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TEACHERS' PERCEPTIONS OF THE USE OF ASL PHONOLOGICAL INSTRUCTION TO
DEVELOP ASL AND ENGLISH LITERACY IN AN ASL/ENGLISH BILINGUAL
PRESCHOOL

BY

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DISSERTATION

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Abstract

This dissertation study seeks to understand how teachers who work in an ASL/English bilingual educational program for preschool children conceptualize and utilize phonological instruction of American Sign Language (ASL). While instruction that promotes phonological awareness of spoken English is thought to provide educational benefits to young children in terms of language proficiency and reading development, there is limited understanding of how deaf children may similarly benefit from the phonological instruction of ASL. Part of the resistance in promoting ASL may be related to how signs native to ASL do not directly map onto written English in the same way that spoken English does. However, ASL does incorporate the use of the manual alphabet, which is a manual representation of the English alphabet, and many signs in ASL do have partial or full overlap to words in the orthography of English. ASL also has the added benefit of being considered the natural language for deaf people, which allows teachers with the means to promote ASL phonological instruction in ways that allow students to access and utilize a language in ways that can maximize their ability to process information.

Data were collected through teacher interviews and a follow-up survey. Interviews were conducted with preschool teachers and ASL specialists to gain insight into how they conceptualize and engage in phonological instruction with their deaf students. Interview questions focused on how teachers used phonological instruction for ASL development and also to enhance the student's understanding of English. A follow-up survey was sent to the teachers with the intent of corroborating the findings in the interviews and to identify patterns of instruction that were prevalent within the individual

classes. The analysis was conducted through a grounded theory approach that identified major themes that emerged from the data (Charmaz, 2006; Strauss & Corbin, 1990).

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Chapter One

Introduction

Phonological awareness is an individual's awareness of the basic structures of linguistic units in language. In spoken languages, phonological awareness refers to the ability to detect and manipulate the basic sound structures, such as words in sentences, syllables in words, or phonemes in syllables (Lonigan, 2006). Phonological awareness is thought to have an important role in early childhood education. It helps children acquire the sublexical aspects of language, which provides them with a means to understand the structure of language separate from the meaning of words (Pullen & Justice, 2003). Research has found that phonological awareness contributes to vocabulary growth and language proficiency (Leonard, 1998; Nash & Donaldson, 2005). Furthermore, studies have shown that phonological awareness has a role in the normal acquisition of reading (Adams, 1990; Stanovich, 1992; Wagner & Torgesen, 1987); and some studies have even suggested that it plays a causal role (Ball & Blachman, 1988; Wagner, Torgesen, & Rashotte, 1994).

Individuals with poor phonological awareness tend to be found at the lower end of reading proficiency (Bowers, 1995; Bowers & Wolf, 1993; Torgesen & Burgess, 1998). A group of children that traditionally struggles with both phonological awareness and reading are deaf children. For nearly a century, studies have found that deaf children's reading ability often plateaus around a fourth grade level (Allen, 1986; Furth, 1966; Goetzinger & Rousey, 1959; Pinter & Paterson, 1916; Traxler, 2000), and part of this difficulty has been attributed to deaf children's limited abilities in phonological

awareness (Hanson, 1991; Leybaert & Alegria, 1993). The prevailing belief is that deaf children have difficulty with phonological awareness of spoken language because it requires a deeper awareness of the sound structure of language. Hearing loss can limit deaf children's access to sounds produced in spoken language, leading to a more limited understanding of how the sound structure works. Several studies suggest that deaf children's phonological awareness of spoken language may not be based on sound, but is, instead, a functionally equivalent level of awareness (McQuarrie & Parrila, 2009; Miller, 2006) derived from visual cues developed from speech reading (Campbell, 1987; Dodd, 1976; Dodd & Hermelin, 1977), and tactile cues developed from forming words in the mouth (Marschark & Harris, 1996).

Although the population of deaf children, on average, reads poorly, some deaf children are highly proficient readers. Prior studies have examined whether deaf children who are proficient at reading also had higher levels of phonological awareness. Studies that have examined older deaf children, such as deaf adolescents and college age students, have found mixed results. While several studies documented higher levels of phonological awareness and processing among proficient deaf readers (Conrad, 1979; Hanson & Fowler, 1987; Hanson, Goodell, & Perfetti, 1991; Hanson & McGarr, 1989; Leybaert & Alegria, 1993), other studies did not (McQuarrie & Parrila, 2009; Miller, 1997, 2006; Olson & Caramazza; 2004; Olson & Nickerson, 2001; Treiman & Hirsh-Pasek, 1983).

Interestingly, studies that have examined the phonological awareness of younger deaf children have not found conclusive evidence that supports the use of phonological awareness of spoken language as a predictor of reading, even though some deaf children

in these studies were proficient readers (Harris & Beech, 1998; Izzo, 2002; McQuarrie & Parrila, 2009; Treiman & Hirsh-Pasek, 1983). What is particularly interesting in these studies was that some of the deaf students with higher reading proficiency did not use spoken language as their primary language, but instead used signed language as their primary language. This finding could suggest that although the deaf students did not use phonological awareness of spoken language to learn to read, they did potentially use phonological awareness of *sign language* to develop their reading abilities.

Even though sign language does not directly map onto written language via sound-to-print mapping (i.e., phonemes to graphemes) in the same way as spoken languages, sign language phonological awareness may provide deaf children with a benefit that has not been thoroughly explored to date¹. It may be that a deeper understanding of the sublexical structures of a signed language provides deaf children with a generalizable understanding of phonological structure and thus provides them with a means to map sign language structures onto print in ways that promote higher levels of reading proficiency. Research shows that deaf children with at least medium-to-high level of proficiency in sign language also tend to have higher scores on reading proficiency (Dubuisson, Parisot, & Vercaingne-Ménard, 2008; Hoffmeister, 2000; McQuarrie & Abbott, 2008; Niederberger, 2008; Padden & Ramsey, 2000; Prinz & Strong, 1998; Strong & Prinz, 2000). It may be that since reading is also a cognitive process it provides deaf children with both cognitive and linguistic benefits as well.

¹ Written English is based on the spoken language of English, thus the basic minimal units of written English, graphemes, map onto the basic minimal units of spoken English, phonemes. However, the basic minimal units in native American Sign Language (ASL) phonology do not map onto written English. However, ASL does borrow some features from English and these features do map onto written English. These aspects will be described shortly.

There has been only limited attention given to the potential role of sign language phonology in developing literacy skills. Most of the research to date has focused on the spoken language phonological awareness, and not on children's use of sign language phonology. It appears that, to date, only one study has examined the role of ASL phonological awareness and its potential role in developing reading proficiency. This was a correlational study conducted by McQuarrie and Abbott (2008) and they found a positive relationship between ASL phonological awareness and reading proficiency, among 7-to-18 year old deaf children. Although it is difficult to draw broad conclusions about the potential role of ASL phonological awareness from just one study, this outcome does suggest a possible link.

Sociocultural contributions to language and literacy development. Strong language skills are important for phonological awareness and for many cognitive, linguistic, and academic tasks. However, children are not born with innate language abilities from birth, they must acquire it as they develop and mature. Different competing theories exist and offer different perspectives of how children use and acquire language. These theories can include Nativism theory, which examines the biological roots of language (e.g. Chomsky, 1965; Lenneberg, 1967; Newport, 1990; Petitto & Marentette, 1991); Information processing theory, which examines the way in which the brain processes and uses linguistic information (e.g. Cooper & Aslin, 1990; Harris, 1992; Kuhl, 2004; Locke, 1983; Masataka, 1992; Pruden, Hirsh-Pasek, Golinkoff, & Hennon, 2006); and Functionalism, which examines the practical benefits of language and the reasons that human beings develop language (e.g. Bloom & Tinker, 2001; Budwig, 1995; Pinker, 1984, 1997; Senghas & Coppola, 2001). This research focuses on the sociocultural

theories of language development. Sociocultural theories of development offer a means by which to understand how social communities influence children's language development (Heath, 1983; Ochs & Shieffelin, 1984; Rogoff, 1990, 2003; Vygotsky, 1978, 1986). Sociocultural theories of development advance the notion that language and cognitive development are construed as inherently social activities; by participating in these social activities children acquire cultural tools and are enculturated into a community by more advanced members of society (Bruner, 1983, Vygotsky, 1978, 1986, Wertsch, 1985). In other words, children acquire the basic knowledge of language through others, and learn how to think and use language as they engage with others in social contexts, such as home and school.

Sociocultural theories related to deaf children are primarily influenced by two contrasting philosophies about how to treat deaf people in society: a medical model and a cultural model. In the medical model, deafness is viewed as a pathology that should be eliminated or mitigated as much as possible (Arnos, Israel, & Cunningham, 1991). Medical professionals encourage parents to “normalize” their deaf children and use interventions, such as hearing aids or cochlear implantation and provide them with intensive oral and aural rehabilitation services to enhance spoken communication skills as much as possible. The goal is to try and ultimately restore deaf children as participating members of mainstream hearing society by emphasizing auditory forms of input.

Alternatively, the cultural model supports a belief that deaf people consider their experiences normal, just like anyone else, and that deaf people are a “visual variation of the human race” (Bahan, 2008). Proponents assert that deafness is a defining characteristic that unites deaf people, and that, through the use of sign language deaf

communities have evolved to develop their own Deaf culture, with its own history, mores, values, and belief systems (Lane, 2005). Deeply embedded within the Deaf cultural model is the idea that deaf children are considered important future members of the deaf community. Deaf children are encouraged to participate within the deaf community with the belief that they will develop a sense of identity (based on deafness) and incorporate the everyday practices and beliefs about “a ways of being” that are inherent in the deaf community (Singleton & Morgan, 2006).

The two philosophical perspectives on deafness can significantly influence how deaf children are raised in social contexts. For example, one line of research has examined the engagement patterns of deaf children of deaf parents, deaf children of hearing parents, and hearing children of hearing parents because comparing these interaction patterns reveals differences in how adults incorporate and facilitate language and social development of children. These studies indicate that the engagement patterns within parent-child dyads are enhanced when parents and child share the same orientation toward processing information, as deaf children and deaf parent dyads more closely align those with hearing children and hearing parent dyads (Singleton & Morgan, 2006). In these parent-child dyad groups, parents use communication strategies that respond appropriately to the cues of their children. Parents tend to use intuitive communication and interaction strategies based on their own personal experiences (Papoušek & Papoušek, 1987), and these strategies seem to help parents communicate more effectively with their children when they are consistent, or “matched,” with the abilities of their children. For example, hearing parents incorporate both (spoken) language and visually based strategies (e.g. gestures, pointing) to respond to communication needs of their

hearing children. Alternatively, studies report that deaf parents place greater emphasis on visually based strategies while minimizing auditory based strategies to encourage their deaf children to use their eyes to maximize their access to environmental information and sign language (Koester, Brooks, & Traci, 2000; Koester, Karkowski, & Traci, 1998; Meadow-Orlans & Spencer, 1996; Waxman & Spencer, 1997). Deaf parents also make the interaction more salient for their deaf children by pausing until their deaf child establishes eye contact, and then providing information within their child's gaze if their child looks away (Koester, et al., 1998; Meadow-Orlans & Spencer, 1996; Waxman & Spencer, 1997). The use of visual language and visually based processing strategies makes language learning more meaningful for deaf children and helps deaf children acquire "Deaf ways of being" that promote the acquisition of sign language and ways of engaging others visually. Moreover, deaf children born to deaf parents often achieve language, social, and cognitive developmental milestones at levels that closely approximate those of hearing children of hearing (Mayberry, 1994; Newport & Meier, 1985).

By comparison, studies examining the interaction patterns between hearing parents with deaf children report that hearing parents often rely upon their own intuitive communication and interaction strategies based on their own personal experiences, but these intuitive strategies are often "mismatched" with the needs of their deaf children (Jamieson, 1994; Lederberg & Everhart, 1998; Meadow-Orlans & Spencer, 1996; Spencer, Bodner-Johnson, & Gutfreund, 1992; Waxman & Spencer, 1997; Waxman, Spencer, & Poisson, 1996). Studies have found that hearing parents may not be as responsive to their deaf children as deaf parents. Hearing parents in these studies

attempted to engage their deaf children when they were not looking, or they used auditory-based cues that their deaf child did not respond to appropriately (Lederberg & Everhart, 1998; Spencer, et al., 1992). It is suggested that these kinds of mismatch limit a child's access to language and socialization. This lack of "attunement" may be because hearing parents are often encouraged to promote more hearing "ways of being" and make an effort to normalize their deaf children to the standards of communication used in the mainstream hearing society. Unfortunately, there seems to be a negative consequence of the mismatches in communication, as studies have consistently found that many deaf children born to hearing parents have significant delays in achieving language, social, and cognitive milestones in comparison to their deaf and hearing peers from "matched" interaction groups (Antia & Kreimeyer, 2003; Marschark, 2003; Newport & Meier, 1985).

It should also be noted that the findings previously described about hearing parents are not meant to represent all hearing parents. There are some hearing parents who are more visually attuned to the needs of their deaf child or purposely seek out assistance from other deaf individuals in their community or at schools for the deaf to learn about ways to communicate effectively with their deaf child. The purpose of describing the interaction patterns of hearing parents is to emphasize that many hearing parents may not incorporate visually based strategies with their deaf child without explicit self-reflection or education and training from others.

In summary, sociocultural theories of language development examine the ways that communities engage children to help them acquire language and the cultural tools used within the community. This review summarizes the different models of deafness,

medical and cultural, and explains how, as parents, our outlook toward our deaf child shapes the way we interact with that child.

Schools as Social Communities for Deaf Children. While the language exposure and sociocultural experiences of deaf children can vary based on their home environments, schools for deaf children can offer *all* the deaf children in the school access to a signing community. Residential schools for deaf children can be beneficial for deaf children because they provide a signing community, and an extended social network in areas surrounding the school because many members of the deaf community often gravitate to communities where residential schools are located.

Schools for the deaf can vary in their communication approaches. Some schools emphasize an “oral only” approach, others incorporate speech with some sign language, and some emphasize sign language as the primary communication method. In recent years, a few deaf education programs have shifted to an ASL/English bilingual approach. ASL/English bilingual programs place high emphasis on promoting a visually centered approach to language development and learning (Mahshie, 1995). In these settings, sign language is promoted as the primary language of communication and this provides all deaf children enrolled, regardless of parental hearing status, a communicative mode in which to learn, develop, and socialize with others.

ASL/English bilingual schools serve an important role in serving as sociocultural contexts of learning because they offer deaf children an opportunity to acquire and develop proficiency in a sign language that they might not acquire at home (Livingston, 1997). In ASL/English bilingual schools, teachers and ASL specialists serve an important role as facilitators of language development. For many deaf students, teachers and ASL

specialists may serve as one of their primary language models (i.e. instead of their parents). Teachers promote sign language development through natural, everyday language through informal and formal conversations with their deaf students (Singleton & Morgan, 2006). An ASL specialist may also rotate through different classes to teach ASL as an individual subject to deaf students, and provide individual deaf students with tailored sign language instruction as needed. Ultimately, this interaction provided by teachers and ASL specialists is aimed at providing deaf children a solid foundation in language that gives them the means to utilize a deeper understanding of different components of sign language, such as phonological structure, and an enhanced understanding of how to use language as a means to acquire information.

Definition of Terms

American Sign Language (ASL): A natural language developed and used by the deaf community in the United States and parts of Canada that incorporates the use hands, vision, and space. ASL has its own vocabulary, grammar, and lexical rules that are different from English (Stokoe, Casterline, & Croneberg, 1965).

Handshapes: Configurations of the hand that is considered as one of the phonological parameters used to produce signs native to ASL; handshapes are also used form the manual alphabet (Klima & Bellugi, 1979; Liddell & Johnson, 1989).

Initialized signs: Signs in ASL where the handshape from the manual alphabet replaces the hand configuration of the native base sign to represent the first letter of a word in English (Frishberg & Gough, 1973).

Lexicalized fingerspelling. Also known as a lexicalized sign or a loan sign, this form is a frequently fingerspelled word in ASL that has been regularized and incorporates a sign-like movement (Battison, 1978). Instead of using the manual alphabet to represent each distinct letter of the word, the individual movements are combined into a single sign like movement (Valli, Lucas, & Mulrooney, 2005).

Manual Alphabet: Individual handshapes that represent individual letters of the (Roman) alphabet of English. The manual alphabet is incorporated in initialized signs and neutral and lexicalized fingerspelling (Valli, Lucas, & Mulrooney, 2005). Spanish Monks in the late 1500s are credited with developing the manual alphabet used in ASL (Padden & Gunsalis, 2003).

Native Handshapes: Configurations of the hand that are considered to be one of phonological components of a sign in ASL. There are approximately 40 handshapes commonly used in signs native to ASL (Klima & Bellugi, 1979).

Native signs: Signs in ASL that have been naturally developed and used in ASL. Native signs do not borrow features from English, such as the manual alphabet, which is commonly used in initialized and lexicalized fingerspelling, and fingerspelled words (Brentari & Padden, 2001).

Natural language: Languages that develop spontaneously by a group of users that have a chance to meet and communicate regularly. Natural languages have their own distinct vocabulary and grammar (Sandler & Lillo-Martin, 2001).

Neutral Fingerspelling: As referred to as just fingerspelling. It is a one-handed manual representation of the individual letters in the English alphabet. Fingerspelling

incorporates manual alphabet to distinctly represent each letter of a word in English (Hanson, 1992; Haptonstall-Nykaza & Schick, 2007; Valli, Lucas, & Mulrooney, 2005).

Orthography: The representation of sounds of a language by written or printed symbols; part of the language study that deals with letters or spelling (Merriam Webster, 2010).

Phoneme: the smallest contrastive unit in a language (Valli & Lucas, 1995).

Phonological Awareness: The ability to detect and manipulate the overall structure of language. In spoken language, phonological refers to the sound structure, such as syllables, onsets and rimes, and phonemes. In signed language, phonological awareness refers to the ability to detect and manipulate refers to the phonological structures used to produce signs such as handshapes, movement, and location (Stokoe, 1960).

Conclusion

In this chapter, I described the research on phonological awareness and its contributions to language proficiency and literacy. Phonological awareness seems to be important in terms of understanding the structure of words, and literacy development, particularly in understanding the alphabetic principle or the notion that phonemes and graphemes correspond to each other. It is argued that deaf children struggle with developing phonological awareness of spoken language because they have limited physical means to access the sound structure of language.

It may be possible that sign language phonological awareness can provide deaf children with a means to develop their language and literacy abilities, and sociocultural contexts that emphasize awareness of sign language phonological structures could help promote deaf children's phonological awareness of sign language. According to

sociocultural theories of language development, social communities hold an important role in facilitating children's language development. Research has found that deaf children in hearing families often struggle to develop language because their parents focus primarily on spoken language, which is not easily accessed by deaf children. Conversely, deaf children of deaf parents are immersed in social communities that are rich in sign language input, which provides deaf children a means to achieve linguistic milestones comparable to hearing children of hearing families. ASL/English bilingual schools for deaf children provide all deaf children, regardless of parental hearing status, access to a signing community that immerses deaf children in a rich linguistic environment that can naturally promote higher levels of sign language development. Ultimately, higher levels of sign language proficiency could lead to a deeper understanding of the structures of sign language and insight in how to connect sign language with print to develop literacy skills.

In the next chapter, I expand on my discussion of phonological awareness of spoken language in education in order to provide a basis of comparison for how it could be used with signed languages. I also review previous research that has examined native signing children's acquisition of phonological components of sign language (i.e. location, movement, and handshape) to outline how children progress in their acquisition of sign language phonology. In Chapter Three, I describe the design of the study and detail the setting and participants and method of data collection and analysis.

Chapter Two

Literature Review

This chapter provides a framework for understanding the similarities and differences with how phonological awareness of English and American Sign Language (ASL) are considered within an educational setting. Toward this end, I first describe the findings with respect to the role and use of spoken language phonological awareness in the development of language and literacy. I then discuss the potential role of ASL phonology in education, by first providing an overview of ASL phonology, with particular attention to the phonological parameter of handshape. This description will provide a framework to understand how teachers might guide their instruction, keeping in mind the similarities and differences in the phonological structures of ASL and English.

Since one purpose of this study is also to understand how ASL phonological awareness could be developed in a natural education context, I provide an overview of the ASL/English bilingual educational approach. The ASL/English bilingual approach is unlike other educational programs for deaf children. The most common educational programs for deaf children emphasize English as the primary language of instruction, either through the sole use of speech, or through the use of speech in conjunction with an English-based sign code system². The ASL/English bilingual approach uses ASL as the primary language of instruction, and teaches written English concurrently as the second

² According to the 2007-2008 Annual Survey published by the Gallaudet Research Institute, 52% of deaf students use speech only, 35% use sign and speech together, and only 11% of deaf students use sign only. Retrieved from http://research.gallaudet.edu/Demographics/2008_National_Summary.pdf on November 9, 2010

language. This provides deaf children with a means to use a natural sign language to acquire information and use their knowledge of ASL to learn written English.

Phonological Awareness

As children become more fluent in their ability to use language, they also grow in their understanding of how language is structured. In spoken languages, this understanding of the sub-lexical structure of language, or phonological awareness, broadly refers to an individual's understanding of the basic sounds used in spoken languages, such as syllables, rhymes, alliterations and phonemes. Phonological awareness allows children to understand how a word is pronounced and formed separately from the meaning of the word (Pullen & Justice, 2003).

A significant area of interest in studying phonological awareness in the field of education relates to how it is used to develop literacy. Phonological awareness is considered to be important in developing literacy in English because English is an alphabetic language. As a writing system, alphabetic languages differ from the other two major writing systems of the world, logographic and syllabic languages, because alphabetic languages use a more direct mapping of the spoken language onto the written form. Logographic and syllabic languages are both based on a symbolic representation of larger phonological structures in their written system (Sampson, 1985). In logographic languages like Chinese, the basic written symbol represents a *whole word* in the spoken language. In syllabic languages like Japanese, the basic written symbol represents a *syllable* in the spoken language. By comparison, in alphabetic languages written symbols represent *phonemes*, which is the smallest structural unit in the spoken language. Thus,

children learning to read an alphabetic language, such as English, must learn to map phonemes in the spoken language to its corresponding unit in the written language, graphemes. Thus, children who become well versed in manipulating phonemes and graphemes, and who can map each of these structures to their counterpart, are considered to have grasped *the alphabetic principle* and have the basic foundation needed to become literate in the alphabetic language (Adams, 1990).

Alphabetic languages vary in their degree of correspondence between their phonemes and graphemes. The degree of correspondence between phonemes and graphemes in alphabetic languages is referred to as orthographic depth (Katz & Feldman, 1983; Katz & Frost, 1992). Alphabetic writing systems with shallow or transparent orthographies, such as Greek and Finnish, have a more direct correspondence between their phonemes and graphemes. Alphabetic systems with deep or opaque orthographies, such as English, Hebrew, and Danish, have significantly less regularity in the correspondence between their phonemes and graphemes. For example, in English there are words that graphemically the same but phonetically different, and conversely words that phonetically the same but graphemically different. An example of the former, would be words such as *hint*, *mint*, and *pint* that graphemically similar because they share the same ending (*-int*), but have an irregular phonetic form (*pint*). By comparison, an example of the latter would be the words *to*, *too*, and *two*, which are phonetically pronounced the same, but graphemically different.

The orthographic depth of an alphabetic language can significantly influence the rate at which children acquire literacy skills (Frost, Katz, & Bentin, 1987). A study conducted by Ziegler & Goswami (2006) found wide variation in children's reading

proficiency based on the orthographic depth of the language. The study examined 14 different European alphabetic languages and sought to compare children's reading skills at the end of first grade. The results indicated that children learning languages such as German, Greek, and Finnish were at least 98% accurate on familiar real words and more than 92% accurate on pseudowords. By comparison, children learning French, Portuguese, and Danish were less than 79% accurate in familiar real words and less than 85% accurate in pseudowords. Children learning Scottish English struggled the most and were only 34% accurate on familiar real words and 29% accurate on pseudowords. Ziegler and Goswami reasoned that the English-speaking children were not as accurate in their reading proficiency. They argued that English had a high level of inconsistency between phonemes and graphemes, and that it took a longer period to master all the rules for both the regular and irregular correspondences. English has a total of 41 phonemes and 26 letters or graphemes (Helland & Kaasa, 2005), and learning the combinatory patterns between the phonemes and graphemes can be challenging and require a longer period of training. Ziegler and Goswami cite how children learning to decode the 3,000 most frequent monosyllabic English words at the level of rime³ would have to learn to map 600 different orthographic patterns and 400 phonological rimes. From this description, it is easy to understand how learning how the written form of English would take longer to master and is not readily mastered by young children until they become older.

³ Rimes are usually referred together with onsets, such as in onsets and rimes. This pairing refers to the beginning and ending sounds of words. For example, the onset in the word, *book*, corresponds with the initial consonant, *b-*; the rime corresponds with the vowels and final consonant, *-ook* (Goswami & Mead, 1992).

The Development of Phonological Awareness in Language and Literacy. As children mature and develop in their proficiency of spoken language, their awareness of the various phonological segments begins to progress and develop. Goswami and Bryant (1990) describe three broad areas of phonological awareness of sounds within words, and these include syllable awareness, intra-syllable awareness, such as onsets and rimes, and phonemes. According to Stackhouse and Wells (2001), children's phonological awareness develops along a continuum. They stress that phonological awareness abilities does not develop in step-wise progression, but that children jump back and forth between specific types of phonological awareness depending on their own maturation and exposure to language and literacy. Early on, children rely predominantly on their auditory skills to develop the earlier forms of phonological awareness, such as distinguishing and putting together syllables (i.e. syllable segmentation and blending) and rhyming. Eventually, children begin to rely on their speech abilities in the middle stages of their phonological awareness, such as for skills like sound blending and sound segmentation (i.e. forming phonemes to form words or identifying phonemes in words). At the highest level of phonological awareness, children rely on their orthographic skills for sound manipulation or cluster segmentation (i.e. switching phonemes to form new words and recognize recurring patterns in words). According to Stackhouse (1997) the sequence of phonological awareness often follows this progression: 1) syllable segmentation; 2) rhyming; 3) syllable blending, 4) phoneme blending; 5) phoneme segmentation; 6) sound manipulation, and 7) cluster segmentation (see Table 1).

Table 1

Progression of Children's Phonological Awareness (Stackhouse, 1997)

Stage	Description	Approximate Ages
Syllable Segmentation	Identifies the different syllables in words	3 to 5 years
Rhyming	Identifies words that have same ending sounds or that sound the same at the end	3 to 5 years
Syllable blending	Identifies syllable parts and puts them together to create a word	4 to 5 years
Phoneme blending	Produces individual sounds to form a word	6 years
Phoneme segmentation	Identifies individual sounds in a word	6 years
Sound manipulation	Deletes/Add phonemes to form new words	7 years
Cluster segmentation	Manipulates syllables to form new words	7+ years

Several studies have found that children in preschool programs benefit from phonological instruction (Brady, Fowler, Stone, & Winbury, 1994; Dorval, Joyce, & Ramey, 1980; Lindamood & Lindamood, 1975). Each of these studies suggests that when children received direct instruction in phonological awareness tasks, their level of phonological awareness increased. For example, Brady et al. (1994) provided an intervention to groups of four and five year old children. The experimental group was provided with instruction in phonological awareness tasks such as syllable segmentation and rhyming, as well as syllable blending and phonemic blending. Results show that the experimental group could generate a rhyme, and some could also segment words into phonemes, much more effectively than the control group.

Once children enter kindergarten and first grade, phonological instruction begins to target phonemic awareness with the aim of helping children learn the alphabetic principle. Children are taught phonemic awareness to enhance their knowledge of individual sounds in speech. Learning how to detect phonemes in pronunciation so that

they can be paired to their corresponding graphemes can be difficult; thus, explicit instruction helps children understand how phonemes are structured in spoken English and provides them with a basis to learn how to pair phonemes to graphemes (Ehri et al., 2001).

While teachers emphasize phonemic awareness to develop children's awareness of the alphabetic principle in reading, children's appreciation of the connection between speech sounds and print occurs much earlier. Previous studies have found that children's ability to use phonological awareness in reading gradually develops over time; children seem to go through a progression of stages or periods in their ability to connect speech to print (Frith, 1985; Ehri, 1991). According to Ehri and Snowling (2004), children go through four stages of word recognition in their development of reading. Initially, in the Pre-Alphabetic phase, children begin to pair words they hear in their spoken language input with the words they may recognize in the environment. In this phase, children are not pairing their recognition of environmental print with any form of graphemic-phonemic knowledge. At the second level of development, the Partial Alphabetic phase, children begin to use some knowledge of letters to identify words, and can often identify letters their own names and names of important others (e.g. Mom and Dad). In the third level of awareness, children enter a Full Alphabetic phase and begin to demonstrate an understanding of the alphabetic principle and are able to map phonemes and graphemes. Children in this phase show the ability to manipulate graphemes and phonemes and are able to decode unfamiliar words and store sight words into memory (Ehri, 1991, 1992, 1999). Finally, in the fourth stage, the *Consolidated Alphabetic* phase children are able to utilize their knowledge of the alphabetic principle, and begin to blend graphemes and

phonemes into larger units that repeatedly occur in words. Children are mature and experienced in their ability to parse and blend larger chunks of phonological structures, such as affixes, root words, onsets, rimes, and syllables (Ehri, 1991, 1994; Juel, 1983; Treiman, Goswami, & Bruck, 1990). Children at this advanced stage have mature abilities and this helps them recognize sight words quickly (Ehri, 1995), and increases their word decoding accuracy (Juel, 1983). Table 2 summarizes all the four periods of word recognition according to Ehri and Snowling (2004).

Table 2

Phases of Word Recognition (Ehri & Snowling, 2004)

Phase	Description	Approximate Ages
Pre-Alphabetic	Children recognize environmental words based on context or some link that is not related to the sounds in words	2-4 years
Partial Alphabetic	Children recognize words based on the sounds of some letters, and mostly read words based on sight	4-6 years
Full Alphabetic	Children are adept at the alphabetic principle and can map phonemes to graphemes	6-7 years
Consolidated Alphabetic	Children have matured in their ability to blend and segment all phonological segments and recognize recurring patterns	7+ years

Finally, growth in phonological awareness may also be partially connected to the amount of children’s encounters with printed material. Studies indicate that the growth of phonological awareness and printed letter awareness may be reciprocally related. For example, studies by Burgess and Lonigan (1998), and Share (2004), found that letter knowledge was a predictor of phonological awareness. Murray, Stahl, and Ivey (1996) described an experimental study of children who were exposed to alphabet books with

letter-sound information, then children were found to have higher gains in letter-sound knowledge than children exposed to just alphabet books without letter-sound information and/or just storybooks. From this data, it seems that phonological awareness promotes the development of letter and word knowledge, and, in turn, letter and word knowledge facilitates children's continued development of phonological awareness.

Signed Language Phonology

This section departs from the traditional notion of “phonology” and its more widely applied definition in which it refers to the basic *sound* structure of languages. Instead, this section considers the basic sublexical structures of a visual language. First, it should be stated that historically, sign language linguists have struggled to define the concept of a phonology of a sign language because of the distinct modality differences between signed and spoken languages. For much of human history, sign language was not considered a true language because it was not spoken (Baynton, 1996). However, William Stokoe (1960) conducted a thorough analysis of the structural elements of signed language and spoken languages and found that sign language possessed all the elements of a natural spoken language, as described by Hockett (1960), with the lone exception being the means of production (i.e. manual vs. speech articulators). In describing the phonological system of American Sign Language (ASL), Stokoe focused on how signs were created (i.e. manually produced). He described the study of the basic structure of signs in sign language as cherology, with the root, *chere-* indicating the most primitive unit of language originating from the hands, instead of sound, as in the root *phone*, which is found in the words phoneme and phonology. While the term cherology may be more

conceptually accurate, sign language linguists have opted to use the term phonology because it “refers to the patterns of organization of linguistic signals rather than to the signals themselves” (Liddell & Johnson, 1989, p. 207). Moreover, the use of the term phonology in sign language linguistics provides a shared terminology of a basic concept that can be used among researchers that are interested in sublexical properties in either or both signed and spoken languages.

On one level, the phonological systems of signed and spoken languages seem vastly different. Words in signed and spoken languages are constructed differently, and this creates a difference in the surface features of both phonological systems. Signed languages are manually produced in spaces around, and on, the body and face of signers, Spoken languages are produced in the speech organs of the mouth and nose.

Beneath the surface differences, there are parallels between the phonological systems of signed and spoken languages. At its core, phonology refers to the basic units that form a language and the rules that define how the basic units can be used and structured (Coulter & Anderson, 1993). In spoken languages, the phoneme is the smallest unit of spoken language, but larger units also include words, syllables, morphemes, and onsets and rimes. Signed languages are visual languages, and because they are represented in a three-dimensional space around the signer, they include a wider array of basic structures. These structures include hand configurations or handshapes, movement of signs, location on the body, palm orientation, and non-manuals, such as facial expression (Liddell & Johnson, 1989; Stokoe, 1960). Signs may share similar phonological parameters and contrast on only one of the basic parameters. For example, the signs for SUMMER and DRY share the same phonological components of

handshape, movement, and palm orientation. However, the two signs differ in the location in which they are produced on the face (forehead compared to chin). Similarly, the sign for RED and CUTE are the same in terms of their location, movement, and palm orientation, but differ in their handshape (i.e. the 1-handshape vs. the 3-handshape).

Another similarity in expression of phonology between spoken and signed language relates to phonological segments used in language. The basic segment of a word in spoken language is a syllable, which is structured around a particular order of consonants and vowels. However, another way of conceiving a syllable is in terms of how it is produced in speech organs. Coulter and Anderson (1993) describe how vowels and consonants in spoken language can be characterized in terms of their differences in their resonance of sound or sonority; vowels are highly sonorous, while consonants are less so. Syllabic segments produced in the vocal tract with high sonority (i.e. vowels) have unimpeded movement of airflow and high acoustic energy, while low-sonority segments (e.g. consonants) have more impeded movement of airflow and much less acoustic energy. In ASL, linguists have suggested that there is a similar segmenting of signs. Sign segments are defined in terms of their movements and holds (Liddell, 1984; Liddell & Johnson, 1989). In one part of the sign, there is unimpeded movement and then in another part of the sign, there is impeded movement and less energy, which is similar to how phonological segments are produced in spoken languages.

In sum, what sign language linguists have made an effort to demonstrate is the ways in which phonological structures of signed and spoken are similar to each other. Even though both signed and spoken phonological structures have surface differences, they both still are made of a minimal set of dimensions and are still created through a

series of movements and holds. This suggests that signed and spoken phonological structures share similar universal qualities, even though they are distinct differences in their expression.

Before proceeding, it is important to describe that there are certain handshapes that look identical and are observed in ASL phonology, and in the manual alphabet (see Figure 1 for comparison). There is a total of 40 handshapes that are used in ASL phonology, including a total of 19 basic or prime handshapes, and 21 variations of prime handshapes or sub-primes. These handshapes are used in combination with other phonological parameters such as location and movements to form signs (Klima & Bellugi, 1979). By comparison, the manual alphabet is a manual representation of the English alphabet, and handshapes in the manual alphabet are used in signs that are borrowed from English (Brentari & Padden, 2001). These borrowed signs comprised a group of a signs in the ASL lexicon that are in the form of lexicalized or loan signs, initialized signs, and fingerspelled words; and these forms of ASL words will be described shortly.

The multiple uses of a single handshape in ASL can be confusing to novice signers, especially to young children, because there are instances where the same handshape is a part of an ASL sign, occurs in a borrowed vocabulary item adopted into ASL, and is used in a native sign which happens to share the first letter with a word in English. An example of this can be seen with the F handshape (HS), which is used all three instances. The F-HS is used in native ASL signs such as *CURIOUS*, *CAT*, and *EARRING*. It is used to represent the sign *FRANCE*, an initialized sign representing a

word in English beginning with the letter F. Similarly, the F-HS is also used in the sign FIND, which is a native ASL sign that also starts with F in English (See Figure 2).

Hand Configurations in ASL (from Klima & Bellugi, 1978)

/θ/	/ʃ/	/g/	/c/	/s/	/v/	
flat hand	fist hand	index hand	cupped hand	spread hand	V hand	
/θ/	/f/	/x/	/h/	/l/	/y/	
O hand	pinching hand	hook hand	index-mid hand	L hand	Y hand	
/s/	/k/	/t/	/r/	/w/	/3/	/t/
mid-finger hand	chopstick hand	pinkie hand	crossed-finger hand	American-3 hand	European-3 hand	nail-buff hand

The manual alphabet in ASL



Figure 1. Comparing ASL native hand configurations and the manual alphabet

The manual alphabet is distinct means of communication, and there have long been conflicting views in how to conceptualize its function within ASL. According to Wilcox (1992), the manual alphabet can be described as a *tertiary* system because it is based on English orthography, a secondary symbolic system. Earlier studies of fingerspelling (i.e. using the manual alphabet to spell words in English) did not consider the manual alphabet as part of the core phonological system of ASL because it was borrowed from English and represented English orthography (Bornstein, 1978; Klima & Bellugi, 1979; Tweney, 1978). However, more recent views have considered fingerspelling to have a more vital function within ASL (Brentari & Padden, 2001).

Padden described fingerspelling as being “frequent, and pervasive and deeply entrenched in the grammar of ASL” (Padden, 2006, p. 192).



Figure 2. Different uses of the F handshape in American Sign Language

The manual alphabet of ASL (see Figure 1) is primarily used in three ways in ASL. Fingerspelling is the most well known form of using the manual alphabet. Fingerspelled words are commonly used to represent proper names, technical vocabulary, and words that have no current signs are the most common fingerspelled words in ASL, but fingerspelling also represents other grammatical classes, as well. In a study conducted by Padden and Gunsauls (2003), they found that 70% of fingerspelled words used by deaf adults were nouns, with an even distribution between proper and common nouns. The next most frequently used fingerspelling items were adjectives and verbs that occurred in about 5-10% of fingerspelled words, with all other grammatical categories occurring less than 5% of the time. They also found variation in the types of fingerspelled words, based on level of education, vocation, and topic of conversation. In their analysis, they found that deaf adults tended to blended-in fingerspelling in about 15-20% of conversations, but the percentage could increase up to 35% depending if the topic was more technical. Overall, Padden and Gunsauls found that fingerspelling was used not to represent only English vocabulary, but that it was a tool for representing certain types of English vocabulary in certain kinds of ASL structures.

Fingerspelled words are produced with the dominant signing hand in what is referred to as neutral space (Brentari & Padden, 2001). Fingerspelled forms are produced sequentially, and the handshapes produced in the manual alphabet directly map onto the letters of the word in English. There is a direct mapping of the handshapes of the manual alphabet and the spelling of the word in English. In this sense, fingerspelled words are phonemic because they are produced sequentially just like phonemes in spoken English and because they directly map onto graphemes in English (Wilcox, 1992).

ASL also incorporates the manual alphabet into its signed vocabulary. Lexicalized fingerspelling, also known as fingerspelled loan signs or lexicalized signs, are words that were once fingerspelled that have become adopted in ASL and have since taken on a sign like quality in its execution (Battison, 1978). Letters in the middle of the lexicalized fingerspelling may be dropped, so there is no longer a full correspondence between the handshapes used in the lexicalized fingerspelling and the word in English. For example, in the lexicalized fingerspelling, “JOB,” the manual letters are produced only using the letters J-B (the letter O has been dropped). Furthermore, the execution of the sign is also different. The sign begins with letter J and ends with the letter B all in one motion. By comparison, in the fingerspelled form of JOB, the letters J-O-B would be produced sequentially in the neutral fingerspelling space.

The other way that ASL incorporates the manual alphabet into its signed vocabulary is through initialized signs. Initialized signs are ubiquitous in sign code systems or Manually Coded English (MCE), such as Seeing Essential English (SEE1), Signing Exact English (SEE2), or Signed English. However, there are some initialized signs in ASL that have become adopted into the ASL lexicon. In initialized signs in ASL,

there are a group of signs that are similar to each other and the initialized signs are formed off a base sign (Frishberg & Gough, 1973). A handshape from the manual alphabet replaces the hand configuration of the native base sign to represent the first letter of the English word. A common example of this can be seen in signs representing groupings of people, such as DEPARTMENT, FAMILY, LEAGUE, ORGANIZATION, SOCIETY, and TEAM. The base ASL sign uses a C-HS, which is a commonly used to designate a grouping of things or people. However, since there are many words in English that denote groupings of people, ASL has borrowed the initial letter of each of the words in English to specify the grouping that is referred. For example, the D-HS is used for the sign, DEPARTMENT; the F-HS is used for the sign, FAMILY, and so on. The C-HS is used to initialize the signs for CLUB or CLASS, and this is an example of where there is overlap between the conventional hand configuration of an ASL sign and the handshape used in an initialized sign. With only the first letter of each word being designated with the manual alphabet in an initialized sign, there is only a limited mapping between an initialized sign and the word in English. A deaf person who is trying to spell the English word “family,” while using their knowledge of the initialized ASL sign FAMILY, would potentially know that the word for “family” begins with the letter F.

Acquisition of American Sign Language Phonology. In order to understand how teachers could use American Sign Language (ASL) phonological instruction to develop language and literacy skills, it is relevant to describe prior research that has examined how and when children acquire phonological components of sign language (e.g. movement, location, and handshapes). Prior studies have shown that children acquire some phonological components earlier than others and are able to produce certain

phonological components, such as location and movement, more accurately than others, i.e. handshapes. The purpose of this section is to discuss why children acquire certain aspects of phonology more easily than others and to describe what is known about the sequence of acquisition.

Children's earliest production of sign forms can begin as early as six months (Petitto & Marentette, 1991). Children's earliest production of signs is largely affected by their ability to manipulate and use their body. Since the early work of Robbins, Brody, Hogan, Jackson, and Green (1928) and Gessell and Thompson (1934), proximal to distal preference for development of articulators with young children has been observed (see discussion in Newell & McDonald, 1994). This means that children are more likely to move joints that are closer to the body, such as the shoulder, elbow, hip, and knee joint, earlier than they are joints that are further from the body, such as the wrists, fingers, ankle, and toes joints. For example, studies examining children's non-linguistic motoric abilities have found a progressive mastery of proximal to distal articulators, such as in activities like kicking in infants and in drawing in preschoolers (Jensen, Ulrich, Thelen, Schneider & Zernicke, 1995; Saida & Miyashita, 1979).

Similarly, research examining the early acquisition of signs has found that children show a similar preference using proximal to distal articulators in the creation of signs. Studies have consistently found that young children under the age of two are most accurate in their location of signs (70-80%), followed by the movement of signs (around 50%), and are the least accurate in their production of handshapes in signs (around 25%-50%; Bonvillian & Siedlecki, 1993; Boyes Braham, 1990; Conlin, Mirus, Mauk, & Meier, 2000; Marentette & Mayberry, 2000; Meier, Mauk, Mirus, & Conlin, 1998;

Siedlecki & Bonvillian, 1997). This pattern reflects children's usage of more proximal to distal articulators. Young children are more likely to use the more proximal articulators of the shoulder and elbow first to produce signs in a specific location, then use the more distal articulators found in the elbow and below (e.g. wrist and hand) to produce sign movements, and then use the most distal articulators in the fingers to produce specific handshapes (Marentette, 1995; Meier, et al., 1998; Siedlecki & Bonvillian, 1993).

Two studies (Boyes-Braem, 1973/1990; Siedlecki and Bonvillian, 1997), in particular, examined the detailed patterns of young deaf children acquiring a sign language from birth. In general, they found that children's acquisition of handshapes in sign language is influenced by their physical developmental capacities to move and coordinate the fingers on their hands, and by the sign exposure they receive in their environment. The studies found that children between the ages of 9 – 15 months first acquire handshapes that can be formed with an open or closed whole hand and/or pincer grasp, and these include the /S, L, baby O, G, 5, C/ handshapes. This basic group of handshapes has also been described as unmarked handshapes, which are handshapes that are more natural and easier to produce, and found in almost all sign languages (Battison, 1974). Battison also noted that unmarked handshapes were ubiquitous in ASL, and constituted 69% of all entries in the Stokoe, Casterline, and Croneberg (1965) ASL dictionary.

Boyes-Braem (1973/1990) and Siedlecki and Bonvillian (1997) also found that as children reach 15-18 months, they become more proficient in using the basic level or unmarked handshapes in signs. Children also begin to incorporate handshapes in signs that could be formed by additionally incorporating the middle, ring, and/or pinky fingers

in full extension in handshapes, and these include the /I, Y, D, P, 3, V, H, W/ handshapes. Finally, as children begin to approach three and a half, they finally begin to develop higher level of sophisticated finger motor control and they can bend, cross, and insert fingers between other fingers to produce more complex handshapes, such as the /open-8, 7, X, R, T/ handshapes. This capacity gives children to the ability to begin to produce a more full range of handshapes, depending on the exposure of sign vocabulary they have had from caregivers in their environment.

In summary, children's phonological acquisition of handshapes seems to be initially influenced by their anatomical and physiological development, and suggest a preference for proximal to distal articulators. In early childhood, phonological aspects of placement and movement are produced more accurately, while the accuracy of the handshape lags behind. However, as children continue in their physical and cognitive development, they become more proficient with a limited number of handshapes. Handshapes, such as /5, B, S, G, C, O/, are among the first handshapes to develop because they are anatomically and physiologically easier to produce and seem to be naturally acquired by a broad number of children regardless of signing ability. Unmarked handshapes also form the basis for a high percentage of early signs produced in ASL, and provide children with a foundation from which to acquire a large base of sign language vocabulary. By comparison, marked handshapes are more difficult to use. These handshapes are more complicated for children to produce, are acquired at a later stage of development, and appear in a lower percentage of signs used in ASL. Manual alphabet derived handshapes appearing in initialized ASL signs would also be considered marked.

Benefits of Phonological Awareness in Language Processing Abilities

As described in previous sections, much of the research conducted on phonological awareness with hearing children has examined how phonological awareness contributes to children's reading development. Some studies have focused on the connection between phonological awareness and oral language proficiency and, for the most part, have found these two factors to be significantly related (Chaney, 1992; Lonigan, Burgess, Anthony, & Barker, 1998, Lonigan, Burgess, Anthony, & Barker, 2000; Storch & Whitehurst, 2002). Other research has investigated how phonological awareness contributes to particular aspects of language development (i.e. word learning), especially in hearing children with Specific Language Impairment (SLI). Children with SLI have difficulties in processing language, and struggle to process, store, and retrieve new words efficiently (Gray, 2004, 2005; Leonard, 1998; Nash & Donaldson, 2005; Rice, Bahr, & Nemeth, 1990). These lexical processing abilities are seen as important for word learning, and children who demonstrate deficits in these processes frequently experience deficits in vocabulary knowledge (Leonard, 1998; Nash & Donaldson, 2005).

Deaf children, typically, are not considered to have SLI, even though recent research suggests that some deaf children could have SLI (Mason et al., 2010; Quinto-Pozos & Singleton, 2010). However, deaf children are similar to hearing children with SLI because both groups of children experience vocabulary deficits. Deaf children, especially those born to hearing parents, frequently experience vocabulary deficits, not because of cognitive processing limits, but because they are acquiring language in an impoverished linguistic environment (Bornstein, Selmi, Hayes, Painter, & Marx, 1999; Lederberg & Spencer, 2001; Mayne, Yoshinaga-Itano, Sedey, & Carey, 1998; Moeller,

2000). In this regard, there are parallels in understanding how promoting phonological awareness and phonological processing could enhance children's ability to learn words, enhance language proficiency, and ultimately improve overall reading proficiency.

In spoken languages, phonological processing is an important aspect of the word-learning process. According to Lonigan (2006) when a child hears and processes a word from spoken speech, the phonological structure of the word is analyzed and compared to existing words held in the mental lexicon. If no word exists, then the novel word is placed into short-term memory, before eventually being stored in long-term memory. In order for children to retrieve the word again, they need strong phonological representation in order to access the word and correctly use it.

Evidence of phonological processing and word learning has been documented in several different areas. First, correlational studies have found a relationship between abilities in phonological processing and vocabulary development, especially with regard to phonological awareness tasks (e.g. phonemic blending and isolation) and phonological short-term memory (Gathercole, 2006; Gray, 2006; Metsala, 1999). Second, children with SLI have difficulty in efficiently storing words in a strong network of associations (Leonard, 1998). In general, words are not stored individually, but are stored in networks of associations that include semantic, phonological, and morphological information. For example, the word "*dogs*" might be stored with additional semantic information (animals, pets, puppies), morphological information (noun, plural), and phonological information (starts with /d/). Most links are based on semantic associations, and a stronger network of associations should facilitate retrieval of a word from the lexicon. Gray (2005) taught children a set of new words and then assessed children's word-

learning skills using phonological and semantic probes. The results of the study show that phonological production and semantic processing influenced word-learning in SLI children in different ways. First, the children did better on production tests when words were presented with phonological cues; and second, children did better on comprehension tests when words were presented with semantic cues. Thus, it seems that both the phonological and semantic processing tasks enhanced children's cognitive processing abilities by providing them multiple and overlapping pathways to access words.

Similarly, prior research studies with hearing children without SLI have also found that hearing children make use of their cognitive connections as they learn words. This phenomenon has also been called the *lexical restructuring model* (Fowler, 1991; Metsala & Walley, 1998). According to the model, as children first begin to learn words their initial representation of words are represented globally as whole words. However, as children continue to access the word, their access becomes more fine-grained and segmented, especially as children mature in preschool and the early grades. Studies have also suggested that children have greater segmentation for high frequency words and words from dense phonological neighborhoods (Walley, Metsala & Garlock, 2003). Thus, children with small vocabularies may be limited in their phonological awareness and their memory of words has not yet moved from the global whole words into the segmented parts (Lonigan, 2006).

In summary, the research conducted on phonological awareness with hearing children with SLI suggests several potential benefits of promoting phonological awareness to improve word learning. First, instruction that promotes phonological awareness strengthens children's phonological representation of words. This seems to

improve children's ability to process words phonologically and allows them to store new words into phonological short-and-long-term memory, which improves their ability to retrieve previously learned words. Second, instruction that promotes children's phonological understanding of words (i.e. semantic strategies) could be used to enhance and strengthen children's network of associations of words, which include associations of semantic, morphological, and phonological information.

Based on the research of phonological instruction with hearing children with SLI, there seem to be similar opportunities to use ASL phonological instruction to improve word (sign) learning and lessen vocabulary deficits that are commonly observed with deaf children. Natural exposure to American Sign Language (ASL) provides deaf children with opportunities to build a lexicon, and understand what signs mean, how they are produced, and used in context (Lederberg, 2003; Schick, 2003). Formal instruction that emphasizes the phonological structure of signs in ASL may be used to enhance children's ability to process novel signs with known signs. This occurs by improving children's capacity to store signs into memory, and then retrieve the signs as necessary. Formal instruction of the phonological structure of ASL may contribute to children's network of associations and build on children's existing semantic, phonological, and morphological understanding of signs.

One other potential benefit of promoting phonological awareness of ASL may be to improve the automatization of deaf children's language processing (Bebko, 1998; Bebko & Metcalfe-Haggert, 1997). According to Bebko (1998), automatization is a state where individuals rapidly name something or execute an action without having to think about it. The automatization of actions reduces the mental effort to execute a particular

task and allows individuals to attend to other mental tasks. An example of automatization could be a typist who no longer has to think about typing individual letters, but can focus on editing and evaluating the text being typed. In language, if children no longer need to focus on how words are produced, then they can focus on playing with words or using them in broader and more complex ways.

The automatization of phonological components of signs could provide deaf children with a means to understand how signs are formed and are similar to each other (i.e. similar handshape, movement, location). This would benefit deaf children's ability to recall specific phonological aspects of signs and improve the overall network of associations of a particular signs, allowing deaf children to spend more advanced cognitive processing abilities to focus on higher levels of language, literacy⁴, and academic forms of knowledge.

Cummins (1984, 1989) also makes reference to the automatization of language in his discussion of the uses and contexts of language. He describes a model of language development that proceeds through three separate and sequential levels of acquisition. In

⁴ Paul (2006) argues that the term literacy should be reconceptualized as a form of "captured" or frozen form of verbal information. He cites that there are three categories of literacy that are commonly used in society, and these include script literacy, performance literacy, and caption literacy. Script or print literacy refers to captured information through written symbols (e.g. English orthography); performance literacy refers to captured spoken or signed information in the form of audio or video books, and signed videos; and captioned literacy refers to the combination of script and performance literacy with a video background. Furthermore, Paul believes that in our current technological age, children need to be able to use all forms of captured verbal information and have the ability to derive meaning and utilize critical thinking skills as they engage the various forms of literacy. Thus, according to Paul, ASL captured on video can serve a role as a form of performance literacy that benefits deaf children's ability to utilize and think critically about verbal information, even though this has not yet been shown to date.

Level 1, children are learning language in more concrete, and context-embedded situations, while acquiring social and interpersonal language skills. Children in this level, learn how to label, pronounce and articulate words, and develop an understanding of basic syntactic structures. Levels 2 and 3 require more advanced language skills that children acquire in less contextually embedded situations as children engage in literacy, cognitive, academic tasks. In Level 2, children develop basic reasoning and verbal intelligence. In Level 3, children develop higher-order thought and engage in abstract reasoning, strategic thinking and comprehension monitoring. Cummins (1983) suggests that it takes second language learners of English (i.e. deaf children learning ASL) two years to master basic social language skills (Level 1), but that it typically takes five to seven years to develop proficiency in academic situations, which are more abstract and less embedded in context. Bebko (1998) argues that Cummins' description of the automatization of Level 1 skills such as word retrieval, pronunciation, and the use of basic syntactic structures, allows deaf children to acquire and master more academic skills and in Level 2 language skills.

In conclusion, phonological instruction seems to enhance children's phonological and semantic processing abilities. This appears to increase the number of lexical associations that are available to children and seems to improve their ability to make connections to words they recall and produce in language. As children increase their recall capacity, they have more ways to recall words and make associations between words. Moreover, as Bebko (1998) and Cummins (1983) indicate, increasing recall and basic associations helps provide children with a means to use more advanced cognitive abilities, and to process information that is more abstract and less embedded in context.

In short, phonological instruction could increase deaf children's cognitive functioning and ASL abilities, allowing them to process signs they do know quickly, freeing them to focus on unknown signs, the broader meaning of the language, and on more abstract forms of language.

ASL/English Bilingual Education

The purpose of this section is to describe ASL/English bilingual programs for deaf children, which is the educational context where ASL phonology instruction is most likely to occur. The secondary purpose of this section is to outline the importance of a natural language environment for young children in school and to describe its potential contribution to the language development of deaf students, and by extension, their potential development of ASL phonological awareness.

ASL/English bilingual programs advocate an all-encompassing approach with sign language development, promoting both a natural and a formal use of ASL (Livingston, 1997). ASL is the predominant language of communication in ASL/English bilingual programs, and teachers, staff, and children are expected to use sign language during casual interactions and during formal classroom instruction. In addition, teachers or ASL specialists may also teach ASL as a specific subject, where students receive instruction that expands their knowledge of ASL grammar and vocabulary. When exposed to a signed language through both natural discourse and through formal use and instruction, deaf children have the opportunity to receive all encompassing exposure to ASL. Ultimately, the goal of ASL/English bilingual programs is to immerse deaf children

in an ASL context in order to provide them with an opportunity to develop a primary language that they can use to converse with others and learn about the world.

ASL/English bilingual programs also promote ASL as a vital aspect of Deaf culture. While many people in mainstream society may view deaf people as disabled or deficient because of their inability to hear sounds and communicate orally, many deaf people feel that their lives are normal. Many deaf people have never lived a life that significantly includes sound or sound based communication; therefore, they do not feel as if they are missing something. Many deaf people feel that their reality of the world is based on what they can process through their visual senses, and that they live rich fulfilling lives that are based on a “Deaf way of being” (Singleton & Morgan, 2006). Since deaf people live lives that are predominantly visual, ASL serves the same purpose for the deaf community that any other language in the world serves a group of people. It allows deaf people to communicate with others, make sense of the world, and pass down ideas, beliefs, and past events from one generation to the next (Lane, 2005; Lane, Hoffmeister, & Bahan, 1996). In this capacity, ASL unites deaf people together and allows members of the deaf community to share beliefs, mores, experiences, and a history that forms the basis for a Deaf culture (Padden & Humphries, 1988). Viewed from this perspective, ASL/English bilingual programs serve an important role, not only in promoting ASL as a primary language of communication, but also in serving as a store of Deaf cultural knowledge and awareness that can be transmitted to students, who serve as the future generation of the deaf community.

Teachers in ASL/English bilingual programs serve an important role in the ASL development of their students. Deaf teachers are often highly fluent in ASL and can serve

as language role models for their deaf students, especially those born to hearing nonsigning parents. Deaf teachers may also have the ability to engage their students in ways that are more visually sensitive (Mather, 1987, 1989; Singleton & Crume, 2010), and use more fingerspelling, which can help promote future language and literacy development (Humphries & MacDougall, 2000; Padden & Ramsey, 1998, 2000).

These qualities can be especially important for their deaf students because there is a wide variation of signing abilities among deaf children attending ASL/English bilingual programs. Typically, deaf children of deaf parents begin school with native signing abilities, having been exposed to signed language from birth. By comparison, deaf children of hearing parents may begin school with minimal-to-moderate proficiency in ASL, because their parents are likely to have either no signing abilities or be much less fluent than deaf parents. Thus, the wide-ranging signing abilities of their deaf students can create challenges for teachers who must tailor their use of language to meet the developmental needs of their students.

Developing English in ASL/English Bilingual Education. While ASL/English bilingual programs serve an important role as cultural and language spaces, their other important mission is to educate deaf children and develop their reading and writing abilities. ASL is taught as the primary language and English is developed as an additive second language in order to enrich the primary language (Lambert, 1975). This approach is different from subtractive bilingual approaches where a dominant language of the

society (e.g. English) replaces or reduces the heritage language or mother tongue⁵ of the minority group (Landry, Allard, & Theberge, 1991).

Theories and practices about how to develop written English in ASL/English bilingual programs stem from the literature of spoken language bilingual education. Cummins's (1984) linguistic interdependence principle is a prominent theory often cited in the bilingual education research literature. The linguistic interdependence principle holds that all languages have an underlying conceptual core and that the knowledge individuals' gain in one language can be transferred while learning another language. Cummins is careful to note that what is transferred between languages is not necessarily surface features of language, such as grammar and vocabulary knowledge, but a range of deeper level skills. These deeper level skills include qualities such as higher-order thinking, subject-matter knowledge, conceptual thinking, and reading skills. Thus, for deaf children who are learning ASL as their primary language, they should theoretically be able to transfer over their deeper level skills of their ASL to learning English and vice versa.

In addition to utilizing the linguistic interdependence between ASL and written English, ASL/English bilingual programs also seek to enhance deaf children's metalinguistic knowledge of ASL and English in order to allow deaf students to use their knowledge of one language to learn the other (Livingston, 1997; Mahshie, 1995). Metalinguistic knowledge requires explicit awareness of languages that allow users to analyze and consider how languages can be used to express an underlying concept

⁵ Sign language is considered by some in the field of deaf education as the mother tongue or mother sign of Deaf people (Bergmann, 1994; Skutnabb-Kanga, 2008; Stokoe, 2001).

(Bialystok, 2007). In order to understand how ASL is structured and conveys meaning, deaf children need to develop a high level of proficiency in ASL. Once deaf children have a well established, deeper understanding of ASL, then teachers can instruct their students to compare and contrast how English expresses the same concept in a different manner.

Not all scholars in the field of deaf education agree with the notion of the linguistic interdependence theory as it pertains to using ASL to develop written English. Mayer and colleagues (Mayer & Akamatsu, 1999; Mayer & Akamatsu, 2003; Mayer & Wells, 1996) argue that the development of literacy in a second language, as proposed by Cummins, only applies when individuals can have full access to the *spoken* language and the writing system of both L1 and L2 target languages (e.g. Greek and English). They indicate that Cummins (1981) suggests two pathways to the acquisition of literacy in a second language, which is shown in Figure 3.

Cummins Model
<i>1st Pathway: L1 spoken language > L2 spoken language > L2 written language</i>
<i>2nd Pathway: L1 spoken language > L1 written language > to L2 written language</i>

Figure 3. Path of spoken language bilingual development of a L2 written language.

Neither of these pathways would be logical in the literacy development of deaf children. In the first pathway, deaf children may have limited ability to develop their L2 spoken language because they have diminished opportunity to access and use spoken

English. Similarly, in the second pathway, there is no written system of ASL⁶ that can be used to develop the L2 written system of English.

In essence, what Mayer and colleagues seem to be critiquing is what amounts to a “Sign Language Bilingual” Model, which is shown in Figure 4; this model represents the belief that an L1 conversational signed language (ASL) can directly lead to the development of an L2 written language (English). While Mayer and colleagues provide an opposing viewpoint with respect to the potential application of the linguistic interdependence principle to the literacy development of deaf children, they do not provide any empirical evidence that supports their critique. Moreover, Mayer and Akamatsu (2003) also indicate that they accept that “ASL can confer cognitive and academic benefits and lead to a primary language maintenance without blocking L2 literacy learning” (p. 144). Thus, while Mayer and colleagues may disagree about the potential pathway and benefits that ASL uses to develop literacy in a second language, they do support the notion that ASL provides deaf students with distinct cognitive benefits.

The work of Mayer and colleagues has fueled an interesting debate among scholars and researchers in the field of deaf education about the potential effectiveness of ASL in developing written English. It seems contradictory that ASL proficiency could influence English literacy proficiency, but recent studies show a potential relationship

⁶ While there is no formally recognized writing system of ASL or any signed language, there is a growing movement within deaf communities throughout the world to use a system called SignWriting. The SignWriting system is designed to symbolize any sign language and currently represents 27 different sign languages. The system is currently used in 36 different countries, including the United States. Retrieved from <http://www.signwriting.org/> on October 4, 2011.

between the two languages. Numerous correlational studies, that have examined the relationship between ASL and English proficiency, have found a positive relationship. Deaf students with medium-to-high levels of ASL proficiency have been found to demonstrate higher levels of reading proficiency in English (Hoffmeister, 2000; Strong & Prinz, 2000). These findings have also been replicated with deaf students in France who use French Sign Language as their first language and have learned French as their second language (Niederberger, 2008). Studies have also documented a positive relationship between sub-skills of sign language, such as ASL production and comprehension (Padden & Ramsey, 2000; Prinz & Strong, 1998; Strong & Prinz, 2000), antonym and synonym knowledge (Hoffmeister, 2000), fingerspelling (Padden & Ramsey, 2000) and English reading proficiency.

Sign Language Bilingual Model

L1 signed language > (by-pass L2 spoken language) > L2 written language

Figure 4. Path of a “signed language bilingual” development of a L2 written language.

McQuarrie and Abbott (2008) also found a positive relationship between ASL phonology and reading proficiency. Their study tested 50 deaf children, ranging from 7-18 years old with a mean age of 13 years. All the deaf children used ASL as their primary language. The children were tested on their knowledge of the four basic phonological parameters found within ASL (e.g. handshape, location, movement, palm orientation) and the children were also administered the Woodcock Johnson Word Identification subtest as a measure of English reading proficiency. The results indicated a correlation of $r=.47$ between students’ knowledge of ASL phonological structures and reading proficiency.

To date, the study conducted by McQuarrie and Abbott appears to be the only study that has investigated the potential relationship between ASL phonological awareness and reading proficiency.

What these aforementioned studies suggest is that ASL provides deaf children with a language base from which they can learn to read English. Even though ASL does not map directly onto written English, the recent research suggests that there is some transfer of linguistic ability occurring between ASL and English. The Strong and Prinz (2000) study analyzed complex predicate structures of ASL, while Hoffmeister's (2000) evaluation of ASL synonyms and antonyms reflected students' knowledge of ASL lexical and semantic systems. Moreover, the study conducted by Padden and Ramsey (2000) examined students' understanding of sign order in ASL sentences and ASL verb agreement; these domains are part of ASL's morphosyntactic system. Each of these studies provided some insight into the deaf students' understanding of basic foundational structures in a language (ASL), and these basic analytic abilities, according to Cummins' principle of linguistic interdependence, could be transferred when learning another language (i.e. the writing system of English). While McQuarrie and Abbott (2008) documented a relationship between ASL phonological awareness and reading proficiency, there is still limited research on how ASL phonological awareness is promoted in an educational setting. It is not possible to ascertain how the potential relationship was formed or even what ASL phonological awareness provides deaf children. Part of the difficulty may be that researchers and educators in the field of deaf education have not yet conceptualized what the notion of promoting ASL phonological awareness in early childhood education entails.

Using ASL Phonological Instruction to Build ASL and English Literacy

Even though it appears that researchers and educators in the field of deaf education have not fully conceptualized the notion of phonological awareness and instruction in ASL in the same way it has been used with hearing children, it is possible to speculate how it might be used with deaf children based on prior research. This next section focuses on how phonological instruction could be used to build ASL proficiency and then be used to promote children's acquisition of words in written English.

As previously described, phonological instruction with spoken languages is aimed at helping children understand that spoken words are formed of minimal linguistic units; and that the minimal units can range from larger units, such as syllables, to intra-syllables awareness (e.g. onset and rimes), to individual phonemes at the most finite level (Goswami & Bryant, 1990). Ultimately, studies have shown that phonological instruction promotes linguistic abilities, as it helps children retrieve and produce words based on phonological and semantic associations (Leonard, 1998; Snow, 2005). Furthermore, studies have also shown that phonological instruction contributes to development of literacy as it facilitates children's ability to map their knowledge of the phonological structure of spoken words to written words of English (Adams, 1990; Lonigan, 2006; Pullen & Justice, 2003; Snow, Burns, & Griffin, 1998).

There seem to be parallels between the potential benefits of spoken language and signed language phonological instruction. Prior research has already established that both spoken (i.e. English) and signed languages (i.e. American Sign Language) are natural languages (Emmorey, 2001; Klima & Bellugi, 1979). Previous studies have also found several areas of support to suggest that both spoken and signed languages are biologically

based. Studies have indicated that both language modalities are processed in the language processing centers in the brain, such as the Broca's and Wernicke's regions in the left hemisphere (Emmorey, 2001; Neville et al., 1998). Studies have shown that native signing children achieve linguistic milestones at similar rates of native spoken language children (Meier, 1991; Newport & Meier, 1984). Lastly, investigators have also suggested that there are sensitive periods for the acquisition sign language (Newport, 1990; Mayberry, 1994). Furthermore, numerous studies have shown how children progressively acquire phonological components of sign language (Conlin et al., 2000; Marentette & Mayberry, 2000; Meier, 2000, Siedlecki & Bonvillian, 1997; see Schick, 2003 for review). In sum, what the research literature suggests is that both language modalities are natural languages comprised of minimal linguistic units and that children's ability to understand, acquire, and manipulate the basic linguistic units matures as they become older.

It seems appropriate to hypothesize that, at a fundamental level, phonological instruction of ASL could be used to promote children's linguistic abilities, especially their ability to retrieve and produce words based on phonological and semantic associations, just as phonological instruction of spoken languages has promoted these abilities with hearing children. What is uncertain is the potential of ASL phonological instruction to facilitate children's ability to either directly or indirectly map their ASL knowledge onto words in written English. The study conducted by McQuarrie and Abbott (2008) suggests that there is at least a possible relationship between ASL phonological knowledge and English reading proficiency. However, it is not clear from the study how

this relationship between ASL and English could be formed because most signs in ASL do not provide any information about the word in English.

It is true that many native signs in ASL do not provide any information about words in English, but there are groups of signs in ASL that borrow from English in one form or another. These signs, which include initialized signs, lexicalized fingerspelling, and fingerspelled words, range in the degree to which they represent words in English. Initialized signs partially represent words in English, primarily through the first letter, such as with F-handshape (HS) in the sign of FAMILY, or the P-HS in the sign for PRINCE. Lexicalized fingerspelling represent words in English more fully. Many of the letters will be included but not all of them. For example, the sign for JOB, uses only the handshape J-B in the sign, or the sign for PIZZA, which uses the handshapes of Z-Z-A in the sign. Fingerspelled words represent the most direct level of correspondence to words in English, as the handshapes in the form of the manual alphabet directly map onto the letters of words in English. For example, fingerspelling is often used with common nouns (e.g. C-H-E-V-Y or F-O-R-D cars) or with technical vocabulary (X-R-A-Y).

Previous research suggests that fingerspelling is used to bridge words in English to signs in ASL, especially with signs that include little information or no information to the word in English through a process called chaining (Humphries & MacDougall, 2000). In chaining, an adult introduces a sign (e.g. CAT), then fingerspells the word (e.g. C-A-T), and then shows the word in English (e.g. cat). Chaining allows the signing child the opportunity to forge a connection between their knowledge of the signs in ASL to words in English through the manual alphabet. A study conducted by Haptonstall-Nykaza and Schick (2007) found that chaining techniques help deaf children write and recognize

printed words in English and were also effective at helping deaf children fingerspell words.

It seems possible that signs do map onto words in English, either partially with initialized signs, or more fully through lexicalized or neutral fingerspelling, or even through chaining. Teachers in ASL/English bilingual programs for deaf children promote the development of sign language proficiency in school, and presumably seek to facilitate their students' knowledge of how signs are formed and their semantic meaning (Livingston, 1997; Mahshie, 1995). However, the key consideration in calling these instructional practices as being a part of "phonological" development is based on how sign language linguists conceive of the manual alphabet and fingerspelling in terms of their relationship in ASL phonology.

As previously described, earlier studies of fingerspelling did not consider the manual alphabet as part of ASL phonology because it was borrowed from English and represented English orthography (Bornstein, 1978; Klima & Bellugi, 1979; Tweney, 1978). However, some contemporary views of the manual alphabet and fingerspelling consider that fingerspelling has a vital and deeply embedded function within ASL (Brentari & Padden, 2001; Padden, 2006). Thus, if a more contemporary framework of viewing the manual alphabet and fingerspelling as being integral parts of the ASL lexicon is considered, then this could be seen as having the potential for incorporating a broader view of ASL phonological development. This could suggest that instructional practices that promote the phonological development of ASL, not only include the awareness of phonological structures of signs that are native to ASL (e.g. movement, location, and handshape), but also include an awareness of how the manual alphabet is incorporated

into signs, such as with initialized signs, and with lexicalized and neutral fingerspelled words. This broader perspective of ASL phonological development then makes it possible to view how teachers could use phonological instruction of ASL to promote proficiency in ASL, *and* promote the acquisition and use of words in English.

In order to include the broader perspective of ASL phonological development, there are several aspects of ASL production that should be considered with regard to phonological awareness of sign language. First, it has already been described that the traditional forms of signs native to ASL incorporate multiple phonological components, such as movement, location, and handshape, which are all produced simultaneously in the production of signs. Initialized signs are similar to native signs of ASL in terms of their production, but differ because the handshape used to produce the sign uses the manual alphabet to represent the first letter of the word in English (e.g. the P-HS for the sign PRINCE, Q-HS for the sign QUEEN, K-HS for the sign KING).

The other use of handshape occurs in the form of the manual alphabet in fingerspelling. Prior research conducted by Padden (1991, 2006) and Akamatsu (1982) indicate that deaf children seem to learn to fingerspell *twice*. In other words, deaf children's understanding of fingerspelling evolves from a linguistic form that is uniquely related to ASL to an eventual symbolic representation of English orthography. Deaf children's early encounters with fingerspelling occur with signing adults in the context of conversation and reading activities (Erting, Thumann-Prezioso, & Benedict, 2000). Adults may often use fingerspelling as they use proper nouns or lexicalized fingerspelling in a discussion or while reading a story. The initial connection between a fingerspelled word and English print for children is not initially obvious and takes time to develop

(Padden, 1991). While adults are able to perceive individual letters in fingerspelling, children's perception of fingerspelling is more like a complex sign or a series of up and down movements of the hand, also referred to as "movement envelopes" (Akamatsu, 1982). Fingerspelling can begin early in childhood. A study by Kelly (1995) described how a 24-month child was videotaped trying to fingerspell C-H-I-P (potato chip). The child produced a movement cluster of letters and did not include the hand shape in the middle or medial part of the fingerspelled word (C-H-P). When children fingerspell at a young age, they may also produce the sequence wrong and the wrong letters. For example, a study conducted by Padden and LeMaster (1985) found that a young child at the age of 2 years and 9 months was asked to spell her name, and she spelled the letters E-U-B (with E being the only letter in her actual name). When the girl was asked to spell her dog's name "Sasha", she produced the letters U-B-A. These examples of fingerspelling exemplify how young children in the early stages of fingerspelling development understand that certain movements that are symbolic of something; however, they may not understand that the specific letters and their sequence may be important (Padden, 2006).

The second time children learn to fingerspell is when there is a convergence of early literacy skills that helps the signing child understand that fingerspelling is actually a manual representation of letters in English orthography (Padden, 2006). This convergence of skills occurs when children includes incorporate their fingerspelling with reading and written spelling (Padden, 1991). As children read books and begin to write words in their assignments, they begin to realize that writing words, fingerspelling it, and understanding the same fingerspelling produced by someone else are the same (Padden,

2006). This transition seems to indicate that children understand there is a direct connection between the manual alphabet in the form of a handshape and that of the letter in words in English orthography. Maxwell (1988) suggests that this realization of individual letters of the manual alphabet and letters in printed English could be considered an understanding of the *alphabetic principle* (Maxwell, 1988). In other words, children begin to make the connection that the handshapes in the form of the manual alphabet directly map onto the letters in the words in English print. In English, the alphabetic principle refers to the relationship between phonemes in spoken language to graphemes in the written language; in ASL, the relationship refers to phonemes of handshapes in the form of the manual alphabet to the graphemes of the written language.

It is also speculated that once children begin to understand that manual alphabet maps onto the letters of English print that children begin to make the connection between handshapes produced in some signs, as well. For example, children may soon begin to understand that the handshape(s) used in initialized signs also refers to the first letter in the word in English print (e.g. F in FAMILY). Likewise, children may also begin to connect the handshapes in commonly occurring lexicalized fingerspelling such as B-U-S or G-O to the word produced in English. Conversely, this suggests that as children begin to learn that some handshapes connect to words in English print, they also learn that some signs DO NOT have handshapes that correspond to words in English print. This could suggest that children may have to refine their phonological understanding of signs and reclassify them into categories of signs that either do or do not have representation of English. This ability to parse out signs into newer categories could help them understand what strategies to use with particular signs in order to learn the word in English.

Emerging ASL Phonological Awareness. The next part of this section will consider the broader perspective of ASL phonological development as it relates to the progression of acquisition. Children seem to progress from an understanding of the basic structures of signs in ASL, to an emerging awareness of fingerspelling, to an understanding of the alphabetic principle, to learning to separate out groups of signs based on their ability to represent English, to using ASL based strategies to learn words in English (e.g. chaining). This proposed progression of ASL phonology is a theorized model based from a convergence of ideas from research conducted on the biological basis of language, on the phonological development of spoken English, and on the acquisition of sign language and fingerspelling. This framework will serve as a means to understand how ASL phonological development could develop to support ASL proficiency, facilitate the acquisition of English written vocabulary, and further refine knowledge of the English lexicon.

The proposed theory suggests that deaf children's awareness of the alphabetic principle represents a significant shift in how deaf children perceive and use sign language. Prior to grasping the alphabetic principle, children acquiring sign language have limited awareness that English may influence ASL in certain aspects. As described so far, deaf children naturally acquire ASL through their contact with others, and they acquire the ability to produce initialized signs, and lexicalized and neutral fingerspelling. As they learn each of these types of signs they learn the rules and patterns for each of these sign types along a continuum of development (Conlin et al., 2000; Marentette & Mayberry, 2000; Meier, 2000; Padden, 1991; Padden & LeMaster, 1985; Siedlecki & Bonvillian, 1997). However, after children begin to grasp the alphabetic principle and

understand that some handshapes map onto words in English, they begin to perceive that some signs are native to ASL and that some signs represent English to some degree, and children then begin to use different strategies to decode words in English as they encounter them.

One strategy deaf children may use to access words in English is to use the partial information represented in either initialized sign, or the full information provided in lexicalized or neutral fingerspelled words. Another alternative strategy children may use to gain full access to words in English is chaining, which allows deaf children a means to bridge fully their knowledge of signs in ASL to decode words in English. Chaining is beneficial because it provides deaf children with a means to bridge signs that either provides little or no connection to English (i.e. native signs) or signs that provide more limited information to the word in English (i.e. initialized or lexicalized signs). With the ability to use their knowledge of ASL to access English, deaf children are afforded the opportunity to continue to expand their knowledge of ASL phonological structures, while they can simultaneously use ASL based strategies to access words in English.

Suggested Progression of ASL Phonological Development

The earliest stage of phonological development is aimed at facilitating children's development of phonological structures in American Sign Language (ASL). This can range from earliest form of phonological instruction, *Sign Segmentation*, which helps children understand that signs are produced in a specific location, with a specific movement, and with a specific handshape (see Table 3). Once children develop a base of sign vocabulary, then they might start to identify how some signs share similar

phonological components, such as a handshape, movement, or location, in the form of *Sign Rhyming*. This helps children understand how signs are similar to each other and share identical phonological components. Next, children could become increasingly adept at *Syllable Blending* and may be able to change one phonological component of a sign to form another sign, such as changing the movement of the signs for SIT to form the sign TRAIN, or changing location for the signs of SUMMER to form either UGLY, or DRY. Syllable blending requires that children understand how to manipulate specific phonological components in order to recall signs with similar features.

Parallel to the development of phonological awareness of signs in ASL, teachers may also promote children's understanding of movement sequences of fingerspelling in ASL. In this way, teachers help children understand that some representations in ASL utilize fingerspelling. Even though children may not initially be able to segment individual handshapes in the fingerspelled word, they begin to display an awareness of *Emergent Fingerspelling* and begin recognize overall pattern of movement that is associated with a fingerspelled word. This may provide deaf children with a developing awareness of patterns that are embedded in fingerspelling movements and that these movement sequences linguistically represent an action or a person, place, or thing. Eventually, as children become more accustomed to the movement patterns, they may begin to produce handshapes in neutral or lexicalized fingerspelling, but do not yet fully understand that the handshapes are representative of the manual alphabet that can be used to form an a word in English.

Table 3

Theorized Progression of ASL Phonological Awareness (Based on Padden, 1991; Stackhouse, 1997)

Stage	Signed Language	Approximate Ages
Sign segmentation	Identify that signs have different phonological parameters	3-5 years
Sign Rhyming	Identify how signs share phonological parameters (e.g. handshapes)	3-5 years
Emergent Fingerspelling	Identify that fingerspelled words have movement contours that represent signs and words	3-5 years
Syllable blending	Manipulate different phonological parameters to create new signs	4-5 years
Handshape Divergence	Grasp that handshape can be native to ASL or can be used to represent English through the manual alphabet	6-7 years
Phonemic blending	Produce fingerspelling to create words	6 years
Phonemic segmentation	Able to read fingerspelling	6 years
Phonemic manipulation	Delete/add letters in fingerspelled words to form new words	7 years
Cluster segmentation	Manipulates fingerspelled groupings to create new words	7+ years

The next part of the model suggests that children begin to transition into an intermediate phase of phonological development as they begin to grasp a signed based version of the alphabetic principle. The early stage of ASL phonological development provides signing children with a linguistic foundation in ASL and facilitates their development of a deeper understanding of the lexicon of ASL. As children begin to grasp the alphabetic principle, they begin to reclassify their understanding of signs in ASL. This reclassification would be facilitated in ASL/English bilingual programs for deaf children because they promote both ASL and English through other English literacy activities, such as storybook reading and writing exercises. Through exposure to English, children gain some understanding of English orthography and may have the emerging

ability to recognize some words in English. As deaf children begin increase their knowledge of ASL, and they begin to grasp that certain ASL signs represent words in English, but may not understand precisely how to decode the word in English. However, as children are placed in situations where they have to write words in English, they may begin to recognize that some handshapes in certain signs represent some feature of the word in English. In particular, as the teachers' reported, lexicalized fingerspelling may offer an opportunity to experience an "a-ha" moment about the alphabetic principle because the handshape, either mostly or fully, corresponds to the letters of the word in English.

After acquiring insight of the alphabetic principle, children begin to transition in an intermediate phase of ASL phonological development as they develop an awareness of *Handshape Divergence*. This awareness develops into an understanding that some handshapes are native to ASL, and that some handshapes are part of the manual alphabet and are used for representing words in English, either in the form of initialized signs, or lexicalized or neutral fingerspelling. Teachers may try to promote this awareness by emphasizing how some handshapes represent signs native to ASL and how some are used in the form of the manual alphabet to represent English.

As deaf children become more skilled in their knowledge of how signs categorizing signs by their degree of overlap to English, it is suggested that they begin to use this knowledge to decode words in English. The early stage of phonological awareness provides deaf children with knowledge of what structures were authentic to ASL. The intermediate stage provides deaf children with a means to differentiate signs based on the degree to which they overlapped with English. The advanced stage of

phonological development could seek to promote an ASL-based method to decode words in English (e.g. fingerspelling or chaining).

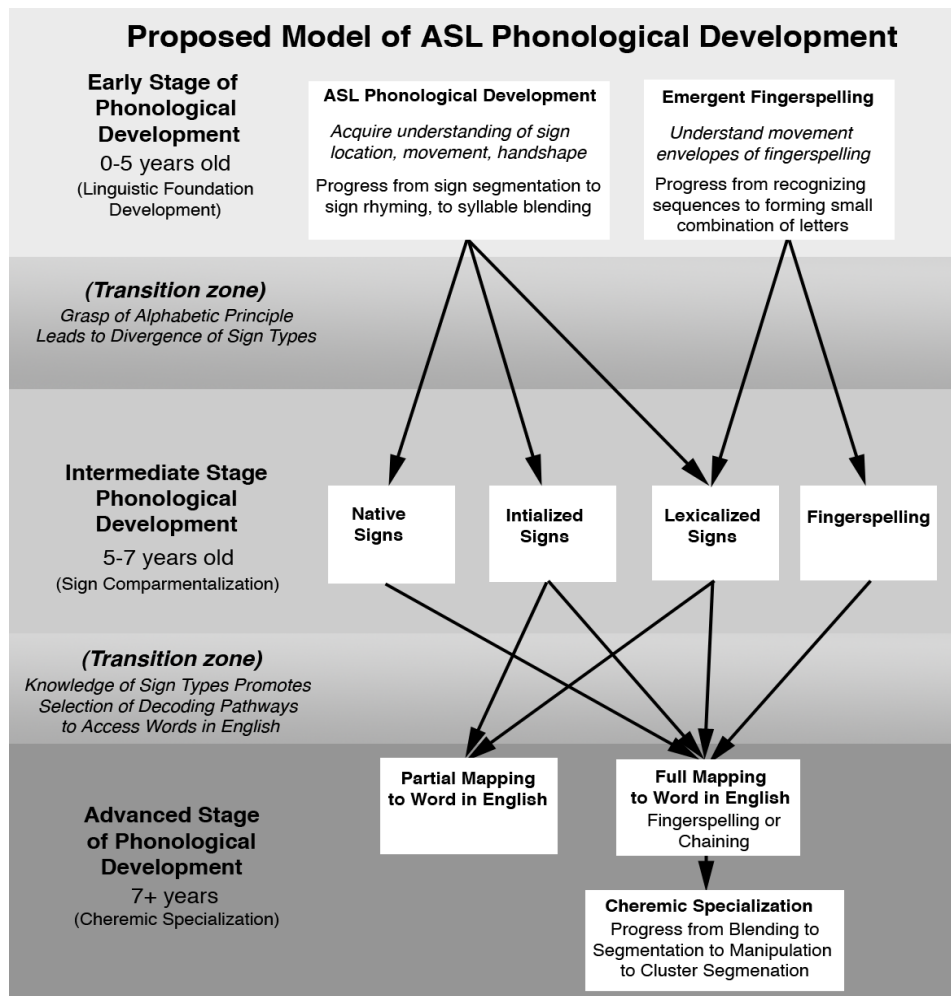


Figure 5. Proposed model of phonological development in an ASL/English context

It may be that deaf children have two pathways to decode words in English. The first pathway is based on partial mapping to words in English, in the form of initialized signs. This pathway may provide only limited information to the word in English, but it may be sufficient for deaf children based on their experience and knowledge of the word in the English. The second pathway provides a means to fully map to the word in English. Fingerspelled words already incorporate this full mapping based on the nature of their

structure within the ASL. Native signs, initialized signs, and lexicalized fingerspelling, by the nature of their structure, do not provide an exact correspondence to the word in English. However, if teachers incorporate the use of chaining, this instructional practice allows fingerspelling to be used as a bridge to connect signs to words in English.

In terms of deaf children's phonological awareness progression of ASL, there seem to be parallels between how deaf children and hearing children progress through their ability to map phoneme and graphemes, whether it is based in spoken or sign language. Hearing children must learn how to manipulate phonemes in order to become more proficient in their abilities to map this knowledge onto graphemes. In the same way, deaf children must be able to manipulate the cheremes or the manual alphabet. Deaf children who are able to fingerspell effectively can map this knowledge onto English print (Musselman, 2000; Padden, 1998, 2000). They can also learn how to connect signs to fingerspelling and can then use the chaining techniques to expand greatly their capacity to encode and decode words from sign language and print. More advanced stages of phonemic awareness could help deaf children blend, segment, and manipulate cheremes to enhance their capacity to learn and understand fingerspelled words. At the last stage of cluster segmentation, deaf children could be able to recognize certain patterns or clusters and can use their knowledge of sign language to understand what these patterns or clusters mean.

Deaf children's progression of English word recognition using ASL phonological awareness should also parallel hearing children's ability to recognize words. Ehri and Snowling (2004) proposed that children go through Pre-Alphabetic phase of awareness. Deaf children would also go through a similar paired association stage because they can

read environmental print and recognize words in a certain context, but not in other contexts (see Table 4). At the second phase, deaf children may also use a *Partial Alphabetic* knowledge to read words, but may also use their knowledge of sign language to identify words and have a basic understanding and ability to pair some fingerspelled letters with the print form in English. This could serve as a prompt to help children recognize some words based on sight. At the third phase, children become proficient in the alphabetic principle and then are able to map fully their knowledge of fingerspelling to words in print. At this phase, children become increasingly proficient in their ability to pair signs to fingerspelling to print. Finally, at the *Consolidated Alphabetic* phase, deaf children are able to recognize clusters of graphemes (e.g. –ing, -ed, -tion) and are able to use their knowledge of ASL to encode/decode rapidly these segments in both fingerspelling and print form.

Table 4

Proposed Progression of English Word Recognition using ASL Fingerspelling (Based on Ehri & Snowling, 2004; Maxwell, 1988; Padden, 2006)

Phase	Description	Approximate Ages
Paired Association	Environmental Print. Can recognize certain words in context but cannot transfer over to other contexts (e.g. McDonalds, Stop sign)	2-4 years
Logographic / Partial Alphabetic	Children memorize features of words and can pair them with signs or features. May be able to recognize some letters based on fingerspelling knowledge that aids in word recognition	4-6 years
Alphabetic / Chaining	Children are adept at the alphabetic principle and begin to chain signs to fingerspelling to print	6-7 years
Consolidated Alphabetic	Children have matured in their ability to blend and segment all phonological segments and recognize recurring patterns	7+ years

Conclusion

While previous research has outlined a potential progression of ASL phonological awareness and instruction, there are numerous unanswered questions. Does ASL phonological instruction build a more developed understanding of ASL, which can then be used to foster the development of English literacy? Does ASL phonological instruction provide an enhanced metalinguistic understanding about the structure of languages, which allows deaf children to transfer this knowledge over to reading English? Does ASL phonological instruction help deaf children learn to parse the difference between a handshape used within signs of ASL and a handshape used to represent English orthography?

While it would take a more extensive program of research to address all of these questions, this study begins the inquiry process by first seeking to understand *what teachers understand about ASL phonology in their instruction*. Little is known about teachers' ideas concerning ASL phonology or their use of instructional strategies to foster ASL phonological awareness. The goal of this study is to gain insight into teachers' conceptualizations of ASL phonology and provide an initial description of how they might be using ASL phonological instruction in their classrooms. Thus, this study seeks to answer the following two core research questions:

1. How do teachers conceptualize the role of American Sign Language Phonological Awareness in deaf children's bilingual language development?
2. What strategies do teachers use to promote deaf children's American Sign Language Phonological Awareness in ASL/English bilingual education?

Chapter Three

Methodology

This qualitative study used a grounded theory based approach for the data collection and analysis (Glaser & Strauss, 1967). The grounded theory approach aims to explain social and social psychological processes (Charmaz, 2001). This study used a constructivist approach of grounded theory in order to understand how participants construct meanings and actions through a collaborative effort with the researcher. The constructivist approach posits that data analysis is situated in a time, place, culture, and context and thus reflects the researcher's world view. In the rest of this chapter, I will describe the organization of the study and the proposed method of analysis in more detail.

Setting. This study was conducted at an ASL/English bilingual school for deaf children located in the United States. This ASL/English bilingual school emphasized American Sign Language (ASL) as the primary language and written English as the second language. According to the school's website, this emphasis stems from the belief that, for most deaf students, ASL is the accessible and dominant language for communication and thinking. By promoting competencies in both ASL and English, the school gives deaf students opportunities to develop skills and attitudes that help them function effectively with members of both deaf and hearing communities.

Participants. This study sought to include participants who worked in a Bi-Bi school, and worked with young deaf children to develop ASL language proficiency with written English. Individuals who met these criteria at the Bi-Bi school were teachers and ASL specialists. Nine teachers and one ASL specialist agreed to participate in the study.

Invitations to participate were disseminated by the school’s assistant principal and by the researcher on personal visits to the school.

Teachers are defined as the participants who instruct a group of students in an individual classroom and use ASL informally in social settings and formally during classroom-based instruction. The *ASL specialist* is defined as the participant who rotates among different classes and provides formal instruction in ASL, with a goal of developing competencies in ASL. A summary of teacher background characteristics is provided in Table 5.

Table 5

List of participants in the study

Pseudonym	Teaching Role	Hearing Status
Jennifer	Preschool (1 st year)	Deaf
Lisa	Preschool (1 st year)	Hearing
Cathy	Preschool (2 nd year)	Deaf
Elisa	Preschool (2 nd year)	Deaf
Amanda	Prekindergarten	Hearing
Katie	Prekindergarten	Deaf
Stacy	Kindergarten	Hearing
Jane	Kindergarten	Deaf
Linda	Kindergarten	Deaf
Carol	ASL Specialist	Deaf

In addition to their instructional roles in the Bi-Bi school, the participants differed in their hearing status, years of instructional experience, and the age level that they

taught. The potential implications of each of these background characteristics will be described below.

A majority of the participants are deaf. Of the 10 participants, seven participants are deaf and three participants are hearing. The hearing status of the participants is relevant. Prior studies have found that the hearing status of the participants can provide different sorts of experiences and worldviews in how they relate to, socialize, and instruct deaf children (Mather, 1987, 1989; Mather & Thibeault, 2000). Deaf participants may have an intuitive sense or “folk theory” of how deaf children learn ASL, including phonological aspects of ASL. These beliefs may contribute to deaf children’s development of language and may not yet be articulated in the research literature (Chamberlain & Mayberry, 2000). These intuitive insights could prove useful in learning how deaf children incorporate and use phonological components of ASL in their language and literacy development. Conversely, the hearing participants (and deaf participants) may also have developed their own understandings about the broader nature of language and literacy development because they are able to draw from their understanding of both spoken and signed language. This insight may provide the hearing teachers with the opportunity to compare and contrast how deaf children acquire, and incorporate phonological aspects of ASL to develop their language skills.

The participants’ years of instructional experience varied. Some participants taught for one or two years, while others taught for more than a decade. The participants with a longer tenure have insight, understanding, and experience of working with a broad range of deaf children with varied linguistic abilities and experiences. The participants with a shorter tenure completed their pre-service training recently and have the benefit of

exposure to current theories, research, and teaching practices that may provide them with different strengths in their teaching practices.

The participants also varied in terms of the ages of the children they teach. Teachers were selected over several age ranges to understand how ASL phonological instruction might be different for children at different stages of development. The pool of teachers includes teachers from two pre-school classes (3-4 year olds), a pre-kindergarten class (4-5 year olds), and a kindergarten class (5-6 years old). The needs and abilities of the children vary according to age level. When teaching very young children, teachers may focus on explicitly or implicitly developing basic elements of ASL phonology, and they may be focused on exposing their deaf students to the proper handshapes, movement, location, and palm orientation of signs in order to develop a solid foundation in ASL as a primary language. As children age, teachers may begin to focus on more advanced aspects of ASL phonology with a goal of bridging ASL features and English orthography. This may help students understand when handshapes are appropriate for an ASL sign and when handshapes may be used to map onto written English. Since the ASL specialist teaches a wider range of ages, her perspective will be valuable and provide insights related to the needs of students at varying age levels.

Recruitment. A school administrator was contacted, and the study was explained. The school representative was asked to inform potential participants, either teachers or ASL specialists, about the study. The researcher then met with each of the participants and described the study, informed them about their rights as Human Subjects, and then asked participants if they would be willing to be interviewed. It was made clear that

participation in the study was voluntary and was not required by the school. All nine teachers and the one ASL specialist that were asked agreed to be interviewed.

Data Collection

Teacher Interviews. The teacher interviews were conducted using a semi-structured format. A list of interview questions (see Appendix A) was used to guide the interviews. The interview questions covered four areas: teacher's philosophical beliefs about teaching in a Bilingual-Bicultural program; whether ASL phonological instruction promotes ASL development; whether ASL phonological instruction promotes written English development; and Training and Support.

The questions were developed after reading the literature related to the instructional practices and beliefs about using spoken language phonological instruction to develop literacy with hearing and native-signing deaf children, as well as with literature related to the development of ASL phonology with deaf children. As detailed previously, there appears to be a limited body of research on the instructional use of ASL phonology with deaf children; thus, interview questions were guided by general pedagogical theories and practices based on phonological instruction with hearing children. Interview questions mainly focused on how teachers use ASL phonological instruction to promote ASL proficiency, and how teachers might help deaf children learn to acquire words in written English.

The researcher, a hearing native signer who is fluent in ASL, conducted the interviews. Interviews were done with teachers at the school or via web-based video chat

program. The interviews in person were recorded using mini Digital Video (DV) cameras. One interview that was conducted over the videoconference program was also recorded. The interviews were recorded to allow for later transcription of the conversation. Since all the interviews included some portion in ASL, the use of videorecordings was necessary in order to view and transcribe the linguistic information in the conversation.

Survey Questions. Teachers were also sent a follow-up survey (see Appendix B). The survey questions were developed based on the data the teachers reported in interviews. The survey was divided into four sections, ASL hand configuration (handshape), Manual Alphabet, Emergent Literacy, and Decoding English. Within each section, was a listing of the different types of instructional strategies associated with that section. Teachers were asked to rate the frequency in which they used each instructional strategy. The rating scale was as follows: 0=Never, 1=monthly, 2= bi-weekly, 3=weekly, and 4=daily.

The survey served two purposes. The first was to corroborate the findings in the interview. As each participant had the opportunity to identify if they used an activity and report its frequency and add an additional instructional activity that they may have used that was not listed. A second purpose of the interview was to acquire a better understanding of the developmental trajectory and frequency of use of an instructional activity. This information helped identify what instructional strategies teachers emphasized more with children of certain age levels. Teachers were also asked how often they used an instructional activity to gain a qualitative understanding of how often teacher's used in the classroom.

Teacher Perceptions of Instruction and Efficacy Beliefs

Teachers' perceptions are their understanding and beliefs about a given topic, task, or individual. Perceptions can be an unreliable guide to the nature of reality because individuals differ in how they characterize the world (Pajares, 1992). Closely related to perception, is the notion of a belief. Beliefs are affective and evaluative aspects of knowledge systems (Nespor, 1987). While knowledge is defined as facts, truths, or principles that exist within society, belief systems are personal and often not influenced by persuasion (Pajares, 1992).

Teachers' perceptions and beliefs affect their classroom management and instructional strategies (Brownell & Pajares, 1999). According to social cognitive theory, teachers, like other individuals in society, pursue activities in which they feel competent and avoid those in which they doubt their ability to perform successfully (Bandura, 1986). If teachers feel confident in their abilities to teach what they are asked to do, they will do better than if they feel they do not have the appropriate abilities.

The research literature also frames teachers' perception of instruction in terms of teacher efficacy beliefs. Teacher efficacy beliefs are "contextual judgments of their capacity to succeed in particular instructional endeavors (Brownell & Pajares, p. 154)." Teachers with high efficacy beliefs are likely to give students who have difficulty learning additional help to get them to succeed (Gibson & Dembo, 1984). Teachers with low self-efficacy beliefs are more ready to give up on students who were not successful, and had a more negative view of students' motivation, were more rigid in their control of

the classroom, and were more likely to use extrinsic rewards to get students to study (Wolfook, Rosoff, & Hoy, 1990).

Research has also examined teacher efficacy perceptions of teachers working with student with disabilities. The findings suggest that teachers who feel confident in their ability to work with students with learning and behavioral difficulties are more likely to use effective instructional strategies than teachers who have lower efficacy (Bender & Ikechukwu, 1989). Some factors increase teacher self-efficacy, and these include quality special education pre- and in-service training as well frequent and higher quality interaction with peers (Brownell & Parajes, 1999).

Based on the interviews with the teachers in this study, I feel that they possess a high level of efficacy and are aligned with the instructional goals of the school. The teachers' comments reflected that they view their deaf students positively, which is consistent with a Deaf cultural perspective. A Deaf cultural perspective views deafness more as a defining trait and not a pathology that needs to be fixed (Lane, Hoffmeister, & Bahan, 1996) A Deaf cultural view also advocates the use the American Sign Language as a natural language for members of the deaf and views members of the deaf community as a linguistic minority group. During the interviews, each teacher communicated with a high level of sign language proficiency. The teachers also indicated that they had a high level of support from the school administration and enjoyed quality interaction with their peers at the school. The teachers worked in teams and also had teacher aides in the classroom. Teachers also had access to the ASL specialist and an English specialist in addition to other forms of support. Teachers also seemed to be receiving in-service training. The teachers conveyed that they received in-house training from the ASL

specialist. Several teachers also reported that they had either completed or were taking the ASL/English Bilingual Professional Development (AEBPD) provided by CAEBER (http://www.gallaudet.edu/CCS/LPI_and_CAEBER.html) or the Center for ASL/English Bilingual Research, which is based at Gallaudet University in Washington, DC.

The Background of the Researcher

In qualitative research, I, as researcher, am a research instrument because I make decisions about the collection of data and its interpretation (Mertens, 2009). Moreover, as described at the beginning of the chapter, from a constructivist perspective, qualitative research is conducted in collaboration with participants in a context that is situated in a time, place, and culture, and consequently, the data collection and analysis are a reflection of how I frame the information through my perspective of the world. Thus, in the interest of full disclosure, the following section provides a framework for understanding my background as the researcher of this study.

My involvement in the deaf community started from infancy. I am a hearing child born to two deaf parents. Hearing children born to either one or two deaf parents, like myself, are commonly referred to as Codas or Children of Deaf Adults in the deaf community. Codas are considered to be integral members of the deaf community. Many Codas in the United States and Canada are native signers of American Sign Language (ASL) or Quebec Sign Language (LSQ). They were brought up on the values of Deaf culture and acquired the visually based socialization norms of the deaf community (Singleton & Tittle, 2000). Even though Codas have internalized the linguistic, cultural, and behavioral norms of the deaf community, they are not considered full members of the

deaf community because they lack the defining physical characteristic of hearing loss that affects the day-to-day experiences of deaf and hard of hearing individuals (Preston, 1994). Regardless of this distinguishing factor, Cudas still serve a vital role as a cultural liaison between the deaf and hearing communities because they are linguistically and culturally proficient in both domains.

As a Coda, I am familiar with both the deaf and larger mainstream hearing community's perspective in the long-standing debate about whether there is or is not a Deaf culture. Many people from the larger mainstream community often categorize deaf people with other people with physical challenges, such as those who are blind or in wheelchairs. Many from the hearing community argue that there can be no Deaf culture because there is no blind culture or "wheelchair" culture. A main reason why there may be no distinct culture for blind or wheelchair bound people is because they use the same spoken language as people from the mainstream hearing culture. I argue, as others researchers and scholars in the field of Deaf studies have argued, that it is the signing deaf community's use of a distinct *language* that makes the deaf community a cultural group (Lane, 2005; Lane & Bahan, 1998; Padden & Humphries, 1988) compared to other groups of people with physical challenges. In general, culture comprises the values, beliefs, mores, and artifacts that are transmitted between people through *language* (Lane, 2005). Language allows the expression of shared concepts, beliefs, and experiences, and language is an essential medium that shapes meaning and perspective about the world. As described in chapter two, signed languages, such as ASL, are natural languages that afford deaf people the full capacity to share ideas and values in ways that are equivalent to spoken languages, but in ways that are qualitatively different from spoken languages.

I believe that residential schools serve a prominent place in the deaf community. Residential schools allow deaf children, especially those from hearing families, to gain exposure to the deaf community and to be exposed to a natural language at a young age. This context allows deaf children an opportunity to be among other people like themselves and to learn to use a natural language through their visual senses, which is the sense related to communication that is most accessible to deaf children. Moreover, deaf children can learn from adults and peers in such a community where they can socialize, and acquire language naturally (a process that most hearing people take for granted).

The issues related to Deaf culture and signed languages in the deaf community are complex, highly personal, and can vary by how people choose to identify with the deaf community (Davis, 2007, 2008). I advocate a sociocultural perspective on development, and from this lens, I believe that children learn best when they can engage with others in a social environment where their natural abilities (i.e. visual senses and manual communication) are utilized to the fullest. I believe that this form of interaction promotes the development of robust cognitive, language, and psychosocial development that allows deaf children to reach a higher level of potential than they could without it.

I have long appreciated the importance of sociocultural environment in the development of language and literacy. In my years interacting with a wide spectrum of deaf people from various backgrounds, I have noticed significant differences in the language, cognitive, and social abilities of my deaf friends who have been raised in an enriched visual environment compared to my deaf friends that were raised in more sound-based environments. Not only does a robust visually based sociocultural environment contribute to the development of language and literacy, it also seems to

promote healthy identity formation and positive self-esteem.

My interest in understanding how deaf people learn to read was spurred one night as I was discussing reading with a college friend of mine who was deaf. My friend graduated at the top of his (hearing) high school class of nearly 400 students and graduated from our alma mater, East Carolina University, with straight A's while triple majoring in Biology, Chemistry, and Biochemistry. At the time of our discussion, he also completed medical school and was in the midst of three-year pediatric residency. He was a gifted student in his own right, but he was even more remarkable because he had achieved a high level of success predominantly through sign language and without the use of speech. As a hearing person, I knew I often relied on an inner speech to read English words in print, but I was curious as to how he read since he did not hear and use spoken English in the same way I did. He replied that he simply just saw words on the page and just knew how to read them. Not satisfied, I followed this reply by asking him if he used an "inner sign" when he read. He said he did not. His response left me curious as to cognitive processes he used when reading. Importantly, my friend conveyed that throughout his childhood, he felt a crucial factor in his academic success was that his hearing parents exposed him to sign language at an early age, and encouraged him to have deaf friends throughout childhood. The lesson I took from him was that a visually based language environment was critical to his academic success because it provided him with a language foundation in which he could learn to read and achieve academically.

My belief in the positive role of a visually based language environment was further supported in my work as a sign language interpreter. As an interpreter, I had the opportunity to work with many high achieving deaf individuals in the course of my work.

What each of these individuals all seemed to have in common was that they had a visually based language environment to support their early language development.

To conclude, here are the beliefs about ASL, deaf people, and ASL/English bilingual education that I bring to this research:

- 1) ASL is, and should be, the natural language for deaf people in the United States and Canada
- 2) Deaf people should be treated as a native linguistic minority and should be given the opportunity to have full and sustained exposure to ASL from highly fluent signers from infancy to adulthood
- 3) Deaf children who have had sustained exposure to ASL from infancy in a visual learning community have the capacity to enjoy greater cognitive, linguistic, academic, and literacy successes
- 4) ASL can support the development of English literacy because deaf children can use their understanding of a more developed primary language (i.e. semantic knowledge combined with awareness of phonological, morphological, and syntactic structures) to more readily learn a second language
- 5) Learning to read and write in English is critical to successful participation in a technological society, such as the United States
- 6) ASL/English bilingual programs for deaf children help deaf children become literate, bilingual adults

Data Analysis

A total of ten participants (nine teachers and one ASL specialist) were interviewed. An analysis was completed on the interviews and the surveys filled out by six of ten the participants. The analysis of the interviews of the three kindergarten teachers was performed using grounded theory (Charmaz, 2001; Strauss & Corbin, 1990). The rest of this section will describe the grounded theory process and provide sample analyses done on the interviews of the kindergarten teachers to show how the grounded theory process was applied to interview and survey data.

Grounded theory uses an iterative process to analyze the data and there are processes for analyzing data at several points in the research (Charmaz, 2001). After the interviews were conducted and transcribed, the first layer of analysis employed a coding stage. In this initial phase of coding, a detailed analysis was conducted with each line of the transcript. Action codes (e.g. words that end in *-ing*, such as describing, teaching, making) were created to show what was happening and describe what people were doing. Action coding allowed for a comparison of data between participants, and with data from the same participant at different times throughout the research.

The next level of coding was selective or focused coding. In this level of coding, frequently appearing codes were used to sort and compile large amounts of data. The focused codes were more analytical. The focused codes tried to capture, and categorize large portions of the data precisely and provide a means to segue to the next phase of the analysis. Examples of action and focused coding conducted on the interviews with the kindergarten teachers are presented in both Figures 6 and Figure 7.

Time	Who	Transcript	Action Coding	Focused Coding
07:28	Me	I know the concept is important, but what about structure of ASL? ASL phonology is structure of the language. Do you think teaching the structure of ASL gives any benefit to the students?		
08:07	Jane	With guided reading. It's nice to have structure. Kids understand and then with repetition. "I Like Blue" "I Like Red" and again and again. I think that helps. I'll sign it. Then if you repeat the first two words again. It's the same category. Kids look it and try to make connections to it. That's the basic skill with that. I think the structure helps. Kids with no structure, I don't know. I hold that and value it very much.	Using guided reading helps promote structure through repetition Expressing that children with limited understanding of structure are more limited in their language ability	Guided reading> repetitive>structural formation Guided reading>structures language Poor language abilities>limited structural understanding
08:45	Linda	Guided reading really helps them. Repetition really helps them too. I'm sure with hearing children phonology the repetition really helps and I think it's the same with the deaf children too. There's similarity between the two groups.	Using repetition helps promote structural knowledge Citing parallels between activities using repetition to promote understanding of phonology of spoken language	Repetition>promotes pattern recognition Repetition>deepens structural knowledge

Figure 6. Sample of action and focused coding from T2 and T3

After the action and focus coding phases were completed, the next phase of the analysis was memo writing (Charmaz, 2001). The memo writing phase linked the analysis during the coding phase to the first draft of the analysis. In the memo writing process, categories were developed and based on an analysis of the codes. Memo writing provided a means to define categories, specify the qualities of each category and described how each category was developed, maintained, and changed, and identified how one category related to another category. As the memo writing process developed, categories were defined and analyzed and illustrative examples were drawn from interviews and survey data that provided support for each category and helped bring the analysis and the data together. As a process, memo writing was an informal brainstorming process that allowed the researcher to write freely and provide a means to make sense of the tremendous volume of data needs to be analyzed. Ultimately, the memo-writing phase provided a foundation for developing interpretive sections in the

research paper. An example of the memo writing phase, which is based on the focus codes created for the kindergarten teachers, is shown in Figure 8.

ASL > Conceptual knowledge > Builds language proficiency
 ASL > Conceptual knowledge > Important
 ASL > Conceptual knowledge > Transfers from L1 to L2
 ASL > Connects life experiences and meaning
 ASL > Deeper level of awareness
 ASL > Prior knowledge > Grounds instruction
 ASL > Prior knowledge > Transfers to L2
 ASL > Provides knowledge of structure
 ASL > Provides linguistic foundation
 ASL phonological instruction > Facial expressions > Movement > Space > Language play > Flexibility with language > Use of classifiers
 ASL phonological instruction > Handshape instruction > 5-HS > increases knowledge of vocabulary with 5-HS
 ASL phonological instruction > Handshape instruction > comparison chart > differentiate uses of different HS > English or ASL
 ASL phonological instruction > Handshape instruction > taught weekly / biweekly
 ASL phonological instruction > Handshape instruction > wrong use > alters sign
 ASL phonological instruction > Handshape instruction > Signs > different HS
 ASL phonological instruction > Handshape stories > Enhances structural + semantic pathways
 ASL phonological instruction > Handshapes/Classifiers/Orientation > provides creative play
 ASL phonological instruction > Language play > Handshape stories > uses specific HS >
 ASL phonological instruction > Language play > Increases language flexibility > Increases semantic mapping with structural knowledge
 ASL phonological instruction > Modeling > Informal > Improves phonological awareness
 ASL phonological instruction > Modeling > Informal exposure to structure and semantics of lexicon
 ASL phonological instruction > Not overtly considered by T2 & T3
 ASL phonological instruction > Preschool setting > heavy emphasis on handshape
 ASL phonological instruction > Promotes ASL foundational knowledge > develop knowledge of ASL structure
 ASL phonological instruction > Resource > ASL dictionary > promotes words learning through ASL channel > resource
 ASL phonological instruction > Resource > Videos of students signing > phonological parameters > allows self-reflection
 ASL phonological instruction > Resource > Videos of students signing > promotes phonological awareness
 English instruction > Alphabetic Principle > Advent > Late fall kindergarten year
 English instruction > Alphabetic Principle > Epiphany moment > Connects lexicalized fingerspelling with letters in English word
 English instruction > Alphabetic Principle > Spelling activities > Promotes alphabetic awareness
 English Instruction > Chaining > Fingerspelling > Tactile Memory > Understanding movement envelope
 English Instruction > Chaining > Helps connect to English > Needs to be connected to ASL
 English Instruction > Chaining > Bridges between ASL signs, Kinesthetic memory, and English Print
 English Instruction > Chaining > Fingerspelling > learning pattern of words > Connecting between patterns and semantic memory
 English Instruction > Reduce Cognitive Load > Site Word > Contextual Clues > Highly structured and repetitive texts
 English Instruction > kindergarten > Phonemic - Graphemic Awareness > Undeveloped
 English Instruction > 2nd grade > Phonemic - Graphemic Awareness > Maturing

Figure 7. Sample of a refined focused coding list for the kindergarten teachers

After the memo writing was completed, the next phase of the analysis involved theoretical sampling. In this phase, theoretical sampling refined concepts and provided a deeper level of analysis. The properties of each category were defined and described in terms of the conditions under which a category functioned, and detailed how one category connected to other categories. Theoretical sampling depended on a comparative method where the properties of each category were reviewed and linked to each other. By

defining how they relate to each other, the categories evolved into concepts that began to develop into an emerging theory.

Cognitive Benefits of ASL

Potentially Related Codes

ASL > Conceptual knowledge > Builds language proficiency

ASL > Conceptual knowledge > Transfers from L1 to L2

ASL > Connects life experiences and meaning

ASL > Deeper level of awareness

ASL > Prior knowledge > grounds instruction

ASL > Prior knowledge > Transfers to L2

ASL > Provides knowledge of structure

ASL > Provides linguistic foundation

Teachers repeatedly stressed that ASL was the foundation of cognitive and linguistic abilities of their deaf students. Higher levels of ASL proficiency provide deaf children with a means to define and categorize the world. From a socialization perspective, this means that ASL provides deaf children with a medium to communicate and socialize with others. From a language processing perspective, ASL provides deaf children with a linguistic structure that includes a phonological, semantic, and a syntactic system that they must learn in order to become highly proficient in the language. As deaf children continue to acquire language from teachers and peers naturally, their knowledge about how to use ASL increases. This provides deaf children with a growing language base that they can draw from and use as they engage in educational activities, where their knowledge of language is regularly required. Moreover, as teachers encourage deaf children to tease apart their knowledge of the structure and meaning of signs. This potentially provides deaf children with a means to focus on how there are similarities and differences of the structure and meaning units of signs. Ultimately, this has the potential for deepening students understanding of ASL and allows them to access and manipulate signs or aspects of signs as they engage in educational activities.

ASL Phonological Instruction

Phonological instruction > Handshape instruction > 5-HS > increases knowledge of vocabulary with 5-HS

Phonological instruction > Handshape instruction > comparison chart > differentiate uses of HS > English or ASL

Phonological instruction > Handshape instruction > taught weekly / biweekly

Phonological instruction > Handshape instruction > Signs > different HS

In the kindergarten classes, the teachers expressed that they focused more on helping children differentiate with the different ways handshapes can be used to reflect concepts in ASL and English. All the teachers described how they used comparison charts to help students understand how particular handshape (e.g. the F handshape) are used within ASL. The teachers focused on a particular handshape and then had students provide responses to different signs in ASL that used that particular handshape. Then teachers reviewed signs and described how the signs were primarily used to convey signs native to ASL and how some signs were used to represent words in English. One teacher also described how she focused on the use of the 5-handshape. Since there are no words in English that begin with the number 5, this apparently served as a means to understand that there are some handshapes that distinctly used in ASL and that there are some handshapes where there is overlap with English. This activity to me seemed to suggest that the teachers were trying to help students compartmentalize their knowledge of signs in ASL into native oriented signs and signs that shared influence with features of English. The teachers wanted to work with students' knowledge of ASL and then use that to help them understand how some aspects of signs in ASL could be used to help students decode words in English. This also seemed to be on going naturally evolving process as the teachers said that they taught this activity on a weekly or biweekly basis as the time permitted.

Figure 8. Sample of memo-writing notes for kindergarten teachers

The theoretical sampling listed in Figure 9 indicates how data were categorized from interviews with the kindergarten teachers. As more data were developed from

analysis of other teacher interviews and the survey data, the theoretical sampling continued to be refined and compared with the other sets of data. These analyses provided an improved understanding of teacher's perspectives on the process of phonological instruction to develop the language and literacy skills of the deaf students at the Bi-Bi school.

There is disagreement among qualitative methodologists as to when theoretical sampling should be used in the analysis of grounded theory research. Strauss and Corbin (1990) suggest that researchers use theoretical sampling early in the research to define categories and concepts. Charmaz (2001), however, argues that it is better to use theoretical sampling later in the research to allow the data and analytic directions to emerge and not be limited prematurely. Delaying theoretical sampling until much later in the analysis allows the data and categories to emerge naturally without being forced.

The last phase of the analysis was the integration of the findings. The memo-writing phase provided the means to develop concepts and draft sections of the paper, while theoretical sampling allowed for a deeper analysis of the different categories, and a means to structure and develop concepts. The integration phase connected all the pieces together and allowed for the findings to be developed in a logical progression. The integration of the findings provided a structure to consider the findings in ways that represented the participants' experiences in a clear and balanced manner.

The integration of the findings connected the data collection (initial teacher interviews, classroom observation, field notes, follow-up teacher interviews) and data analysis (action and focused coding, memo writing, theoretical sampling) into one overall complete analysis. In short, the findings suggest that the teachers do actively engage in

phonological instruction with their deaf students, either through their own initiative or with the assistance of the ASL specialist. The teachers expose students to sign language in the natural context of school and then use instructional strategies based on the developmental progression of their students. A full description of the findings and analysis will be provided in the subsequent chapters.

Category	Description
Lexical Network Refinement	The third level of phonological instruction focuses on building onto the connections of the previous two levels by working with students to refine and broaden the lexical network by adding new layers to it. Teachers seem to introduce students to fingerspelled variations of ASL signs, such as lexicalized fingerspelling. This level of development seems to emphasize more advanced handshape instruction and additional language play, which serves to enhance further the structural and semantic network that allows children to understand signs at a deeper conceptual level.
Alphabetic Principle Attainment	The fourth level of phonological instruction seeks to build on children's emergent understanding that handshapes in ASL can potentially map onto letters in English. Children start to realize that handshapes in fingerspelled words, lexicalized fingerspelling, and initialized signs correspond to letters of words in written English. Children must learn to distinguish handshapes in signs that do and do not match up to words in English. Children at this level now seem more receptive to have certain handshapes "chained" or mapped to English print via fingerspelling. Fingerspelled words now become another way to manually represent words in English and these can be used to represent words in written English. This category emphasizes that children are learning new ways to bridge signs in ASL to words in written English.

Figure 9. Sample of theoretical sampling from the kindergarten teachers

In summary, grounded theory research provides a structured approach for researchers to understand social and social psychological processes. Participants in the study were interviewed and surveyed to understand how they conceptualize and utilize ASL phonological instruction to promote the language and literacy of young children at the Bi-Bi school for deaf children. Data was analyzed using an iterative process that seeks to understand the perspectives of the participants. The analysis was done through a

process of coding, developing categories and concepts, and then finally integrating the findings into a narrative that conveys the insights of the participants.

Chapter Four

Results

Descriptive Results

The interview data were transcribed, coded, and analyzed according to the process described by Charmaz (2001) for grounded theory methodology, which was detailed in chapter three. The results of the interview data were organized into two overarching categories: Teaching Philosophies and Instructional Strategies. The Teaching Philosophies category details the beliefs the teachers shared about their students and how they felt students learned language most effectively. The Instructional Strategies category describes what teachers did to develop their students' bilingual language and literacy skills. The Instructional Strategies category was further divided into four sub-categories and these include, American Sign Language (ASL) Handshape Awareness, Manual Alphabet Awareness, Emergent Literacy awareness, and English Decoding. The two overall categories will be described next.

Teaching Philosophies

According to Brookfield (1995), a teaching philosophy is what a teacher believes about teaching and learning. During the interviews, teachers described different beliefs that seemed to form the basis of their views about educating their students. The teachers' views, regardless if they were hearing or deaf, were similar and consistent with each other and showed that the teachers' views reflected a bilingual philosophy that was associated with the bilingual education programs they taught in at the school. The teachers' comments also reflected a belief about the benefits of using ASL to develop the

structural and conceptual awareness of their students’ primary language, and promote their students’ reading and writing skills in English. Teachers also described how they believed that it was best to promote students’ development of language, which supported their students’ ability to learn. In sum, three general teaching philosophies seemed to resonate among the teachers and these include the following: 1) Additive bilingual approach, 2) Linguistic awareness of ASL and English, and 3) Repetition and overlap, and each of these will be described next (see Table 6).

Table 6

Summary of philosophical beliefs category

Belief	Description
Utilize an additive bilingual approach	Expose students to ASL and English equally, maintaining ASL
Enhance linguistic awareness of ASL and English	Promote knowledge of language structure of ASL and English
Reinforce repetition and overlap of language	Expose students to signs and vocabulary multiple times to support language acquisition

Utilize an Additive Bilingual Approach. One of the main philosophical tenets that the teachers articulated in the interviews was a strong belief in a bilingual approach to language development. The teachers’ views were commensurate with an “additive bilingual approach” that has been well described in the research literature. An additive bilingual approach seeks to build on the native and primary language of students and then use the school language to complement and add to what the students already know (Cummins, 2000). This view of bilingualism differs from the “subtractive” bilingualism approach, in which the school language (i.e. English) is intended to substitute or replace the students’ native language (Baker, 2001).

The teachers viewed ASL as the native and primary language of their deaf students, even though some of the students did not use ASL at home with their parents. The teachers promoted ASL because they felt that it contributed to their students' holistic development. The teachers felt that ASL provided a strong linguistic foundation, supported robust psychosocial development, and facilitated their students' growth academically. Amanda, one of the prekindergarten teachers, summed up this view of ASL in this way:

Language really affects their lives throughout. Now with ASL, as we expose children that will help them with reading and writing later on. Because they can't already hear, they are not just ready to go with the flow. You have to expose them to sign language to help them for their future and everything, such as reading and writing, dating, really everything.

Amanda's comments resonated among many of the teachers who felt that ASL was vital in the development of deaf children in many different areas of life.

In additive bilingual programs, the school language is viewed as complementing what students know with their primary language. In the ASL/English bilingual school in the study, the school language was written English. The teachers were very committed to developing English as a complement to the students' primary language of ASL. The teachers viewed ASL as being crucial, but they saw English as equally important, and tried to balance the level of instruction of both ASL and English. Cathy described this relationship in her comment about the important role of developing both language and literacy skills:

It's important to have sign language skills, but you have to keep in mind the importance of English, as well. You need to have a balance. When I teach throughout the day, I try to make sure that there's a similar proportion between ASL and English. I will sign stories in ASL and I also use the LCD, and project the text of the stories, and point to the words in English.... During the week, they (the students) draw in journals, where they will draw and write English. They will

sign, and we will write down what they say. We try to balance both (English and ASL), and it's important.

Another reason that the teachers stressed English was they knew that their students were surrounded by English print in their lives. The teachers understood that their students were exposed to different kinds of print, whether it was through words, logos, and/or pictures, and the teachers felt that these forms of print contributed to their students' development. In following excerpts, Cathy and Elisa, both of the second year preschool teachers described their views of the influence of environmental print on their students' language and literacy development:

Cathy: I've realized the pictures are part of English, too. Children are born seeing pictures, and it's there. Children are communicating, and English is not held back. They develop in parallel.

Elisa: At the same time, people forget that children see pictures before they arrive to school; people forget that part of reading. Studying the pictures is part of reading development; it's not only words. It's already there you can't take that away because that's a part of life and the interaction experience.

Cathy: It's like if you go to McDonald's and you see the logo. These are things that you notice. It's the same with Disney characters, too. There's a parallel process that comes together.

These excerpts reflect a perspective shared among many of the teachers that viewed their students' acquisition of ASL and English as two languages that were intertwined together. The teachers understood that their students were immersed in an ASL environment at the school, but they knew that their students were immersed in communities where English was a constant presence. The teachers seemed to strive to promote both ASL and English to help their students make better sense of their environment, but ultimately to help them succeed academically.

The timing of the additive bilingual approach also seemed to be an important belief that resonated with the teachers. Some of the teachers felt that it was important to focus on the informal language skills before trying to develop the formal language skills in ASL. Some of the teachers described that many of their students entered school program with limited language proficiency and they needed to develop their basic language skills in ASL before they could begin to focus on using their academic language (i.e. English). Two of the kindergarten teachers, Jane and Linda, described the language use concepts described by Jim Cummins, and his theory about BICS (Basic Interpersonal Communication Skills) and CALP (Cognitive Academic Language Proficiency). In the following quote, Linda detailed the importance of establishing a strong language foundation and then continuing the interplay between informal and formal language skills. “You use the BICS. You don't use the CALP first with kids. You use the BICS first and once they seem to be doing pretty good with that, then you start with the CALP and then go back and forth between them (BICS and CALP) until they become fluent.” Jane also stressed that even some of her deaf students from deaf families, the students with supposedly more advanced language proficiency, sometimes entered the school program with limited language skills that need to be developed. In the following excerpt, she detailed how a former deaf student with deaf parents needed to have more basic language exposure before he was able to use the more academically oriented sign language.

There was a boy. He was from a deaf family. He moved here in the fall and he was avoidant. His parents were deaf, but he was from a mainstream program. He used Signed English and we really had to work (to communicate) with him. You can't think because he started school that he could just start signing well. It wasn't like that. We tried signing with him and it wasn't working. We had to go back to BICS first. Eventually, we transitioned back and he was able to acquire the

(academic ASL) language quickly. It was very interesting. We realized that he did not have enough BICS experience.

In sum, the teachers' views were consistent with an additive bilingual approach.

They viewed ASL as the primary language and English as a vital complement to the students' academic success. The teachers sought to develop ASL proficiency and stressed that students should acquire it at a basic level of competence before trying to acquire more academic forms of language.

Enhance the Linguistic Base of ASL and English. Another one of the underlying philosophies that seemed to guide the teachers' instruction was a focus on the progressive development of their students' abilities of ASL and English. Even though teachers articulated a desire to promote ASL and English equally, they were cognizant that their students needed to develop a strong linguistic base in ASL, both in terms of structure and meaning. Ultimately, this strong linguistic base would serve to provide a framework that would help their students learn English.

The teachers sought to model ASL in their daily interactions with their students. Part of the reason for modeling ASL was to promote conceptual knowledge for their students, but the teachers were also aware that their students needed to understand the structure of ASL. They sought to promote an awareness of the structure of ASL, and they seemed to give a particular focus on developing handshape awareness. All of the teachers in preschool and prekindergarten stated that they wanted to make sure that students knew at least the seven basic handshapes in ASL (A, B, S, O, 1, 5, F), and the kindergarten teachers expressed that they expected that students would already have this awareness of handshapes by the time they entered kindergarten.

The preschool classes were very focused on developing students' knowledge of handshapes. The preschool teachers felt that it helped improved students ability to acquire sign vocabulary and learn ASL. Cathy suggested that teaching handshapes, as a part of the structure of signs in ASL, was parallel to hearing teachers who sought to develop a connection between the alphabet and speech sounds of spoken words for their hearing students:

It's the same with teaching the alphabet in English, it makes connections. It's the same with handshapes; it helps develop the signing part. If you teach the letters of the alphabet for the word apple, it helps to develop their English reading and writing. Children need to recognize that ASL parts have structure. The structure (of ASL) can include things such as handshape, facial expression, movement, depth, such as a person walking (signs 1-HS moving outward), as compared to persons straggling (signs 1-HS with back and forth movement, and moving outward) and whatever the movement might be. All of those have a structure within that so handshape is one of them.

Elisa, the other second year preschool teacher, reinforced this point in her comment:

It's like teaching the letter A, then making the connection to the sound A and point out how it's the same in other words. It's the same in sign language, where you show the A-HS and then describe how it's used in the sign HUG, or you can describe the C-HS, and how it's found in the sign COP. The C is in the English word for cat, but it's also in the sign POLICE or DRINK. These things help the students help think about the language and continuously build to it.

Elisa's comment indicated that teachers felt it was important to build a strong linguistic base and have students analyze the different components of language, such as handshape, and how different signs used handshapes that were similar (and different) from each other. Once this knowledge is established, it becomes possible to build on this understanding and expand on the structural relationships that are shared by similar signs, such as the C-HS.

Moreover, Cathy viewed developing handshape awareness as being a gateway to learning other aspects of language. She described handshape awareness as "sort of like a

‘pre-guide’ to an advanced understanding.” Her comment was indicative of a common belief among these teachers that providing instruction of the basic handshape would establish a foundation that students could use to learn more complicated sign language structures in the future. The teachers also seemed to believe that students would begin to understand other ways that handshapes were used in ASL, such as how the manual alphabet was used in ASL to represent English.

The teachers also appeared to help students navigate the linguistic similarities and differences between ASL and English. The teachers signed the stories and pointed to the words and pictures; this promoted students’ awareness that both languages conveyed the same ideas in the story, even though the languages use different structures. Teachers sought to help students understand influences of English within ASL, such as when certain handshapes represented signs native to ASL and when certain handshapes represented English.

In sum, the teachers’ philosophical approach on promoting the students’ linguistic knowledge of the ASL and English was geared toward making both languages more distinct for their students. ASL and English are two very different languages with different structures and ways of expressing ideas. However, both languages can overlap in terms of handshape usage. The teachers seemed to understand that students could be confused to how handshapes could be used to represent ASL and English and believed that it was important to minimize this confusion as much as possible.

Reinforce Repetition and Overlap. The third belief that emerged among the teachers was their desire to make the acquisition of language as efficient and effective as possible. The teachers seemed to feel that repetition and overlap allowed their students to

learn and acquire sign vocabulary easily and quickly. The teachers exposed their students to signs and words multiple times and across domains. Part of this practice may have stemmed from the project approach that they used in the preschool and prekindergarten classes. In the project approach, the teachers follow the students' lead and interests and develop lesson plans that focus on a theme for period of time (Edwards, Gandini, & Forman, 1998; Katz & Chard, 2000). In the following excerpt, Jennifer, one of the first year preschool teachers, described how she used the project approach and incorporated handshape during her lesson on cars:

For example, when we talk about wheels or maybe driving. I will discuss the S-HS or the 1-HS, like in the sign for WHEEL. Or the S-HS in the sign for DRIVING. That kind of thing is student based and student centered. I expose them to it and try to understand what they like and give them some handshapes. For example, from teaching them the concept of cars backed up traffic, I would use the 5-HS. This shows them how to use the 5-HS within the sign (CARS BACKED UP IN TRAFFIC). Some kids get it (does sign for CARS BACKED UP IN TRAFFIC). Perhaps, I'll do the sign for CARS CRASH so the students can see how the S-HS is used in the sign. The kids learn things based on their interest.

The teachers also described that they believed in repetition because they felt it helped students develop language proficiency. When teachers repeated signs, they provided students the opportunity to identify patterns and recurring structures, such as learning handshape stories. As students became more familiar with recurring structures this also helped increase their capacity to play and be creative with language. This could help students become more creative in their signing because they had a strong language base and could build off their knowledge of handshapes and expand upon it. The teachers in the kindergarten classes also described using highly repetitive simple readers; this allowed students to recognize recurring words and phrases in English and build their understanding of the differences between ASL and English.

In summary, the teachers' use of repetition and overlap seemed to form the basis of a philosophical belief that was common in much of their instructional approaches. The belief in exposing students to signs and structures multiple times and across different subject areas seemed to be geared at reinforcing their students' learning. It also seemed to help students make connections between signs and sign structures that served as the basis for building a strong language foundation.

Instructional Strategies

Teachers varied in their use of instructional strategies depending on the age, language proficiency, and developmental abilities of the students. In general, teachers of the first and second year preschool classes focused more on developing ASL proficiency and exposing their students to English. By comparison, teachers of the prekindergarten and kindergarten classes focused less on developing ASL proficiency, and more on helping their students apply their knowledge of ASL to learning English.

The instructional strategies identified in the interview data were divided into four sub-categories (see Table 7). The first two sub-categories were aimed at promoting students' knowledge of handshapes that were used to represent different components of ASL structure. The first sub-category, *Promoting ASL handshape knowledge*, was aimed at developing students' knowledge of the basic handshapes used in ASL signs. The second sub-category, *Promoting knowledge of the manual alphabet*, reflected how teachers sought to help students understand how the manual alphabet was represented in ASL, either in fingerspelling forms, such neutral fingerspelling or lexicalized

fingerspelling, or with some signs that replaced the ASL handshape with the manual alphabet in the sign (i.e. initialized signs).

Table 7

Overview of instructional strategy categories

Category	Description
Promoting ASL handshape awareness	Instructional approaches and tools teachers used to help students learn the different handshapes used in signs in ASL
Promoting knowledge of the manual alphabet	Activities and techniques teachers used to help students learn how the manual alphabet was used within ASL
Promoting an emerging awareness of written English	Approaches teachers used to expose students to English based reading and writing
Promoting English decoding skills	Instructional strategies teachers used to help students learn to read English print

The last two sub-categories were aimed at promoting knowledge of English. The third of the four sub-categories, *Promoting an emergent awareness of written English*, was geared toward exposing students to a developing knowledge of print and developed their knowledge of how printed letters and words could represent ideas in stories and signs in ASL. The fourth sub-category, *Promoting English decoding skills*, focused on developing students' abilities to decode words in English.

Each of the four sub-categories included different activities and these will be described in greater detail. A description of each of the techniques used by the teachers will also be presented to indicate how they promoted each sub-category with their students.

Promoting Knowledge of ASL Handshape. This sub-category highlighted the ways in which teachers sought to enhance students’ knowledge of how signs incorporate specific handshapes as a part of the structure of signs (see Table 8).

Table 8

Sub-category overview: Promoting ASL handshape knowledge

Activity / Resource	Description
Natural conversation	Signing with students to get them to express ideas and expand their language
Sign vocabulary instruction	Teach signs and discuss how they are formed
ASL handshape of the week	Have students bring in objects or pictures that begin with the handshape in ASL (e.g. A-HS for BRUSH)
Handshape stories	Stories with signs that incorporate one handshape or a set of handshapes
Sign rhythm activity	ASL stories incorporating signs with repetitive movements
Student self-video critique	Students view themselves on video and analyze what they sign
Tracing handshapes on paper	Students trace their handshape on the paper and use the drawings for activities such as labeling objects
Poster of ASL handshapes	Poster in the classroom that highlights the different handshapes used in ASL signs
ASL/English dictionary	ASL Dictionary with signs organized by handshape and made in the classroom

The primary strategy teachers used to promote handshape awareness was through *natural conversation* with their students. Through natural conversation, teachers could expose their students to ways in which handshapes were used in ASL and progressively build students’ knowledge of handshape and simultaneously expose them to the way signs are formed (i.e. the phonological articulation). Lisa, one of the first year preschool teachers, summed up a view that was common among the teachers, “It’s just a very

natural process... I don't feel like we're teaching them ASL. It's just natural like what you're doing with hearing kids. We're just talking to them and talking about what they're doing and just providing language and modeling for them."

The teachers' use of natural conversation allowed them to emphasize ASL and gauge the students' level of understanding to help them improve their knowledge of handshapes and language skills. Jennifer, one of the first year preschool teachers stated, "Most of the time, we have a heavy focus on ASL and try to draw language out and expose them." This comment reflected the individualized interaction that teachers had with their students, and illustrated a belief that they could work with students to improve their areas of weakness. Additionally, when students made mistakes in their signs, teachers did not criticize their students, but they modeled the correct response instead with the belief that their students would eventually internalize the correct form. Lisa described this practice in the following excerpt:

Sometimes they may be signing (a sign) and that's not quite right. You figure it out, and you're like, oh, right! It's a COW! and you're modeling that back for them. You don't say you're wrong, but right that's a COW (correctly formed). Then, they'll start to pick it up.

Katie, one of the prekindergarten teachers, added that having natural conversation with students allowed teachers to engage their students and help them become more communicative:

We exposed the children as much as we can. We expose them. For some students, we might try to draw language out of them. Other students might have more language and that's fine. It's mixed. We try to pull language of some students. We can work with them individually if they need us to draw language out of them. We expose them to handshapes as much as we can. We give them examples of how to express that.

Natural conversation allows teachers to build students' knowledge of ASL informally, and this strong foundation gave students support as they progressed to more advanced topics and language structures.

Teachers also exposed their students to ASL handshapes in signs by providing formal *sign vocabulary instruction*. When teachers taught specific signs, they included information about the meaning of the sign and how to form the sign. Teachers often provided instruction on new signs as they began a different theme in their project approach with the class, and the teachers also focused on helping students develop their sign vocabulary in a specific area of need.

In addition to developing a broader understanding of handshapes in signs, teachers also provided instruction that facilitated the awareness of specific handshapes. In the preschool classes, teachers focused on developing an awareness of a core set of handshapes, which included the B, A, S, C, 1, O, and 5 handshapes. Teachers developed this core set of because they appear in a wide range of frequently used signs. The teachers also targeted these handshapes because preschool-aged children were physically capable of coordinating their fingers to produce these basic handshape forms. Each of the handshapes could be formed by either the thumb and/or index finger or by closing and opening the hand. By comparison, some of the other handshapes, such as the Open-8, 7, X, R, and T handshapes were more difficult and challenging for young children to produce because they require children to coordinate their outer three fingers (middle, ring, and pinky), cross over fingers, or bend fingers at the middle joint. All of these movements required more advanced forms of fine motor coordination that would eventually mature as children became older.

One of the ways that the preschool teachers sought to develop an initial awareness of ASL handshapes was through an *ASL handshape of the week* activity. Jennifer and Amanda (when she taught preschool previously) both described how they sent their three-year-old students home with a note for their parents describing that their child was to bring in an object or picture showing the use of a particular ASL handshape. For example, when teachers targeted the A-HS as the handshape of the week, the students were asked to bring in an object and/or picture of an action that began with the A-HS in ASL, such as a hair brush or perhaps a picture of a hug because these things incorporate the A-HS in the signs for BRUSH and HUG. In class, the teachers would discuss each item the students brought in and point out how each item used the targeted handshape of the week. Teachers would then take a picture of each item and place the photo on a poster board, and then write the word in English associated with the item. Teachers would later review the poster to reinforce what they discussed previously with the students. Throughout the week, the teachers would refer to the handshape of the week to reinforce students' knowledge of the handshape. The teachers also indicated that during down time in class, students would often look at the poster board together and other and discuss the handshapes with each other.

The ASL handshape of the week activity represented a change from an approach used in prior years. The preschool teachers reported that teachers in the past used to teacher letters of the week that were associated with words from English (e.g. such as the beginning "a" in apple or ant). The preschool teachers noticed that their students did not seem to learn the vocabulary very well. Jennifer had a friend who was a doctoral student, and Jennifer's friend encouraged her to teach handshapes that were based on ASL signs.

The next school year, Jennifer decided to try teaching only ASL handshapes and quickly noticed a marked improvement in her students' ability to remember and acquire sign vocabulary. Moreover, Jennifer also described that she felt teaching ASL-based handshapes of the week helped her students and the parents learn more about ASL, particularly the hearing parents of her deaf students,

I feel that [this approach] helps [students] develop a fuller understanding and it helps them develop sign language. This is especially true of the deaf students of hearing parents. This really helps them a lot. This is still true too for the deaf (students) of deaf (parents). I can see this from those years where I taught the letter of the week when the kids were three years old, I really had to repeat myself again and again. It didn't really make a connection. For example, for the sign DOLL (X-HS moving up and down on the tip of the nose), they would bring a doll to school and they wouldn't understand the connection with D in doll because they couldn't hear the letter D in the spoken word doll because of English. It was too abstract for them.

Jennifer continues to use the ASL handshape of the week because her students are able to use their emerging knowledge of ASL to identify ASL handshapes that are used in signs. Hearing parents also benefitted because they had the opportunity to learn ASL handshapes used in signs that their children were learning in school.

Teachers also sought to develop handshape awareness through the use of ASL handshape stories or sign rhythm activities. ASL handshape stories have long been used in residential schools for the deaf and the deaf community. They function as visual forms of poetry and rhyme. ASL handshape stories incorporate a group of handshapes in a defined order in a way that conveys a story. For example, handshape stories might incorporate all the handshapes from A-Z (not necessarily based on the manual alphabet), or incorporate all the handshapes from numbers 1-10. Handshape stories are a sign language based phenomenon because users blend ASL structure and meaning in creative

ways that parallel the word play or transformational qualities of poetry or rhyming stories used in spoken language.

In the following example, Jennifer shares a handshape story she developed with her students during a down time at lunch. Jennifer developed this story after she taught her students a set of handshapes (A, B, S, O, 1, 5, F) over several weeks. The class created a handshape story that incorporated and used the sequence of handshapes she reviewed in class. Translated literally, the story is about a person who *knocks* (A-HS) on a *door* (B-HS), *enters* (B-HS) a *building* (B-HS), feels *cold* (S-HS), *searches* (C-HS) around for something, sees *nothing* (O-HS), and then is *surprised* (1-HS) and *scared* (5-HS) by a *cat* (F-HS). Jennifer described that her students thoroughly enjoyed the story and wanted to recite it repeatedly. Another benefit of the handshape story was that it encouraged her students to think creatively of ways to incorporate the structure of handshapes into a coherent narrative, as well as devise an entertaining story that requires a deeper understanding of handshapes.

The teachers of the first year preschool class also used incorporated a sign rhythm activity with their students. In sign rhythm activities, teachers incorporate the repetitive use of signs together with clapping or patting on knees. The sign rhythm activities allowed deaf students to learn specific handshapes in signs in a pattern that made learning fun. This provided the deaf students a similar benefit that hearing preschool children enjoy when they incorporate movement and gesture in songs. Lisa commented that she frequently used this activity when she taught 18-month-old deaf children, but she also used it when she taught the three-year-old students in her preschool class. For many of the very young students who were just beginning to learn sign language, the sign rhythm

activity allowed teachers to introduce basic handshapes, and to incorporate words and repetitive movements together. The teachers viewed this activity as especially beneficial for their students who had limited language and often had minimal participation. Lisa described how she incorporated “We’re going on a Bear Hunt” using a sign rhythm activity to engage her some of her students with limited language proficiency:

We started to do that bear hunt one, with the different handshapes (signs with 5-HS as if searching or looking for something), and they didn’t have much interest except in (pats hand on knees with 4-HS, and then signs searching with C-HS – which is the pattern combination for the song). They didn’t do any of that (signs searching with C-HS), but they did do this (pats on lap), but of course that was the beginning of things, that rhythm, and now they’re a little bit more into doing those things.

An activity described by the teachers of the second year preschool class was the use of *tracing handshapes on paper*. For this activity, the teachers had students look around the room and try to identify things based on a handshape used to form the sign for the object. Then they had students trace their handshape to describe an object in the classroom. Elisa, described how one of her second year preschool students devised a clever way to incorporate a handshape tracing with an object he found in class:

One cute thing that they do is to use handshapes to identify things. For example, with technology, you have equipment that you need to plug-in. My students looked around the room to find things like that. We have a WEB-CAM, and I told the student to draw it. One student traced an outline of his five fingers. I asked the student what was that, and he said it was a web-cam. He said he traced he traced his five fingers because it was the 5-HS that’s used in the sign for WEB-CAM. I was surprised.

The teachers also incorporated other approaches that allowed their students to take the initiative in developing their own awareness of handshapes. Some of the teachers in the prekindergarten and kindergarten classes incorporated the *use of self-video critique*. This activity allowed students to video-record themselves signing stories in ASL, and

then teachers encouraged their students to watch the video and analyze their own signs. For example, Katie described how she video-recorded her prekindergarten students reciting an ABC story from A-to-Z. This gave her students the opportunity to see themselves signing the ABC story and analyze their signs. It also gave Katie an artifact she could use to document her students' ability to produce handshapes and signs at certain age.

The last two approaches that promoted the instruction of ASL handshapes were resources that teachers provided to serve as visual aids for students. The first resource was a *poster of ASL handshapes*. The poster allowed students to see a collection of common ASL handshapes on a large poster board, and served as a reference for students as they continued to learn more ASL handshapes.

A second resource described by the teachers was the *use of an ASL-English dictionary*. The ASL-English dictionaries ranged from informal class-made versions to formal published volumes. Several of the teachers made their own class-made versions that incorporated the different handshapes of the week and words in English associated with each sign. The published ASL/English dictionary was used in several classes and allowed students to look-up signs and then find the word associated with it in English. In addition to the ASL/Dictionary in paper form, one teacher also described using an ASL-English dictionary computer software program. This computer program was organized by different phonological components of ASL, such as the location and handshape of signs. Students could click on the location of a sign and then look for the corresponding handshape used at that location. Stacy, one of the kindergarten teachers, gave an example

how her students use their knowledge of signs in ASL to find the matching word in English using this computer program:

It shows them how to use the dictionary differently. Suppose, I know the sign for APPLE. On the computer, it has a picture of a person's profile that's color-coded with various parts of the body. Kids can look at the part of the body where the sign is made and the screen has a listing for all the different handshapes listed. The kids can find the handshape and then click on it and then find a list of words with the X-handshape in the area around the mouth. It matches the location with the handshape. It's the word in English with the signs listed. Kids can look it up and find the spelling in English (e.g. apple).

In summary, the results of this section reveal that the teachers used a broad range of strategies and activities to develop their students' knowledge of ASL based handshapes implicitly and explicitly, and across a wide range of contexts. Through natural conversation, teachers could expose their students to ASL and provide them linguistic awareness of handshapes and to understand how handshapes were used in natural discourse. Teachers also promoted awareness of handshapes through various structured activities such as ASL handshape of the week, sign rhythm activities, handshape stories, sign vocabulary instruction, handshape tracing, and handshape comparison charts. Teachers also incorporated other strategies and displays that allowed students to build on their knowledge of ASL handshapes, such as through having students critique their own signing on video, and using handshape charts, and various forms of ASL-English dictionaries.

Promoting Knowledge of the Manual Alphabet. This category details the instances in which teachers described how they promoted knowledge of the manual alphabet with their students. The manual alphabet is an integral aspect of communication among ASL signers, even though it is borrowed from English and represents the alphabet used in English. For children to become effective users of ASL and learn English,

especially in academic settings, it is essential for them to become skilled in knowing how handshapes can sometimes represent ASL and at other times represent English. This section presents ways teachers sought to promote the knowledge of the representations of English within the ASL context by developing their students' knowledge and awareness of the manual alphabet (see Table 9).

Table 9

Sub-category overview: Promoting manual alphabet knowledge

Activity / Resource	Description
Direct instruction of the manual alphabet	Teaching students manual alphabet from A-to-Z
Display of manual alphabet in classroom	Poster display of the manual alphabet in the classroom
Use fingerspelling in signing	Use of fingerspelling within ASL communication
Use lexicalized fingerspelling in signing	Use of fingerspelling that has become sign-like (e.g. B-U-S, B-E-A-C-H, J-O-B)
Handshape comparison chart	Charts that compare signs that use overlapping handshapes in used in ASL signs with the manual alphabet used in initialized signs (e.g. A-HS in BRUSH, compared to the A-HS in AUNT)
Instruct initialized sign vocabulary	Discuss handshape used in widely accepted initialized signs in ASL (e.g. BLUE, GREEN, KING, FAMILY) and its connection to English

The most basic means teachers used to promoted knowledge of the manual alphabet was through *direct instruction*. In direct instruction, teachers reported teaching each letter of the manual alphabet individually and helping students form letters with their fingers. Direct instruction was most commonly used with students who were still learning both the printed alphabet and the manual alphabet, such as students in the preschool classes or with novice signers who had recently joined the school. Teachers also described using a poster *display of the manual alphabet*, where the letter of the

alphabet is next to same handshape in the manual alphabet. This visual aid allowed students to see the letter and handshape side-by-side and learn to pair them together.

Teachers also exposed their students to the manual alphabet in ways that were embedded within sign language. The most common and frequent use of the manual alphabet occurred when teachers *used fingerspelling in their signing*. With this strategy, teachers showed students how to incorporate the manual alphabet in ASL as they intermixed fingerspelling with signs. Teachers felt that it was especially important to provide their students with early and consistent exposure to fingerspelling, even if they were limited in their ability to spell words in English. The teachers felt that students, especially at the preschool level, could produce the overall movements or “movement envelope” of the fingerspelled words, even if they were not yet able to produce the individual letters in the fingerspelled word yet.

One representative example was by described by Jennifer. She detailed an incident when she was giving a lesson on farm animals to her young preschool students. During the lesson Jennifer drew pictures, provided signs, and fingerspelled the different types of farm animals. After she finished her lesson, she detailed how one student got up and began to imitate her:

Once I finished (my lesson) I was amazed by something a student did. The student got up and pretended to play teacher, and went up to the board and started signing the names of the animals. He signed COW (the sign was a close approximation of COW with using the one-HS on the location of cow, instead of the proper Y-HS), and I signed to the student YES. The student then made fingerspelling-like movements while trying to fingerspell the word cow. That example is really fascinating.

What is revealing about this example is that it indicates that even relatively novice signers can produce fingerspelling like movements after interacting with their teachers

and peers within a short period. This particular student was a three-year-old child who had just begun to learn sign language that year and had already demonstrated the capacity to understand that fingerspelling was a series of small hand movements that reflected a concept within his first year of learning to sign.

The teachers also related other similar examples with respect to *use of lexicalized fingerspelling* in ASL. In this case, the fingerspelling has become more sign-like in its production. Additionally, some of the letters in the middle portion of the word may be omitted (e.g. the letters J-B would be signed for job, and B-K would be signed for back). Some of the teachers reported using lexicalized fingerspelling daily in their interactions with students. However, teachers conveyed that it was difficult for the youngest preschool students to use lexicalized fingerspelling (with few exceptions such as the lexicalized form of B-U-S). Prekindergarten and kindergarten teachers reported that their students used lexicalized fingerspelling much more frequently, and with words with longer letters, such as B-E-A-C-H

The strongest reaction in support of the early use of neutral and lexicalized fingerspelling came from Carol, the ASL specialist. She described a weekend where she was providing a workshop to a group of teachers who taught deaf children throughout the state. During the workshop, one of the teachers in the audience seemed to be surprised that she actually fingerspelled to young deaf children. Carol was taken aback by the comment and her response indicated just how deeply she believed in the power of early fingerspelling exposure in the development of early language and literacy skills:

Then one of the participants asked me, you mean you fingerspell to the children? And I said well yes. She looked at me and said I thought it was too hard. And I said that's not the point. Suppose you're talking about the park, and you produce a sign code for PARK (signs the P-HS with both hands in the outline of a square),

why would you do that? You shouldn't do that because you think they can't fingerspell. They will learn eventually.

They might do something like PK or PRK, and eventually make it more of a lexicalized PRK. It's the same with spoken English. At first the child might say da, and then they'd increase it to dad, and then eventually to daddy. It's the same as spoken language. Why would you decide to take that from them, and decide you think you know best and give them a sign instead? What business do you have!

They looked at me embarrassed. Don't you hurt their English reading! Don't you recognize how there's a connection? Don't do that. If you see a word and there's no sign, and it's lexicalized, go ahead and use it. Don't think because I'm not comfortable and I'm not skilled, I'm not going to do it. So be it. You wanted to become a teacher of the deaf. I expect that you are the expert. You are THE language role model for these children. They were really shocked.

This excerpt reveals several important connections between fingerspelling, and language and literacy development. First, Carol's comments indicated that she believed that teachers of deaf children should incorporate fingerspelling in their signing, whether they were comfortable with it or not, because deaf children needed to learn to fingerspell and were often dependent on their teachers as their primary language model. Second, Carol's comments also conveyed a common belief among the teachers that they needed to consistently promote early exposure to fingerspelling and/or lexicalized fingerspelling because its development was an emergent process, much like that for hearing children learning to speak. Lastly, Carol's comments also indicated that she believed that there was a relationship between early exposure to fingerspelling and reading proficiency. She argued that deaf children's acquisition of reading is curtailed if they have limited early exposure to fingerspelling.

In addition to providing students with exposure to neutral and lexicalized fingerspelling to promote awareness of the manual alphabet, teachers also targeted improving students' awareness of handshapes in initialized signs. Initialized signs are

those in which the manual alphabet is used instead of an ASL native handshape. These teachers used this focused instruction to help students understand that some signs used the manual alphabet to represent the initial letter of the word in English, while other signs did not. For example, Amanda, one of the prekindergarten teachers, gave an example of how she was providing a lesson on color words. She described the color blue, pointed to the word in English, and then provided the sign for BLUE, which is an initialized sign in ASL that uses the B-HS with the forearm rotating back and forth. Then she helped students make a distinction between the initialized BLUE and the non-initialized sign of BLACK as she pointed to the word in English and asked students to provide the sign for the word. Several students provided the sign for BLUE, which seemed to be based on the assumption that color words that begin with the letter B must use an initialized sign with the B-HS. However, Amanda explained that the sign for BLACK uses the 1-HS (with palm orientation down) going across the forehead from left-to-right. Moreover, the sign for BLACK does not have identifying handshape information in the sign that would provide a clue to the word in English. Amanda indicated that was one example where students had the opportunity to see the difference in how some signs represented English with the handshape, while another closely related sign for a concept did not.

Another instructional strategy reported by the prekindergarten and kindergarten teachers was a *handshape comparison chart*. This chart was an extension of the initialized sign vocabulary instruction where teachers have students identify whether the handshape in the sign is initialized or not. For example, the A-HS is used in the sign for BRUSH, DAILY, HUG, and AUNT. The sign for AUNT is initialized, and the other signs are native to ASL. This chart provides students with a visual aid to review when

determining whether signs incorporate a handshape that matches the first letter in the word in English or not.

In summary, this section described how teachers sought to develop students' knowledge of handshapes of the manual alphabet. The teachers seemed to focus on progressively developing students' knowledge of the manual alphabet through various strategies, such as direct instruction of the manual alphabet, and then incorporating the manual alphabet into various forms used in ASL, such as with neutral and lexicalized fingerspelling, and initialized signs. The teachers also reinforced their students' knowledge of differences between handshapes representing ASL and the manual alphabet through the handshape comparison chart.

Promoting an Awareness of Written English. This next section describes the teachers' efforts to expand their students' emergent understanding of English literacy. This section details the instructional approaches the teachers described using with the students that were geared toward exposing them to word and sentence structures in English. These efforts by the teachers seem to represent a continuum of English development with their students. On a daily basis, the teachers seemed to concurrently expose their students to ASL and English print with the expectation that students would acquire a proficient base in ASL and *eventually* begin to decode words in English and focus on grammatical structures (see Table 10).

Many early childhood education teachers throughout the United States view storybook reading as an integral part of the curriculum for their students, and this certainly seemed evident with all the teachers interviewed for this study as well. The teachers viewed storybooks as being a vital link between ASL and English, because it

allowed teachers to point to pictures and print and then tell the stories in ASL. This gave the teachers a way to form connections between ASL and English, and show that the printed words in the text represented another language, but the same story. It also provided students with an opportunity to recognize patterns that exist with written language and recognize words visually. Stacy also emphasized the importance of repeated exposure with young children, “Expose the kids early and often, because language has a pattern, period. It has a structure. It has a pattern. If you expose children enough that they can then start to acquire language, it doesn’t matter if you’re just reading a language based on pictures. Just look at hieroglyphics, Egyptian characters. It’s not phonologically based.”

Table 10

Sub-category overview: Promoting an understanding of written English

Activity / Resource	Description
Group storybook reading	Signing storybooks to your class or combined class, while pointing to words in English
Individualized storybook reading	Signing storybooks to one or two students, while pointing to words in English
Tracing and printing letters	Students trace over letters or practice writing letters
Letter of the week	Focus on words & ASL equivalent signs that start with a specific letter of the week (e.g. cat, cake, couch)
Writing down the student’s stories produced in ASL	Students sign stories and then you write them down for the student
Writing in Journals	Students write letters or words in their own journal (in addition to pictures)

During the emergent reading phase, the goal of the teachers seemed to be to provide their students with a conceptual understanding of the story. The teachers focused primarily on translating the story into ASL in order to provide students with visual and conceptual imagery of the text. Teachers also made use of pictures to help facilitate the students' understanding of the story. When working with a large group of students, the teachers included the use of sociodramatic play and incorporated props and materials that allowed students to portray one of the characters of the story. This kind of student participation likely increases students' appreciation of the story. Cathy conveyed this clearly in her comment about the use of sociodramatic play:

We do a lot of props and action. It helps make a connection to print in English. We use props for things like monsters. For example with the *Hungry Caterpillar* we used props and the kids really loved it and enjoyed it but it really helped motivate the kids to make a connection to reading. Do they understand what they're reading? Maybe not, but it's the development process that they're internalizing.

This example illustrates that teachers wanted their students to relate to print as they provide an activity to make the story more meaningful to their students. This strategy promotes students' understanding that ASL and print both can represent a story filled with ideas that could be fun and entertaining. The teachers did not expect that their students would be fluent readers while in preschool, but that they would eventually acquire the skills to learn to read.

In the book-sharing context, the teachers seemed to focus on exposing children to specific words and grammatical structures in English. In the preschool and prekindergarten classes, teachers provided the fingerspelling and the signs of words in the text and then asked students to identify individual words and/or phrases. This strategy was used to develop students' vocabulary knowledge and form connections to English.

As Jennifer stated, “If I introduce the [text] word blue, and sign BLUE, and sign it repeatedly, then they will start to understand. They should remember it... I have to make a connection first. That’s the key is to make the connection.”

The teachers also took time to emphasize specific letters of the alphabet. In the prekindergarten class, the teachers described placing greater emphasis on learning the *letter of the week*. The teachers felt this was more beneficial for students who already had an established language base in ASL and knew that many signs featured handshapes native to ASL. Prekindergarten teacher Amanda indicated this in her comment, “This year we discussed that we wanted to expose the children to a letter of the week, instead of a handshape of the week, because some have already experienced it. If a student has deaf parents then they have already have had that.” The letter of the week strategy emphasized learning words in English. For example, if the letter C was the letter of the week, then the students brought in objects or pictures of objects from home that began with the letter C in English, such as cat, cake, and couch, and the teachers wrote it down and took a picture of it. This activity allowed students to focus on pairing signs with words in English that began with a specific letter, even though the handshape may have been different in ASL. Moreover, it also helped build an emerging knowledge of the alphabet and exposed students to the concept that letters form the basis of words in English.

Emergent writing. In addition to developing students’ emergent reading abilities, teachers also sought to develop their emergent writing skills. The teachers described three different emergent writing activities that they used with students. The most common method that teachers described was having their students write in journals. For the

preschool and prekindergarten students, “writing” in journals often meant having students draw pictures, letters, or words in journals. The teachers in the kindergarten classes emphasized writing journals and encouraged students to write stories and describe their own personal experiences. The teachers felt that it was important to write, because as Jennifer stated, “You feel confident when you write. When the children paint or do artwork, I encourage them to write even if they write the letter J-O.... even if it’s not perfect I’ll leave it. The students get excited, and it builds their self-esteem. I really encourage them to write.”

The teachers also took dictation for the personal narratives that their students produced in ASL, writing their stories down in English. This enabled students to see what their ideas looked like in print. In the preschool classes, this was done occasionally to expose students to English print and show them that their ideas in ASL could also be written down on paper. The teacher often did this to expand upon the ideas the students wrote in their journals. Elisa added that was important because it allowed the students to “see it in ASL, and then (look) down at the print on the page. They are able to understand it is the same because the English is there and then they can look up and get the communicated message in ASL.” In the kindergarten classes, the teachers used this as a strategy to help students learn to write for themselves and provide spelling help if necessary.

The last thing teachers did to develop students’ knowledge of English print was to have their students trace or print letters and/or words in English. Some of the teachers described a designated learning center where their students could practice their printing and writing skills. This approach permitted students to develop their ability to create and

write letters in English. In the preschool classes, teachers placed minimal emphasis on forming letters. However, by the time students reached kindergarten, the teachers emphasized forming letters in the alphabet much more because students were expected to write more in kindergarten.

In summary, this section described how teachers strove to provide their students with a framework through which to develop an understanding of English. The teachers want to expose their students to letters, and words, and simple sentences. These instructional strategies helped students form connections between the structure and meaning in English as they were concurrently developing their proficiency in ASL. The teachers felt it was vital to facilitate this ASL connection and meaning to English through various activities such as individual and group storybook reading activities, (English) letter of the week, and emergent writing activities, which supported students' efforts to draw or write about their own experiences or have teachers write down the words for them in English so that could see what English looked like on the page.

Promoting the Decoding of Words in English. This section details the teachers' attempts to help students learn to decode English. Here, teachers reported that they helped students use their knowledge of ASL as a bridge to understanding similar concepts that are expressed in English. What distinguishes this section, as compared to the previous section, is that teachers seemed to be trying to develop students' understanding of the sub-lexical structure of words and word combinations in English, rather than merely exposing students to individual letters and words in English (see Table 11).

Table 11

Sub-category overview: Promoting the decoding of words in written English

Activity / Resource	Description
Chaining	Connecting signs and pictures with English print through fingerspelling
Beginning reader books	Using easy reader books with highly repetitive phrases and structures (e.g. the boy is walking, the boy is running)
Frequent English word lists	Review the common words in English that may not be used in ASL, such as articles and prepositions in English (e.g. The, a, an, this)
Collaborative Guided Reading	Reading books with students to give them an understanding of the story, and then go through the book to point out specific structures in English (e.g. “is” needs to connect with “-ing”)

Before describing the teachers’ instructional approaches to promote decoding, it is important to convey that teachers characterized a distinct period when their students seemed to grasp the manual alphabet truly represented English. In a previous section, the teachers articulated that many students knew that there was the manual alphabet and that it was different from ASL, but they did not seem to understand that the manual alphabet was truly representative of English. For example, Katie, one of the pre-kindergarten teachers, described a situation in her preschool classroom where her student, who had not yet attained the relevant insight, just focused only on the B & S, but not the U in the lexicalized fingerspelling for B-U-S. She also mentioned that students did not really understand at that age, but just copied what others produced.

However, as students grew older, several of the kindergarten teachers described a golden moment when a student realized that the manual alphabet was a full representation of English. The teachers reported that this insight usually occurred when

students were using lexicalized fingerspelling, and then asked the teachers to spell out the lexicalized fingerspelling they were using, without realizing they were actually already spelling most of the word. For example, Stacy described the moment when one of her kindergarten students seemed to make the connection between the manual alphabet and print, “They’ll ask me how do you spell bus and I tell them that they know. They’ll look at me and say, “I don’t know!” Then, I’ll tell them to sign it slow, and they’ll make the letters in the lexicalized fingerspelling, B-U-S, and then look at their hand again as they spell B-U-S, and then they say “Wow!” and they’ve gotten it. Kindergarten teacher Linda estimated that her students with advanced language proficiency began to make the connection between the manual alphabet and English print, “Probably around November, December, to January.” This important transition suggests that is not until around their 5th birthday that students begin a higher level of sophistication to decode English. They must first understand that the manual alphabet represents English, and then teachers ramp up their instruction, stress the development of English more intensely.

Once deaf students make the connection between the manual alphabet and English, then teachers can more effectively utilize *chaining*. In chaining, teachers attempt to link words in English to signs students know in ASL through the use of fingerspelling, and pictures, if available (Humphries & MacDougall, 2000). If the teacher comes across a word in English that students do not know, she points to the printed word, fingerspells it, and points to a picture, if available, and then produces the sign. The teachers had different views of chaining, though they all thought it was beneficial for the students. Stacy felt that chaining was beneficial for some students who benefitted from kinesthetic and visual forms of memory.

With chaining, I think that helps some. Those who seem to benefit are those who are tactile learners. They're more physical and benefit from the manual fingerspelling movements – the feel of it. Some kids might not understand the [printed] spelling, but then remember the fingerspelling... Vocabulary words have contours to them, like the outline of the height of the word – the word shapes. The kids can recognize the letters.

Carol felt that most of the students who benefitted from chaining were those in kindergarten with good language skills; but that it could take children longer before they start to realize the connection between fingerspelling and English print.

(Chaining) can happen in kindergarten, if they have a strong language I think they'll respond. If they don't have that, then it's perhaps in the first grade when they respond. Yeah, I've noticed that happening between the kindergarten and first grade in my analysis. I know one kid he just seemed to get it immediately in kindergarten. It's like his eyes were opened, and his mind was just receptive to the possibilities, and he just made lots of connections.

The teachers' beliefs about the effectiveness of chaining suggested that it is a vital link between English and ASL. Through chaining, teachers build connections between ASL signs and words in English, and also use the manual alphabet as a bridge between the two languages. It also permits deaf students to use their structural and conceptual knowledge of their primary language, ASL, to decode a second language, written English.

The three other activities the teachers used were directed toward developing students' understanding of how ideas can be expressed differently in English as compared to ASL. In each of these instances, teachers fingerspelled the words in English because there was no exact equivalent sign in ASL for these categories of words, such as articles (the, an, a), pronouns (he, she, this), prepositions (in, on, at), and verbs "to be" (is, was, are). Thus, in order for students to decode these words in English, they had to learn to fingerspell them and commit their use and function to memory.

One of the most common approaches the teachers used to expose students to the basic structure of English was through the use of *beginning reader books*. These books used highly repetitive phrases and structures (e.g. the boy is walking, the boy is running) with pictures, which gave students the opportunity to learn the structure of English through repetitive use of specific phrases. These books exposed students to the basic ways in which English used particular words (e.g. articles and the verbs “to be”) that were different from ASL in a reading based activity. Stacy detailed her approach to using the beginning reader books in this way:

I start with simple books called Beginning Readers. The sentences tend to be very repetitive and I tend to look for books that are easy to translate into ASL. So a sentence like, “I see the dog” has almost the same word order as ASL and with picture support such as dog. So the kids can read the words and see the picture. If they don’t know the word “dog” when they read it, then they can see the picture.

The same was true for *frequent English word lists* that some of the kindergarten teachers used with their students. The kindergarten teachers used these lists to expose their students to words, such as articles, pronouns, and prepositions that are frequently used in English, but not in ASL. In order to decode these words, students needed to learn how to fingerspell them. Jane and Linda described how they incorporated the same type of frequency list into spelling tests to help their kindergarten students recognize and identify these words. Jane describes how she uses the English word list in the following excerpt:

We also have Frye's list of words, first 100-word list of words. We try to follow that so that way they can gain similar exposure to what hearing children receive. Some of the words are unusual (for the deaf students). These are words high on the list that are frequent for hearing students, but not for deaf students. I try to pick them. There are some words that are used a lot by deaf children that are toward the end of the list. I try to mix them up (for the spelling test).

Finally, the *collaborative guided-reading* was a strategy implemented in kindergarten and by Carol, the ASL specialist. During the collaborative guided-reading, the teachers read books with the students to give them an understanding of the story, and then they went through the textbook to highlight different structures in English, with the goal of improving students' understanding of English grammar. Moreover, this approach also helps students make connects to words in English because the teacher would often fingerspell words, such as articles and prepositions that were common in English and not in ASL. Carol described how she used the collaborative guided-reading with a student in the following excerpt:

(We) discuss what the story was about and we will sign back and forth to make sure it was clear. Then we'll open the book again and analyze the words in more detail. You can't just read the words and then analyze them. You have to understand the story behind it, and then it helps make connections to the words in English.

In summary, these findings suggest that teachers use various strategies to help students learn to decode words in English. The teachers connected the use of the manual alphabet with signs along with printed words in English. The teachers also noticed that students became more effective at decoding words in English once they understood that the manual alphabet was an actual representation of English print, instead of just another handshape feature of ASL. One of the primary means to form connections to English was through the use chaining, and this strategy provided students with a bridge between ASL and English. Teachers also sought to help students decode English by facilitating their understanding of how the structure of English was different from ASL. This instruction required teachers to use both the structural and conceptual aspects of ASL to make connections to the different structures in English. To develop these decoding skills,

teachers used highly repetitive “easy readers” to help students recognize recurring structures in English, target the most frequent words used in English but not in ASL, and also use collaborative guided-reading exercises to target specific structures in English text that may be challenging for students to understand.

Follow-Up Survey

Each teacher was sent a follow up survey after their interview (see Appendix B). The purpose of the survey was to gain an idea of how common or frequent an instructional strategy was in a teacher’s classroom. In the interviews, teachers reported using various instructional strategies and approaches, but it was difficult to know if the teachers used a particular activity, daily, monthly, or even not at all.

The survey was divided into four sections, ASL hand configuration (handshape), Manual Alphabet, Emergent Literacy, and Decoding English. Within each section, was a listing of the different types of instructional strategies associated with that section that had emerged from the analysis of all the interviews. Teachers were asked to rate the frequency with which they used each instructional strategy. The rating scale was as follows: 0=Never, 1=monthly, 2= bi-weekly, 3=weekly, and 4=daily.

The surveys were e-mailed to all 10 participants and a total of six participants responded. The overall response rate made it difficult to do a complete analysis of the survey data, but it was possible to discern some patterns from the responses. The survey responses were sufficient to corroborate which instructional strategies the teachers used individually and which were used by all of the participants. The instructional strategies were added together for each of the six teachers. A score of four for a teacher indicated

that she used this particular strategy daily, and an overall total of 24 for all six teachers indicated that the strategy was used daily by all teachers. Conversely, a teacher could also put down zero to indicate that she never used the strategy, and an overall total of zero would indicate that none of the six teachers used the strategy in their instruction.

The survey results corroborated the majority of the responses provided by the teachers during the interviews. A significant finding of the survey data was that there were five instructional strategies that received either a score of 23 or 24, which meant these strategies were used daily by all the responding teachers (see Figure 10), and these activities include 1) natural conversation in ASL, 2) display of manual alphabet in the classroom, 3) use of (neutral) fingerspelling in signing, 4) use of lexicalized fingerspelling in signing, and 5) chaining. Conversely, there were three activities that received very low overall scores, and these include 1) student video self-critique, 2) the computerized ASL dictionary, and 3) tracing handshapes on paper. Only one instructional strategy had an overall score of zero, and this was the tracing handshapes activity that was reported in interviews by two of the teachers who did not respond to the survey. The other two remaining low scoring activities included a small group of teachers that used one activity selectively and an individual teacher who made more extensive use of one activity extensively. The former included the kindergarten teachers and the ASL specialist used the video self-critique, and the latter was the ASL specialist used the computerized ASL dictionary program.

All the other instructional strategies listed in Appendix B, and not cited in Figure 10, were used with less frequency, or they were used with a high level of frequency, but only by certain teachers. This information provided by the participants revealed some

patterns of instructional practices seemed noteworthy because they were more prevalent in certain classes and not others, suggesting a developmental progression of sorts. The preschool classes made more use of the ASL handshape of the week and referred to posters of ASL handshapes more than the other classes. The pre-kindergarten and kindergarten classes focused on more on direct instruction of the manual alphabet, and displaying of the manual alphabet, and emphasized all the instructional strategies in the emergent literacy section much more than the preschool class. It was also notable that the kindergarten classes focused much more on the frequent English word list and collaborative guided reading than preschool and prekindergarten classes.

High Frequency Use - Used by all teachers daily
Natural conversation Display of manual alphabet in classroom Use neutral fingerspelling in signing Use lexicalized fingerspelling in signing Chaining
Limited Use – Used by one or two teachers
Student video self-critique ASL dictionary (computer program) Tracing handshapes on paper

Figure 10. Most frequent and least frequently used instructional strategies

Chapter Five

Discussion and Implications

Overview

This study examined teachers' perceptions of their use of American Sign Language (ASL) phonological instruction to develop the language and literacy skills of their deaf students. Specifically, this qualitative study investigated how teachers conceived of ASL phonology and used it to develop the language and literacy development of their students. This chapter will provide a brief summary of the findings, discuss its findings, implications, limitations, and describe future directions for research.

Summary of the Findings

The purpose of this study was to examine how teachers of deaf children in a bilingual ASL/English preschool program promoted ASL phonological development to develop language and literacy skills. Studies in the past 15 years have found a positive relationship between ASL proficiency and reading ability (Hoffmeister, 2000; Padden & Ramsey, 2000; Prinz & Strong, 1998; Strong & Prinz, 2000). However, little is known about how sign language phonological awareness may increase reading abilities. Many educators and researchers in the field of deaf education believe that sign languages, such as ASL, mainly provide a top-down benefit to deaf children's literacy acquisition because they increase deaf children's real-world knowledge, which promotes better comprehension of text (Drasgow, 1998).

It is not known whether ASL can be used to promote reading through a bottom-up approach, such as through the use of ASL phonological instruction. An abundance of research conducted with hearing children suggests a strong relationship between

phonological awareness of spoken English and reading (Adams, 1990; Stanovich, 1992; Wagner & Torgesen, 1987). By comparison, only a handful of studies have examined a potential relationship between American Sign Language phonological awareness (ASLPA) and reading. Studies conducted on deaf adults indicate that some deaf adults activate ASL phonology when processing text (Treimen & Hirsh-Pasek, 1983; Morford, Wilkinson, Villwock, Piñar, & Kroll, 2011), and a study conducted on deaf children found a significant, positive relationship between ASL phonological knowledge and English word recognition (McQuarrie & Abbott, 2008). However, these studies did not address the processes through which deaf children develop ASL phonological awareness. Did the deaf children develop ASLPA from their parents, or did they acquire it from their teachers? The lack of research and understanding in this area of ASLPA provided the impetus for this study. In particular, this study seeks to understand how teachers might incorporate ASL phonological instruction, specifically of handshapes, to promote ASL proficiency and then use this awareness to build a connection to literacy skills.

The study seeks to answer two core research questions: 1) How do teachers conceptualize the role of ASLPA in the language development of deaf children? 2) What strategies do teachers use to promote ASLPA of deaf children in early childhood education? Overall, the results found that the teachers report making extensive use of ASL phonological instruction in their classrooms, and these practices seem to be influenced by teaching philosophies that connect structural understanding (ASLPA) to develop higher levels of language proficiency.

More specifically, teachers in the study seemed to perceive the role of developing children's ASLPA as part of a larger effort to promote ASL proficiency and sign

vocabulary acquisition. The teachers viewed providing instruction of the structure of ASL as being necessary to developing their students' understanding of the structural components of ASL; they believed that it would help students understand how to use ASL more effectively and make connections to English.

Furthermore, the themes that emerged from the interviews indicated that the teachers used an array of instructional strategies to cultivate students' knowledge of ASL structure and the means by which to make connections to English. The teachers provided instruction on ASL handshapes to promote students' knowledge of ASL vocabulary and help students make connections between signs. The teachers also exposed students to fingerspelling and the manual alphabet to promote their awareness of these components as a part of ASL phonological structure. Moreover, the teachers incorporated emergent literacy instruction of English to provide their students with knowledge of the structure of English so that their students could eventually make a connection from ASL to English. As students progress in their development of English, the teachers report that they began to explicitly connect their students' knowledge of ASL to English. Teachers made frequent use of chaining, where they pointed to the word or phrase in English, provided the sign, and then fingerspelled the word to link the two languages together.

A Revised Theoretical Model of a Bottom-Up Approach of Reading Development Using ASL

This section describes a theoretical model of how teachers could promote American Sign Language phonological awareness (ASLPA) to develop deaf students' reading skills using a bottom-up approach. An initial model of the developmental progression of ASLPA was proposed in Figure 5 on page 77. The initial model proposes

a potential pathway of ASL phonological development based on acquisition studies of ASL and spoken English phonological development. The model suggested how deaf children could progress in their awareness of ASL phonology through three stages: an Early Stage, an Intermediate stage, and an Advanced stage. In the Early stage, deaf children begin to learn handshapes that form the basis of signs in ASL. In the Intermediate stage, deaf children begin to partition their knowledge of handshape in native sign structures from those that represent English. In the Advanced stage, deaf children begin to apply their knowledge of handshapes and use this knowledge to decode English. While this model was beneficial in showing a developmental progression of ASL phonological awareness, it was limited in characterizing how teachers could promote the development of ASL phonological awareness.

A revised model of ASL phonological development is now offered based on the findings from the current study. The revised model incorporates how teachers seem to conceptualize ASL phonological awareness in a way that helped students understand the basic handshape structures were used in signs within ASL. The model also illustrates ways that handshapes could be used as *manual phonemes* to allow students to establish a direct connection to graphemes in written English. The teachers' perceptions and use of instructional strategies indicate that they understood the various forms and function of handshapes within ASL. Teachers reported that handshapes functioned as one of the four basic structures of signs native to ASL, but that these handshapes did not provide a direct connection to written English. They also described that handshapes were used in the manual alphabet, and their reported instructional practices indicate that they believed that the manual alphabet could help students form a connection between ASL and English.

As described in chapter two, the manual alphabet is a tertiary representation system, as it is a manual representation of the letters of the alphabet used in written English, which is considered a secondary representation system (Wilcox, 1992). The manual alphabet can be used to translate words from English into ASL. When the manual alphabet is used in fingerspelling forms, such as lexicalized or neutral fingerspelling, it forms a direct correspondence to the individual letters used in words in written English. In this context, the manual alphabet functions like a manual form of a phoneme in spoken English because the manual phonemes are the smallest lexical unit in a serial representation of letters that comprise a word or a sign (Wilcox, 1992). This structure provides deaf students the potential to establish a representational link between a sign and the fingerspelled form and allows deaf children to use their knowledge of signs to learn English because the fingerspelled forms serve as a gateway between native signs and written English.

The process of getting students to a high level of awareness to where they can form a representational link between signs, a fingerspelled form, and printed words in English requires a stepwise progressive development and understanding of the way handshapes are structured and function within ASL. The teachers' instructional patterns suggest that students have to first possess a strong foundation in the structural forms in ASL before they can build on. Once the foundation is established then teachers can expand on students' knowledge of the form and functions of handshapes in ASL, but also highlight their alternate function, that is to represent letters in English.

The stepwise development of phonological development is shown below in Figure 11. The left column of the figure describes the teachers' instructional practices, while the

right column illustrates what teachers perceive their students to understand in terms of phonological structures and representation systems. The figure is divided into three sections, with the development of skills progressing from an early stage at the bottom upward toward the advanced stage at the top.

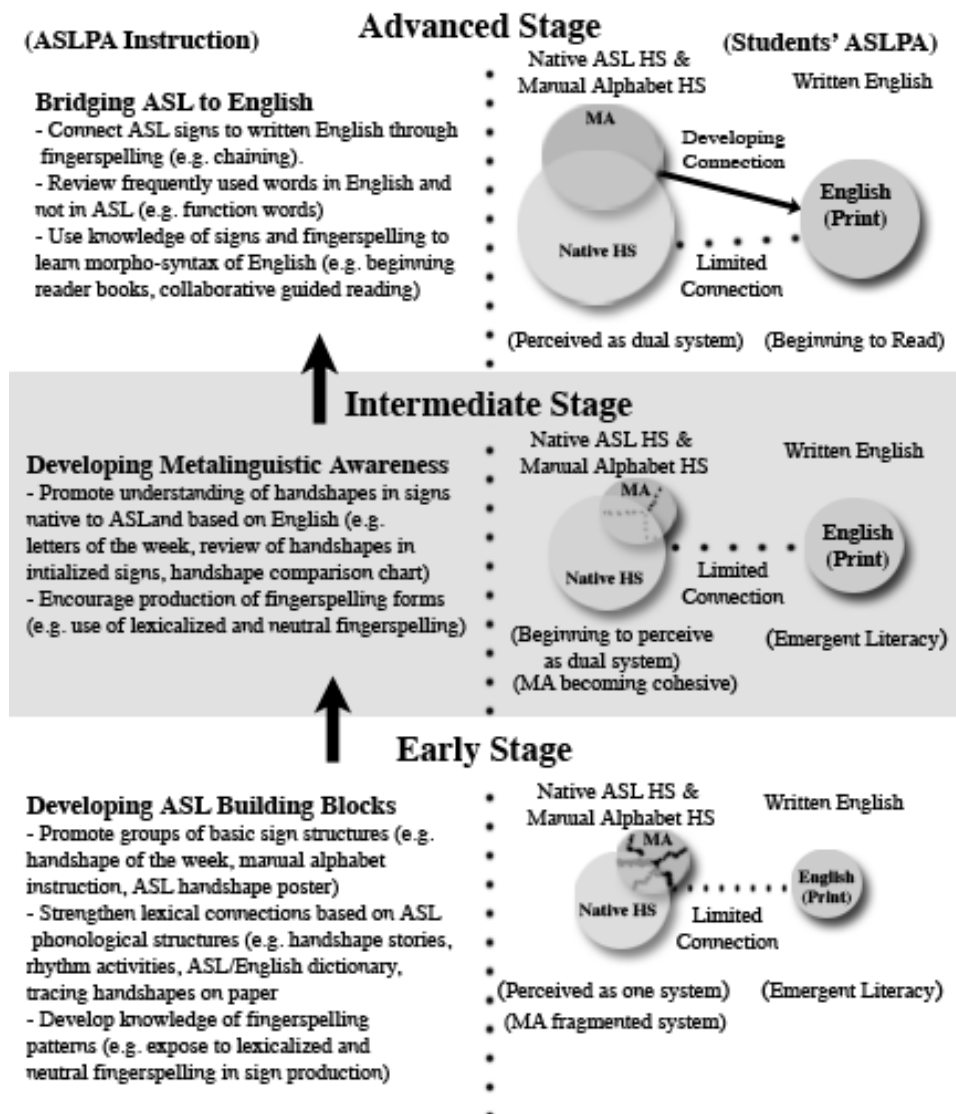


Figure 11. Developmental progression of ASLPA and instruction

In the early stage, teachers wanted to develop students' knowledge of how handshapes formed structural elements of signs in ASL. They packaged their instruction primarily in terms of providing natural exposure of sign forms used in daily conversation

to give their students a base of sign language vocabulary they could use and access. They also explicitly focused on using instructional strategies that developed students' knowledge of handshapes used in native sign structures through various activities, such as the "ASL Handshape of the Week." They also incorporated activities, such as "ABC stories" that encouraged students to focus on identifying signs that shared a specific handshape. These activities helped students to consider handshapes as a structure of sign, recognize how the structure could be identified in signs the children used daily, and provided an extra means to form a connection between signs.

In the early stage, teachers did not seem to emphasize developing knowledge of the manual alphabet as much as they did native handshape structures. The teachers seemed to focus more on teaching the basics of the manual alphabet, and showing students how the manual alphabet was used in the form of lexicalized and neutral fingerspelling. The teachers reported that they explicitly taught the students the manual alphabet and that students could recognize letters in words. However, teachers did not make extensive connections between the manual alphabet in signs because they wanted their students to understand the structure of native signs first. Thus, in this early stage, students were characterized as having more of a compartmentalized or fragmented understanding of the manual alphabet because, for them, it had not yet developed into a cohesive system, functioning within and alongside ASL.

The intermediate stage indicates how teachers began to shift their focus toward expanding their students' metalinguistic knowledge of handshapes native to ASL, and toward forming connections to the manual alphabet. The teachers continued to expose their students to handshape forms native to ASL, and they reported that their students

were becoming more adept at understanding a wider range of handshapes. The teachers also tried to foster students' knowledge of the form and function of the manual alphabet into a more coherent system. As teachers continued to expose students to lexicalized and neutral forms of fingerspelling, they described that their students were beginning to produce some lexicalized and neutral fingerspelling and could produce some of the individual letters in production of the fingerspelling.

The teachers also began to highlight, through contrastive analysis, that handshapes used within some signs familiar to students were actually initialized signs, and the handshapes represented one or more letters used in the word in English. This instructional strategy helped students form representational categories for handshapes that could be grouped into those that were used in native signs and with those that represented letters in English. Students also seemed to develop a more cohesive understanding of how the manual alphabet was used in ASL. However, even though students were beginning to identify some connections between handshapes and print, the teachers reported that students were still making limited connections between the manual alphabet and lexicalized fingerspelled forms and initialized signs, and this finding is consistent with similar findings in previous research (Hile, 2009; Padden, 1991, 2006).

As teachers continued to expose students to signs and fingerspelling in natural conversation and with direct instruction, students continued to grow in their awareness of handshapes in ASL and the manual alphabet. Students are characterized as transitioning into the advanced stage when they possess an explicit cognitive awareness that the manual alphabet used in signs represents individual letters in English. Padden (2006) states that deaf children seem to learn to fingerspell twice. They first view the letters of

the alphabet as part of the structure of ASL, and then make the connection that the manual alphabet represents English. The teachers also indicated this pattern with their students. This ‘new’ awareness of fingerspelling seems to be suggestive of a manual version of the alphabetic principle. When children achieve this awareness, their understanding of the manual alphabet appears to develop into a more cohesive system because they are more ready to make connections and can recognize the manual alphabet in various signs forms of ASL.

The teachers’ instructional patterns represent that they try to utilize the connection between the manual alphabet and print by chaining together signs, fingerspelling forms, and printed words in English. The teachers report providing daily exposure to chaining as they pair signs and fingerspelling to words in written English. The benefit of incorporating fingerspelling is that it provides deaf children with a tool for “cross-modal” borrowing and a way to convert important spoken language vocabulary into ASL (Padden & Gunsauls, 2003, p. 14). The chaining process provides students with a dual representation of a sign that they can use to read and write words. Chaining helps students know a how sign is used in ASL, establishes a connection with fingerspelling that allows students to bridge a connection to written English. The chaining process allows teachers to use a compare-and-contrast analysis of how ASL is similar and different to written English. For example, a teacher can point out words in English that were not used in ASL (e.g. function words), fingerspell the words, and then explain their use and function in English to the children in ASL. Teachers can also engage in collaborative-guided reading instruction to help explain the structure of English using the

students' knowledge of ASL structure as a guide, which helps them decode words in English.

One lesson that can be learned from the development used by the teachers is that it is important to embed knowledge of handshapes into an overall natural ASL discourse. Handshapes can be used in multiple ways in ASL. Handshapes primarily function as one of the essential elements of the structure of signs, but they can also be used to help deaf children acquire and develop literacy skills. However, in order for deaf children to form a connection to literacy, they must have a strong base in ASL, and then learn how to parse and manipulate the structure of fingerspelling, in addition to their knowledge of signs in ASL. When deaf children have a strong connection between the dual manual representations of a concept, they have a high level of flexibility to communicate effectively in ASL, and forge a connection to literacy. This provides deaf children with a more inclusive and well-rounded primary language and allows deaf children to maximize their potential to communicate in ASL and produce written forms of English.

The teachers' approach of incorporating ASL phonological awareness indicates that they are using an alternative approach for developing language and literacy. Teachers provide instruction that allows deaf children to analyze the structure of their everyday conversational language of ASL. These practices allow deaf children to focus on the individual structures they know and make sense of the linguistic input that they see and produce in their environment.

Many early literacy programs in North America promote phonological awareness of spoken language to help develop literacy skills, and research has shown that is effective (Snow, Burns, & Griffin, 1998). Deaf education programs also try to promote

phonological awareness of spoken English, but since deaf children do not easily process spoken language, many programs have tried to devise manual forms to try and make English visible to deaf children. Some programs have focused on only aural and oral training, or enhance lipreading with speech-based handshapes that are not derived from fingerspelling (Cued Speech). Other programs, such as SEE1 and SEE2 have tried to develop sign codes that represent morphemes in English (Lou, 1988). Other programs have tried to use a fingerspelling only approach, which is also commonly known as the Rochester Method (Padden & Gunsauls, 2003). While there are some children who have succeeded with these methods, a majority of deaf children experience more limited success. One reason is that deaf children seem to have limited success with these approaches is that these approaches are limited communication systems that do not provide deaf children with the same full access to a primary natural language (Hoffmeister, 2000; Lou, 1988).

What seems to be relevant in the approach the teachers used in this study was that they were trying to develop an all-inclusive understanding of sign structure. The teachers exposed students to basic handshape structure to give students a strong language base of understanding, and then tried to build on this initial base. After the students developed their understanding of structure of signs, then teachers provided students with exposure to how handshapes could be used in other ways, such as acquiring literacy skills.

Moreover, the teachers also emphasize that it is important to build an early understanding of the structure and use of fingerspelling. While deaf children may initially view fingerspelling forms as another sign form, they will eventually understand that it can represent a word in English and provides an alternative manual representation of a

word. However, as Carol indicated in her interview, many teachers in deaf education, especially hearing teachers in general, seem to be reluctant to frequently fingerspell with their deaf students. Padden and Ramsey (1998, 2000) supported this finding in a study of fingerspelling in teachers' instructional practices. They found in their sample analysis of six 15-minute lessons that deaf teachers fingerspelled an average of 176 words, while hearing teacher teachers fingerspelled an average of 75 words. Similarly, research also indicates that many hearing teachers made limited use of the chaining process and did not connect signs and fingerspelling to words in English as frequently as deaf teachers (Humphries & MacDougall, 2000; Padden & Ramsey, 1998, 2000). This limited exposure to fingerspelling and other forms of explicit instruction of ASL phonology could significantly limit deaf children's overall potential development of handshape awareness in ASL. As a result, many deaf children may have a weaker connection between their manual phonemes and graphemes because their understanding and use of manual phonemes in the form of lexicalized and neutral fingerspelling are less embedded and interconnected, reducing their ability to use ASL to decode words or process text.

In summary, what this model shows is that promoting knowledge of the structure of ASL from the bottom up may enhance deaf children's capacity to acquire vocabulary and encode and decode written English. Promoting awareness of the handshapes in progressive stepwise development allows deaf children to build on their knowledge of how handshapes are used in native sign structures and in forms that use the manual alphabet. This awareness gives deaf children the capacity to access signs and words based on the way that handshapes are used, and provides deaf children with a high level of flexibility in communication. This gives deaf children access to more encompassing

natural language and lets deaf children utilize their knowledge of ASL to learn English effectively.

Implications

Only a limited number of studies have focused on American Sign Language phonological awareness in the educational context and there are many potential implications of this research. One of the important implications of this research is that there seems to be no clear consensus on what constitutes American Sign Language (ASL) phonological development in educational settings. Research being conducted on ASL and other sign languages is still evolving. While many linguists agree that ASL is indeed an actual language, there is still ongoing debate about the use and application of ASL in educational settings. Even though ASL has been used as a language in deaf education since 1817 (Lane, 1984), it has only been 15-20 years since research has shown a relationship between higher levels of sign language proficiency and higher levels of reading skills (e.g. Hoffmeister, 2000; Padden & Ramsey, 2000; Prinz & Strong, 1998; Strong & Prinz, 2000).

Little is known about the specific mechanisms of how higher levels of sign language proficiency may promote better reading abilities. One barrier may be the lack of agreement on how to categorize the manual alphabet within the study of ASL linguistics. While there is agreements in regards to the phonological structures or parameters of individual signs (Liddell & Johnson, 1989), there still seems to be a lack of agreement about how to categorize fingerspelling forms, such as neutral fingerspelling and lexicalized fingerspelling in relation to sign language phonology. Earlier studies of

fingerspelling did not consider the manual alphabet to be a part of the core phonological system of ASL because it borrowed from English and represented English orthography (Bornstein, 1978; Klima & Bellugi, 1979; Tweney, 1978). However, more recent work by Brentari and Padden (2001) and Padden (2006) view fingerspelling to have a more vital function within ASL because it is deeply entrenched within the structure and use of ASL. Fingerspelling forms have rules that govern the how handshape, movement, location, and palm orientation are used in the production; thus, it seems appropriate to classify it as a sub-structure of sign language phonology. Deaf children also acquire fingerspelling progressively and initially view it as part of the broader sign language structure, and then eventually realize that it has its own distinct manual system that represents letters in English (Padden, 2006). Therefore, a broader definition of sign language phonology seems warranted, especially if it promotes a better understanding of how sign language phonological awareness can be used to improve language and literacy abilities for deaf children.

Another revealing finding of this research is that even though teachers used numerous instructional practices that make sign language phonology explicit to their students, they did not necessarily label these practices specifically as targeting sign language phonological awareness. For example, during the interview, teachers were specifically asked how they thought “ASL phonological awareness” contributed to their students’ language and literacy development, and several of teachers struggled to answer the question. However, when the interview question was rephrased and teachers were asked how they thought teaching students the structure of sign language, such as handshapes, was beneficial, they were able to answer effectively. Part of this may be due

to the lack of agreement as to what constitutes sign language phonological awareness. Another reason may be the dearth of research investigating the benefits sign language phonological awareness may have in educational settings. There has been significantly more research conducted on spoken language phonological awareness, and these findings have been widely disseminated in teacher education programs for both deaf and hearing children; teachers deploy this information in their teaching practices. If more research on the benefits of sign language phonological instruction is conducted and disseminated, then teachers may be more likely to incorporate these strategies in their teaching practices.

Even though there is limited research on ASL phonological awareness, this study found that teachers report using many instructional strategies that target sign language phonology with supposedly minimal training in this area. Teachers reported having to use their own intuitive understanding of language development, and visually based learning practices to guide their instructional practices; these intuitive practices have been termed by some researchers as indigenous practices (Humphries, 2004; Padden, 2006; Singleton & Crume, 2010). These indigenous practices and beliefs or “folk theories” (Boudon, 1986; D’Andrade, 1987, 1995) can play a critical role in learning about the nuanced ways in which deaf teachers communicate, interact, and instruct deaf children, which could ultimately help enhance the overall quality of education for deaf children.

This study only examined the ASL phonological instructional practices at one ASL/English bilingual school. It is not known if this school was unique, or if other schools also promote ASL phonological instruction in similar ways. It may be worthwhile to investigate whether ASL phonological instruction is typical only at schools

that use an ASL/English bilingual educational approach or that use ASL as the primary instructional language. The use of ASL phonological instruction may also exist in other deaf education programs that promote spoken language, but still use sign language as a means of communication. It also may be possible that individual teachers, either hearing or deaf, may also incorporate ASL phonological instruction because they intuitively believe that deaf children learn more effectively understanding the basic structure of their primary language.

It is also worth noting that school based ASL specialists may serve a vital role in promoting ASLPA. The ASL specialist in this study, Carol, was highly knowledgeable and stated that there were a “1,000 different ways to promote ASL phonological awareness.” Carol supported the teachers by suggesting ways to incorporate ASL phonological instruction in their classroom teaching, and she provided individual support with students who needed more help with their sign language development. Carol also indicated that she developed her own assessments to measure students’ ASL abilities, and she devised targeted ASL phonological instruction to correct weaknesses in specific areas. The instructional support provided by Carol seemed invaluable, and highlights the critical role played by ASL specialists in promoting the sign language abilities of deaf children.

There are also potential implications of how the specific instructional strategies identified in this research promote deaf children’s acquisition of language and literacy. Most of the research conducted on children’s acquisition of phonological aspects of sign language has involved language acquisition studies. Few studies have examined the potential benefits of using phonological instruction to promote deaf children’s acquisition

of specific phonological components, such as handshapes, and how ASLPA may enhance deaf children's language proficiency or knowledge of ASL sign vocabulary (Lederberg, Prezbindowski, & Spencer, 2000). Studies conducted with hearing children with Specific Language Impairments (SLI), who are limited in their vocabulary knowledge, have found that targeted phonological instruction helped students improve their vocabulary knowledge (Gray, 2004, 2005; Leonard, 1998; Nash & Donaldson, 2005; Rice, Bahr, & Nemeth, 1990). A similar approach could be used to enrich knowledge of ASL vocabulary with signing deaf children who are delayed in acquiring sign language.

Research is also insufficient with respect to the long-term benefits of early exposure to fingerspelling. Earlier exposure to fingerspelling may promote children's abilities to read and produce fingerspelling. We know that in general, early sign language contributes to the development of anatomical structures and physiological processes that positively impact the development of language systems in the brain (Neville et al., 1997). Studies on maturation constraints on ASL acquisition also find that an earlier age of sign language exposure bestows linguistic benefits that persist well into adulthood (Newport, 1991; Mayberry, 1994), suggesting that early robust sign language exposure promotes a hardy neural architecture that can provide benefits that last a lifetime. Thus, children exposed to fingerspelling early in their childhood may develop the ability process and produce fingerspelled words rapidly. Moreover, one study found that when young deaf children's fingerspelling ability is paired with their knowledge of ASL vocabulary, they are better able to decode words in English more effectively (Haptonstall-Nykaza & Schick, 2007).

Another potential implication of early exposure to fingerspelling is that it may help promote deaf children's ability to acquire the manual version of the alphabetic principle, or learn to fingerspell a second time (Padden, 2006). There is limited understanding whether deaf children should be exposed to fingerspelling at a younger age to develop this awareness sooner. The teachers indicated that students with higher levels of sign language proficiency seemed to grasp the manual version of the alphabetic principle earlier than students with more minimal levels of proficiency. It may be that earlier exposure to fingerspelling helps promote the necessary cognitive development that children need to map the manual alphabet to the printed alphabet, and moreover, children who develop insight into a manual version of the alphabetic principle become more proficient at decoding words in English.

There also seem to be potential implications of this research in the area of bilingual education. Most of the research conducted in bilingual education has investigated unimodal bilingual education, or bilingual education that occurs between two spoken languages, and at least one corresponding written system. Far fewer studies have been conducted on bimodal bilingual education, especially when sign language is the primary language (L1) and the written form is of the dominant spoken language (L2), such as English. A commonly held belief in bilingual education is that in order to promote knowledge of a L2 written language, there must be an intermediate stage (Cummins, 1989), such as:

L1 (spoken) language > L2 spoken language > L2 written language

L1 (spoken) language > L1 written language > L2 written language

For many signing deaf children, these two options are not viable pathways because they have limited access to the L2 spoken language (e.g. English), and their L1 language (e.g. ASL) does not have a written system. Mayer and colleagues (Mayer & Akamatsu, 1999; Mayer & Akamatsu, 2003; Mayer & Wells, 1996) have argued that it is theoretically impossible for deaf children to follow Cummins's model because there is no immediate step, such as:

L1 signed language > (no linking stage) > L2 written language

However, as indicated throughout this study, ASL and other sign languages (e.g. British Sign Language, Australian Sign Language, French Sign Language) incorporate a manual alphabet that functions as a hybrid or a tertiary representation system. This present study suggests that some teachers view promoting the use of the manual alphabet as an intermediate step to facilitate decoding of the L2 written language. In essence, the bilingual approach at this school utilized the following:

L1 signed language > manual phonemes (fingerspelling) > L2 written language

The teachers sought to develop knowledge of the manual alphabet to bridge the L1 signed language and the L2 written language. This pathway was also suggested by Haptonstall-Nykaza and Schick (2007), who indicated that there might be a benefit to promoting lexicalized fingerspelling initially for emerging young deaf readers because neutral fingerspelling is more complex for them. More research needs to be conducted to investigate whether proficient fingerspelling ability provides signing deaf children with a means to decode words in written language, especially if they are paired with signs. Similar research could also be conducted with sign languages that do not make significant use of fingerspelling, such as Kenyan Sign Language. This may help

researchers and educators understand the potential role that fingerspelling may serve as a bridge between an L1 signed language and an L2 written language for deaf children.

Study Shortcomings

The data gathered in this study made significant use of teacher self-reports to gather data. While there is no reason to believe that the teachers were not forthright in their responses, there is no way to know with certainty if their responses were completely accurate. Many of the individual teacher responses overlapped with each other, which provided an added layer of credibility. The responses to the survey data also added another layer of credibility and served to corroborate the findings of the interview data. It is also difficult to know if the teachers' definition of instructional practices were the same as the researcher's definition. One approach that could address these issues would be to add classroom observations. This would give an additional means to compare what the teachers were doing with their beliefs about their instructional practice.

Including child data would also enhance this study. The teachers indicated that they provided various types of instruction, but it is difficult to gauge how the children respond to the particular strategies. It is possible that the level of instruction was too complex or too simplistic for the children. Without being able to observe how the children performed in response to the teacher, it is difficult to know if the teachers were using appropriate instructional practices with their students. In order to gain such insights, assessment tools would have to be developed to methodically track the children's developing ASL phonological awareness and how it related to their emergent literacy.

Lastly, it is difficult to understand the complete progression of ASL phonological development from only a cross-sectional analysis of interview data. This study gathered viewpoints from individual teachers working with different age groups to develop a composite of ASL phonological instruction. A longitudinal study following a cohort of students that details the instruction they receive through the early childhood and early elementary years from their teachers would provide a more detailed understanding of the potential impact of providing ASL phonological instruction.

Future Research Considerations

The inductive process of this qualitative study lends itself to developing a road map for future research studies. As indicated throughout this study, there has been a limited amount of research that seeks to understand the potential benefits of ASL phonological instruction in deaf education; thus, there is a need for more investigation and understanding in many different areas.

One of the first issues that need to be addressed is the development of a consensus of what constitutes phonological awareness in deaf learners of ASL, and the role of the manual alphabet in that process. This issue can be discussed with specific stakeholders such as ASL linguists, researchers, educators of the deaf, and school based ASL specialists to gauge what ASLPA means to them, whether it is an educationally relevant issue, and how it can best be studied. A consensus among stakeholders of how ASL phonological instruction in educational settings can be best characterized will allow it to be studied in more detail and with common measurement tools.

Another important future consideration that needs to be explored is the extent of ASL phonological instruction in deaf education programs throughout the United States and Canada. The school in this study was an ASL/English bilingual education program for deaf children, and similar schools that identify themselves as ASL/English bilingual programs could be targeted initially. Surveys could be developed and sent to teachers and ASL specialists in these schools to assess whether and how they use ASL phonological instruction to develop the language and literacy skills of their deaf students. The results from the survey could be compared to the results of the school in this study to evaluate instructional strategies that facilitate ASL phonological instruction. The findings of the survey would provide a measure to understand how many schools in North America incorporate ASL phonological instruction and describe any potential variations in the instructional practices that may be used in other schools.

Classroom observations are needed to understand how teachers provide ASL phonological instruction and document what students produce in terms of language. The first wave of data collection could use cross-sectional naturalistic classroom observation. This would allow for an overview of the type of instruction teachers use at certain age levels and abilities and document what aspects of phonology children produce at specific ages. The second wave of classroom observations could follow a group of students longitudinally to assess how they develop their ASLPA. This would provide an in-depth understanding of how children progress in their language and literacy development with the ASL phonological instruction they receive.

In order to evaluate the impact of ASL phonological instruction, there need to be assessments that can be used to measure students' progress in ASL phonological

awareness. There appears to be a limited number of assessment tools that can document ASLPA that are available to researchers and educators (Singleton & Supalla, 2011). However, the ASL specialist in the study described assessments that she had developed to measure the ASL phonological abilities of the students at the school. It may be possible to work with the ASL specialist in this study, with ASL specialists at other schools, sign language linguists, and other educational researchers to develop age-appropriate assessments that can be used to measure the effectiveness of ASL phonological instruction. For example, Lederberg et al. (2000) investigated whether deaf children used a fast mapping technique to acquire new signs. They worked with an ASL linguist to develop a test to determine whether nonsense signs were possible based on ASL phonological principles. A similar test could be developed and used to determine if children were using their ASLPA to acquire new signs, such as through the fast mapping technique, and if this process helped students acquire sign vocabulary.

Work also needs to be done to examine the potential role that ASL phonological development has on deaf children's ability to decode words in English. Haptonstall-Nykaza and Schick (2008) found that deaf children were more effective at acquiring new vocabulary when a word in print was paired with a sign and lexicalized fingerspelling compared to just the printed word and a sign. The study found that pairing lexicalized fingerspelling with a regular sign was more effective than pairing it with a neutral fingerspelled word and a sign. The authors reasoned that neutral fingerspelling was more complex than lexicalized fingerspelling for young deaf children. This suggests that lexicalized fingerspelling is easier for young deaf children to process, possibly because they are more sign-like and based on sign forms they are more familiar with in their daily

experience with sign language. The teachers in this study indicated that they used both lexicalized and neutral fingerspelling in their sign production, but how the teachers used each of these fingerspelling forms to promote literacy was not investigated. It may be that lexicalized fingerspelling forms the building blocks of neutral fingerspelling, and helps deaf children become more adept at fingerspelling as they develop their sign language abilities. This is an area that could be investigated in more detail.

Lastly, more research needs to be conducted in the area of ASL/English bilingual education programs for deaf children. This study suggests the fingerspelling forms may serve as an intermediate step in helping deaf students decode words in English. Studies need to be done to examine this process and describe what other potential factors may be necessary for deaf children to use ASL as a primary language that bridge their learning of English. Additionally, research needs to be done to examine how ASLPA may promote metalinguistic awareness of ASL. In bilingual programs for deaf children, metalinguistic awareness is often cited as being an important feature of deaf children's success in acquiring English proficiency (Erting, 1997; Hoffmeister, 2000; Mahshie, 1995). For example, studies could investigate whether children are able to understand whether handshapes in signs represent native ASL signs or words in English and then correlate these findings with the reading abilities of deaf children.

Recommendations for Teachers

This present study produced several results that could be potentially beneficial to teachers in deaf education. These recommendations are on based on three guiding principles that seem to characterize the intent of the instructional practices that the

teachers described in this study. First, the teachers seemed to want to develop a natural and holistic understanding of sign language through daily immersion. Developing students' knowledge of native sign structures in combination with the structure of fingerspelled forms, such as neutral fingerspelling or lexicalized fingerspelling, encouraged students to construct a dual representation of a concept. When this was paired together with the students' semantic and syntactic knowledge of ASL, students had the potential to access an interconnected system of language and develop higher levels of ASL proficiency. Second, the teachers seemed to want to establish a salient connection between signs, fingerspelling forms, and print. This may provide deaf children with the ability to form connections between their knowledge of signs in ASL to manual phonemes, and from the phonemes to graphemes in words in written English, which promoted decoding abilities and word recognition. Third, the teachers wanted to promote vocabulary growth. Studies have shown that deaf children with higher levels of sign vocabulary have higher levels of reading ability (Kelly, 1996; Paul, 1996; Paul & Gustafson, 1991). The best way to promote vocabulary growth is to follow the first and second principle. In other words, learning vocabulary in a natural context is ideal, especially if it gives deaf children multiple ways to access the same concept on different layers (e.g. semantic connection, phonological connection, syntactic connection, manual phoneme connection, orthographic connection).

Taken together, the three aforementioned guiding principles are the basis for the following recommendations:

1. Build phonological awareness of ASL. Teaching the structure of signs in ASL helps deaf children to understand how their language works and demonstrates

how the subparts can be manipulated. Phonological awareness allows deaf children to make a connection between signs with similar parameters, such as the signs that share the same handshape or location of sign. The “Handshape of the week” activity seems to be an ideal activity to encourage handshape awareness because it encourages students to identify the handshape in signs and discern how the same handshapes are used in common signs that describe things in their daily lives. This provides deaf children with explicit examples of the components of signs. By comparison, teaching the “letter of the week” to young deaf children was considered more abstract and based on a spoken language phonological system that is not easily accessed by them. Likewise, the teachers’ use of sign stories (e.g. ABC stories) and other ASL poetry forms encouraged deaf children to think of creative ways to integrate sign structure and meaning in an entertaining and meaningful way while also promoting a componential analysis. This makes the individual structure of signs more salient, and facilitates the students’ acquisition of ASL vocabulary.

2. Promote sustained exposure to fingerspelling beginning with young deaf children:

As prior research has shown (Akamatsu, 1982; Padden, 1991; Padden & LeMaster, 1985) even though very young deaf children may not be able to understand or produce distinct individual letters in their fingerspelling, they do produce a fingerspelled “movement envelope” that they use to represent a concept (e.g. a person’s name). Eventually, deaf children will start to add more letters within their overall movement envelope and then may even produce more sign-like forms of their fingerspelling. Deaf children may initially view fingerspelling

as part of the overall sign structure, but they will eventually begin to understand that individual fingerspelled letters represent letters of the alphabet in English. Earlier exposure to fingerspelling may facilitate this insight and help deaf children understand its relationship to the alphabet at an earlier age.

3. Use only naturally occurring sign forms found in ASL. ASL is a natural language and students need to develop a strong interconnected knowledge of the grammatical layers of ASL to acquire a high level of proficiency of the language. The teachers in the study used only native signs and widely accepted initialized signs when they communicated with their students. When no sign for an English word existed, teachers consistently provided a fingerspelled form to represent the word. This encouraged deaf children to develop their understanding of ASL fully and make natural connections to print because they were familiar with the consistent fingerspelled form. By comparison, in many sign-based deaf education programs, teachers or educational sign language interpreters may depend heavily on randomly created or non-standard initialized signs, especially for words where there is no sign. These artificial signs will often incorporate the first letter of the word in English and incorporate the corresponding manual alphabet shape in the sign. While this strategy may temporarily fill a “lexical gap,” deaf children may still fail to understand what the word is in English, except that it starts with the letter that it was initialized with. Additionally, deaf children would have less opportunity to see and produce fingerspelling, limiting their potential to develop manual phonemes to connect signs with print.

4. Promote metalinguistic awareness. For deaf children to make the transition from learning about handshapes native to ASL to those that represent English, deaf children need to learn about the structural differences in ASL. Learning about the individual structure of ASL helps deaf children understand how ASL structure at a deeper level and how it functions to represent ASL. More advanced instruction that promote metalinguistic awareness helps deaf children learn how ASL can be used to represent ASL and be manipulated to represent English. As students began to read, then teachers can use a compare and contrast method to help students understand how ASL and English could represent a concept in similar and different ways. Without metalinguistic awareness, it may be difficult for deaf children to understand the ASL and English at a deeper level.
5. Make frequent use of chaining. The teachers stated that they made frequent use of chaining in their instruction, where they paired a sign with fingerspelling and then to a word and sometimes a picture. This permits deaf children to bridge their understanding of signs with a manual phoneme and then to graphemes in the written English. This enables deaf students to adopt an initial bottom-up decoding strategy that they can use when reading. According to the teachers, the constant pairing of signs and fingerspelling, encourages deaf students to learn to identify words in English and promotes their ability to become proficient in reading.

Conclusion

Much of the research that has explored the benefits of using ASL to develop literacy skills indicates that it provides deaf children with primarily a top-down benefit

(Marschark, 1997). Top-down knowledge is crucial to developing strong literacy skills because deaf need real-world knowledge and to understand how print can be used to share and transmit information. This research study shows students' bottom-up understanding of ASL can complement their top-down knowledge of the language because students can use ASL to effectively encode written English. The teachers in this study helped students learn and identify structures that are common in ASL discourse and those that could also be used to promote literacy skills in written English. The teachers provided incorporated a bottom-up approach because it provides their students with a different means to acquire and strengthen sign language vocabulary based on structural features and access and decode written English using a visually based approach.

While there is an abundance of research conducted on the benefits and use of spoken language phonological awareness, research and training efforts are still developing with ASL phonological development. The teachers in this study reported that they received minimal training in ways to develop ASL phonological awareness and often resorted to using their own indigenous knowledge or folk theories to develop their students' abilities. Folk theories used in underrepresented populations can be especially important in learning about unique teaching and learning processes used with distinct minority groups. The teachers' folk theories in this study provided important lessons about how to develop phonological awareness in a visual modality with signing deaf children. These insights can help educators and researchers in deaf education explore how to use ASL phonological awareness as alternative pathway to traditional beliefs and practices that emphasize phonological awareness of spoken English.

One contribution of this study is a discussion of how the manual alphabet should be incorporated as a part of the ASL phonological structure, especially in an educational context. While current beliefs in sign language linguistics often considers the manual alphabet as being separate from phonological structure of ASL, this study indicates that teachers developed students' understanding of the manual alphabet as a practical aspect of its use in ASL. The teachers exposed students to fingerspelling, lexicalized fingerspelling, and initialized signs to show students these forms could be used in daily ASL discourse and manipulated to help students encode words in written English. This approach to developing ASL phonological awareness in an educational context can contribute to larger understanding of how ASL phonological structure incorporates manual alphabet within sign forms and serves as an integral part of students' development of phonological awareness in ASL.

Finally, this study shows that the teachers in this study develop and use ASL phonological awareness with their deaf students in similar ways that teachers might use spoken language phonological awareness with hearing students. This belief relates to how human beings have an innate capacity to develop solutions to their problems using resources and tools available to them. Human history is full of examples of how people adapt to live in harsh climates, invent tools to improve their shelter and access to food, and create language and literacy to share and pass down ideas from one generation to the next generation. The same ingenuity is found within the deaf community. Bahan (2010) states that deaf people "use a visual language to communicate and have developed a visual system of adaptation to orientation them in the world that defines their way of being" (p. 83). Signed languages represent the ingenuity of deaf people to develop a

visually based natural language to share and express ideas. Likewise, deaf people can also devise their own solutions to develop the language and literacy skills of deaf children. This research shows some of this ingenuity in practice and has described how the teachers in this study developed an approach that seeks to help deaf children understand the structure of their native language (ASL) and develop awareness of the structure of additional manual symbolic representation system (the manual alphabet) that can be used to promote literacy skills. Ultimately, what this study indicates is that deaf people use many of the same processes that hearing people use, but with an approach and method that is more suited to their visual orientation of the world.

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Appendix A
Teacher Interview Questions

Philosophy Questions

1. As you see it, what is the current philosophy of the Bilingual-Bicultural (bi-bi) approach at the school?
2. What are theories in which you base your teaching practices?

Curriculum Questions

1. Do you use a formal curriculum? If not, have you developed a guiding framework of some sort?
2. What guides your curriculum decisions?
3. What are the learning goals in the curriculum?
4. What age group do you work with?

Instructional Activities

1. What is your approach to building ASL proficiency?
2. How do you incorporate reading activities?
3. How do you incorporate writing activities?
4. How do you balance the use of ASL and English literacy in instruction?
5. What do you do to bridge ASL to English text?
6. How do you build ASL and English vocabulary?
7. How do you build metalinguistic awareness of ASL and English?
 - a. What is the value of building ASL phonological awareness?
 - b. How do you feel ASL phonology contributes to written English?
 - c. How do you build awareness of ASL phonology?
 - d. How would you characterize initialized signs and fingerspelled words & signs and their potential connection to developing English literacy
8. How do you incorporate literacy development in different activities throughout the school day? (e.g. play, snacks/meals, center time, art)
9. What materials do you put up in the classroom and do you use them with a specific purpose in mind? (e.g. materials with printed English with pictures of static forms of ASL Fingerspelling and ASL Handshapes)

Peer Interaction

1. How do you promote literacy building through peer interaction?
2. Do you see any benefits of peer interaction in building literacy?

Student Abilities

1. What is the range of linguistic and academic abilities of your students with deaf parents and with hearing parents?
2. What benefits does a bi-bi program provide students? (e.g. language, social, & cognitive development, increased cultural awareness & parent involvement)

Training & Development

1. Where and when did you receive training in bi-bi teaching practices?
2. How much do you incorporate your own intuitive practices with your training?
3. If you previously taught with a different approach to deaf education (e.g. total communication), what were your experiences in changing to the bi-bi approach?
4. How long did it take you to feel comfortable teaching in the bi-bi approach?
5. What training do you feel is important for novice teachers

Appendix B

Survey Questions

Activities/Displays that promote knowledge of ASL Hand Configurations

Instructional Strategy	Description	Rating of Use 0= Never, 1=monthly, 2=bi-weekly, 3=weekly, 4=daily	Comment (e.g. use by students, effectiveness)
Natural conversation	Signing with students to get them to express ideas and expand their language	0 1 2 3 4	
ASL handshape of the week	Have students bring in objects or pictures that begin with the handshape in ASL (e.g. A-HS for BRUSH)	0 1 2 3 4	
Sign vocabulary instruction	Teach signs and emphasize how its formed	0 1 2 3 4	
Handshape stories	Stories with signs that incorporate one handshape or a set of handshapes	0 1 2 3 4	
Sign rhythm activity	ASL stories incorporating signs with repetitive movements	0 1 2 3 4	
Student self-video critique	Students view themselves on video and analyze what they sign	0 1 2 3 4	
Tracing handshapes on paper	Students trace their handshape on the paper and use the drawings for activities such as labeling objects	0 1 2 3 4	
Poster of ASL handshapes	Poster in the classroom that highlights the different handshapes used in ASL signs	0 1 2 3 4	
ASL dictionary (made in class)	ASL Dictionary with signs organized by handshape and made in the classroom	0 1 2 3 4	
ASL dictionary (published book)	Formal published ASL dictionary book with signs organized by handshape	0 1 2 3 4	
ASL dictionary (computer program)	Computer program, with signs grouped by how they are formed (e.g. location, handshape)	0 1 2 3 4	
<i>Other Activities</i>		0 1 2 3 4	

Activities/Displays that promote knowledge of the manual alphabet

Instructional Strategy	Description	Rating of Use 0= Never, 1=monthly, 2=bi-weekly, 3=weekly, 4=daily	Comment (e.g. use by students, effectiveness)
Direct instruction of the manual alphabet	Teaching students manual alphabet from A-to-Z	0 1 2 3 4	
Display of manual alphabet in classroom	Poster display of the manual alphabet in the classroom	0 1 2 3 4	
Use fingerspelling in signing	Use of fingerspelling within your ASL use	0 1 2 3 4	
Use lexicalized signs in signing	Use of fingerspelling that has become sign-like (e.g. B-U-S, B-E-A-C-H, J-O-B)	0 1 2 3 4	
Handshape comparison chart	Charts that compare signs that use overlapping handshapes in used in ASL signs with the manual alphabet used in initialized signs (e.g. A-HS in BRUSH, compared to the A-HS in AUNT)	0 1 2 3 4	
Instruct initialized sign vocabulary	Discuss handshape used in widely accepted initialized signs in ASL (e.g. BLUE, GREEN, KING, FAMILY) and its connection to English	0 1 2 3 4	
<i>Other Activities</i>		0 1 2 3 4	

Activities that promote the emerging understanding of English print

Instructional Strategy	Description	Rating of Use 0= Never, 1=monthly, 2=bi-weekly, 3=weekly, 4=daily	Comment (e.g. use by students, effectiveness)
Group storybook reading	Signing storybooks to your class or combined class, while pointing to words in English	0 1 2 3 4	
Individualized storybook reading	Signing storybooks to one or two students, while pointing to words in English	0 1 2 3 4	
Tracing + Printing letters	Students trace over letters or practice writing letters	0 1 2 3 4	
Letter of the week	Focus on words & who ASL equivalent signs that use a specific letter of the week (e.g. cat, cake, couch)	0 1 2 3 4	
Writing down the student's stories in ASL	Students sign stories and then you write them down for the student	0 1 2 3 4	
Writing in Journals	Students write letters or words in their own journal (in addition to pictures)	0 1 2 3 4	
<i>Other Activities</i>			
		0 1 2 3 4	

Activities that promote the emerging understanding of English print

Instructional Strategy	Description	Rating of Use 0= Never, 1=monthly, 2=bi-weekly, 3=weekly, 4=daily	Comment (e.g. use by students, effectiveness)
Read beginning reader books	Using easy reader books with highly repetitive phrases and structures (e.g. the boy is walking, the boy is running)	0 1 2 3 4	
Frequent English word lists	Review the common words in English that may not be used in ASL, such as articles and prepositions in English (e.g. The, a, an, this)	0 1 2 3 4	
Collaborative Guided Reading	Reading books with students to give them understanding of the story, and then go through the book to point out specific structures in English (e.g. "is" needs to connect with "-ing")	0 1 2 3 4	
Chaining	Connecting signs and pictures with English print through fingerspelling	0 1 2 3 4	
<i>Other Activities</i>			
		0 1 2 3 4	