typically developing conversational and language skills that in which native English-speaking children achieve mastery by the age of five years (p. 327). In most bilingual hearing children learning English as a second language, mastery in these conversational language skills is achieved within approximately 2 years. Conversational fluency implies the ability to hold interpersonal conversations with consistent use of high-frequency words and a given language's characteristic grammatical features (Mayer, 2009, p. 327). In hearing children whose first language is spoken English, these skills develop as part of the natural language development process via environmental language exposure and typical interactions with peers and adults.

For both deaf and hearing children, conversational language proficiency must precede the development of cognitive academic language proficiency, otherwise known as CALP skills (Mayer, 2009, p. 327-328). Academic language skills include literacy skills such as reading and writing. Due to the uniqueness of deaf bilingualism, adequate development of conversational abilities in oral English among deaf individuals is not typical. Deaf children have the same capacity as hearing

children to acquire language and develop literacy skills, but this does not mean that they possess the same capacity to develop oral language. The development of oral language is based nearly entirely on the ability to auditorily perceive language; an ability that deaf children do not possess. This means that for many deaf children, conversational proficiency in English language is not easily achieved before academic literacy education is initiated.

The primary difference between deaf and hearing second language learners is the level of proficiency acquired in the conversational mode of language before they are expected to perform in the academic realm of English language (, 2009, p. 328). Deaf children, more than hearing children, enter the academic setting with varying degrees of language exposure and development. In addition to the bimodal aspect of deaf bilingualism, there is also a gap in an academic language foundation. According to Mayer (2009), there is positive linguistic interdependence between reading and writing skills in one's first language and subsequent development of those skills in a second language (p. 328). American Sign Language is a visuospatial language developed by deaf individuals as a means of communication and was for many decades viewed as an inferior method of communication, not a comprehensive language with all components of a complete language. Therefore, deaf children have not developed a foundation in academic language in their native language. This, combined with the fact that they most likely will not develop fluency in the conversational skills of oral English means that they do not have either a foundation in either academic language or conversational skills in the language in which they are expected to develop academic proficiency.

Many deaf children who enter the formal school setting are expected to readily develop academic language skills in English without a fully developed first language foundation in ASL

(Mayer, 2009, p. 325). For these children, several issues stand in the way of developing grade-level reading achievement. As previously mentioned, adequate development of a second language cannot occur without a solid language foundation in the first language on which to build the second language (p. 325). Additionally, the development of academic language is based on conversational fluency in the same language meaning that conversational fluency in ASL does not provide a foundation for academic language development in English. Therefore, there is a significant gap in fundamental language knowledge and skills necessary for academic language development even before entering the school setting.

Given the abundant challenges facing signing deaf children in achieving English literacy skills, there are several approaches to literacy education for both deaf and hearing children that have shown varying degrees of success in practice. One approach to literacy education is that of the bottom-up model. This approach to literacy learning is built on the concept of building blocks and the premise that simpler concept such as letters and words must be mastered in order to develop the skills of reading comprehension and writing (Sheetz, 2012, p.165). The bottom-up approach often emphasizes mastery of these skills through memorization and drilling (Moore, 2006, p.53). Once literacy concepts such as phonemes and word recognition become automatic, higher order concepts such as sentence formation and comprehension can be developed (Sheetz, 2012, p. 165). It is believed that the skills of decoding letters, phonemes and text are the key to literacy development and until mastery of phonemes is achieved, text will remain abstract (Sheetz, 2012, p.165). In the bottom-up model of literacy, there is a focus on step-by-step sequential structural skill development in which comprehension is believed to manifest naturally

as decoding skills evolve from phonemes to text-based letters to sentences (Sheetz, 2012, p. 165, Moores, 2006, p. 44).

When considering literacy education for deaf children, the bottom-up method's emphasis on phonics is inherently not effective as the association between letters and sounds cannot be made in the absence of the ability to hear given sounds. According to this theory, difficulties in learning to read stem from the inability to make connections between English speech sounds and printed alphabetic letters (Sheetz, 2012, p. 165). Another criticism of the bottom-up approach to literacy education is its lack of attention toward development of comprehension skills. This approach assumed that comprehension will develop once decoding skills are mastered and become automatic (p. 165). For deaf children, mastery of decoding skills via visual means has not proven to be as difficult as comprehension of the decoded material therefore the bottom-up method does not provide adequate means for developing academic language skills for deaf students.

A second method of literacy education used with both deaf and hearing children is the top-down model. Top-down methods of literacy education take a process oriented approach to the development of literacy skills (Moores, 2006, p.44). In top-down methods, there is a focus on understanding content and the expression and reception of meaning (p.44). According to Moores (2006), reading and writing skills can develop naturally given children read and write with the purpose of expressing and learning meaning (p. 44). The top-down approach is intended for children to be able to develop academic language skills in much the same way as they develop conversational language skills, with a focus of the function of literacy (p, 44). This approach provides very little focus on the structure of academic language which, for deaf children is wholly

unfamiliar (p. 44). While this approach may be effective for deaf learners in the area of reading comprehension, structural language skills of spelling, grammar, syntax and morphology are essential for the development of print literacy and some attention must be paid to their development.

While the bottom-up and top down approaches to literacy development each provide an emphasis on key elements of the literacy development process, neither is comprehensive in its approach (Moore, 2006, p.44). The interactive models of literacy education provide a balance between the structure and process aspects of reading and writing necessary for academic language fluency. The theory of interactive models, according to Moore (2006), states that the strengths in different areas of reading and writing compensate for the weaknesses in other areas, essentially balancing each other out (p. 45). One aspect of this model that is significant for literacy education for deaf children in particular, is the incorporation of various modes of language and learning. Interactive theories of literacy for deaf students allow for the use of sign to print, sound to print and fingerspelling to print concepts which cater to the individual abilities, needs and learning styles characteristic of deaf learners (p. 51). Additionally, elements of morphological awareness and functional and pragmatic are addressed culminating in a comprehensive literacy education model that is effective for deaf learners. It is especially important with deaf children to utilize individual students' areas of strength in learning. Interactive approaches use these strengths to build a foundation to compensate for gaps in other areas.

Though there are many factors that stand in the way of deaf children's access to language in the academic setting based on gaps in language development, acquisition and learning, there are several approaches to literacy development that consider the various areas in which deaf

children struggle. To date, the interactive philosophy of literacy education has proven the most effective for deaf students due to its flexible and individualized approach as well as emphasis on strengths (Moore, 2006, p. 51).

Literacy skills for both deaf and hearing children provide a vital communication tool essential for learning about the world. It is clear that the development of reading and writing skills is heavily reliant on a foundation of conversational language proficiency. In the absence of this conversational proficiency, conversational and academic language must develop simultaneously. In the case of hearing children, conversational language continues to develop with academic language (Mayer, 2009, p.328). For deaf children conversational language continues to develop in American Sign Language, not English language, therefore development of academic language proficiency falls further behind academic hearing peers. Even more fundamental than the gap in development of conversational and academic language is that of primary language acquisition. Literacy development is based on proficiency in primary language skills. Due to the issues surrounding early identification of hearing loss and subsequent language intervention, deaf children, before acquiring literacy skills, are often already delayed in language development. Though there are medical, social and audiological measures that can be improved in or for deaf children to receive earlier access and exposure to higher quality language models, there are also educational modifications that can be made to compensate for these gaps in development.

Much of the focus on deaf children's literacy acquisition is from the perspective that deaf children are inherently lacking a key component for literacy acquisition. As exemplified by the interactive model of literacy education, a focus on the strengths that deaf students bring to the

educational environment can allow for a better understanding of ways in which these strengths can be utilized to develop language and literacy proficiency skills. More research is needed on the ways in which deaf children acquire language separate from the template of hearing oral speech development in order to better develop literacy approaches consistent with sign language development. In the model of English literacy education for deaf student, a bilingual approach unique to the bimodal nature of ASL-English bilingualism must be considered in order to effectively educate deaf students. Deaf children's sign mode of language develops differently than hearing children's. This factor must be considered when developing any educational program for deaf students. In conclusion, a focus on a solid foundation in language must be central to any discussion of literacy education for deaf students as they present a unique case.

Resources

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