Recognition, Use, and Comprehension of Vocabulary by Students who are Deaf/Hard of Hearing: A Strategic Approach to Vocabulary Instruction

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A DISSERTATION

Submitted to

Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Department of Counseling, Educational Psychology, and Special Education

2007

ABSTRACT

Recognition, Use, and Comprehension of Vocabulary by Students who are Deaf/Hard of Hearing: A Strategic Approach to Vocabulary Instruction

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The necessity for intervention grounded in research becomes particularly important when children with hearing losses are identified. Sensory losses have a major impact on language skills and communication competence (Paul, 2001). Further, children with pre-lingual hearing losses are often faced with an increased rate of language delay because the hearing loss occurred before speech and language are acquired. Additionally, deaf children who do not have access to communicative information tend to fall behind in language and literacy skills (Nelson & Welsh, 1997). Intense, targeted interventions that utilize evidence-based approaches are imperative for students with disabilities like hearing loss to maximize language development and minimize the impact of hearing loss.

The purpose of this study was to identify an instructional strategy that addresses the needs of deaf and hard of hearing students that is potentially effective. The intervention focused on utilizing a conceptual focus for vocabulary instruction through visual means and to determine if the intervention improved students' vocabulary skills in terms of word recognition, production, comprehension and spontaneous use.

A single-subject multiple baseline design was utilized to determine the effects of the vocabulary intervention. Six students took part in a 30 minute conceptually based sign language vocabulary intervention session. The vocabulary intervention sessions were composed of three components: (1) word introduction; (2) word activity (semantic mapping); and (3) practice. Four sessions were conducted per week, 2 devoted to learning

Dolch words and 2 devoted to learning Bridge phrases. During the vocabulary intervention, students learned 3 Dolch words or 3 Bridge phrases per session, for a total of 6 Dolch words and 6 Bridge phrases learned per week. Students were assessed two times per week to determine mastery of vocabulary with results and findings based on these assessment data. Results are presented by research question with overview descriptions of findings and individual analysis and findings for each student. All data was graphically displayed for each student and analyses were conducted visually and statistically to determine the findings

Results indicated that the vocabulary intervention was successful in improving their mastery of recognition, production, and comprehension of the vocabulary words/phrases for all students. All students positively improved their vocabulary knowledge in percent mastered and also demonstrated an emerging understanding of vocabulary during the vocabulary intervention. Further, deaf students with an additional disability mastered fewer vocabulary words/phrases when compared to typical deaf students.

DEDICATION

I would like to dedicate this dissertation to Dr. David Stewart and Dr. Michael Pressley, both of whom passed away during my doctoral studies at Michigan State University. These men were instrumental to the path I chose during my work at MSU and the knowledge I gained in deafness and literacy from both these extraordinary men. Their words of wisdom echoes in my mind to this day…rest assured David, I did not whine or complain, but I do have a story to tell.

ACKNOWLEDGMENTS

Many people were instrumental in assisting me along this journey. First, to my dissertation director, Dr. Harold Johnson whose willingness to take on my dissertation during your first year at Michigan State was a tremendous leap of faith. I am so grateful for your knowledge and your constant encouragement. I look forward to having you as a colleague and exploring our future endeavors. My committee, Dr. Cindy Okolo, Dr. Troy Mariage, and Dr. Summer Ferreri: Dr. Okolo, thank you for stepping in after the loss of Dr. Stewart, and providing me with the support needed to continue with my program. Dr. Mariage, thank all your positive energy and your enthusiasm for classroom research. Dr. Ferreri, your class demonstrated the enjoyment of single subject research and gave me the inspiration to pursue this type of design. The contributions this dissertation committee made truly benefited all aspects of my dissertation, and I thank them for being part of it.

My family, without whom this goal would have been impossible. Your love, dedication, and endless support fuelled my dedication. Mom, thank you for all the prayers and phone calls to make sure I was still alive and walking! The endless supply of "cooler food" over the past four years has been a wonderful reprieve and reminder of home. Eric, I never thought four years ago when we celebrated at the Public House that I would make it though the first year, let alone all the way to the end. Thank you for believing in your big sister and checking to make sure my funding was always adequate. Thank you both for reading and re-reading, giving feedback, and not falling asleep when I practiced my presentations.

To "the girls" thank you for your support and never ending encouragement. Your infinite love and support during the 23 years of our friendship has been my solace. When things were difficult, I knew there were always ears to listen and shoulders to cry on. It seems like yesterday when we were Mustangs...can you believe we've come this far?

To Meghan, words can not express how grateful I am that you were willing to allow me full access to your classroom and your wonderful students. I looked forward to visiting your classroom each week and the observing your incredible rapport and ease at which instruction took place. Finally, the students who participated in this study were an incredible inspiration to me. The insights I have gained from these students will remain in my mind and in my heart for the longevity of my career. You have touched my life and my philosophy of deaf education forever.

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CHAPTER I

Introduction

Problem Statement:

"Learning to read is not always an easy task...it is not an ability that is naturally acquired, like learning to speak or sign."

(McCardle, Cooper, Houle, Karp, & Paul-Brown, 2001, p. 183)

In an era stressing results, high stakes testing, and accountability, in addition to President Bush's requirement in the *No Child Left Behind Act of 2001*, that all children will be reading at grade level by the year 2014, the pressure to improve achievement of all children, especially students with disabilities is increasing. The consequences for students who have been experiencing continued difficulty and failure with reading may continue to spiral downward and rapidly worsen (Kelly, 2003b), thus creating a child who is unable to read and dependent on others. Literacy therefore may become a matter of public health, rather than simply an educational issue, as Reid Lyon notes in McCardle, et al., (2001).

The 2002 Presidential Commission report, *A New Era: Revitalizing Special Education for Children and Their Families*, viewed the current system of special education as an antiquated one, often failing children instead of providing them with prevention and early intervention. Too often, the current special education model leaves children with disabilities without strong interventions based on research and may result in leaving children academically behind. The report goes on to state that 40% of children in special education classes are receiving services because they have not learned to read.

Additionally, *A New Era* notes that students do not get the help they need early in their schooling to prevent disabilities because of the lack of emphasis on intervention and prevention derived from research based approaches.

The necessity for intervention grounded in research becomes particularly important when children with hearing losses are identified. Sensory losses have a major impact on language skills and communication competence (Paul, 2001). Further, children with pre-lingual hearing losses are often faced with an increased rate of language delay because the hearing loss occurred before speech and language are acquired. Additionally, deaf children who do not have access to communicative information tend to fall behind in language and literacy skills (Nelson & Welsh, 1997). Intense, targeted interventions that utilize evidence-based approaches are imperative for students with disabilities like hearing loss to maximize language development and minimize the impact of hearing loss.

In 1978, Quigley stated that the state of deaf education was discouraging. In more than 180 years, of the education of deaf/hard of hearing (deaf/hh) students, and vast amounts of resources expended on this topic, we still have not learned the most effective way to teach deaf children to read English successfully. Quigley also suggests critically looking at deaf education and asking ourselves if it really can be done, and if the answer is yes, do the results justify our efforts. Given the current educational policies and the need for students to be reading on grade level, it is unquestionably worth the effort trying to figure out a solution to the problem.

Reading problems have been a continuous struggle for deaf/hh students for decades. Researchers in the field of deaf education have been distressed by the fact that the average reading level of deaf high school graduates remains at a third to fourth grade

level, despite deaf educators' efforts (Kelly, 2003a & 2003b). Debates continue to wage among colleagues regarding the best method to communicate with deaf/hh students (i.e., oral communication, total communication, simultaneous-communication, and bilingual-bicultural methods) (e.g., Kuntze, 1998; Luetke-Stahlman, Griffiths, & Montgomery, 1998; Mayer & Akamatsu, 2000; Wilson & Hyde, 1997), however, the outcome remains the same: reading levels have not increased. During the past forty years, traditional approaches to teaching reading to deaf/hh student included the use of basal readers such as The Reading Milestones series. While continuing to emphasize the decoding and comprehension with a basal, a new approach (Schimmel, Edwards, & Prickett, 1999) gives rise to conceptually based strategic instruction of words and phrases that have multiple meanings through the use of American Sign Language (ASL). The approach is beginning to gain interest among deaf education teachers and is being employed more frequently across the United States (C. Schimmel, personal communication, August 25, 2006). However, little research has been conducted supporting the approach and strategies utilized by the program. Previous research (Schimmel et al., 1999) with these strategies used in the commercially produced Fairview Reading Program has shown improvements in the reading and comprehension levels of students, as well as ASL development. Therefore, this study explored factors impacting literacy development in terms of strategic instructional programming and ASL development.

CHAPTER II

Review of the Literature

The review of the literature examines the primary concepts guiding this study. First, the groundwork for this study is rooted in Sociocultural theory, suggesting that learning takes place through joint endeavors with the assistance of knowledgeable others. This interaction can provide support for language and literacy development for deaf/hh children who are delayed in acquiring these skills. Second, a review of literacy theory is presented to offer instructional philosophies that have added to the intervention used in this study. Given that the development of literacy skills for deaf/hh students can be affected by several factors (e.g., language development, instructional programming, and ASL development) an overview of factors contributing to development is then discussed. Next a review of how deaf/hh child develop literacy skills (vocabulary and sight word reading) and the difficulties often faced when children have hearing loss is presented. To meet the aforementioned needs of deaf/hh students, a discussion of various methods for teaching literacy is offered. Finally, to provide support for the study's design, the research approach (i.e., single subject design) utilized frequently with students with disabilities and for literacy instruction will be discussed.

Sociocultural Perspectives in Literacy

Several factors have been found to contribute to the success and achievement of children. Some of these factors include involving students in social interaction with knowledgeable others and providing students with support during learning to effectively address their needs. For deaf/hh students, these needs are particularly important, given

that many students with hearing loss are delayed in language development, which can lead to further complication in literacy achievement.

Vygotsky (1978) makes the argument that interaction with others is instrumental to developing thinking abilities in children and that "all higher mental functions are internalized by social relationships" (pp. 98). Lave and Wenger (1991) also suggest that who a person becomes, in terms of skills, identity, and values, depends on the activities they take part in, as well as the support and assistance they receive during community participation. Further, Lave and Wenger also note that learning is not a solitary activity, but one that takes place with others during "joint activity". Knowledgeable others within the community help support new learners in constructing meaning jointly until the new learner can function independently (Lee & Smagorinsky, 2000). Known as the zone of proximal development, behaviors and activities that would be out of the child's ability level are achieved with the support and assistance or scaffolding, from the teacher or knowledgeable other (Wells, 2000).

Wells (2000) suggests that language plays an important role as a tool in constructing meaning during activities or interaction with others and is essential to learning new knowledge. Often facilitated by adults, this interaction provides the basis for learning, and can be seen in the scaffolding that teachers utilize during instruction. Scaffolding, one of the principles of Vygotsky's work provides assistance to children during learning to accomplish the tasks the student may be unable to do without help. The teacher offers support or help for the child so he/she can make progress during the task and then this support is reduced as the child is increasingly able to progress independently. This idea becomes especially salient for children who are deaf/hh who

may experience little language interactions with others. Through consistent interaction and scaffolding by the teacher, language learning for deaf children may eventually become internalized by the child. Hart and Risley (1995) for example, have documented a correlation between language interaction and cognitive development (in hearing children), with high quality verbal interactions positively influencing cognitive development. Snow (1991) also suggests reading and writing success depend largely on the development of communication skills during the early years, as children with high quality interactions were found to have more vocabulary. This interaction is essential for children whose hearing loss may limit their verbal interactions, and continue to affect their vocabulary development and reading and writing success. Through the use of sociocultural practices and exposure to literacy instruction that is based on reading theory, deaf/hh students' literacy skills can be further developed and supported during instruction.

Literacy: Reading Theories

Several reading theories exist that support the development of the reading process. Among those theories, the following will be reviewed here: Bottom-up, Top-down, Interactive, Whole Language, and finally Balanced literacy. Instructional decisions based on theoretical knowledge can further assist deaf/hh students by providing them with pedagogy that supports the needs of struggling readers.

Bottom-up theory.

Bottom-up theorists (Gough, 1972; LaBerg, & Samuels, 1974) suggest that meaning is derived from the text and emphasizes letters, words, phrases, and sentences. Often referred to as the "simple view" of reading, the reader decodes letters and words

and uses their listening skills to help them understand the meaning in the text (Gough, 1984). The "simple view" of reading as suggested by Gough and Tunmer (1986), Hoover and Gough (1990) consist of decoding and linguistic comprehension. As readers become fluent automatic decoders, their attention is then focused on comprehending instead of on processing and decoding words.

This approach also supports the instruction of decoding and teaching comprehension skills in a sequential order (King & Quigley, 1985). Pressley (2006) defines bottom-up processing as "the processing of letters and words. Meaning making is sounding out the words, which are listened to by the mind" (p. 59). Additionally, Samuels (2004) proposes that obtaining meaning from printed words requires two things: the reader must decode or translate the printed word into a spoken word and then comprehend those decoded words. Samuels also notes that during reading for the beginning reader, attention is being divided by the need to decode and comprehend at the same time, thus putting strain on the comprehension process. However, when words are read automatically there is much more attention to comprehension instead of decoding the words.

Top-down theory.

Top-down theorists (Smith, 1988; Goodman, 1970) suggest that prior knowledge interacts with the processing of text to create meaning. During reading, the reader generates hypotheses about the text from his/her knowledge of the world and experiences. These hypotheses assist the reader with understanding and comprehending the text (Anderson & Pearson, 1984).

Interactive theory.

Interactive theory suggests that the reader actively processes information and makes mindful attempts to create meaning from the text (Anderson, 1981). This theory combines the bottom-up and top-down processing and suggests that the reader uses prior knowledge, the written text, and uses strategies to construct meaning from the text, with skilled readers being able to combine strategies (McAnally, Rose, & Quigley, 2004; Stanovich, 1980).

Whole Language.

An emphasis on the natural development of literacy with immersion in authentic literature and daily writing characterizes the whole language philosophy. This philosophy of literacy education has been used in early elementary classrooms for more than twenty years and was pioneered by several authors including Frank Smith, Kenneth S. Goodman, Constance Weaver, and Regie Routman. Pressley (2006) suggests that strong advocates for strict whole language teaching support "immersion in real literature and daily writing and is favored over explicit teaching of basic reading skills. Skills instruction occurs in wholly committed whole-language classrooms on an as-needed basis only, and then only in the context of reading and writing rather than as a focal point of instruction" (p. 15).

Several of Routman's (1991) tenets of whole language beliefs appear to be consistent with what deaf/hh learners require, such as the need for many opportunities for language, ongoing evaluation, demonstrations, and collaboration for social interaction. In line with Routman's recommendations, the Laurent Clerc National Deaf Education Center (1998) recommends that deaf/hh students be educated within social, collaborative, activities, with much discussion and interaction. In addition, there are also consistencies with the whole language approach in both Pressley (2006) and *Best Practices in Teaching*

Reading (Gallaudet University, 1998) to deaf/hh students, both documents agree that immersion in literature and writing, as well as consistent experiences with high quality literature increases understanding and comprehension.

However, several researchers suggest (Adams, 1990; Rayner, Foorman, Perfetti, Pesetsky, & Seindenberg, 2002; Stahl, 1992; Stahl & Miller, 1989) students experiencing reading difficulties may be less likely to benefit from whole language instruction and argue for more skills-based programs. In light of this finding, deaf/hh students who are already lagging behind in language and literacy development may continue to lag or fall even further behind if whole language methods are not supplemented. In addition, studies by Jeynes and Little (2000) and Juel and Minden-Cupp (2000) demonstrate that whole language effects appear to be in word recognition rather than comprehension. With respect to deaf/hh students' low reading ability and comprehension challenges, whole language may present continued comprehension difficulties to deaf children who lack effective communication skills for decoding and comprehension processes.

Balanced Literacy.

Advocates for balanced literacy instruction and the need for effective teaching are currently supported by a number of studies conducted by Pressley and associates (Pressley, et al., 2001; Pressley, et al., 1996; Wharton-McDonald, Pressley, & Hampston, 1998) and may provide deaf/hh students with the extra advantage they need to become competent and effective readers and writers. For instance, Pressley and associates' research of effective literacy instruction suggested that effective teachers present instruction in a balanced manner, as well as utilizing whole language practices, such as immersion in literature. Further, these teachers also explicitly taught students how to

decode. In addition, both Pressley (2005) and Ruddell (1997), suggest that an effective literacy teacher utilizes a balanced approach to literacy which includes: (a) the incorporation of whole language experiences (e.g., immersion in authentic literature and writing experiences), (b) varying types of reading, (c) skills instruction in and out of context, (d) numerous opportunities for writing, (e) explicit instruction for weak readers, (f) high motivation factors, and (g) extensive and ongoing assessment. Ruddell (1997) also suggests further that effective teachers of literacy possess clear and articulated instructional strategies, in-depth knowledge of the reading and writing processes, and a strong ability to motivate. Exemplary teachers have also been found to provide intense and frequent scaffolding for struggling students and the classroom as a whole to assist students in learning.

Factors Influencing Literacy Development of Deaf/hh Students

Several factors have been found to influence the literacy development of deaf/hh children (LaSasso, 1993; Paul, 1997, 2001; Marschark, 2002). Those factors include, but are not limited to: language development, instructional programming, textual features (e.g., English-based vs. ASL), linguistic developmental (ASL or English), and cognitive considerations.

Language Development.

Several factors have been found to influence the language development of deaf/hh children. Included in those factors are age of onset of hearing loss, age of identification, linguistic input and environment, and parent-child interactions. Chomsky's theory of language development states that children possess an inherent capability to acquire language (2005). Inherent cognitive structures exist in all children that allow for

linguistic universals to be acquired naturally, regardless of the structure or form of the linguistic input. All children posses this capability to learn language, however the input provided must come from competent linguistic models (McAnally et al., 2004). For children with normal hearing, this inherent capability permits them to acquire language naturally from hearing the language of their parents. In this case, language learning is an effortless process that is relatively free from difficulty.

Hearing loss has its greatest effect on the ability to communicate, often due to inaccessibility of verbal language. Resulting from this loss, the linguistic model is incomplete, and a normally spoken message may be distorted (McAnally et al., 2004; Spencer, 1996). Consequently, the receptive acquisition of linguistic universals, including phonology, semantics, and syntax may be delayed or absent (Paul & Quigley, 1994). Several aspects of communication may be affected, including the acquisition of verbal language skills for children with hearing losses (Luetke-Stahlman & Luckner, 1991). In addition, the sensory loss may also affect a child's ability to hear other's speech, his/her own speech, or monitor any expressive language. Consequently, expressive speech and language development may become delayed because of incomplete linguistic messages, the inability to hear oneself clearly, and difficulty accessing auditory languages exchanges that occur around him/her (Berko-Gleason, 1993). The primary complication therefore becomes the inability to acquire the spoken language completely (McAnally et al., 2004; Paul & Quigley, 1994). Consider the difference between a hearing child who has auditory access to the English language through daily conversations, television, incidental learning, and many more activities that occur before formal instruction in reading and writing. When this hearing child begins

learning to read and write, he/she has already acquired a generous amount of English language experiences and skills and can use his/her receptive and expressive knowledge and skills to help him/her learn to read. A deaf/hh child on the other hand, who may have delayed expressive and receptive language, and may not have had access to language learning through incidental learning, must continue to learn the English language (spoken or signed). In some cases, a deaf/hh child may simultaneously be learning the English language, while learning to read and write. As a result, the child may ultimately experience increased language learning difficulties in the areas of vocabulary knowledge, syntax, figurative language, and language processing (Paul, 2003). Consequently, a deaf/hh child may arrive at school with delayed language and therefore is not able to utilize a fully mastered language to help him learn to read or write.

The extent to which language acquisition occurs for deaf/hh children is often dependent on several factors. McAnally et al., (2004) suggest that the type of hearing loss (e.g., conductive, or sensorineural), degree of hearing loss (e.g., mild, moderate, profound), age of onset, (e.g., prelingual or postlingual), age of amplification, early intervention, and mode of communication used may effect how language develops in deaf/hh children. In some instances, infants whose severe-profound hearing loss is identified within the first months of life may expect to follow normal patterns of development from nonverbal communication to spoken language (Plant & Spens, 1995). For instance, postlingual losses (those hearing losses occurring after speech and language acquisition) generally do not disrupt language development significantly. However, many prelingual losses (those that have occurred before age two and before the development of speech and language) have been found to compromise all aspects of knowledge and skill

of language (Swisher, 1984; Cicchetti & Beeghly, 1987). Therefore a prelingual loss may have a profound disruption of language development.

Other factors may also play a significant role in language development including early detection of hearing loss, consistency of amplification use, and access to a symbolic system of communication (Robinshaw & Evans, 1995). Further, it has been suggested that parents play an integral role in their child's language acquisition and development. Given the fact that over ninety percent of deaf children are born into hearing families (Leutke-Stahlman & Luckner, 1991; Moores, 2001), having a mutually intelligible communication system between parent and child appears crucial to the development of language. For language learning to properly develop, exposure to a competent and complete linguistic model appears necessary for children to learn essential skills, such as initiating and maintaining conversations, how to pose questions, intonation patterns, pragmatics, and the rules of the English language (Berko-Gleason, 1993). Generally, this occurs through parent-child interactions (McAnally et al., 2004).

Instructional Programming.

For children with hearing losses, the ability to communicate effectively is considerably hindered by the lack of auditory input, consequently this may affect literacy achievement. However, Greenberg, Ehri, and Perin (1997) suggest that deaf/hh learners be engaged in specifically arranged instructional experiences to promote decoding, comprehension, and overall literacy skills.

The deaf education literature offers strategies for teaching literacy. For example, the Laurent Clerc National Deaf Education Center has produced several best practices for teaching literacy (see Fernandes, 1999; Gallaudet University, 1998). The Pre-College

National Mission Programs at Gallaudet University has also produced several instructional programming suggestions for teaching literacy (French, 1999). Specific use of literacy instructional strategies such as inferential reading strategies, guided reading, and comprehension monitoring strategies have also been recommended and investigated (e.g., Andrews & Mason, 1991; Kelly, 2003; Makil, 1996; Musselman, 2000; Walker, Monro, & Rickards, 1998) (see Easterbrooks, 2005 for an in-depth review of the literature). There have also been specific investigations exploring the use of instructional programs by authors Schimmel and Edwards (1999) and most recently, Loeterman, Paul, and Donahue (2002) who investigated the use of *Cornerstones*, a technology infused approach to literacy instruction. While both instructional packages have noted improvements in word knowledge (Loeterman et al., 2002; Schimmel et al., 1999), and comprehension (Schimmel et al., 1999), results were limited.

The role that prior knowledge and experience plays in comprehension appears to contribute largely to what children are able to bring to the table in order to fully understand what they have read. Incidental learning also plays an important role in developing word meaning and reading development. Deaf children frequently are unable to take part in the benefits of incidental learning, due to their lack of auditory input. To supplement for this lack of auditory input, Stewart and Clarke (2003) note that providing deaf students with numerous experiences will provide the rich background that they need in order to become good readers and relate to what the author is saying. Lack of knowledge contributes greatly to difficulty in reading. Additionally, the problem remains that deaf children often appear similar to children with lower socio-economic status as in Hart and Risley's (1995) study. These children lacked the quality and amount of

information said to the child. The same is often very true for deaf children, who may lack quality and quantity of information. However is this due to poor parenting skills, poor teaching, or apprehension on the part of both teacher and parent? Either way, the deaf child's reading and writing skills suffer due to lack of prior knowledge and vocabulary development (Paul, 2001). Unfortunately, the likelihood that children who are poor readers will remain poor readers continues to be documented by the Matthew effect (Juel, 1988; Snowling, Goulandris, & Defty, 1996; Stanovich, 1986). This also may be true for deaf/hh students who are often poor readers (Kelly, 2003a & 2003b; Paul, 2001; Quigley, 1978) and who often lack access to good language models, whether through sign language or verbal language, providing the experience needed to develop vocabulary and ultimately literacy skills.

ASL Development.

ASL is a visual spatial language that utilizes the hands, arms, body, and face moving within space to indicate meaning. Research suggests that children who are exposed to early and continual sign language (e.g., Brasel & Quigley, 1977; Padden & Ramsey, 2000; Strong & Prinz, 2000) achieve higher literacy and academic achievement when compared to children who were not. Yet, parents choosing to learn sign language often discover difficulties learning an entire sign system while trying to keep up with their child's emerging communication development and symbolic needs (Robinshaw & Evans, 1995). Many parents also feel a sense of frustration while learning a completely new and foreign mode of communication. Additionally, sign language training for parents is often inadequate and finding someone to practice with makes it difficult to truly learn the language. Therefore, developing fluency may become challenging

(Swisher, 1984), often causing infrequent interactions of deteriorating quality (McAnally et al., 2004) which may be tied to the language development of their child. Consequently, a parent's deficits in sign language have a significant effect on how well the child's language develops (Marschark, 1997).

The development of ASL skills also has been noted as a factor that may influence the literacy skills of deaf/hh students. However the findings and views are mixed. For example, Padden and Ramsey (1998) suggest there is a link between early exposure to sign language and normal development of language and cognitive skills. Moores and Sweet (1990) have previously documented that deaf adolescents of deaf parents performed better than students who utilized the Total Communication philosophy during reading comprehension assessments. Further, Kuntze (1998) also suggests that early exposure to ASL may offer children more in terms of language development. If a first language is robustly developed, deaf children would be at an advantage both linguistically and cognitively to learn English literacy. ASL may allow for a strong natural language development, and deaf/hh children could benefit from having a strong language basis to draw upon in order to learn English and learn to read. Advocates for deaf/hh children, strongly encourage that the primary language of deaf children is ASL, and that it should be used as the language of instruction, regardless of what is used at home (e.g., manual English, Signing Exact English). Further, it has been suggested that ASL is the language that is biologically matched to deaf children because it is a natural language that has been used by generations of Deaf people. Further, ASL has been recognized as a full-fledged language that meets linguistic requirements in a visual modality (Kuntze, 1998).

Similarly, bilingual education advocates such as Kuntze (1998), strive for language minority children to be able to benefit from schooling and access curriculum. This educational position strongly suggests that children should not be "held hostage" by their limited language proficiency in order to fully participate in education. Therefore, bilingual advocates support the use of the child's first language as the language of instruction, and English as the second language. Kuntze argues that manual English may not be adequate for complex language communication, and without access to a complete language like ASL, literacy skills of deaf children may not develop fully. However, he does offer a suggestion that if parents decide on the use of Manual English as their primary means of communication, that children are exposed to a literacy rich environment early and consistently with the use of books, storytelling, and discourse.

ASL development has been found to follow the same developmental path as spoken language (Newport & Meier, 1985; Schlesinger & Meadow, 1972). Only about 5-10% of deaf children learn ASL as their first language from deaf parents (Schick, 2003; Marschark, Lang, & Albertine, 2002). Deaf children exposed to ASL from their deaf parents have been found to develop language that closely aligns with hearing children (McAnally et al., 2004; Petitti & Marentette, 1991). In a study conducted by Petitti and Marentette (1991) comparing deaf and hearing infants, both were found to initially follow the same developmental patterns with respect to communication. However, as hearing infants decreased their use of gestures in favor of vocal babbling, deaf infants increased their use of gesture and manual babbling. Further, there also appears to be an advantage for deaf children whose parents are deaf and use ASL. Anderson and Rielly (2002) observed that deaf children's first signs generally appear at about 8-10 months, compared

to the emergence of spoken words for hearing children at about 12-13 months. Several additional researchers (e.g., Bonvillian, Orlansky, & Novack, 1983; Folven, Bonvillian, 1991; Petitti, 1990) have also noted that signs occur before spoken words of hearing children. Ultimately, the use of ASL as the primary language of deaf children may form the basis for learning English as a second-language (Johnson, Liddell, & Erting, 1989), since ASL provides deaf children a visual means for access language and literacy opportunities.

Literacy Development of Deaf/hh Children

Frequently, a complication of delayed receptive and expressive language skills, (e.g., spoken or signed) may result in difficulty acquiring literacy skills, in the areas of word recognition, fluency, and comprehension. This may be especially true for deaf/hh students who lack effective communication skills, decoding, and comprehension processes. Low reading ability and comprehension may present challenges to comprehension in the content areas, thus limiting access to the general education curriculum. Many parents, service providers, and policymakers have suggested that access to the general education curriculum is important to improving the lives of children with disabilities (Baker, Gersten, & Scanlon, 2002). Unfortunately, the likelihood that children who are poor readers will remain poor readers, as the premise of the Matthew effect suggests, continues to be documented (Juel, 1988; Snowling, Goulandris, & Defty, 1996; Stanovich, 1986). This may be especially true for deaf students who lack effective communication skills as well as the decoding and comprehension processes.

According to Perfetti (1985, 1992) efficient word identification and decoding skills serve as foundational support for comprehension. When word identification skills

are fluent, working memory is therefore freed-up for comprehension tasks. Basic linguistic skills (Kelly, 2003a) such as retrieving word meanings, chunking words into meaningful units, as well as other higher order reading processes are typically performed automatically by skilled readers. Readers with low automaticity have significant difficulty performing these tasks, thus negatively affecting their comprehension and use of resources, recall, and appropriate use of reading strategies (Linderholm & van den Broek, 2002). Garrison, Long, and Dowaliby (1997) have suggested a direct relationship exists between being a good or poor reader and working memory capacity. Further, LaBerge and Samuels (1974) have also suggested that when word reading or decoding is automatic, there is less of a demand on processing. In other words, students struggling with automaticity of word identification will be taxing their working memory capacity, thus causing difficulties with reading and comprehension.

Deaf/hh readers often fall into the category of low automaticity due to limited vocabulary knowledge and word identification. Several studies by Kelley (1993, 1995, 2003a, & 2003b) suggest the effect of low automaticity in word recognition and recognition of sentence patterns greatly affects the cognitive demands of the reader. Deaf/hh readers may therefore spend an extraordinary amount of time processing unknown or unfamiliar words and phrases, ultimately reducing their capacity for comprehension, often due to the difficulty learning English (Kelly, 2003a). In addition, deaf/hh readers may be attending so intently on basic decoding and reading operations that information recently processed may not be attended to sufficiently. Furthermore, Kelly (2003b) notes that deaf/hh readers spend considerably more of their mental capacity on decoding which often result in comprehension breakdowns. Oakhill and Cain

(2000) also suggest that poor deaf/hh readers may be constrained by comprehension at the word and sentence level, thus restricting the development of overall comprehension.

The achievement of proficiency in English literacy, whether reading or writing is a challenging and complicated process. Reading and writing problems have remained a problematic area for deaf/hh students for decades. Researchers in the field of deaf education have struggled with the fact that the average literacy level of deaf/hh high school graduates remains at a third to fourth grade level, despite deaf educators' efforts (Paul & Quigley, 1990). As a result, debates continue to wage among deaf educators regarding the best method to communicate with deaf students (i.e., oral communication, total communication, simultaneous-communication, and bilingual-bicultural methods). For example, Luetke-Stahlman et al., (2003) studied the reading ability, phonological awareness, receptive, and expressive English of children who were taught utilizing Signing Exact English (SEE), for a variable number of years as a communication method. Results indicated that the children who had received the longest exposure to SEE (5 years) scored higher than those children who were only exposed to two years of SEE. However, Leutke-Stahlman did not document whether these scores were commensurate with hearing peers. Miller (1995) investigated the effect of communication mode on the development of phonemic awareness. The three groups of children were exposed to either an oral approach (speech, speech reading, and residual hearing) signing language approach, or were hearing. Miller found no significant difference in phonemic awareness for communication mode. There has also been some support for the use of bilingual-bicultural approaches, which emphasizes ASL as the first language of deaf children

(Evans, 2004; Strong & Prinz, 1997; Wilbur, 2000), though the results of this approach are mixed.

Vocabulary development.

Several factors have been linked to vocabulary development of deaf/hh children, including the environment in which children learn language. Lederberg (2003) suggests three factors that influence vocabulary development: frequency of word use by parents, visual accessibility (signs, facial cues, or lips for speech reading need to be seen in order to be learned), and contingency (contingent naming or labeling objects when the child is attending to them). An additional factor affecting size of a child's lexicon includes the age at which hearing loss in identified. For instance, children who are identified before six months had larger lexicons compared to children identified later. During the early stages of language development, signs appear to be acquired at a faster rate than spoken words, as children's motor skills are easier to produce on the hands, rather than with their mouths, as deaf children of deaf parents appear to have a larger lexicon between 12-17 months when compared to hearing peers (Anderson & Reilly, 2002; Meier & Newport, 1990). Unfortunately, the advantage for sign language development for these children appears to diminish between 18-23 months (Anderson, et al., 2002). This may occur because vocabulary begins to become delayed, and more variable when compared to hearing children or deaf children of deaf parents (Lederberg & Spencer, 2001; Mayne, Yoshinaga-Itano, Sedey, & Carey, 2000; Moeller, 2000)

Word learning can occur in several manners. One such manner includes the process of fast mapping, in which children store the phonological forms of word meanings after a few exposures of a new word, or by learning word meanings based on

adult's social and pragmatic cues (Lederberg, 2003). An additional way children learn vocabulary involves the novel mapping strategy which allows children to learn a new word by inferring its meaning based on the presence of familiar words. That is, when presented with objects and their known words and an unknown word, the child will infer that the new word refers to the unknown object (Mervis & Bertrand, 1994). Deaf children have been found not to acquire novel word mapping until after five years old (Lederberg et al., 2000a &200b; Lederberg & Spencer, 2001). Word learning has also been observed to be related to the size of the child's lexicon. For example, Lederberg and colleagues (2000a; 2000b; 2001) noted that children with smaller lexicons had difficulty learning new words when they were taught explicitly, children with moderate lexicon size learned new words only when taught explicitly, and children with larger lexicons learned new words either by inferring the meaning or by being explicitly taught.

Rate of vocabulary growth appears to vary among children. For instance, some children with hearing parents exposed to SimCom may acquire vocabulary at the same rate as hearing children (Gardner & Zorfass, 1983; Notoya, Suzuki, & Furkawa, 1994). However several authors have observed continued slow rates of vocabulary development (Ertmer & Mellon, 2001; Gregory & Mogford, 1981; Ouellet, Le Normand, & Cohen, 2001). Yet, still others contend that modality does not affect the rate of vocabulary growth (Mayne & Yoshinaga-Itano, Sedey, & Carey, 2000; Moeller, 2000). Findings among modality affecting vocabulary growth vary.

The types of early words deaf children learn are similar to hearing children. For example, both hearing and deaf children learn names of people (mommy), animals (dog), objects (truck), food (cookie), and social personal words (bye-bye, no) (Anderson &

Reilly, 2002; Gregory & Mogford, 1981; Griswold & Commings, 1974). However, the content of the deaf child's lexicon is inherently different. Deaf children learning ASL have been found to acquire more words that are action, descriptive, and personal-social in nature, and fewer naming words (Anderson & Reilly, 2002; Gregory & Mogford, 1981; Mohay, 1994; Shafer & Lynch, 1981).

Sight Word Reading.

Ehri (1991) defines four ways to read words (a) decoding, (b) analogizing, (c) prediction, and (d) memory or sight. During decoding, words are "sounded out" by phoneme or into larger syllable units and blended until the word is recognized. Analogizing consists of making connections between a known word and an unknown word, such as using the word "bring" to identify "thing." Prediction involves the use of "context or letter clues to guess unfamiliar words" (Ehri, 2005, p. 168). Finally, a child can also read words based on their memory or sight. There are four phases to sight word learning, according to Ehri (2005), all of which are based on alphabetic knowledge that a child possesses. The four phases include: pre-alphabetic, partial alphabetic, full-alphabetic, and consolidated alphabetic. Children in the pre-alphabetic phase have little knowledge of the alphabetic system or the letter sound relationship and therefore tend to learn to read words based on visual characteristics. The partial alphabetic phase is characterized by a limited knowledge of alphabetics and an incomplete understanding of the letter-sound relationship. For instance, children may only associate between the only the first or last letter in a word. This incomplete knowledge causes children to have difficulty reading words that are unfamiliar to them.

Previous research conducted by Ehri and Saltmarsh (1995) suggest sight word reading is problematic for poor readers. Words that are read frequently are likely to become sight words, and are read as whole units, rather than individual sounds or letters. Ehri (2005) stresses the importance of learning to read sight words. "Being able to read words automatically from memory is the most efficient, unobtrusive way to read words in text. Hence, building a sight vocabulary is essential for achieving text-reading skill" (Ehri, 2005, p. 170). When readers can recognize words automatically, word reading can operate unconsciously.

Many educators are familiar with the Dolch Sight word lists, a list of more than 300 words that were identified by Edward W. Dolch (1939; 1941; 1945; 1951; 1960). Dolch believed that children should be taught to recognize words automatically that are found in 50-75% typical texts children read. The Dolch list consists of function words (e.g., at, the), conjunctions, pronouns, prepositions, common verbs and nouns. He also believed that children should be explicitly taught these words in order to gain meaning from the text they read and use their prior knowledge in interpreting their meanings. Further, Dolch suggested that teaching of sight words should be taught frequently and children involved in reading stories that contain in the sight words (Pressley & Fingerett, 2006). This approach to teaching sight words is part of a balanced instructional program that is suggested by Dolch (Pressley, 2006). Previous research indicates a strong positive relationship between in-depth knowledge of words and comprehension (Barlow, Fulton, & Peploe, 1971; LaSasso & Davey, 1987; Paul & Gustafson, 1991). In-depth word knowledge plays an integral role in comprehension of texts and can be viewed as word meanings, concepts, nuances, examples, uses, associations, and figurative use (Loterman,

Paul, & Donahue, 2002), which deaf/hh students often have difficulty with. Instruction in word knowledge may provide deaf/hh students with greater understanding and thus increase literacy achievement.

In summary, the language complications often experienced by deaf/hh students presents a challenge in terms of literacy achievement and instruction. It appears that difficulties are frequently experienced with word recognition, fluency, and comprehension. Further, the debates continue within the field regarding the most effective mode of communication to impact literacy achievement. However, it appears that instruction in in-depth word knowledge may have a positive impact in terms of comprehension and overall literacy achievement. In addition, reading curriculum specifically designed for deaf/hh students may also provide an avenue for achievement.

Reading curriculum for deaf/hh students

Considering the difficulties deaf/hh children experience with reading, few literacy materials address their language, structure, and visual modality needs. For more than thirty years, the most frequently used approach to teaching reading to deaf/hh students included the *Reading Milestones* basal series, a traditional approach that emphasizes a controlled structured approach to vocabulary and syntax. More recently, the *Fairview Reading Program* (1998) was introduced with an instructional approach that emphasizes vocabulary instruction through sign language and an understanding of the multiple meanings of words and phrases. Unfortunately, minimal research has been conducted utilizing either of the reading programs.

Reading Milestones.

The *Reading Milestones* series was developed by Quigley, McAnally, King, Rose, and Paul (1981) to specifically address the needs of deaf/hh students at the beginning stages of reading development. King and Quigley (1985) state that their curriculum contains several features that stress pre-reading and the development of real-world knowledge, techniques that are consistent with the visual communication mode of deaf children, and reading materials that address the linguistic and knowledge of deaf/hh students, when compared to typical reading materials for hearing children. The series contains a set of readers with controlled syntax and vocabulary which are introduced at a controlled pace to ensure that the vocabulary words are understood by deaf students (Rose, et al., 2004). An additional component recently added to the series is the *Reading Bridge* (Quigley, McAnally, Rose, & Payne, 2003) which emphasizes higher level comprehension skills. According to the authors, this additional material was designed to bridge the gap between beginning reading (k-5) and higher level reading. A survey of 478 instructional programs for deaf/hh children conducted by LaSasso in 1987 indicated that the series was the most used basal series for deaf/hh children in the United States. An update of the survey conducted by LaSasso and Mobley in 1997 continued to show that *Reading Milestones* was the most used series for deaf/hh students, but also indicated that the percentage of programs using this series has declined by 9% over the ten year period. The findings also indicated that although the series remains a curriculum material used by many deaf education programs, respondents of the survey indicated some weakness associated with the series. Unfortunately, LaSasso and Mobley did not state what the specific weaknesses were. Further, there as been no published research demonstrating the efficacy of the *Reading Milestones* series with deaf/hh students.

Fairview Reading Program.

Most recently, a program designed specifically for deaf/hh students was introduced to improve reading skills with specific strategies, materials, and assessments. Schimmel et al., (1999), the authors of the program included five components that are essential for reading development: (a) phonemic awareness, (b) adapted Dolch words and word lists, (c) bridge lists and bridging, (d) reading comprehension instruction, and (e) ASL development/language experience instruction. The program is designed to be used as a supplement with a traditional basal reading series. The premise of the reading program is to provide students with literacy instruction that emphasizes the "true meaning being communicated" (1998, p. 2), not just the word for word sign. This instructional approach is conveyed through vocabulary instruction designed to teach students the concepts of English words or phrases and their multiple meanings or signs associated with them. For example, the word "can" has several meanings: (a) "can" the verb, (b) "can" of soda, (c) garbage "can", each of which is signed differently and convey different meanings. The English phrase "down the street" can also have different meanings depending on the context. This phrase is signed conceptually depending on the context: "A ball was hit down the street" and "A man walked down the street" are signed conceptually different. These concepts are presented to students in a variety of ways and include videos with each sign and its meanings demonstrated, and worksheets for students to practice their newly learned vocabulary.

One study has investigated the efficacy of the Fairview Reading Program, which was conducted by the authors Schimmel et al., (1999). The study took place at a residential school for the deaf during the duration of one school year. Forty-eight

students, ranging in age from 7-12 years old participated in the study. Each component was taught twice a week to students and occurred for the duration of the school year. Results indicated that most students made gains in phonemic awareness, improved their word identification (including words with multiple meanings), and improved their reading comprehension and communication skills. In addition, 18 students improved their reading achievement by two or more grade levels. Unfortunately, it was difficult to discern the experimental design, methods for data collection, or data analysis from the study. Therefore, it appears that a further investigation into the effectiveness of the conceptual basis underlying curriculum is warranted.

Single-subject experimental designs for literacy

Historically, the use of single-subject experimental designs has been used within the experimental psychology and clinical research fields. For instance, Wundt, Pavlov, and Thorndike were well known for conducting studies with one or a few participants and close attention to the independent variables effect on dependent variables (Kazdin, 1982). Within the field of clinical research, Freud's work with psychotherapy patients also assisted in popularizing single-subject designs. This approach to research was further developed by B.F. Skinner who helped form the understanding of behavioral relationships. Studying these relationships allowed investigators to determine if a manipulation or treatment of a behavior influenced an individual's performance (Kazdin, 1982). During the1960's Baer, Wolf, and Risley (1968) further developed the science to become known as Applied Behavior Analysis, which "focused on socially and clinical importance of behaviors" (Kazdin, p. 12) while "rigorously evaluating the effects of intervention with the individual case" (p. 3).

Further, this type of design has previously been used in the examination of literacy interventions for students with and without disabilities. For example, Bierschenk and Bierschenk (2003) utilized the single-subject method to investigate a model of instruction for written composition used with high school students. The intervention focused on instruction to increase complex text structure. Results indicated an overwhelming increase in the use of complex text structures by all of the 30 students. An ABAB reversal design was used by Lee and Von Colln (2003) to examine an intervention utilizing a multi-step cognitive strategy (Paraphrasing Strategy) developed by Schumaker, Denton, and Deshler (1984) on the fluency and comprehension of a middle school student with reading difficulties in comprehension. Results indicated a positive effect for the student's paraphrasing, reading comprehension, and overall reading rate.

The use of story-mapping with six students with learning disabilities in the third and fourth grade was investigated by Boulineau, Fore, Hagan-Burke, and Burke (2004) who employed an ABC design. During intervention, Boulineau et al., (2004) examined the effects of instruction in story-grammar on comprehension with explicit instruction on story-grammar elements by the teacher. In addition, the teacher also modeled the use of a story-grammar map. During Phase C or Maintenance, the teacher discontinued any story grammar instruction once the students had reached the criterion. A positive effect on performance was found for story grammar and comprehension levels of the students. Further, gains were maintained after the intervention was discontinued. Belfiore, Grskovic, Murphy, and Zentall (1996) used an alternating treatments design to examine the effects of color coded (black letters vs. colored letters) sight words on frequency of sight words learned with three students who were learning disabled and were diagnosed

with attention-deficit/hyperactivity disorder. Results indicated that all student learned sights word equally well with either color. However, comprehension of the words increased more when the color condition was used.

Although not widely used in deaf education, the single-subject experimental design has the potential to assist investigators with assessing the intervention effects for deaf/hh students. For example, Luetke-Stahlman, Griffiths, and Montgomery (1999) studied the language acquisition of a deaf second grader through mediated retellings with a graphic organizer and discussion with an adult. The authors utilized a single-subject design (ABAB) to determine the effects of the intervention on the student's language acquisition, vocabulary development, and comprehension. Retellings were analyzed for syntactic (e.g., pronouns, conjunctions, correct use of past tense) and semantic (e.g., novel words vs. multiple meanings) features. Results indicated there was not a significant difference in the student's ability to define words, use more or different conjunctions, use pronouns, use forms of the verbs to do and to be, use modals, and use these/those. However, the student did improve in the number of different pronouns during mediated retellings. In addition, the student also improved by more than one grade level over a 12-month period as a result of the intervention.

Von Tetzchner, Rogne and Lilleeng (1997) also utilized the single-subject design during their examination of a literacy intervention with a fourth grade Norwegian deaf child who had a severe reading disability. The intervention involved a combination of literacy practices through the use of Norwegian sign language and included process writing, drawings, and word processing augmented with a word prediction system called Predictive Adaptive Lexicon (PAL). Phases of the intervention included Pre-PAL, PAL,

and Post-PAL. The PAL program is a word prediction program developed to be used with standard word processors, such as WordPerfect. When the student begins to type a letter, a window appears on the screen that contains five words starting with the typed letter. For example, if the student were to type the letter "c", the five words that might appear are: can, catch, cookie, cook, and car. The student then chooses one of the words or types another letter, where five new words would begin with the two typed letters would appear (e.g., "ca"...cake, calm, candle, carry, car). Results of the PAL intervention indicated an increase in number of different word forms used in written compositions. The student developed an awareness of orthographic structure, functional writing strategies, and a written vocabulary on which to base future development.

Finally, Schirmer and Ingram (2003) also utilized the single-subject (AB) design to study three deaf students (i.e., 1 high school student and 2 middle school students) and their hearing peers to determine the effectiveness of an instructional strategy for teaching writing to deaf students. The intervention involved the investigators recasting the deaf student's written language during the on-line chat of an academic topic (i.e., astronomy). Schirmer and Ingram recasted the student's written response with language structures that were not typically seen in their spontaneous writing, by adding a descriptor or conjunction to the writing. In addition, Schirmer and Ingram also framed their responses to be well-formed syntactically, close in time to the student's comments, and related to the student's comments. Results indicated that the strategy was effective in promoting significant increases in the use descriptors and conjunctions for the high school student, but not for the middle school students.

In summary, single-subject design allows the researcher to investigate the relationship between an intervention and a target behavior. In this case, the researcher can determine if the intervention influences an individual's performance. Previous research in the fields of literacy and deafness indicate that the approach to research has been an effective method for studying intervention effects.

The following study is designed to determine if an intervention utilizing instructional strategies with a conceptual focus on vocabulary words, can improve the literacy skills (e.g., word recognition, production and comprehension) of deaf/hh readers who communicate through sign language and are experiencing low achievement in literacy. Presently, only one research study has been conducted utilizing this approach through conceptual focus, with the use of a commercially made intervention program (Schimmel et al., 1999). Results indicated that most students achieved increased in comprehension levels, however the method, data collection and analysis are not clear in the research. Therefore, the proposed study will utilize a single-subject multiple baseline across subjects design to determine the effectiveness of a conceptually based vocabulary intervention, to determine if there is a functional relationship between the intervention and the target literacy behaviors (Tawney & Gast, 1984). The following research questions will address these issues:

Research Questions:

1. To what extent does the vocabulary intervention effect the recognition of single or multiple meaning words, and phrases?
2. To what extent does vocabulary intervention effect the production/use of single or multiple meaning words, and phrases?

3. To what extent does the vocabulary intervention effect spontaneous use during class time of single or multiple meaning words, and phrases?
4. To what extent does the vocabulary intervention effect the comprehension of single or multiple meaning words, and phrases?

CHAPTER III

Method

Participants

Student Participants.

Six students (see Participant Table 1 and Figures 1 and 2) from an urban district in a Midwestern state took part in this study. All participants were deaf or hard of hearing and were in the second grade and had a mean age of 7.95 years. Hearing losses ranged from moderate to profound sensorineural bilaterally. Amplification used included cochlear implants for two students and hearing aids with FM systems for the remaining four students. Communication mode used at school and home was reported by the classroom teacher for five of the six students to be Pidgin sign language (ASL signs in English word order) (Schirmer, 2000). However, the classroom teacher noted that the students' signs are closer to English on the continuum, rather than ASL (Bornstein, 1990). The sixth student was reported to Pidgin sign language at school and both Pidgin sign and ASL at home with her parents, because her mother used Signed English and father used ASL. At the onset of the intervention commencement, only one student had an additional documented disability (Landau Kleffner's Syndrome). However, two weeks after the onset of the intervention, two participants were identified with autism, in addition to being deaf.

All six students were served by the Hearing Handicapped Intervention Specialist for Language Arts and Reading classes. Participants were chosen at this age range particularly because of the need for intervention services and the students' current reading levels were below average (i.e., more than one year below grade level). In

addition, all students included in the study also experienced difficulty with decoding and comprehension. With intervention, it was the proposed that the participants would increase their word knowledge (decoding skill) in American Sign Language or voice and therefore increase reading comprehension levels.

Table 1
Participant Demographics

Participant	Age	Hearing loss	Age of Identification	Age of Amplification	Amplification	Perceived benefit of amplification	Other disability	Deaf/ hearing parents	Communication mode at home and school
Typical Deaf Students									
Kurt	7.5	Bilateral severe sensorineural	Birth	2 years old	Hearing aids/ FM system	Good	None	Hearing	Pidgin sign language
Jill	7.6	Bilateral profound sensorineural	Birth	3 years old	Hearing aids/ FM system	Good	None	Deaf	ASL and Pidgin sign language (both home and school)*
Joe	7.7	Bilateral profound bilateral sensorineural	Birth	1 ½ years old	Hearing aids/ FM system	Good	None	Hearing	Pidgin sign language
Deaf Students with Additional Disabilities									
Bob	7.11	Bilateral profound sensorineural	Birth	1 ½ years old	Cochlear implant	Poor	Autism	Hearing	Pidgin sign language
Dave	9.6	Bilateral moderate sensorineural	Birth	2 years old	Hearing aids/ FM system	Good	Landau Kleffner's Syndrome	Hearing	Pidgin sign language
Charlie	8.10	Bilateral profound bilateral sensorineural	Birth	3 years old	Cochlear implant	Poor	Autism (mild, as teacher reported)	Hearing	Pidgin sign language

*Note: Teacher reported that Jill's mother uses Signed English and father uses ASL. Sign language use at school is Pidgin sign language the majority of the time.

Figure 1

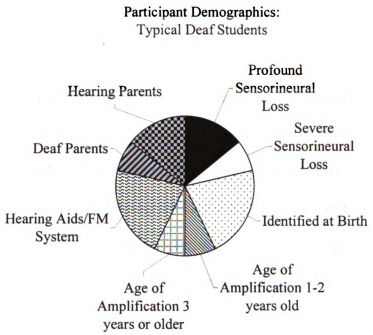
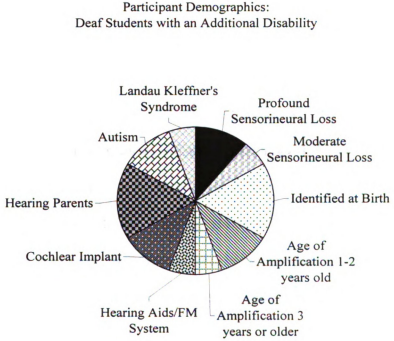


Figure 2



Teacher Participant.

One teacher took part in this study. The classroom teacher was previously identified as being an exceptional teacher of the deaf (Dimling, 2006) and was recommended by four professionals (i.e., intern field instructors and university teacher preparation director) in the field of deaf education invited to recommend a teacher based on the following descriptors: (a) certified teacher of the deaf, (b) taught deaf/hh children in grades 1-2 for a minimum of 3 years, (c) taught children in grades 2-3 in a center-based deaf education program for the deaf/hh or school for the deaf, and (d) utilized the total communication philosophy, which emphasizes the use of amplification, sign language, speech and speech reading, as the primary mode of communication (Moores, 2000). The teacher participant was then chosen from a pool of recommended teachers who participated in the previous study.

In addition, the teacher participant was chosen because of her knowledge of best practices, high ratings for effective teaching practices (Roehrig, Dolezal, Mohan, Pressley, & Bohn, 2004), current literacy knowledge and interest in improving her students' vocabulary and literacy skills. Based on previous observations, the classroom teacher currently used best practices as defined by Fernandes (1999) and The Laurent Clerc National Deaf Education Center (Gallaudet University, 1998), which is affiliated with Gallaudet University. Further, the Classroom AIMS Instrument of Effective Teacher Practices (Roehrig, Dolezal, Mohan, Pressley, Bohn, in press) was also completed to determine that effective classroom practices were being utilized. The classroom teacher was rated as being highly effective based on this measure. In addition, the classroom teacher's credentials included a bachelor's degree in deaf studies and a master's degree in

deaf education. Her teacher training was completed in a Midwestern university which emphasizes the total communication philosophy.

Materials

Adapted Dolch Words and Bridge Phrases.

Adapted Dolch words and Bridge phrases were developed by The *Fairview Reading Learning Company* (Schimmel et al., 1999) as part of a commercially produced instructional program designed to provide deaf/hh students with the linguistic tools for learning to read and write, through direct access to American Sign Language and English. The most unique component of this curriculum, which emphasized teaching students the conceptual understanding of vocabulary through Adapted Dolch words and Bridge Phrases, was designed by Schimmel et al., (1999) provided the basis for instruction during the intervention. This component was created specific to deaf learners, and stressed the importance of vocabulary instruction conceptually based in ASL.

Adapted Dolch words were a list of words commonly found in the majority of basal readers. The list contained 435 signs divided by grade level from pre-primer through third grade. In addition, the Adapted Dolch list contained a variety of words that have either single meanings, such as "me" or "blue" and words that may have multiple meanings. These multiple meaning words required ASL translation for the meaning to be fully understood. For instance, the word "little" had several meanings and depended on the situation, (a) little thing, (b) little person, and (c) little vertically. Through learning the many meanings of a word, it was more likely that the child will be able to understand the word's true meaning in each context (Schimmel et al., 1999). For the purpose of this study, only the content words were utilized for vocabulary instruction because they

supply meaning and information about a topic. Content words, consist of nouns, action verbs, adjectives, and adverbs. For example, in the sentence, "The boy looked under the table," content words would include the words: boy, look, under, and table .In the sentence, "My dog ran away once," content words would be: once, dog, ran, away. These words tell the reader information about the sentence such as what happened, when, where, who, and why of a sentence. Function words consist of articles, pronouns, verbs of being, and prepositions (e.g., a, and, for) and have little meaning when isolated from a sentence (Vacca et al., 20005), and therefore were not used during the study as vocabulary words.

Bridge Phrases were English phrases that required translation in ASL. The Bridge Phrase list contained 423 signed phrases across grades pre-primer through third grade. For example, the phrase "fell down", may have several different meanings depending on the contexts: "I fell down on the street." or "The tree fell down." or "The house collapsed (fell down)." Both adapted Dolch words and bridge lists were presented in video format in American Sign Language (ASL) in both isolation and in the context of a sentence to allow for visual translation.

Dependent Variables and Data Collection

The development of literacy skills is paramount to deaf/hh students, as noted by several authors (e.g., Easterbrooks, 2005; Kelly, 2003; Luckner, Sebald, Cooney, Young, & Goodwin, 2005). To assist with determining the effects of the intervention, an aspect of the Fairview Reading Program, the Vocabulary Component and several dependent variables were chosen and include: (1) recognition, (2) production, (3) comprehension, and (4) spontaneous and appropriate use (See Table 2 for Dependent Variable and

Method Chart). These dependent variables were assessed during pre-test, baseline and intervention in the same manner to determine each student's response prior to and during the intervention. This assisted with determining the effectiveness of the intervention and the student's response to the intervention. Data collected for assessments was collected two times a week by the classroom teacher. In addition, the classroom teacher collected all worksheets and semantic mapping sheets completed by the students during the intervention. Semantic mapping sheets were not analyzed for data, but were utilized as visual products of the students' generated semantic mapping. In addition, these sheets also provided evidence of completion of this intervention component. Student assessments were conducted each Wednesday and Friday for the Dolch words and Bridge phrases learned during intervention sessions. For example, Dolch words and Bridge phrases learned on Monday and Tuesday were assessed on Wednesdays. Dolch words and Bridge phrases that were learned on Wednesdays and Thursdays were assessed on Fridays. Students were assessed individually beginning with one student randomly chosen to begin the assessment. Procedures for choosing students randomly included the following: all students' names were written on Popsicle sticks and placed in a jar. The teacher picked one stick out of the jar and called the first student's name. This student was first to be assessed. The teacher continued this procedure until all students had been assessed.

During the assessment sessions, the classroom teacher completed a data collection sheet for each student (See Appendix A for Data Collection Sheets). To ensure the accuracy of the student's signs and/or voiced responses and to assist with inter-rater agreement, all assessments were videotaped bi-weekly on Wednesdays and Fridays. Each

variable was rated on a scale of: mastered, emerging, or incorrect (see description below for each variable). Dependent variables were therefore assessed in the following manner:

1. Recognition- does the student recognize the word associated with the sign by labeling it by fingerspelling, voicing, or pointing to the word?
    - Evaluated through the use of a weekly sign recognition test. During these assessments, the classroom teacher randomly chose a student using the procedure described above, to begin the assessment. The teacher signed each word or phrase to the student and asked him/her to label the word or phrase by: fingerspelling the word, voicing the word, or pointing to the word that corresponds to the sign produced by the researcher. The teacher then competed the assessment form (see Appendix A) to indicate if the student's response was mastered, incorrect, or emerging. All students were asked to spell each word or phrase first. If the student was unable to spell the word or phrase correctly, he/she was then shown all three words or phrases in written form and asked point to the word that corresponded to the sign produced by the teacher. No reinforcement was given to the student to indicate whether their response was accurate or incorrect. Responses considered mastered were either spelled correctly or pointed to the correct word. Incorrect responses were spelled wrong and/or pointed to the wrong word. Attempts to spell a word with a minor error (1-2 letters incorrect) were considered emerging. For example, if a student spelled "will" for the word "well," the response was considered emerging. However if the student spelled "wase" for the word "well," the response was considered incorrect. In cases where the student was

able to point to the words or phrases correctly rather than spelling correctly, he/she was given credit for mastering the words or phrases.

2. Use/production- does the student accurately produce the sign or say the word when prompted by a word card representing the word?

   - Evaluated by the classroom teacher, through the use of 3x5 cards with each word/phrase printed on individual cards. During these assessment sessions, the classroom teacher randomly chose a student using the aforementioned procedure and presented a card with each word or phrase on it. The teacher asked the student, based on their preferred mode of communication, to "show me the sign" or "say the word" for each card. Based on the student's response, the teacher then completed the assessment form (see Appendix A) and indicated if the student's response was mastered, incorrect, or emerging. Correct responses were those that were signed correctly, which included incorporating: (1) the five features of a sign (see below), as referenced by the American Sign Language Dictionary (Sternberg, 1998) or the ASL Browser (Michigan State University, 2000) (see below), and (2) were understood by a second observer. Responses given by students in voice were counted as accurate if the voicing could be easily understood by the researcher and a second observer who was unfamiliar with the student. Incorrect responses were signed wrong (three or more features of the sign were incorrect), and/or not understood by a second observer. Emerging responses were approximations of the sign, with 1 or 2 sign features of the sign not accurate.

- The American Sign Language Dictionary (Sternberg, 1998) and The ASL Browser provided reference for correct signs to assess the student's production and comprehension mastery. The ASL Browser was developed by Drs. David Stewart and Patrick Dickson at Michigan State University (2000) and is available at the following website: http://commtechlab.msu.edu/sites/aslweb/browser.htm. The ASL browser was an online tool that provided recorded signs and explanations regarding how the signs are formed by Dr. Stewart, who was a Deaf adult, fluent ASL signer, and professor of deaf education. Both references were chosen because they provide standard signs typically used by the Deaf community. The ASL dictionary was currently being used by the classroom teacher participating in the study, which provided a reference of signs that were used by the students. To account for local and/or dialectal signs, the ASL browser was chosen because it included both standard signs and some local/dialectal signs used by the local Deaf community, of which the developer was a member and the students participating in the study were familiar with given their geographical location.
- In addition, the ASL dictionary and ASL Browser assisted with providing reference for the five features of a sign as created by Stokoe (1960) and Wilbur (1979). The five features involved in the formation of a sign included: hand-shape, location, motion, manner, and orientation. Hand-shape consisted of how the hand was formed. For example, a sign can change meaning depending on how the hand was shaped (i.e., the difference between using the

"A" handshape with the thumb pointing out, and the thumb pointing in). Location referred to signs made on the body or in a neutral space. This space must be made within the signing space, which was from the top of the head to just below the waist and in front of the signer to his/her extreme left and extreme right. The use of space varies per individual and may be larger for "loud" reasons or audiences, or smaller for "quiet" reasons, or smaller audiences (Wilbur, 1979). Manner of formation, or the basic direction of the sign movement was described as being unidirectional or bidirectional. A unidirectional manner could be continuous, holding, or restrained movement. A bidirectional manner could be either continuous or restrained. For the sign pairs "fly" and "airplane", the manner of these signs is different. For instance, when signing "fly" the manner of the sign is one continuous movement (i.e., unidirectional continuous). "Airplane" when signed is one continuous movement, yet the manner is held back from action (i.e., unidirectional restrained). Motion described the direction the sign moves in and included vertical (e.g., upward, downward), sideways (e.g., right, left, side-to-side), horizontal (e.g., toward signer, away from signer, supinating) rotary (e.g., twisting, nodding, opening action), and interaction (e.g., linking action, crossing action, interchanging action). Orientation of the sign referred to the direction of the palm during signing which could change the meaning of the sign. For example, the signs for "thing" and "child" use the same type of hand-shape, but the direction of the palm was different with "thing" being

signed with the palm up and "child" signed with the palm down (Wilbur, 1979).

3. Comprehension- does the student understand the newly learned signs or words?
    - Evaluated through a semantic mapping activity. During this evaluation, each word or phrase was signed and voiced by the teacher, and the 3x5 card containing the written word or phrase was shown to the student. The student was asked to provide an example, create a sentence containing the word or phrase, or point to things in the classroom that represented the word or phrase. This was used to determine the students' understanding of each Dolch word or Bridge phrase. Responses were provided verbally or in sign and were scribed by the classroom teacher. Correct responses included an example, a sentence, or pointing to an object that represented the vocabulary word/phrase correctly. Incorrect responses included using the word/phrase wrong in a sentence, gave a wrong example, or pointed to the wrong object that did not represent the vocabulary word/phrase correctly. Emerging responses were those that were prompted by the teacher or signed a sentence that implied the meaning of the sign. For example, during one assessment session, Charlie's phrase was "next week." He signed "Ms. E not here Monday." The teacher informed the researcher that she was not going to be here next week Monday. Therefore, Charlie's sentence implied that he was talking about "next week." Another emerging sentence example included, "walking then I jumped in," for the phrase "jumped in." In this case, the sentence was not complete, and the meaning had to be inferred.

4. Spontaneous and appropriate use- does the student use the newly learned signs or words during expressive communication?

    - Evaluated by the classroom teacher. Classroom teacher recorded the number of words used by each student using a tally sheet. Each student's weekly Dolch words and Bridge phrases were listed on a weekly tally sheet (See Appendix A for example of tally sheet). Each time the teacher saw or heard the student produce the word or phrase outside of the intervention time, she recorded the expression in the column and notated if it was used accurately, emerging, or incorrectly. To be counted as accurate, the student used the sign, word, or phrase in the appropriate manner. For example, if the student signed the word "fly" in the sentence "There is a bird flying outside," the student has used the word accurately in the sentence. However, if the student were to sign the word "fly" in the sentence "Fly your hand to me," the student used the word incorrectly.

Table 2
Dependent variables and method chart

Research question	Dependent variable	Method of measurement
1	Recognition	Recognition test -number of words phrases recognized accurately
2	Production	Word/Phase cards – number of words or phrases produced accurately
3	Comprehension	Semantic mapping activity for each word or phrase- number of words or phrases comprehended accurately
4	Spontaneous and appropriate use	Number of times word or phrase is used

Pretest assessment

Prior to baseline setting, all participants' current knowledge of Adapted Dolch words and Bridge phrases was assessed during a pretest assessment by the researcher. Only content words from the Dolch word and Bridge Phrase lists were chosen to be assessed words, given that content words such as nouns, action verbs, adjectives, and adverbs supply the meaning and information of a topic. Comparatively, function words which are articles, conjunctions, pronouns, verbs of being, and prepositions, (e.g., a, and, for, at, he) have very little meaning when they are isolated from the flow of language (Vacca et al., 2005). For example, in the sentence, "Yesterday, I saw a tree fall down," the content words would include: yesterday, I, saw, tree, fall down. Function words would include the letter a. In this example, the content words tell the reader information about the topic, such as when something happened (yesterday), who it happened to (I), and what happened (tree fall down). The function word (a) when isolated, gives no meaning or information to the reader.

Students were tested individually to determine knowledge of recognition, production, and comprehension of both Adapted Dolch words and Bridge Phrases. This pretest was conducted in the same manner during baseline and intervention phrases (see *Dependent Measures* for description of assessment) and was scored on a scale of: (a) mastered, the student correctly identified or produced the word or phrase accurately (b) emerging, the student identified the word or phrase with approximation, or (c) incorrect/not mastered, the student did not identify or produce the word or phrase accurately.

Intervention procedures

During the first baseline setting, all students were taught using the curriculum currently used by the classroom teacher. The classroom teacher continued with her current literacy program, which included the school district's recommended materials for reading and writing curriculum. Vocabulary instruction included the use of spelling practice, flashcards, worksheets, and writing in various tactile forms such as in rice or sand with words chosen from the student's story books.

After the baseline setting, the intervention condition began and the classroom teacher added a 30 minute session per day to her current program. Students were grouped into three small groups of two students each. Students were randomly chosen for each group, using the procedure previously mentioned (i.e., Popsicle sticks) to control for developmental differences (see Table 3 for intervention schedule). The first two randomly chosen students, Bob and Charlie were chosen for group 1 and began the intervention once a stable baseline was established and were taught Dolch words on Mondays and Wednesdays. Bridge phrases were taught to Group 1 on Tuesdays and Thursdays. The second two randomly chosen students, Kurt and Joe were chosen for Group 2, began the intervention after Group 1, once their baselines were stabilized. Group 2 had a different schedule, being taught Dolch words on Tuesdays and Thursdays, and Bridge phrases on Mondays and Wednesdays. Finally, Group 3 consisted of the remaining two students, Dave and Jill and began the intervention after Group 2, once their baselines were stabilized. The intervention schedule for Group 3 was randomly chosen using Popsicle sticks labeled with the days of the week on them. The sticks were

placed in a jar and were picked each week by the classroom teacher to determine which days Dolch word or Bridge phrase interventions would occur on.

As previously noted, each group of students began the vocabulary intervention at different points in time, based on the multiple baseline research design (Kazdin, 1982). Therefore, each group was involved in the intervention for different lengths of time. Group 1 began the intervention once both students' baselines stabilized and were then involved in intervention sessions for a total of eight weeks. After baselines stabilized for Group 2, these students began the intervention one week later, and were then involved in intervention session for a total of seven weeks. Finally, Group 3 began one week later and were involved in the intervention sessions for a total of six weeks. Each vocabulary intervention session took place four times a week for 30 minutes per session, with two sessions devoted to Dolch words and two sessions devoted to Bridge phrases, as suggested by the Fairview Reading Program manual. Based on pretest results, Dolch words and Phrases that were identified as not-present (i.e., incorrect) in the student's current knowledge base or emerging, were chosen as target words and taught during the intervention phase. These words were verified by the classroom teacher, based on her knowledge that the chosen words were not taught or were not currently in the student's present knowledge base. Therefore, each student had Dolch words and phrases that were selected specifically for them and based on their current knowledge.

During the intervention condition, each participant learned and practiced three Adapted Dolch vocabulary words and three Bridge phrases per session, for a total of six words and six phrases each week individually selected for each student (See Table 3 for schedule). Total number of vocabulary words taught varied per student, given the

multiple-baseline design and student absences. For instance, Bob was taught 39 words/phrases, 42 words/phrases for Charlie, 21words/phrases for Joe, 39 words/phrases for Kurt, 33 words/phrases for Dave, and 33 words/phrases for Jill. Chosen words and phrases consisted only of content words (i.e., nouns, verbs, adjectives, and adverbs) and not function words (articles, conjunctions, pronouns, verbs of being, and prepositions), given that function words had very little meaning when they were isolated from the flow of language. Comparatively, content words supply the information of the topic (Vacca et al., 2005). Examples of content words chosen for the study include: once, fall down, good, running, said, new, two, etc.

There were no specific directions for teachers in the Fairview Reading Program manual for implementation or how to teach the vocabulary. Therefore, instructional strategies were developed by the researcher which was informed by vocabulary instruction principles suggested by Vacca et al., (2005). For example, Vacca et al., (2005) suggests that vocabulary instruction should include words that children encountered frequently during reading, taught in relation to other words, and taught in-depth with discussion. These principles, along with the instruction of vocabulary in a conceptual manner and practice with the words/phrase, guided the development of three components that made up the intervention. For instance, words and phrases that students would encounter on a frequent basis (Dolch words and Bridge Phrases) were chosen for each student based on their current vocabulary repertoire. To support vocabulary and concept development, students completed a semantic map with the classroom teacher that explored the nature of each vocabulary word or phrase with examples or possible multiple meanings. The use of semantic mapping allowed for a visual display of how

words relate to other words, distinguish relationships, deepen vocabulary meaning, and explored the multiple meanings that were associated with a word (Vacca et al., 2005). Next, students practiced the newly learned words or phrases by creating a sentence that incorporated their individual words or phrases and shared them with their classmate. Each intervention session therefore consisted of three components to be completed in sequential order:

1. **Word introduction**: teacher introduced words or phrases, demonstrated the sign for each and students repeated
2. **Word activity:** semantic mapping with classroom teacher and students
3. **Practice and sharing:** Students wrote a sentence(s) for each word or phrase and shared with classmates.

Table 3
Intervention Session Schedule Group 1:

Monday	Tuesday	Wednesday	Thursday	Friday
• Dolch word intervention	• Bridge phrase intervention	• Assessment of Monday and Tuesday's intervention words and phrases • Dolch word intervention	• Bridge phrase intervention	• Assessment of Wednesday and Thursday's intervention words and phrases

Intervention Session Schedule Group 2:

Monday	Tuesday	Wednesday	Thursday	Friday
• Bridge phrase intervention	• Dolch word intervention	• Assessment of Monday and Tuesday's intervention words and phrases • Bridge phrase	• Dolch word intervention	• Assessment of Wednesday and Thursday's intervention words and phrases

intervention				

Intervention Session Schedule Group 3:
Dolch word and Bridge Phrase interventions occurred randomly Monday through Thursday using procedures previously discussed.

Monday	Tuesday	Wednesday	Thursday	Friday
• Dolch word or Bridge phrase intervention randomly chosen by teacher	• Dolch word or Bridge Phrase intervention randomly chosen by teacher	• Assessment of Monday and Tuesday's intervention words and phrases • Dolch word or Bridge phrase intervention randomly chosen by teacher	• Dolch word or Bridge Phrase intervention • Randomly chosen by teacher	• Assessment of Wednesday and Thursday's intervention words and phrases

Procedural Integrity

Procedural integrity was assessed through several methods to determine if all three intervention components (i.e., word introduction, word activities, and practice) were incorporated by the classroom teacher. First, the researcher called periodically to touch base with the teacher and verified the activities and procedures for each lesson and also answered any questions the teacher had. Second, the teacher completed a likert scale (See Appendix B) daily to determine each student's participation in the activities (active vs. passive participation). Third, the classroom teacher was asked to complete a checklist (See Appendix B) at the end of each session that addressed the three components of each session) and number of minutes per session. Checklists were reviewed each Friday by the researcher to assess whether each component was completed. Finally, the researcher made bi-weekly observations (i.e., six lessons) and videotaped an intervention session to

verify that the teacher completed the three components of the lesson by completing the same checklist as the teacher. Procedural integrity was then determined by comparing the checklists completed by the teacher and those completed by the researcher. The following formula was utilized to calculate procedural integrity: dividing the number of correct and incorrect lesson components and multiplying this value by 100. The mean procedural integrity score for 6 sessions was 100%, with the classroom teacher consistently completing all three lesson components during each session observed.

Experimental Design

A single-subject multiple baseline across subjects was utilized for this study (Kazdin, 1982). The purpose of utilizing this design was to allow each student to act as his/her own control with the measurement of baseline and intervention and reduce threats to internal validity (inter-observer agreement also assisted with internal validity). In addition, baseline measurement offered students several opportunities to demonstrate current and stability of achievement, individual measurement of skills, rather than group averages, and repeated and frequent measurement of skills overtime during intervention to control for human variability and demonstrate a pattern of behavior (Kazdin, 1982). The multiple-baseline across subjects design was chosen because skills were taught that were not reversible, due to the nature of the intervention, as students made progress in target behaviors and withdrawing the intervention when progress was being made would have been detrimental to subject and unethical (Kazdin, 1982; Neuman & McCormick, 1995).

As previously noted, the dependent variables were: recognition, production, comprehension, and spontaneous/appropriate use. With the use of the multiple-baseline

across subjects design, these dependent variables were measured in baseline together until stable baselines were observed. Students were placed in three small groups which were randomly chosen; with Group One beginning the intervention first, while the remaining two groups continued in the baseline condition. It was expected that the behaviors for students in group one would change and the behaviors for the remaining two groups would remain the same. Once baselines stabilized for the remaining two groups, Group Two began the intervention, and finally Group Three. Positive effects of the intervention were indicated when performance improved after baseline when the intervention was applied and not before (Kazdin, 1982; Tawney & Gast, 1984).

Inter-rater Agreement

To ensure that student assessment was accurate, to minimize bias, and verify the target behaviors were accurately defined, inter-rater agreement was conducted in the following manner for each phase of the study: pretest, baseline, and intervention phases. The classroom teacher conducted inter-rater agreement for the pretest assessment, since the researcher completed the pretest assessments. To obtain inter-rater agreement, the classroom teacher was trained to identify the difference between student responses that were mastered, emerging, or incorrect. Using videotaped assessment sessions from each student, the classroom teacher was trained until agreement reached at least 80%. Once training was complete, the classroom teacher observed 40% of the student's pretest sessions and completed independent assessment sheets. The mean agreement score was then calculated using the following formula for exact agreement versus disagreements: A/A + D x 100 (Kazdin, 1982; Tawney & Gast, 1984). Mean score for pretest was then calculated for a score of 96.1% (range, 92.9% to 99.3%).

During baseline and intervention assessment sessions, the researcher conducted the inter-rater agreement while the teacher completed the weekly assessments. The researcher, a certified deaf education teacher, was trained using videotaped student assessments from the pre-test, until the she reached at least 80% agreement with the scored pre-tests. To obtain inter-rater agreement, 40% of the overall assessment sessions (i.e., 8 assessment sessions) during both baseline and intervention were viewed and independently rated by the second observer. The researcher personally observed six live assessment sessions and two sessions were observed through videotape. The observed videotaped sessions were randomly chosen by numbering Popsicle sticks with the session numbers and placing them in a jar. One stick was picked and that session was observed by the second observer. Independent assessment forms were completed by the second observer for recognition, production, and comprehension. Observations were compared with the teacher's assessments to determine the consistency of agreement and observer's accuracy of rating the student's performance. The following formula for determining exact agreement for agreement versus disagreement was used for the two observers: A/A + D x 100 (Kazdin, 1982; Tawney & Gast, 1984). Overall agreement was calculated at: 97% (range 83.3% to 100%). Due to the difficulty in determining inter-rater agreement for spontaneous use of the Dolch words and Phrases, the teacher's tally count was supported through the weekly assessment. That is, if the teacher recorded that the word "play" was used by the student correctly 10 times during the week, it was expected that the student was able to identify, produce, and comprehend the word "play" during the weekly assessments.

Data Analysis

Several techniques were utilized to analyze the effects of the intervention. The purpose of the single-subject design was to determine if a functional relationship existed between the intervention and the target behaviors (recognition, production, comprehension, and spontaneous use) (Kazdin, 1982). Analyses took the form of both graphical appraisal and statistical procedures. First, all data was displayed in graphic form presenting the data from each phase of baseline and intervention. Student data was first displayed in multi-baseline formant to represent the students' weekly performance for mastered and emerging Dolch words and Bridge phrases. Data was then displayed in graphic form to represent the percent of Dolch words and Bridge phrases mastered and emerging out of the total number of words taught. Second, data analyses were conducted visually and included changes from baseline to intervention, changes in means across phases, changes in level, changes in trends, and latency of the change (Kamil, 1995, Kazdin, 1982). Finally, student's performances were compared by group of students, comparing typical deaf student who were only identified with deafness as their only disability and students who had an additional identified disability.

CHAPTER IV

Results

The purpose of this study was to determine if a conceptually based vocabulary intervention effected vocabulary recognition, production, comprehension, and spontaneous use of deaf/hh students. The design used for this study was multiple-baseline across subjects, which theoretically allowed the students' behaviors to change as a function of the intervention, rather than withdrawing the intervention and potentially causing harm. In addition, this design also took into account changes in behavior that could be attributed to maturation. Results are presented by research question with overview descriptions of findings and individual analysis and findings for each student. All data was graphically displayed for each student and analyses were conducted visually and statistically to determine the findings presented in the following section.

Baseline

All students were initially assessed with a pretest to determine current knowledge of both Dolch words and Bridge Phrases. After pretest assessment, all students began the baseline condition. During baseline, all students were assessed twice a week on Wednesdays and Fridays with words or phrases chosen from each student's individual pretest assessment, which were scored as either "emerging" or "incorrect" from the pretest. Each assessment session tested three Dolch words and three Bridge phrases. Procedures for baseline assessment remained the same as those utilized during the pretest assessment (see description in methods section). Baseline means for mastered Dolch word recognition, production, and comprehension are presented in Table 4 and range from .00 to 0.33 words mastered. Table 5 presents the baseline means for mastered

Bridge phrase recognition, production, and comprehension and range from .00 to .20 phrases mastered. As indicated by the initial baseline means, all six students had difficulty mastering both types of vocabulary (i.e., Dolch words and Bridge phrases) across all three variables (i.e., recognition, production, and comprehension).

Table 4

Mean Number of Mastered Dolch Words per Assessment Session: Baseline/Vocabulary Intervention

	Student					
Dependent Variable	Bob	Charlie	Joe	Kurt	Dave	Jill
Recognition						
Baseline	.00	.33	.33	.00	.14	.00
Vocabulary Intervention	1.87	3.00	2.57	2.69	2.18	3.00
Production						
Baseline	.33	.00	.20	.00	.14	.00
Vocabulary Intervention	1.53	2.87	2.57	2.69	2.45	2.80
Comprehension						
Baseline	.00	.00	.20	.00	.00	.00
Vocabulary Intervention	.69	1.80	2.43	2.38	2.67	2.80

Table 5

Mean Number of Mastered Bridge Phrases per Assessment Session: Baseline/Vocabulary Intervention

	Student					
Dependent Variable	Bob	Charlie	Joe	Kurt	Dave	Jill
Recognition						
Baseline	.00	.00	.00	.00	.00	.00
Vocabulary Intervention	.46	1.50	1.57	2.38	2.91	2.90
Production						
Baseline	.00	.00	.20	.00	.00	.00
Vocabulary Intervention	.15	1.00	.86	2.46	2.73	2.90
Comprehension						
Baseline	.00	.00	.20	.00	.00	.00
Vocabulary Intervention	.82	1.46	1.71	2.77	2.45	2.90

Vocabulary Intervention

During the vocabulary intervention condition, the classroom teacher added a 30 minute conceptually based sign language vocabulary session per day to her current program. Two types of vocabulary were used during the intervention, and included single and multiple meaning vocabulary words: Dolch words and Bridge phrases. The vocabulary intervention sessions were composed of three components: (1) word introduction; (2) word activity (semantic mapping); and (3) practice. Four sessions were conducted per week, 2 devoted to learning Dolch words and 2 devoted to learning Bridge phrases. During the vocabulary intervention, students learned 3 Dolch words or 3 Bridge phrases per session, for a total of 6 Dolch words and 6 Bridge phrases learned per week.

Students were assessed two times per week to determine mastery of vocabulary with results and findings based on these assessment data.

Research Question 1: To what extent does the vocabulary intervention effect the recognition of single or multiple meaning words and phrases?

Overview Findings: Recognition of Dolch Words Analysis

Table 4 displays the mean number of Dolch words recognized during baseline and the vocabulary intervention condition for all students. Substantial increases in the mean number of Dolch word recognition was observed by all students. For instance, during baseline, Dolch word recognition ranged from .00 to .33 words. During the vocabulary intervention condition, the means increased considerably and ranged from 1.87 to 3.00 words recognized. Students with the most improvement were Charlie and Jill who improved their recognition mean the most improving from .00 and .33 to 3.00 words. Three students (Dave, Joe, and Kurt) also improved to more than two words and increased their means from .00 and .33 to 2.18 (Dave), 2.57 (Joe), and 2.69 (Kurt). Finally, Bob was the only student who made the least improvement in mean number of Dolch words recognized, improving from .00 to 1.87 words.

Figures 3 and 4 display the number of mastered/emerging Dolch words produced by each student during multiple-baseline and the vocabulary intervention condition across six subjects. As illustrated in the figures, changes in level from baseline to the introduction of the intervention indicated that all students immediately and positively increased their recognition of mastered Dolch words. Three students (Bob, Dave, and Kurt) immediately increased their performance from zero words recognized to two words. Three students (Joe, Charlie, and Jill) increased their performance to three words.

This demonstrates that the intervention had an immediate and positive effect on the students' ability to recognize the new vocabulary. Three students demonstrated the most consistent and stable progress: Charlie, Jill, and Kurt. Charlie and Jill's recognition increased immediately, after the vocabulary intervention was introduced, and mastered three out of three words (100%). This trend continued throughout the duration of the intervention and both students consistently mastered recognition of three out of three words during all weekly assessments. Kurt also demonstrated an immediate increase at the onset of the intervention and accurately recognized two out of the three vocabulary words. As the intervention proceeded, he improved his recognition to all three words for 77% of the intervention assessments.

Variability among the students' recognition of Dolch word vocabulary was also demonstrated by two students (Bob and Dave). Bob and Dave were two students with additional disabilities who demonstrated the most variability in their performance and ability to recognize vocabulary words. For instance, several data points for both students dropped to baseline performance with 27% of their data being in this data range (zero words mastered). For the remainder of the intervention, both students improved their performance by mastering recognition of more than one word per assessment session, resulting in an upward improving trend in the data.

Figure 3 Recognition: Number of Dolch Words Mastered/Emerging

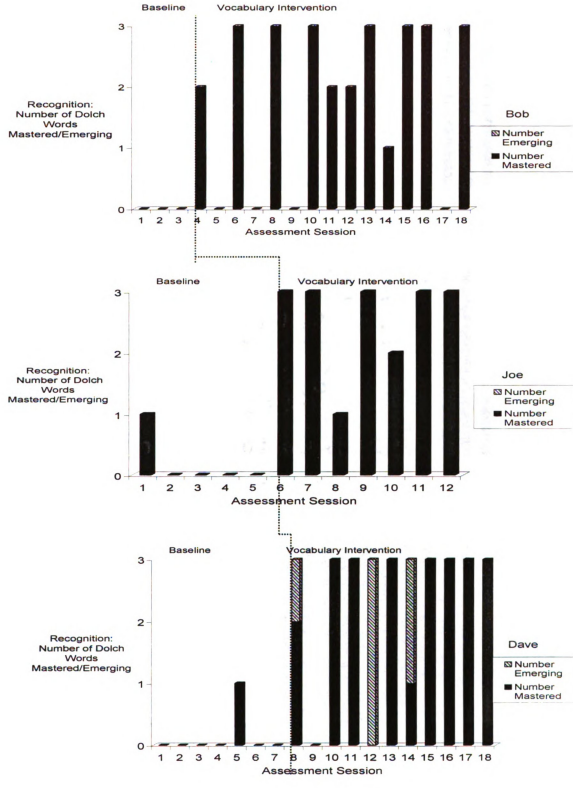


Figure 4 Recognition: Number of Dolch Words Mastered/Emerging

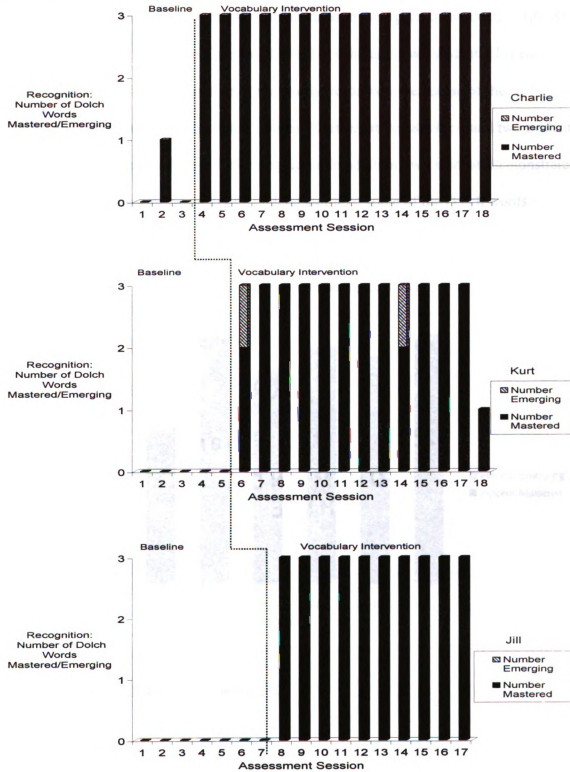
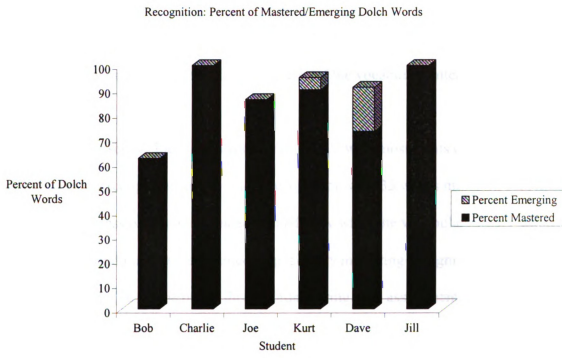


Figure 5 displays the recognition percentage of Dolch words mastered per student during the vocabulary intervention. As demonstrated in the figure, all students mastered recognition of more than 60% of the Dolch word vocabulary. Two students (Jill and Charlie) mastered 100% recognition of the Dolch words over the course of the vocabulary intervention. Two students (Joe and Kurt) mastered 86-90%, and two students (Dave and Bob) mastered below 75% recognition. In addition, two students demonstrated improvement by showing an emerging understanding of some of the Dolch words.

Figure 5



Note: Baseline for all students is below 1%.

Individual Analysis

Bob.

During baseline, Bob's mean number of Dolch words recognized was .00, a stable performance with all data points at zero mastery across three assessment sessions. At the introduction of the vocabulary intervention condition, Bob showed immediate improvement and demonstrated recognition mastery of two of the three Dolch vocabulary words. During the course of the eight week intervention, Bob's performance was variable with 27% of his data points falling back toward baseline mastery at zero Dolch words recognized. Although Bob's performance was variable, he showed improvement in his ability to recognize the vocabulary, as 47% of his recognition mastery occurred at the level of three out of three words correctly recognized. Overall, Bob improved his mean number of words recognized from .00 to 1.87, mastered 63% of the Dolch vocabulary words, with 28 words mastered during the course of the vocabulary intervention.

Joe.

During baseline, Joe's performance was stable with most of his data at zero Dolch word vocabulary recognized and his mean recognition was .33 words mastered across five assessment sessions. Joe responded immediately when the vocabulary intervention was introduced and his first week reflected positively mastering recognition of all Dolch vocabulary words (i.e., three out of three words) during both assessment sessions. For the remainder of the vocabulary intervention, Joe's performance continued to improve positively with an increasing trend and considerable improvement with a mean of 2.57 vocabulary words mastered. Overall, Joe mastered 86% recognition, with 18 words mastered during the course of the vocabulary intervention. It should be noted that Joe was expected to finish the vocabulary intervention for a total of seven weeks, however after the fifth week of the intervention, Joe was absent for the remainder of the school year.

Dave.

During baseline, Dave's performance was stable with a mean number of Dolch words recognized at .14 words across seven assessment sessions. He responded positively with the introduction of the vocabulary intervention and recognized two of the three vocabulary words. During the next five weeks Dave's performance was variable, ranging from zero words recognized to three words. However during the last 2 weeks of the intervention, Dave's performance became stable and he mastered 100% of the vocabulary words during the last four assessment sessions. Dave's mean number of mastered vocabulary words recognized considerably increased from .14 during baseline to 2.18 words during the vocabulary intervention. In addition, Dave demonstrated an increasing positive trend in his performance. Overall, at the conclusion of the vocabulary intervention, Dave mastered 73% (24 words) of the Dolch word vocabulary during the course of the vocabulary intervention.

Charlie.

During the baseline condition, Charlie's mean number of Dolch vocabulary words recognized was .33 words across three assessment sessions. Charlie immediately responded with the introduction of the vocabulary intervention and demonstrated increased positive performance scoring 100% recognition on all three vocabulary words. Over the course of the next eight weeks, Charlie's performance remained stable and he continued to master 100% of the weekly Dolch vocabulary words. Overall, Charlie mastered 100% (45 words) of the Dolch vocabulary, resulting in a substantial increased mean of 3.00 words mastered during the course of the vocabulary intervention.

Kurt.

During the baseline condition, Kurt's mean number of Dolch vocabulary words recognized was .00 words mastered across five assessment sessions. At the onset of the intervention, Kurt immediately demonstrated an improvement of performance and accurately recognized two of the three vocabulary words. His performance then increased again and he mastered 100% (i.e., three out of three words) and continued this trend for the next three and half weeks, or over seven assessment sessions. Kurt's mastery dropped one time to two words mastered and then returned to three out of three (100%) words mastered for three assessment sessions. At the end of the vocabulary intervention, Kurt's performance dropped again to one word mastered, resulting in a slight downward trend in his data. Overall, Kurt mastered 90% of the vocabulary words, considerably increased his mean number of words recognized to 2.69, with 35 words mastered during the course of the vocabulary intervention.

Jill.

During baseline, Jill's performance was stable and low, recognizing a mean of .00 Dolch vocabulary words across four assessment sessions. She immediately responded positively when the vocabulary intervention was introduced and mastered 100% (i.e., three out of three) of the Dolch vocabulary words. This positive performance continued for the entire five week intervention period and Jill mastered 100% of all Dolch vocabulary words taught, substantially increasing her mean number of words to 3.00 with 30 words mastered during the course of the vocabulary intervention.

Overview of Findings: Recognition of Bridge Phrase Analysis

Table 5 displays the mean number of Bridge phrases recognized during baseline and the vocabulary intervention condition. Substantial increases in the mean number of

Bridge phrase recognition was observed by all students. For instance, during baseline, mean number of Bridge phrases recognized for all students was .00 phrases. During the vocabulary intervention, the mean number of Bridge phrases considerably increased for all students and ranged from .46 to 2.91 phrases, illustrating a wide range of mastery. Students with the most improvement were Kurt, Jill, and Dave, who increased their recognition mastery to at least 2.38 or better. Bob, Charlie and Joe increased their mean Bridge phrase recognition the least at .46, 1.50, and 1.57 phrases, respectively.

Figures 6 and 7 display the number of mastered/emerging Bridge phrases recognized by each student during the multiple-baseline and vocabulary intervention across six subjects. As illustrated by the figure, changes in level of performance from baseline to the introduction of the intervention indicated that all six students immediately and positively improved their recognition of Bridge phrases. Five of the students, Bob, Joe, Kurt, Dave and Jill considerably improved correct recognition by all three words at the onset of the vocabulary intervention. Charlie improved recognition by one word, but also improved recognition by emerging on two words. Two students, Dave and Jill demonstrated an immediate and rapid upward trend in recognition of Bridge phrases, scoring three out of three at the beginning of the vocabulary intervention. Their performance remained stable and both students continued to accurately recognize three out of three phrases for more than 91% of the assessment sessions. Bob's performance also remained stable throughout the vocabulary intervention. His mastery of Bridge phrase recognition remained within baseline levels, with 77% of his mastery falling at zero phrases mastered. Students also demonstrated variability within their recognition

mastery. Charlie, Kurt, and Joe all fluctuated between baseline levels (zero phrases mastered) and three phrases mastered.

Figure 6 Recognition: Number of Bridge Phrases Mastered/Emerging

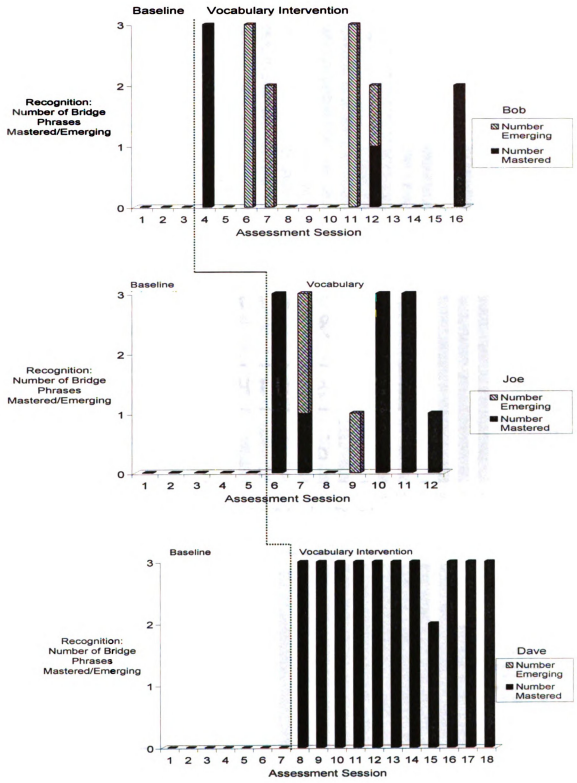


Figure 7 Recognition: Number of Bridge Phrases Mastered/Emerging

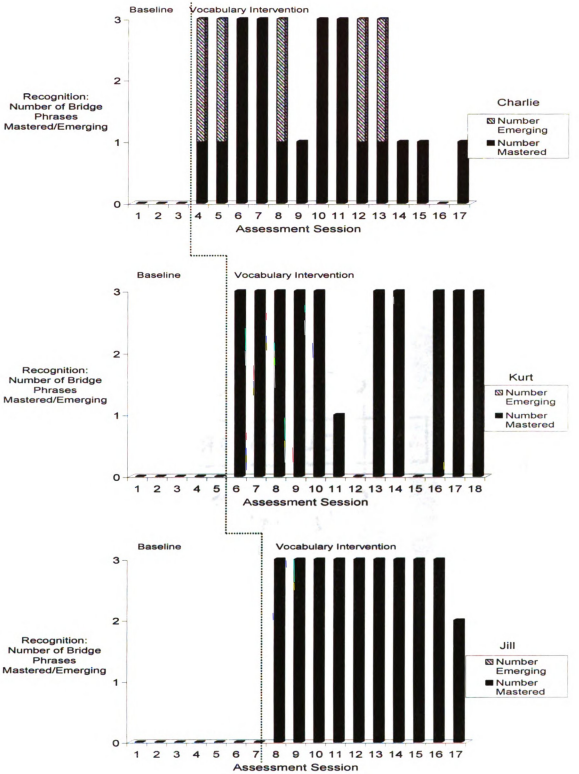
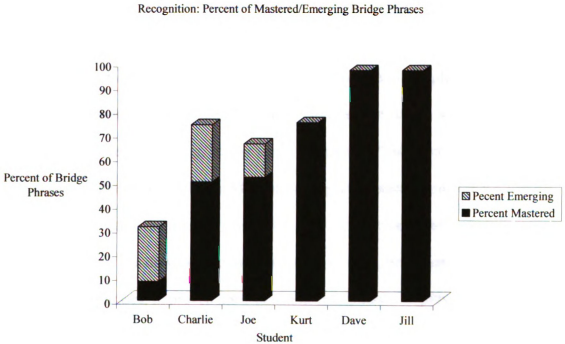


Figure 8 displays the percent of mastered Bridge phrases by all students. As illustrated, the percent of mastery ranged from 8% to 97% phrases mastered. Two students (Jill and Dave) mastered 97% of the phrases, mastering the majority of the vocabulary. Joe, Kurt, and Charlie mastered more than half of the phrases. Bob showed very little recognition mastery, only recognizing 8% of the vocabulary. In addition, three students demonstrated improvement by showing an emerging understanding of some of the Bridge phrases.

Figure 8



Note: Baseline for all students is below 1%.

Individual Analysis

Bob.

During the baseline condition, Bob's mean number of Bridge phrases recognized was .00 phrases across three assessment sessions. Bob's performance displayed an immediate increase in the number of phrases recognized (i.e., three out of three) at the onset of the intervention, followed by another immediate and rapid decrease in recognition to 0 out of 0 phrases accurately recognized. This trend in lack of mastery to recognize Bridge phrases continued during the intervention with performance remaining at zero phrases recognized. However, it should be noted that although Bob was unable to completely recognize most (92%) Bridge phrases, he did make progress in attempting to recognize the phrases, with several emerging scores throughout the intervention. For example, when asked to spell the Bridge phrase "tree fall down," Bob spelled "tree f" and repeated the sign for the phrase. In this case, Bob was unable to complete the spelling of the phrase. However, he did recognize the word "tree" and "f" in the word "fall." For his response, Bob scored "emerging," rather than "accurate" or "incorrect," since he attempted to spell part of the phrase. Most of Bob's performance during the vocabulary intervention fell within the baseline level, with 77% of his scores at zero phrases mastered, resulting in a downward trend in his data. Overall, Bob mastered only 8% of the total Bridge phrases, improved his mean number of phrases slightly to .46 phrases, and mastered 6 phrases during the course of the vocabulary intervention.

Joe.

During the baseline condition, Joe's performance was stable and low, with a mean number of Bridge phrases at .00 phrases recognized across five assessment sessions. Joe demonstrated an immediate and positive response when the vocabulary intervention was implemented and mastered recognition of all three (100%) Bridge phrases during the first

assessment session. However, this mastery did not remain constant. During the next three sessions Joe's performance dropped to mastery of one phrase and then down to baseline levels at zero words recognized. During the next two sessions Joe improved his recognition mastery and increased to all three phrases (100%) and then declined again to one phrase recognized. This trend in data illustrated an increasing, yet variable data pattern. Overall, Joe improved his mean number of Bridge phrases recognized to 1.57 words, mastered 52%, with 6 phrases mastered during the course of the vocabulary intervention.

Dave.

Dave's performance during the baseline condition was stable and low, with all data points at zero Bridge phrases recognized, resulting in a mean of .00 phrases mastered. When the vocabulary intervention was implemented, Dave demonstrated an immediate and positive response, resulting in his mastery of all three Bridge phrases (100%) recognized. This level of 100% mastery was demonstrated over nine assessment sessions. Dave's improvement only declined by one phrase during the entire vocabulary intervention. Overall, data remained stable with a slight decline in trend. In addition, Dave substantially improved his mean number of Bridge phrases recognized to 2.91 words, mastered 97% of the phrases taught, with 32 phrases mastered during the course of the vocabulary intervention.

Charlie.

During the baseline condition, Charlie's mean number of Bridge phrases recognized was .00 over three assessment sessions. When the vocabulary intervention was introduced, Charlie improved his recognition mastery of Bridge phrases by one

phrase during the first assessment session, and again by one phrase during the second session. During week two, Charlie accelerated his improvement by mastering recognition of all three phrases (100%) for both assessment sessions. Charlie's performance continued to be variable over the next two weeks and then leveled off during weeks five and six. During this time, Charlie mastered only one phrase per session. This trend in data performance resulted in a negative downward slope. Overall, Charlie improved his mean number of Bridge phrase recognition to 1.50 phrases, mastered 50% of the phrases during the vocabulary intervention, with 21 phrases mastered during the course of the vocabulary intervention.

Kurt.

During baseline condition, Kurt's mean number of Bridge phrases recognized was .00 phrases mastered across five assessment sessions. At the onset of the vocabulary intervention, Kurt immediately and positively increased his mastery of Bridge phrases recognized by mastering three out of three (100%) of the phrases. Kurt continued to master recognition of phrases for five consecutive assessment sessions and then his performance declined to one phrase recognized and then again to zero phrases recognized. However, Kurt's performance accelerated again and he improved his recognition during the next two sessions to 100% mastery. This was followed by another drop in performance to zero mastered and then an immediate acceleration in improvement to 100% mastery that leveled off over three assessment sessions as the vocabulary intervention concluded. This variable trend in data performance resulted in a downward slope in Kurt's data. Overall, Kurt's' mean number of Bridge phrases improved to 2.38 phrases mastered, with a range of .00 to 3.00. In addition, Kurt

mastered recognition of 74% of the Bridge phrases with 31 phrases mastered during the course of the vocabulary intervention.

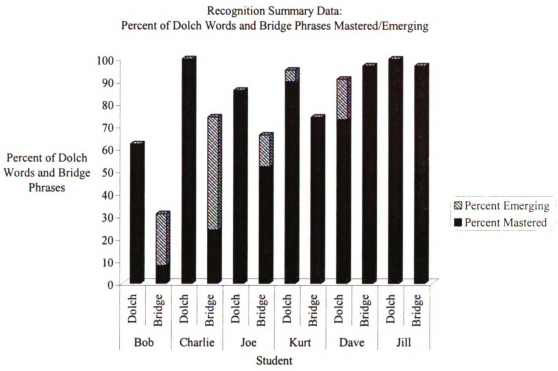
Jill.

During the baseline condition, Jill's mean number of Bridge phrases recognized was .00, a stable performance across seven assessment sessions. At the onset of the vocabulary intervention condition, Jill immediately and positively improved her mastery of Bridge phrase recognition, by demonstrating mastery of 100% of the Dolch words (three out of three). She continued to master production all Bridge phrases for the next nine assessment sessions. During the last assessment session, Jill's performance dropped by one phrase, causing her data trend to decline slightly. Overall, Jill substantially improved her mean number of Bridge phrases recognized to 2.90 words, mastered 97% of the phrases, with 29 phrases mastered during the course of the vocabulary intervention.

Research Question 1 Summary

Figure 9 displays the summary data for Research Question 1: Recognition. As illustrated in the figure, results from baseline to the intervention for both Dolch words and Bridge phrases were substantial. Analysis of the vocabulary intervention on the students' Dolch word and Bridge phrase recognition indicated that all students made substantial gains during the course of the intervention. This finding was supported through both individual and group analyses and indicated that all students made substantial gains in performance during the course of the intervention. These considerable gains are illustrated in the students' increase in mean performance from baseline to intervention, the increase in the number of words/phrases mastered, and the increase in percent of words/phrases mastered by all students.

Figure 9 Recognition Summary Data



Note: Baseline for all students was below 1%.

Research Question 2: To what extent does the vocabulary intervention effect the production of single or multiple meaning words and phrases?

Overview Findings: Production of Dolch Word Analysis

Table 4 displays the mean number of Dolch words produced during baseline and the vocabulary intervention condition. Substantial increases in the mean number of Dolch word production was observed by students. For instance, during baseline, mean number of Dolch words produced ranged from .00 to .33 words. During the vocabulary intervention condition, the means considerably improved and ranged from 1.53 to 2.87 words. Students with the most improvement were Charlie, Joe, Kurt, and Jill. These four

students improved their mastery of production by more than 2.5 words. Bob's mastery improved the least, although his mean performance increased by more than 1.5 words during the duration of the vocabulary intervention.

Figures 10 and 11 display the number of mastered/emerging Dolch words produced by each student during multiple baseline and vocabulary intervention condition across six subjects. As illustrated by the figures, changes in level from the end of baseline to the introduction of the intervention indicated that all students increased their production of mastered Dolch words. In this case, five of the six students (Joe, Drew, Charlie, Kurt and Jessica) immediately increased their production of Dolch words by three words at the beginning of the intervention. Joe also was the only student who improved mastery production by two words. It should be noted that Joe demonstrated improvement in all three words at the beginning of the intervention. However, his third Dolch word was rated as "emerging." That is, Joe attempted to sign the word correctly, but was not accurate enough for full credit. In this instance, Joe signed the word "come," but the motion of his sign was incorrect. Correct motion would be the index fingers coming toward the body. However when Joe signed "come," he signed in an arc from the right shoulder to the left shoulder. In this case, Joe correctly signed the handshape (index fingers), location (signed within the correct space), orientation (palms facing body), and manner (unidirectional restrained). As noted with the Dolch recognition, the pattern of improvement in performance demonstrated by all students during the intervention illustrated an immediate effect on the students' ability to produce the new vocabulary.

During the duration of the vocabulary intervention, all students demonstrated trends in their data. Charlie, Kurt, and Jill all positively responded to the intervention and

mastered production by immediate increased improvement of three out of three vocabulary words at the onset of the intervention. This positive trend continued for these three students during entire duration of the vocabulary intervention, with only five data points dropping below 3 out of three words mastered. Overall, these students were able to demonstrate substantial mastery of production by all three weekly words in more than 85% of the assessment sessions. Joe's performance and mastery of production showed positive improvement and increased by two words at the introduction of the intervention and then improved again the next assessment session by mastering all three weekly words. Over the next three weeks, Joe's performance declined by two words during one assessment session, and then immediately increased again to 100% mastery of all of the weekly vocabulary words. Both Bob and Dave demonstrated variability in their performance mastery of Dolch word vocabulary. Bob's production mastery ranged from 0 to 3 words mastered with 53% of his recognition reaching baseline levels (0 to 1 word produced). Dave's performance also varied, ranging from 1 to 3 words mastered. Yet, 63% of is mastery occurred at three out of three Dolch words produced.

Figure 10 Production: Number of Dolch Words Mastered/Emerging

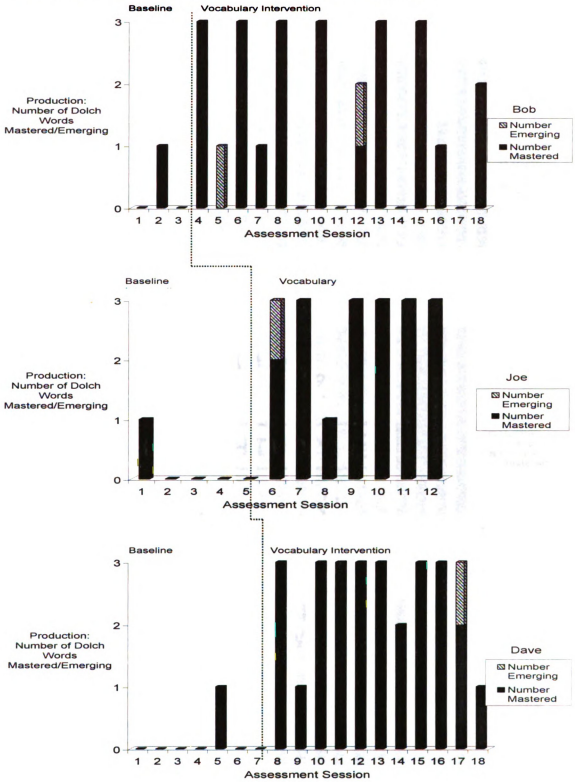


Figure 11 Production: Number of Dolch Words Mastered/Emerging

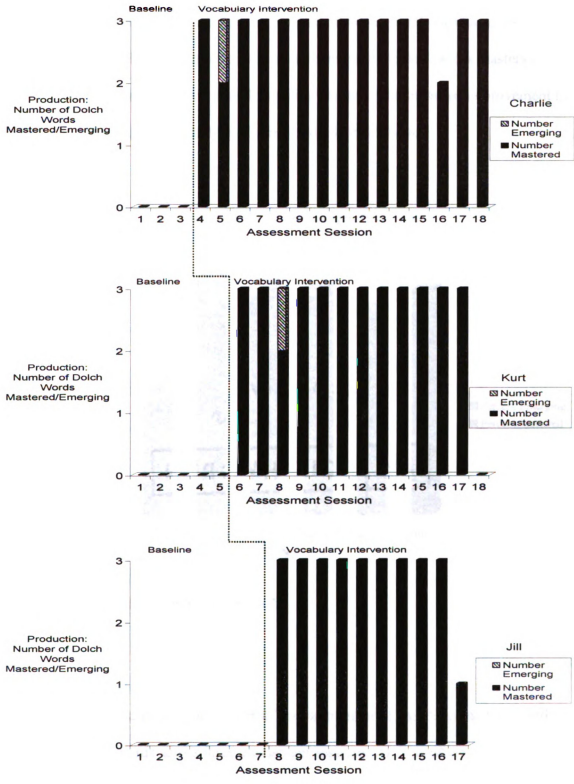
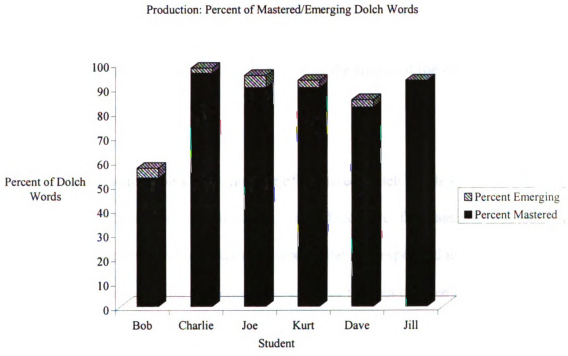


Figure 12 displays overall mastery of production of the Dolch words. As illustrated in the figure, four students mastered production of 90% or more Dolch word vocabulary. These students, Kurt, Joe, Jill, and Charlie consistently produced the vocabulary accurately. A lower level of mastery continued for Bob, as his mastery of production fell to the 50% level. In addition, five students demonstrated improvement by showing an emerging understanding of some of the Dolch words.

Figure 12



Note: Baseline for all students was below 1%.

Individual Analysis

Bob.

During the baseline condition, Bob's mean number of Dolch vocabulary words produced was .33 words across three assessment sessions. An immediate positive increase in performance was observed with the introduction of the vocabulary

intervention. During this first assessment session, Bob increased his production mastery of the Dolch vocabulary words to 100% (i.e., three out of three words). As the vocabulary intervention continued however, Bob demonstrated the most variability within his data among the six students. For example, 33% of Bob's data points reached baseline levels with zero words produced accurately. However, he was able to produce 100% of all three vocabulary words during 40% of the assessment sessions. Further, Bob also produced mastery of more than one word per assessment session 67% of the time. The overall trend of Bob's data illustrated a downward shift in performance and ultimately Bob only mastered production of 53% of the Dolch word vocabulary, with 24 words mastered, and improved his mean number of words to 1.53 during the course of the vocabulary intervention.

Joe.

During baseline, Joe's mean number of mastered Dolch words was .20, a stable performance of data ranging close to .00 words produced over five assessment sessions. Introduction of vocabulary intervention illustrated that Joe responded immediately and positively to the intervention, mastering production of two out of three Dolch words. His performance improved again and Joe mastered 100% (i.e., three out of three words) production of the vocabulary during the second assessment session. Joe's performance only dropped one time during the course of the intervention, and during the second week he mastered only one of the three vocabulary words. For the remainder of the vocabulary intervention condition Joe's performance was stable at 100% mastered production for four assessment sessions, resulting in a positive upward trend in his data. Overall, Joe considerably improved his mean number of vocabulary words to 2.57, mastered 90% of

the Dolch vocabulary words with 19 words mastered during the course of the vocabulary intervention.

Dave.

During the baseline condition, Dave's mean number of Dolch words produced was .14 words over seven assessment session. At the onset of the vocabulary intervention, Dave responded immediately and positively and mastered 100% of the Dolch vocabulary words (i.e., three out of three). During the second assessment session, Dave's performance dropped to mastery of only one vocabulary word, and then increased again the next session to 100% mastered production. Further, Dave also demonstrated some variability in his performance, by fluctuating between mastering one or two vocabulary words during four assessment sessions and then improved production to 100% (i.e., three vocabulary words) across the remaining seven sessions (i.e., 64% of the assessment sessions). This pattern of data performance resulted in a slight downward trend in Dave's data. Ultimately, Dave considerably improved his mean number of words produced to 2.45, mastered production of 82% of the Dolch vocabulary words with 27 words mastered during the course of the vocabulary intervention.

Charlie.

During the baseline condition, Charlie's mean number of Dolch words produced was .00, a stable performance across three assessment sessions. At the introduction of the vocabulary intervention, Charlie responded immediately and positively mastered all three Dolch vocabulary words (100%). His improved positive performance of 100% mastered production remained stable, with only two declines in number of Dolch vocabulary words. This pattern of behavior resulted in a positive upward trend in his data. Overall,

Charlie considerably improved his mean number of Dolch words produced to 2.87 words and mastered 96% of the vocabulary, with 43 words mastered during the course of the vocabulary intervention.

Kurt.

Kurt's mean number of Dolch words produced during the baseline condition was .00 words, a stable performance across five assessment sessions. Kurt responded immediately and positively when the vocabulary intervention condition was introduced, and improved his production mastery of all three vocabulary words (100%). His performance declined to two words produced accurately during the second week of the vocabulary intervention, but increased again to 100% for the next nine sessions. At the conclusion of the vocabulary intervention condition, Kurt's production mastery declined again during the last assessment session to zero words mastered, causing the trend of his performance to decline slightly. His classroom teacher noted that Kurt was not actively engaged during the last intervention session, therefore causing his difficulty in mastering the target Dolch vocabulary words. Overall, Kurt considerably improved his mean number of mastered Dolch vocabulary words produced to 2.69, mastered 90% of the vocabulary, with 35 words mastered during the course of the vocabulary intervention.

Jill.

During the baseline condition, Jill's mean number of Dolch words produced was .00, a stable performance across seven assessment sessions. At the onset of the vocabulary intervention condition, Jill immediately and positively improved her mastery of Dolch word production, and demonstrated mastery of 100% of the Dolch words (three out of three). She continued to master production of all Dolch vocabulary for the next

eight assessment sessions. During the last assessment session, Jill's performance dropped by two vocabulary words, causing her data trend to decline slightly. Overall, Jill substantially improved her mean number of Dolch words produced to 2.80 words, mastered 93% of the vocabulary, with 28 words mastered during the course of the vocabulary intervention.

Overview of Findings: Production of Bridge Phrase Analysis

Table 5 displays the mean number of Bridge phrases produced for all students during baseline and the vocabulary intervention condition. There was a substantial increase in mean number of Bridge phrases produced for most students. During baseline, the mean number of Bridge phrases produced by the students ranged from .00 to 0.20 phrases. During the vocabulary intervention condition, the mean number of Bridge phrases produced by all the students considerably improved and ranged from .15 to 2.90, illustrating a wide range of improvement. Three students (Kurt, Dave and Jill) showed the most improvement, considerably increasing their means from .00 to 2.46 (Kurt), 2.73 (Dave) and 2.90 (Jill) respectively. The students whose performance increased the least were Bob, Joe, and Charlie, increasing their means from .00 to .15 (Bob), .86 (Joe), and 1.0 (Charlie) respectively.

Figures 13 and 14 display the number of mastered/emerging Bridge phrases produced by each student during multiple-baseline and vocabulary intervention across six subjects. As illustrated in the figures, changes in level from baseline to the introduction of the intervention indicated that four (Joe, Kurt, Dave, and Jill) students immediately and positively increased their performance by accurately producing all three Bridge Phrases. Charlie and Bob were unable to produce all three Bridge Phrases accurately, however

both boys demonstrated improvement in production by approximating the signs of all three Bridge phrases. As the intervention proceeded, both Dave and Jill consistently maintained performance by accurately producing all three Bridge Phrases on a weekly basis. The remaining students demonstrated variable performance. Two students (Charlie and Kurt) demonstrated mastery that ranged from zero phrases produced to three phrases.

Figure 13 Production: Number of Bridge Phrases Mastered/Emerging

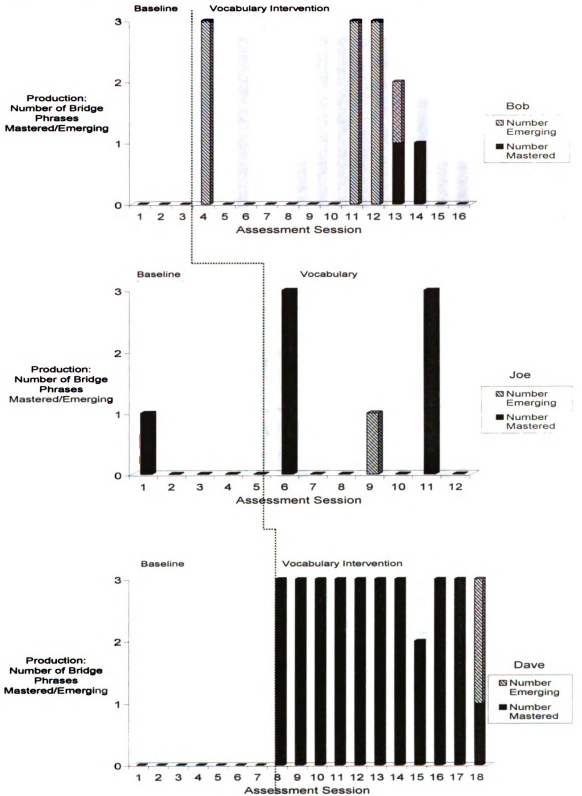


Figure 14 Production: Number of Bridge Phrases Mastered/Emerging

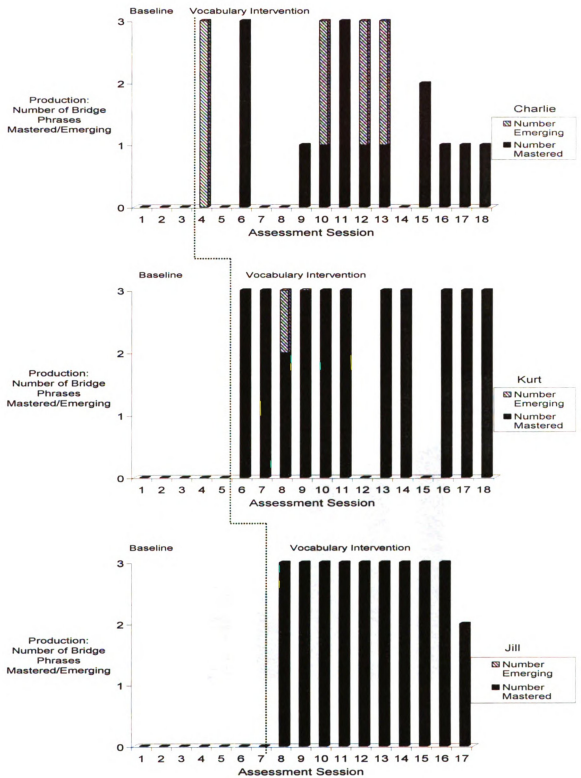
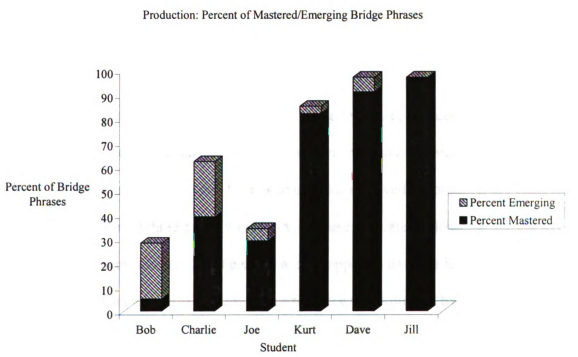


Figure 15 displays the percentage of mastered Bridge phrases produced by all six students. Three students (Jill, Dave, and Kurt) mastered the highest number of Bridge phrases, with production mastery at 97%, 91%, and 82%. Charlie and Joe mastered production of few phrases at 39% and Joe mastered 29% of the Bridge phrases respectively. Finally, Bob was unable to accurately produce more than two Bridge Phrases during the entire intervention, and mastered 5% of the phrases. Fortunately, Bob showed progress by approximating nine (23%) Bridge Phrases, indicating an emerging level of understanding. In addition, five students demonstrated improvement by showing an emerging understanding of some of the Bridge phrases.

Figure 15



Note: Baseline for all students was below .07%.

Individual Analysis

Bob.

During baseline, Bob's mean number of Bridge phrases recognized was .00 phrases mastered across three assessment sessions. When the vocabulary intervention was introduced, Bob made no improvement in his recognition of phrases consistently over nine assessment sessions, remaining at baseline level. During the fifth week of the intervention, Bob improved his recognition to one phrase per session and then dropped back to baseline level at zero phrases recognized. However, Bob did improve recognition by demonstrating an emerging level of understanding for nine phrases during the vocabulary intervention. Overall, Bob improved his mean number of Bridge phrases only slightly to .15 phrases mastered, with a range of .00 to 1.00 phrases. In addition, Bob mastered 5% of the Bridge phrases, with 2 phrases mastered during the course of the vocabulary intervention.

Joe.

During baseline, Joe's mean number of Bridge phrases produced was .20 phrases mastered across five assessment sessions. When the vocabulary intervention was introduced, Joe immediately responded positively and improved his production mastery to 100%, and produced three out of three Bridge phrase accurately. However, during the next four assessment sessions, Joe's performance dropped to baseline levels at zero phrases produced accurately. This drop in performance was followed by a positive acceleration when Joe demonstrated 100% mastery of Bridge phrase production during one assessment session. The conclusion of the vocabulary intervention condition resulted in another drop in performance to baseline levels at zero phrases recognized, thus

illustrating a variable downward trend in Joe's data. Overall, Joe improved his mastery of Bridge phrases slightly to .86 phrases produced, mastered 29% of the phrases, with 6 phrases mastered during the course of the vocabulary intervention.

Dave.

During baseline, Dave's mean number of phrases produced was .00 phrases mastered, across seven assessment sessions. The introduction of the vocabulary intervention condition resulted in an immediate and positive improvement in Dave's performance, with 100% mastery of three out of three Bridge phrases. This level of 100% production mastery remained stable for seven consecutive assessment sessions, followed by a drop in one phrase. Dave improved his performance again immediately after and mastered 100% of the Bridge phrases again for two more sessions, followed by another drop in performance to one phrase mastered at the conclusion of the vocabulary intervention. Dave's decline at the end of the intervention condition resulted in a slight downward trend in his data. Overall, Dave considerably improved his mean number of Bridge phrases produced to 2.73 phrases. In addition, Dave mastered 91% of the phrases with 30 phrases mastered during the course of the vocabulary intervention.

Charlie.

During baseline, Charlie's mean number of Bridge phrases produced was .00 phrases mastered, over four assessment sessions. The introduction of the vocabulary intervention condition resulted in no change in behavior during the first assessment session. However during session two, there was an immediate and positive improvement in Charlie's performance, with mastery of 100% (three out of three) of the Bridge phrases. Charlie's production was variable during the seven week vocabulary

intervention condition, with three sessions at 3 out of 3 phrases mastered, one session at 2 phrases mastered, seven sessions at 1 phrase mastered, and three sessions at 0 phrases mastered. His data therefore reflected a slight upward trend in performance, yet overall Charlie mastered only 39% of the Bridge phrases , with 15 phrases mastered during the course of the vocabulary intervention. Overall, Charlie improved his mean number of Bridge phrases produced to 1.00 phrases.

Kurt.

During baseline, Kurt's mean number of Bridge phrases produced was .00 mastered over five assessment sessions. The introduction of the vocabulary intervention condition resulted in an immediate and positive improvement in Kurt's production mastery of Bridge phrases with 100% (three out of three) mastered during the first and second assessment sessions. Most of Kurt's performance remained at 100% mastery with 10 out of 13 (77%) of his sessions at this level. His performance dropped three times to two words mastered and zero words mastered during the seven week intervention. This data pattern illustrated a slight downward trend in his performance. Overall, Kurt mastered 82% of the Bridge phrases, with 32 mastered, and a considerable increase in mean from .00 to 2.46 phrases mastered during the course of the vocabulary intervention.

Jill.

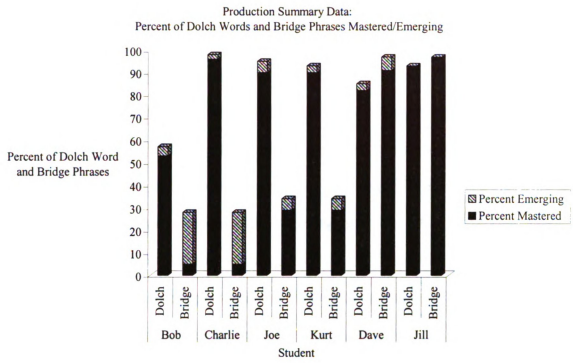
During baseline, Jill's mean number of Bridge phrases produced was .00 mastered over seven assessment sessions. The introduction of the vocabulary intervention condition resulted in an immediate and positive improvement in Jill's performance, with mastery of 100% (three out of three) of the Bridge phrases. This pattern remained stable for nine consecutive assessment sessions. During the last assessment session, Jill's

performance dropped by one phrase, causing her data trend to decline slightly. Overall, Jill substantially improved her mean number of Dolch words produced to 2.90 words, mastered 97% of the phrases, with 29 phrases mastered during the course of the vocabulary intervention.

Research Question 2 Summary

Figure 16 displays the summary data for Research Question 2: Production. As illustrated in the figure, results from baseline to the intervention for both Dolch words and Bridge phrases were substantial. Analysis of the vocabulary intervention on the students' Dolch word and Bridge phrase production indicated that all students made considerable gains during the course of the intervention. This finding was supported through both individual and group analyses and indicated that all students made substantial gains in performance during the course of the intervention. These considerable gains were illustrated in the students' increase in mean performance from baseline to intervention, the increase in the number of words mastered, and the increase in percent of words mastered by all students. Although less success was found for three students (Bob, Joe, and Charlie) in terms of Bridge phrase production, these students did make considerable gains when compared to their baseline levels. Further, the extent of both Bob and Charlie's additional disability should be considered when success with the intervention is examined.

Figure 16 Production Summary Data



Note. Baseline for all students was below 1%.

Research Question 3: To what extent does the vocabulary intervention effect the comprehension of single or multiple meaning words and phrases?

Overview Findings: Comprehension of Dolch Word Analysis

Table 4 displays the mean number of Dolch words comprehended during baseline and the vocabulary intervention condition. Substantial increases in the mean number of Dolch words comprehended was observed for all students. During baseline, mean number of Dolch words comprehended ranged from .00 to .20 words. During the vocabulary intervention condition, the means ranged from .69 to 2.80 words comprehended, illustrating a wide range of mastery. Joe, Kurt, Dave and Jill improved the most with their

mean comprehension mastery of at least a 2.43 or better in comprehension of Dolch words. Bob and Charlie demonstrated less improvement with their scores at .69 and 1.80 words comprehended during the intervention. Unfortunately, Bob's average performance did not improve much past more than one word per assessment session, but should be considered improvement, given the extent of his additional disability.

Figures 17 and 18 display the number of mastered Dolch words comprehended for each student during the multiple-baseline and vocabulary intervention across six subjects. As illustrated in the figure, changes in level from the end of baseline to the beginning of the intervention indicated that four students, Joe, Kurt, Dave and Jill all immediately increased their mastery of comprehension in the number of Dolch words. These four students improved their comprehension by all three words at the onset of the intervention. Charlie and Bob were unable to demonstrate accurate comprehension of the Dolch words, but did improve by "emerging" on all three assessed words. For example, when asked to "tell me something blue (the color blue)" Bob signed the word "blue" several times, but did not give an answer. The teacher prompted two more times by saying, "You know the color blue. What is blue?" Bob then responded by pointing to his shoes, which had blue on them. Since the teacher had to prompt Bob by telling him "blue" was a color, this was scored as emerging comprehension. A similar exchange occurred with Charlie when asked to "tell me a sentence about 'away'." Charlie repeated the sign back to the teacher, but did not give a sentence. The teacher then prompted by asking, "Remember yesterday when Kurt kept tapping you, what did you say? You said, 'go away' remember?" Charlie then responded by signing, "Go away Kurt." This response was also scored as emerging comprehension because of the teacher's prompting.

For the remainder of the vocabulary intervention, most students demonstrated relatively stable trends. Jill's performance was the most stable, improving at the onset of the vocabulary intervention to 100% (three out of three) mastery and remaining stable until the last week of the intervention when her performance dropped slightly to two out of three words comprehended. Joe's performance remained at 100% mastery for most (75%) of the assessment sessions, with only two drops in comprehension mastery. Charlie and Bob demonstrated the most variability in their data with several of their comprehension mastery reaching baseline levels at zero words comprehended. However, both boys' data patterns reflected an upward slope in their data trends.

Figure 17 Comprehension: Number of Dolch Words Mastered/Emerging

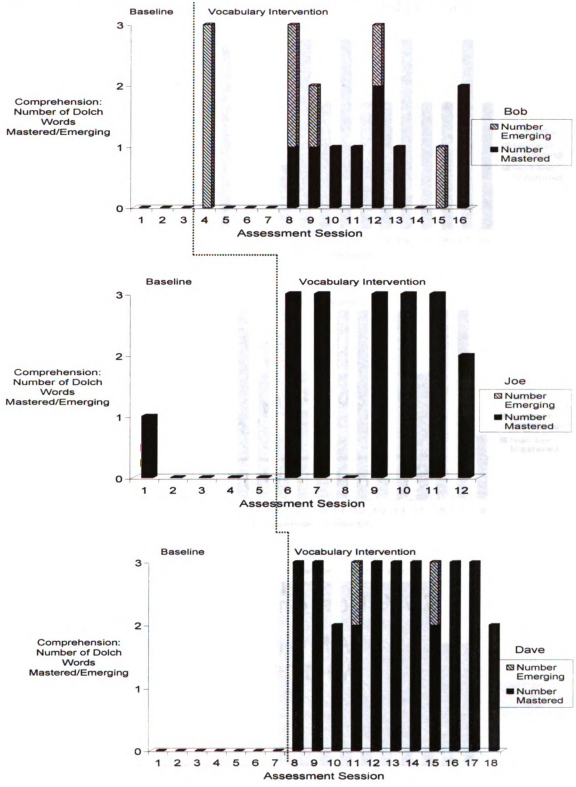


Figure 18 Comprehension: Number of Dolch Words Mastered/Emerging

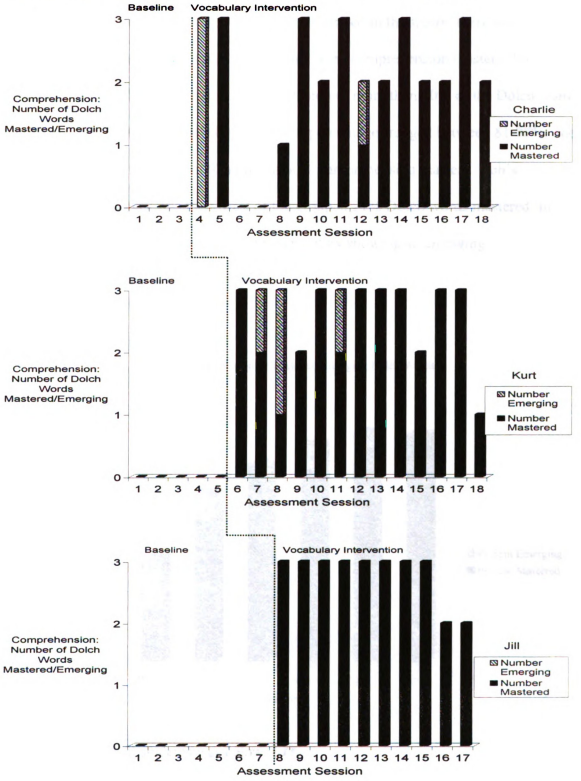
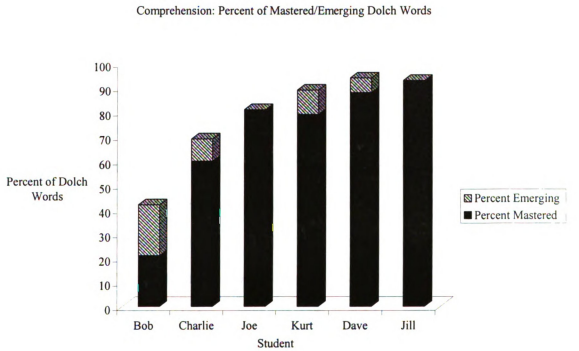


Figure 19 displays the comprehension percentage of Dolch words mastered per student during the vocabulary intervention. As illustrated in the figure, there was variability among the student's percent of Dolch word comprehension mastery. For instance, one student (Jill) mastered comprehension of more than 90% of the Dolch word vocabulary, while two students' (Dave and Joe) percentages ranged between 81-88%, one student at 79%, and one student (Charlie) at 60% comprehension mastery. Bob's comprehension mastery was the lowest of the group at 21% Dolch words mastered. In addition, four students demonstrated improvement by showing an emerging understanding of some of the Dolch words.

Figure 19



Note: Baseline for all students was below .07%.

Individual Analysis

Bob.

During baseline, Bob's performance of Dolch word comprehension mastery was stable with all data points falling at zero comprehension and a mean of .00 across four assessment sessions. When the vocabulary intervention condition was introduced, no change in behavior was observed until the third week of the intervention. During this week, Bob accurately improved his comprehension and demonstrated mastery of two vocabulary words. This pattern of improvement continued for four consecutive weeks, with Bob improving his comprehension by a total of eight words. In addition, Bob also demonstrated an emerging understanding on seven words during the course of the intervention, indicating some improvement. Overall, Bob's data illustrated an accelerating improving trend, improving his mean number of words slightly to .69 words, mastered 21% of the words, with 8 words mastered during the course of the vocabulary intervention.

Joe.

During baseline, Joe's mean number of Dolch words comprehended was .20 over four assessment sessions. When the vocabulary intervention was introduced, Joe's performance immediately improved to mastery of comprehension for all three Dolch vocabulary words (i.e., 100% mastery) and continued for two assessment sessions. During week two of the vocabulary intervention, Joe's performance declined to baseline level (i.e., zero Dolch words mastered), and then quickly accelerated back to 100% mastery of all three Dolch vocabulary words. This mastery trend of 100% continued for three assessment sessions and ended with a small decline in mastery of comprehension of

two Dolch vocabulary words when the intervention concluded at week four. Although Joe completed the intervention early, his data was stable across the vocabulary intervention condition and demonstrated comprehension mastery of 81% of the Dolch vocabulary words, with 17 words mastered during the course of the vocabulary intervention. In addition, Joe considerably improved his mean number of Dolch vocabulary words comprehended from .20 to 2.43 words.

Dave.

During baseline, Dave's mean number of Dolch words comprehended was .00, a stable performance with all data points falling at zero Dolch vocabulary words comprehended over seven assessment sessions. At the onset of the vocabulary intervention condition, Dave immediately responded positively and demonstrated comprehension mastery of all three (i.e., 100%) Dolch vocabulary words. Over the course of the vocabulary intervention condition, all of Dave's scores occurred between 2 and 3 Dolch words comprehended, showing little variability. At the conclusion of the vocabulary intervention, Dave's performance dropped by one data point to comprehension of two vocabulary words, causing his data to show a slight downward trend. Overall, Dave demonstrated comprehension mastery of 88% of the Dolch words, with 29 words mastered during the course of the vocabulary intervention. In addition, Dave considerably increased his mean number of Dolch vocabulary words comprehended from .00 to 2.67 words.

Charlie.

During baseline, Charlie's mean number of Dolch words comprehended was .00, a stable performance with all data points falling at zero Dolch vocabulary words

comprehended over three assessment sessions. Charlie's performance during the vocabulary intervention varied greatly over the course of eight weeks. When the vocabulary intervention was introduced, Charlie showed no improvement in mastery of comprehension until the second assessment session, when he comprehended all three (100%) vocabulary words. During the second week of intervention, Charlie again demonstrated no comprehension of the vocabulary words, and then began improvement during week three and mastered comprehension of four of the six weekly words. A pattern of improvement continued during the remainder of the intervention with Charlie comprehending between 3-5 words per week. Since the second week of intervention, Charlie's performance did not fall to baseline scores. Overall, his data illustrated an accelerating variable trend and improved his mean number of Dolch words comprehended to 1.80. In addition, Charlie mastered 60% of the words, with 27 words mastered during the course of the vocabulary intervention.

Kurt.

During baseline, Kurt's mean number Dolch words comprehended was .00, a stable performance across five assessment sessions. When the vocabulary intervention condition was introduced, Kurt immediately responded to the intervention and positively improved and mastered comprehension of all three Dolch vocabulary words (100%). This initial improvement was followed by a decline in performance by one word and then two words for three assessment sessions. His overall data trend increased slightly and was stable. No data reached baseline levels and Kurt demonstrated improvement by at least 2 or more words during 85% of the assessments. Overall, Kurt considerably improved his mean number of Dolch words comprehended from .00 to 2.38 words, mastered 79% of

the Dolch vocabulary words, with 31 mastered during the course of the vocabulary intervention.

Jill.

During baseline, Jill's mean number of Dolch words comprehended was .00, a stable performance with no Dolch vocabulary words comprehended across seven assessment sessions. Jill was the only student who demonstrated immediate improvement at the onset of the vocabulary intervention, and accurately comprehended three out of the three (100%) vocabulary words. Her 100% mastery continued in a stable pattern for the duration of the six week intervention. This pattern of data performance indicated an immediate and lasting response to the vocabulary intervention. However, during the last week of the intervention (i.e., two assessment sessions) Jill's performance decreased by one vocabulary word for each session. Overall, Jill substantially improved her mean number of words comprehended from .00 to 2.80, mastered 93% of the Dolch words, with 28 words mastered during the course of the vocabulary intervention.

Overview of Findings: Comprehension of Bridge phrase Analysis

Table 5 displays the mean number of Bridge phrases comprehended during baseline and the vocabulary intervention condition for all six students. Substantial increases in the mean number of Bridge phrases comprehended was observed for all students. During baseline, the mean number of Bridge phrases comprehended ranged from .00 to .20 phrases. During the vocabulary intervention condition, all students substantially improved their mean number of comprehended phrases and ranged from .82 to 2.90 phrases, illustrating a wide range in the performance. Three students (Kurt, Dave, and Jill) demonstrated the most improvement, with their means at 2.45 or greater. The

remaining three students (Bob, Charlie, and Joe, demonstrated the least improvement with means ranging from .82 to 1.71 phrases comprehended.

Figures 20 and 21 display the number of mastered/emerging Bridge phrases comprehended by each student during the multiple-baseline and vocabulary intervention across six subjects. As illustrated in the figures, changes in level from baseline to the introduction of the vocabulary intervention indicated that all students increased their comprehension of Bridge phrases. Four students (Joe, Dave, Kurt, and Jill) immediately and positively increased their comprehension and mastered all three (100%) Bridge phrases. Bob also showed an immediate and positive increase in comprehension of the Bridge phrases, and mastered two of the three phrases. Charlie was the only student who showed no improvement in performance, as his comprehension mastery remained at baseline levels (zero phrases mastered) through the first week of the intervention. As the intervention proceeded, three students (Bob, Charlie, and Joe) demonstrated variable performance in their data. Their Bridge phrase comprehension fluctuated between baseline levels (zero phrases mastered) up through mastering all three Bridge phrases. Despite this variability, Bob and Charlie showed an upward trend in their data. Two students (Kurt and Jill) demonstrated the most stability in their data. Both students' consistently mastered comprehension of three our of three Bridge phrases throughout the vocabulary intervention.

Figure 20 Comprehension: Number of Bridge Phrases Mastered/Emerging

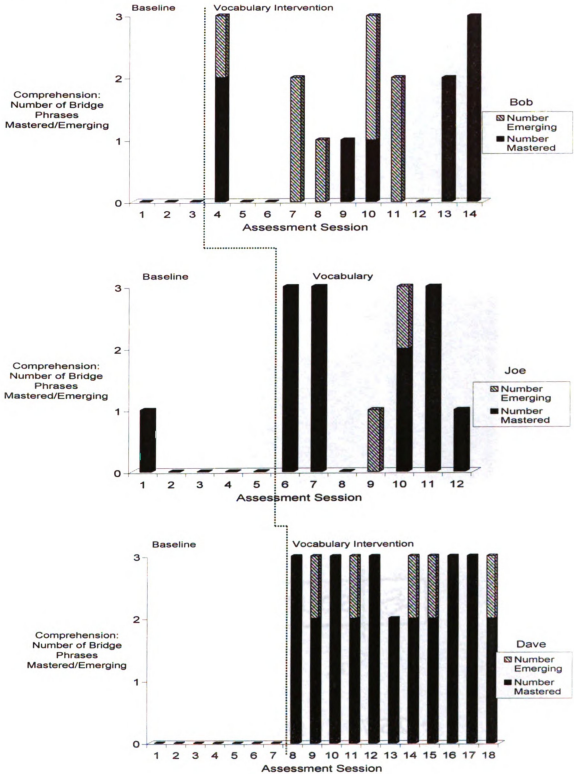


Figure 21 Comprehension: Number of Bridge Phrases Mastered/Emerging

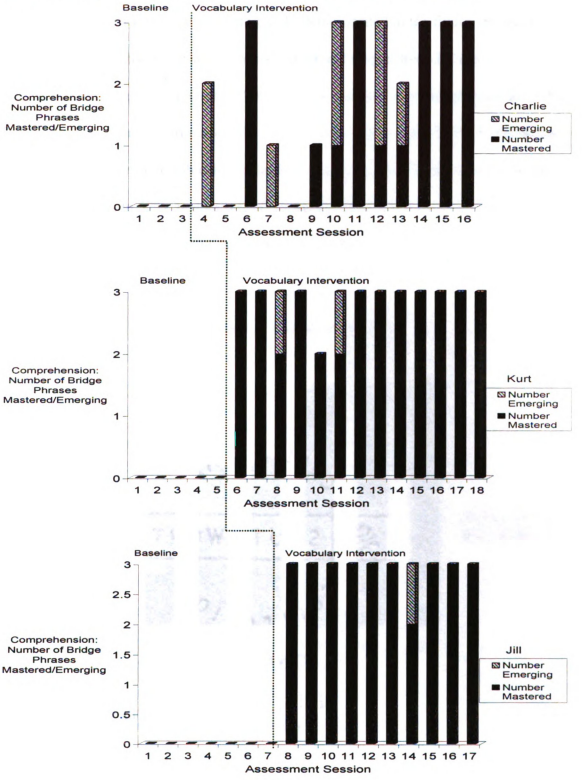
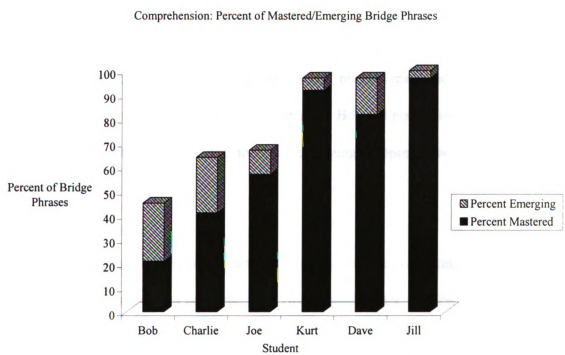


Figure 22 displays the comprehension percentage of Bridge phrases mastered per student during the vocabulary intervention. As demonstrated in the figure, the students' mastery varied greatly. For instance, percent mastered ranged from 21% to 97% comprehension among the students. Three students mastered a greater percentage of the Bridge phrases: Jill and Kurt mastered over 90% and Dave mastered 82% of the Bridge phrases. Joe, Charlie, and Bob demonstrated the least amount of comprehension mastery, ranging from 21% to 57%. In addition, all students demonstrated improvement by showing an emerging understanding of some of the Bridge phrases.

Figure 22



Note: Baseline for all students was below 1%.

Individual Analysis

Bob.

During baseline, Bob's mean number of Bridge phrases comprehended was .00 mastered, with a stable baseline over three assessment sessions. At the onset of the vocabulary intervention condition, Bob showed an immediate and positive improvement in comprehension, and mastered two of the three Bridge phrases. However during the next four assessment sessions, his performance mastery dropped back to baseline levels at zero phrases comprehended. Bob's performance remained variable as the vocabulary intervention continued, fluctuating between zero and three phrases comprehended. During the last week of the intervention, Bob's mastery again improved to two phrases and finally three phrases as the intervention concluded. This pattern in performance resulted in a slow upward trend in Bob's comprehension data. Overall, Bob's mean number of Bridge phrases comprehended improved from .00 to .82 phrases, mastered comprehension of 21% of the Bridge phrases, with 7 phrases mastered during the course of the vocabulary intervention. In addition, although Bob did not improve his comprehension significantly, he demonstrated emerging comprehension in 8 additional phrases.

Joe.

During baseline, Joe's mean number of Bridge phrases comprehended was .20 phrases over five assessment sessions. Joe's performance at the introduction of the vocabulary intervention indicated an immediate and positive improvement in his comprehension of Bridge phrases, and mastered 100% of the phrases for two assessment sessions. During the second week of the vocabulary intervention, Joe's mastery of Bridge phrase comprehension dropped to baseline levels at zero. He then showed acceleration in comprehension improvement during the third week when his mastery increased to two

Bridge phrases comprehended and then three phrases. At the conclusion of the vocabulary intervention, Joe's performance declined again to one phrase comprehended, resulting in a downward trend in his data. Overall, Joe improved his mean number of Bridge phrases comprehended to 1.71 phrases, mastered 57% of the phrases, with 12 phrases mastered during the course of the vocabulary intervention.

Dave.

During baseline, Dave's mean number of Bridge phrases comprehended was .14 phrases across seven assessment sessions. At the onset of the vocabulary intervention condition, Dave showed an immediate and positive improvement in comprehension, and mastered all three (100%) Bridge phrases. During the course of the intervention condition, Dave's performance ranged from mastering comprehension of two or three Bridge phrases, resulting in a slight downward trend in his data. Overall, Dave considerably improved his mean number of Bridge phrases comprehended to 2.45 phrases, and mastered 82% of the phrases, with 27 phrases mastered during the course of the vocabulary intervention.

Charlie.

During baseline, Charlie's mean number of Bridge phrases comprehended was .00 phrases across three assessment sessions. At the onset of the vocabulary intervention condition, Charlie showed no change in behavior from baseline level. There was no change in his mastery of Bridge phrase comprehension until the second week of the intervention when Charlie mastered comprehension of three out of three (100%) Bridge phrases. However, this change positive change in behavior was immediately followed by a downward shift in comprehension again, with Charlie's mastery falling to baseline level

(zero mastered). The next week of the intervention Charlie improved his comprehension mastery of phrases by one phrase during both sessions, and then improved again to three phrases (100%) comprehended. Charlie then dropped down to comprehension mastery of one phrase for the next week (2 sessions). At the conclusion of the intervention, Charlie's behavior leveled off at comprehension mastery of three (100%) Bridge phrases over three assessment sessions. Although Charlie exhibited variable performance in his comprehension mastery, the pattern in his data demonstrated an increasingly positive and upward trend. Overall, Charlie improved his mean number of Bridge phrases comprehended from .33 to 1.46 phrases, mastered 41% of the Bridge phrases, with 16 phrases mastered during the course of the vocabulary intervention.

Kurt.

During baseline, Kurt's mean number of Bridge phrases comprehended was .00 over five assessment sessions. At the onset of the vocabulary intervention condition, Kurt's performance demonstrated an immediate and positive upward shift, and mastered 100% (three out of three) of the Bridge phrases during the first week of the intervention. The next two weeks Kurt's behavior fluctuated between mastery of two or three phrases. However, during the last four weeks of the vocabulary intervention Kurt's mastery of comprehension leveled off and he consistently demonstrated 100% mastery of the Bridge phrases. Overall, Kurt considerably improved his mean number of Bridge phrases comprehended from 0.00 to 2.77 phrases, mastered 92% of the phrases, with 36 phrases mastered during the course of the vocabulary intervention.

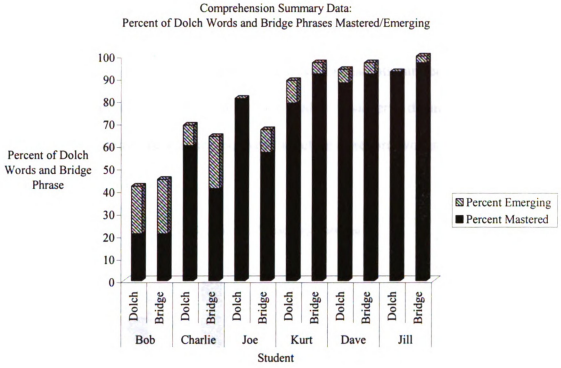
Jill.

During baseline, Jill's mean number of Bridge phrases comprehended was .00 over seven assessment sessions. The introduction of the vocabulary intervention condition resulted in an immediate and positive improvement in Jill's performance, with comprehension mastery of 100% (three out of three) all Bridge phrases. This level of 100% mastery was demonstrated over nine assessment sessions. Jill's improvement only declined by one phrase during the entire vocabulary intervention. Overall, data remained stable with a slight decline in trend. In addition, Jill substantially improved her mean number of Bridge phrases comprehended from 0.00 to 2.90, mastered 97% of the phrases, with 29 phrases mastered during the course of the vocabulary intervention.

Research Question 3 Summary

Figure 23 displays the summary data for Research Question 3: Comprehension. As illustrated in the figure, results from baseline to the intervention for both Dolch words and Bridge phrases were substantial. Analysis of the vocabulary intervention on the students' Dolch word and Bridge phrase comprehension indicated that all students made considerable gains during the course of the intervention. This finding was supported through both individual and group analyses and indicated that all students made substantial gains in performance during the course of the intervention. These considerable gains were illustrated in the students' comprehension increase in mean performance from baseline to intervention, the increase in the number of words mastered, and the increase in percent of words mastered by all students. Two students (Bob and Charlie) found less success with the intervention for both Dolch word and Bridge phrase comprehension, however given the extent of their additional disability, considerable success and improvement were still accomplished.

Figure 23 Comprehension: Summary Data



Note. Baseline for all students was below 1%.

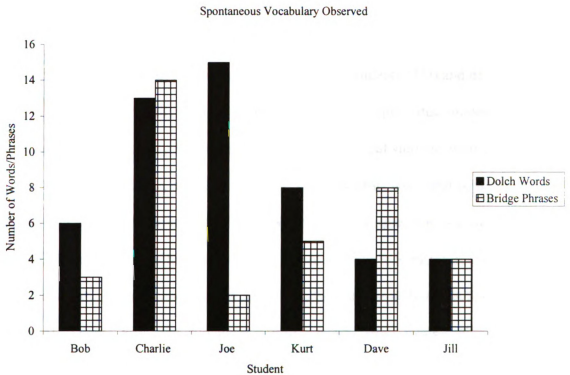
Research Question 4: To what extent does the vocabulary intervention effect the spontaneous use of single or multiple meaning words and phrases?

Overview of Findings: Spontaneous Use of Dolch Words and Bridge Phrases

Figure 24 displays the students' spontaneous use of Dolch words and Bridge phrases as observed by the classroom teacher during the vocabulary intervention condition. As illustrated in the figure, Joe and Charlie were observed using the most number of Dolch words during the intervention and Charlie and Dave were observed using the most Bridge phrases. Students whose spontaneous use was observed the least included Bob and Dave's use of Dolch words, and Joe and Bob's use of Bridge phrases.

Unfortunately, given the time commitment, it was virtually impossible for the classroom teacher to record spontaneous use of all 72 Dolch words (i.e., 12 words/phrases per week, for each student) and Bridge Phrases per week. In future research, it might be more reasonable to handle this situation in several ways: (1) students can record use of their own words/phrases; (2) teacher can select one student to observe during a select portion of the day; (3) students and teacher can work together to record words/phrases.

Figure 24



Research Question 4 Summary

Figure 24 displays the summary data for research Question 4: Spontaneous Use. Analysis of the vocabulary intervention on the students' spontaneous use of Dolch words and Bridge phrases failed to reveal a consistent pattern of responses. Therefore, this question remains unanswered. Given the difficulty collecting data for this dependent

variable, results were interpreted with caution. However, these results are positively supported by observations of all students utilizing the vocabulary on several occasions. These observations occurred during assessment sessions, intervention sessions, classroom instruction, and transition time (e.g., walking to lunch, visiting other classrooms). An alternative method for collecting this type of spontaneous data should be explored to support the finding that students' increased their spontaneous use of vocabulary through the course of the intervention.

Typical Deaf Students and Deaf Students with an Additional Disability Analysis

Dolch word mastery.

Data was also analyzed comparing typical deaf students (TD) and deaf students with an additional disability (DAD). As noted previously, typical deaf students had no identified second disability and were Joe, Kurt, and Jill. Deaf students with an additional disability were Bob, Dave, and Charlie. These DAD students were deaf or hard of hearing and had an additional identified disability. For example, Bob was deaf and autistic, Dave was hard of hearing and had Landau Kleffner's Syndrome, and Charlie was deaf and autistic. Table 4 and Figures 25 and 26 illustrate the differences between the two groups of students. First, TD students mastered a greater mean number of Dolch words per session. For instance, within Table 4, TD students Joe, Kurt, and Jill mastered more Dolch words per session recognizing 2.57, 2.69, and 3.00 words. DAD students Bob and Dave mastered fewer Dolch words per session, recognizing 1.87 and 2.18 words. For production, TD students mastered production of 2.57, 2.69, and 2.80, compared with DAD (Bob and Dave) students who mastered production of 1.53 and 2.45 words. The

exception was Charlie, who mastered recognition at a very high mean of 3.00 and production at 2.87.

Second, TD students' mastered a greater percent of Dolch words across all dependent variables (recognition, production, and comprehension). Figure 25 illustrates that TD mastered a larger percentage of Dolch recognition, with TD students mastering 86% and DAD students mastering 45%. TD students also mastered production of Dolch words more than DAD students, but only slightly more, with TD students mastering 86% and DAD students mastering 81%. In terms of comprehension mastery, TD students again mastered more Dolch words, with 95% mastered, and 85% mastered for DAD students.

Third, Figure 26 displays students' individual percentage across all dependent variables. As demonstrated by the figure, there was less variability within the TD students' performance mastery compared to the DAD students when the data is disaggregated. For instance, TD students' recognition percent mastered were 86% (Joe), 90% (Kurt), and 100% (Jill). Percent of recognition mastered for DAD students was 62% (Bob), 73% (Dave) and 100% (Charlie), illustrating greater variability among their mastery. The same pattern of variability was found with the production and comprehension mastery for DAD students. For example, variable comprehension mastery among DAD was also noted by the classroom teacher, who indicated that she felt both Bob and Dave's additional disability significantly affected their academics more than Charlie's additional disability.

Figure 25

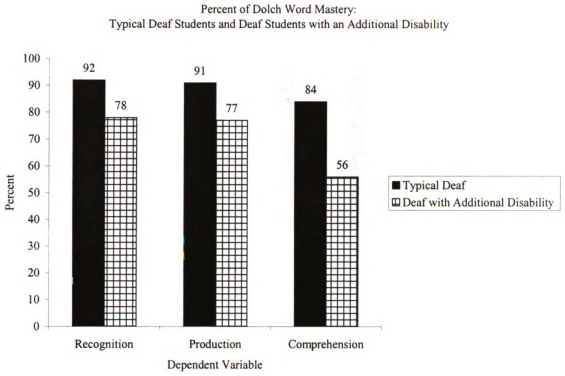
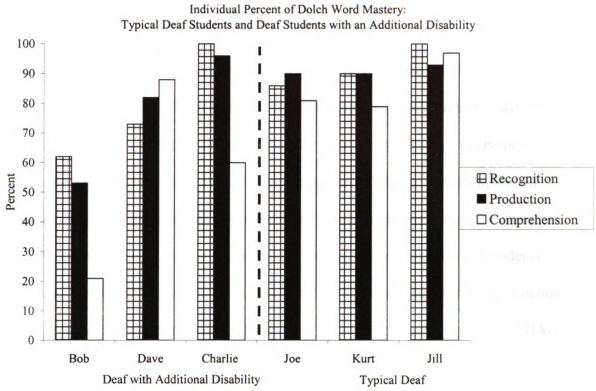

Percent of Dolch Word Mastery:
Typical Deaf Students and Deaf Students with an Additional Disability
Percent
100
90
80
70
60
50
40
30
20
10
0
92
78
91
77
84
56
Recognition
Production
Comprehension
Dependent Variable
Typical Deaf
Deaf with Additional Disability

Figure 26



Finally, there was also greater variability among the DAD students with respect to weekly Dolch word performance mastery (see multi-baseline figures for illustration). That is, while TD students' performance often remained stable, the DAD students' performance fluctuated frequently. For example, at the onset of the vocabulary intervention condition, Dolch recognition mastery for Dave (Figure 3) began at two words recognized, dropped to zero words mastered, and then accelerated up to three words. Jill, who started the vocabulary intervention at the same time as Dave, immediately responded to the intervention and mastered recognition of three out of three Dolch words (Figure 4). Her performance remained stable for the entire intervention condition.

Bridge phase mastery.

Three major findings were found when TD and DAD students' mastery of Bridge phrases were compared. First, TD students mastered a greater number Bridge phrases across all three variables, compared with DAD students during the vocabulary intervention. Overall, TD students mastered 215 phrases, and DAD students mastered 156 phrases, a difference of 59 phrases during the course of vocabulary intervention.

Second, TD students' mastered a greater percent of Bridge phrases across all dependent variables (recognition, production, and comprehension). Figure 27 illustrates that TD mastered a larger percentage of Bridge phrase recognition, with TD students mastering 73% and DAD student mastering 52%. TD students also mastered production of Bridge phrases more than DAD students, with TD students mastering 69% and DAD students mastering 45%. In terms of comprehension mastery, TD students again mastered more Bridge phrases, with 92% mastered, and 40% mastered by DAD students.

Third, Figure 28 displays students' individual percentage for Bridge phrases across all dependent variables. As demonstrated by the figure, there was variability within both the TD students' and the DAD students' performance mastery when the data is disaggregated. For example, TD students' production percent mastered were 29% (Joe), 82% (Kurt) and 97% (Jill). Percent of recognition mastered for DAD students also varied greatly with 8% (Bob), 50% (Charlie) and 97% (Dave). The same pattern of variability was found with the recognition and comprehension mastery for both groups of students.

Figure 27

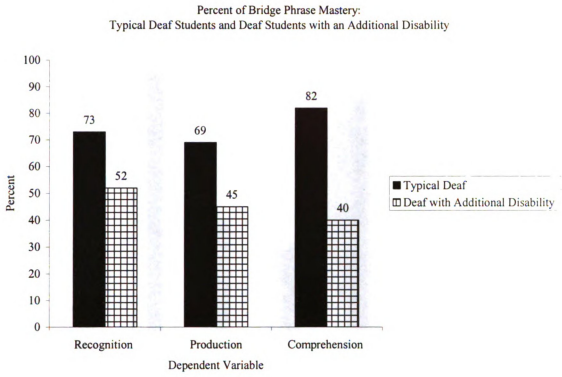
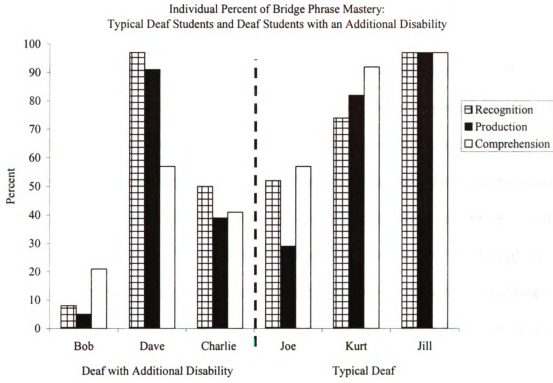

Percent of Bridge Phrase Mastery:
Typical Deaf Students and Deaf Students with an Additional Disability
100
90
80
70
60
50
40
30
20
10
0
Percent
73
52
69
45
82
40
Recognition
Production
Comprehension
Dependent Variable
Typical Deaf
Deaf with Additional Disability

Figure 28



Emerging performance

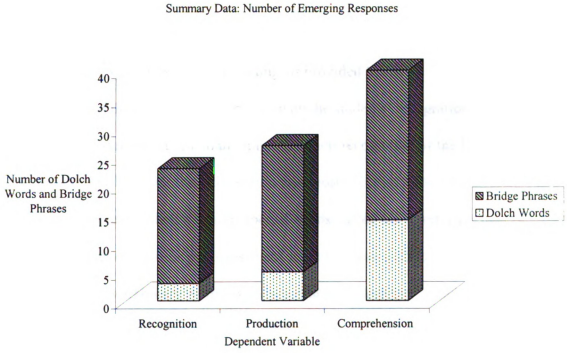
During assessment sessions, all students' responses were rated on a scale of mastered, emerging, or incorrect, indicating their mastery of the dependent variables (i.e., recognition, production, and comprehension) during baseline and the vocabulary intervention condition. Mastered responses were those that were: (1) spelled correctly or pointed to the correct word (recognition); (2) signed correctly as defined in the methods section and understood by a second observer (production) and, (3) provided an example, sentence, or pointed to an object that represented the vocabulary correctly (comprehension). Incorrect responses were those that were: (1) spelled wrong or pointed to the wrong word (recognition), (2) signed wrong and/or not understood by a second observer (production) and, (3) used wrong in a sentence, gave a wrong example, and

pointed to a wrong object that did not represent the vocabulary correctly. The final rating was "emerging," which included responses that approximated a correct response. For instance, for the dependent variable recognition, Bob spelled "prety" for the word "pretty." Clearly this spelling is not accurate, but the response was off by only 1 letter. In this case, Bob's response would be considered "emerging." An emerging response for the dependent variable production might appear in the following way: Joe signed the phase "looked up" using the two separate signs: "lock" and "up," instead signing the phrase as one fluid sign, not separate signs. This response would be considered "emerging" because Joe approximated the sign. If he would have signed "look" and "up" for "locked up" or singed a completely different phrase such as "walked away," the response would have been incorrect. There were several cases where a student confused the three phrases or Dolch words and signed each one incorrect. That is, if the student's phrases were "in a tree," "sat down," and "came back," the student signed "came back" for "sat down," and "in a tree" for "came back." These responses were considered incorrect.

In analyzing the students' presence of emerging responses, three patterns were found. First, the majority of emerging responses were utilized for Bridge phrases. Figure 29 displays the total number of emerging responses observed for all students, across all three dependent variables. A total of 20 emerging responses were observed for Bridge recognition, 22 for production, and 26 for comprehension. Comparatively, 3 emerging responses were observed for Dolch word recognition, 5 for production, and 14 for comprehension. Second, when comparing emerging responses across variables for both Dolch word and Bridge phrases, the variable that the students used the most emerging responses with was comprehension with 14 emerging responses for Dolch comprehension

and 26 for Bridge comprehension. Third, when comparing TD with DAD students, DAD student were observed responding considerably more with an emerging answer, with 74 emerging responses overall, compared to 16 emerging responses from the TD students. Possible reasons for these three patterns include the possibility that Bridge phrases were more difficult concepts to understand and that comprehension was a more difficult task to master, especially for students with additional disabilities. What this data also demonstrates is that DAD students were improving their understanding of the vocabulary words, but did not quite master the full concept. It shows that their understanding was being formed and was still in the process of making that "connection" for full understanding. Instead of a complete wrong answer, these students demonstrated partial understanding.

Figure 29



Summary of Findings

In this chapter, findings were presented on the effects of a vocabulary intervention on three dependent variables (recognition, production, and comprehension). All data was displayed graphically and analyzed for overall findings, individually for each student, and then compared by group (typical deaf students and deaf students with an additional disability). Several findings were found as a result of the data analyses conducted. Overall, the results of the vocabulary intervention indicated that all students made substantial improvements in both types of vocabulary (Dolch words and Bridge phrases), across all variables (recognition, production, and comprehension). Specifically, students made greater improvement with mastering the Dolch words compared to the Bridge phrases. When comparing typical deaf students (TD) and deaf students with an additional disability (DAD): (1) DAD students had a lower overall mean for Dolch word mastery; (2) DAD students mastered a fewer percentage of Dolch word vocabulary; (3) DAD students' weekly performance varied more and; (4) DAD students mastered fewer Bridge Phrases. A brief explanation of these findings is provided below:

Results of the vocabulary intervention on the students' recognition of vocabulary were varied. All students substantially improved their recognition of the Dolch vocabulary words, however the intervention was most successful for five of the six students, who increased their mean number of words during the vocabulary intervention to more than 2 out of 3 words per assessment session. These students mastered more than 73% of the Dolch vocabulary words, with two students mastering 100% of the Dolch words. Results also varied for recognition of Bridge phrase vocabulary. Three of the students substantially increased their mean number of words during the intervention to

more than 2 out of 3 words per assessment session. These students mastered 97% of the Bridge phrases. The remaining three students mastered a mean of 1.57 words or below, with mastery of 52% or less. One (Bob) student with additional disabilities had the most difficulty with both recognition of Dolch words and Bridge phrase vocabulary, and mastered 62% of the Dolch words and only 8% of the Bridge phrases.

Results of the vocabulary intervention on the students' production of vocabulary were varied. All students substantially improved their production of Dolch vocabulary words. However, the intervention was considerably more successful for five of the six students, who increased their mean number of Dolch words produced by more than 2 out of 3 words per assessment session. These five students mastered more than 82% of the Dolch word vocabulary. One student with an additional disability (Bob) also improved his mastered Dolch word production; however his mastered percentage was not as high, at 53% mastered. Results for Bridge production also varied, with three students considerably improving their mean number of Bridge phrases produced by more than 2 out of 3 phrases per assessment session. The remaining three students mastered less than 1 word per session. Further, in terms of percent mastered, the same three students whose mean was larger also mastered production of a greater percent of words (more than 82% mastered). The students who struggled to increase their mean over 1word per session also struggled with percent mastered, and mastered less than 39% of Bridge phrase production.

Results of the vocabulary intervention on the students' comprehension of vocabulary were varied. All students improved their comprehension of Dolch vocabulary words. However, the intervention was considerably more successful for four of the six

students, who increased their mean number of Dolch words comprehended by more than 2 out of 3 words per assessment session. These four students mastered more than 79% of the Dolch word vocabulary. Two students with an additional disability (Bob and Charlie) also improved their mastered Dolch word comprehension; however their mastered percentage was not as high, at 21% and 60% mastered. Results for Bridge comprehension also varied, with three students improving their mean number of Bridge phrase comprehension by more than 2 out of 3 phrases per assessment session. The remaining three students mastered less than 2 words per session. Further, in terms of percent mastered, the same three students whose mean was larger also mastered comprehension of a greater percent of words (more than 82% mastered). The students who increased their mean to less than 2 words per session mastered less than 57% of Bridge phrase comprehension.

CHAPTER V

DISCUSSION

The purpose of this study was to examine the effectiveness of a conceptually based vocabulary intervention on the recognition, production, and comprehension of vocabulary for deaf/hh students. Data was analyzed for overall findings, individually for each student, and by group (typical deaf students and deaf students with additional disabilities). Findings were presented from the multiple-baseline across subjects study in the previous chapter.

Introduction

The *No Child Left Behind Act of 2001* and the *2002 Presidential Commission Report* on special education provide the impetus for the study discussed here. These two policies suggest that research-based interventions must be put into place to improve the reading achievement for students with disabilities. Deaf/hh students specifically face difficulty given the nature of a sensory loss and its possible effects on reading achievement (Paul, 2001).

The theoretical framework for this study was based in Sociocultural theory, suggesting learning which takes place through joint activity with knowledgeable others, can support the language and literacy development of students (Lave & Wenger, 1991; Lee & Smagorinsky, 2000; Vygotsky, 1978; Wells, 2000). As suggested by Wells (2000), language plays an important role in developing meaning through interactions with others. Hart and Risley (1995) further suggest that through language interaction, cognitive development can be fostered, which can ultimately influence reading achievement.

Several theories currently exist that support the development of the reading process. The emphasis in bottom-up theories is in decoding, with meaning derived from letters, words, phrases and sentences (Gough, 1972; Gough, 1974; LaBerg & Samuels, 1974). Top-down models stress the interaction of prior knowledge and the processing of the text for meaning making (Goodman, 1970; Smith, 1988). Finally, balanced literacy, suggests that successful literacy programs combine whole language practices with skills instruction and explicit instruction for struggling readers (Pressley, 2006; Ruddell, 1997). Instruction based on these theories can provide deaf/hh students with pedagogy that develops their language and reading achievement through interaction with others.

The literature also suggests that literacy achievement of deaf/hh students may be influenced by exposure to ASL in several ways. For instance, access to a complete language such as ASL can support the development of literacy skills (Kuntze, 1998). As the primary language of deaf children, Kuntze (1998) suggests that ASL is a natural and visual language that has been used by generations of Deaf people (Kuntze, 1998). Further, literacy achievement may also be affected by the positive link between exposure to sign language and language development, as suggested by Padden and Ramsey (1998)

Unfortunately, many deaf/hh students struggle with the skills necessary for proficient reading and comprehension. For instance, efficient word identification and decoding skills serve as the foundation for comprehension (Perfetti, 1985, 1992). These fluent word identification skills with vocabulary knowledge affect cognitive processing, which ultimately affect comprehension (Kelly, 1993, 1995, 2003a, 2003b). Therefore, when word identification skills are fluent, working memory needed for better comprehension is freed-up (Kelly, 2003a). However, when readers struggle with word

identification, working memory is therefore affected, thus thwarting comprehension, which many deaf/hh students struggle with (Kelly, 2003b).This direct relationship was noted by Garrison et al., (1997).

An additional area that deaf/hh students have difficulty with is vocabulary learning. For instance, the size of a deaf/hh child's lexicon has been found to influence the acquisition of word learning. That is, deaf/hh children with moderate size lexicons learned new words best when they were taught explicitly. Comparatively, children with smaller lexicons had difficulty learning words when taught explicitly (Lederberg et al., 2000a & 2000b; Lederberg & Spencer, 2001). However when deaf /hh children learned ASL, their word learning resulted in acquiring more words that were action, descriptive, and personal-social in nature (Anderson & Reilly, 2002; Gregory & Mogford, 1981; Mohay, 1994; Shafer & Lynch, 1981).

Specific to word learning is the acquisition of sight words in a child's repertoire. Words that are frequently read are likely to become sight words, because they are read as whole words, rather than by their individual sounds or letters. Ehri and Saltmarsh (1995) suggest that reading words automatically is the most efficient way to read text. Therefore, a sight word vocabulary is needed for reading text successfully. A list of sight words was identified by Edward Dolch consisting of words found in 50-75% of texts that children read. He believed that these words, which are made of function words, conjunctions, prepositions, common verbs and nouns should be explicitly taught to children for them to interpret and gain meaning from texts. Pressley (2006) supports this belief, but also suggests that word learning should be part of a balanced literacy program. Further, several researchers also found that word knowledge affects comprehension (Barlow et al.,

1971; LaSasso & Davey, 1987; Paul & Gustafson, 1991). Therefore, word learning should be supported with in-depth study of word meanings, concepts, nuances, uses, and associations, to foster comprehension (Loterman, Paul, & Donahue, (2001).

Several instructional programs have been developed to assist deaf/hh students with improving their word identification and vocabulary knowledge, in an effort to affect comprehension. One program, which emphasizes the conceptual meaning of vocabulary words through sign language, was studied by Schimmel et al., (1999) and found that most students mastered phonemic awareness and made progress on mastering Dolch words and vocabulary. Further, the results also indicated that students improved comprehension, self-expression, and communication skills with this program.

This study also examined the conceptual focus of vocabulary words through sign language using a 30 minute vocabulary intervention and utilizing a multiple-baseline across subject experimental design. Based on the results from the Schimmel et al., (1999) study, it was anticipated that the students in this study would also make gains on all measures. These findings will inform the field of deaf education in terms of providing the groundwork for this conceptually based vocabulary instruction to become a scientifically-based method for intervention and reading instruction (U. S. Department of Education, Institute of Education Sciences, National Center for Education and Regional Assistance, 2003).

Discussion

The study presented here investigated a vocabulary intervention which was grounded in a conceptual emphasis for vocabulary meaning. Four research questions were investigated that examined the effect of this vocabulary intervention on deaf/hh

students' recognition, production, comprehension, and spontaneous use of vocabulary. Several findings were presented in the previous chapter, and the following section situates those findings within the literature.

Vygotsky (1978) made the argument that interaction with others is instrumental for the development of thinking skills in children. Lave and Wenger (1991) further support this theory by suggesting that children participate in a community during "joint" rather than in solitary activities. Knowledgeable others within the community can assist children with constructing meaning together so that they can function independently (Lee & Smagorinsky, 2000). Students who participated in this study took part in joint activity with the classroom teacher and another classmate. Using examples from real life experiences, students created semantic maps that explained, examined, and connected the vocabulary. For example, the students had recently visited the local pet store. During vocabulary session the following day, Dave and Jill were learning about the vocabulary word "saw," when the teacher mentioned a recent field trip to the pet store and asked, "Yesterday, we saw so many different animals. I remember that I saw some beautiful fish and a mouse." Immediately, Jill signed "I saw a lizard and a bird." Dave also began using the sign saw, "I saw a scorpion!" During this session, more than 15 animals were connected with the vocabulary word "saw," offering students several opportunities to see and practice the vocabulary word in the context real experiences.

Both Edward Dolch (1938; 1941; 1945; 1951; 1969) and Ehri (2005) stressed the importance of young readers learning sight words. These words make up 50-75% of the texts that children read. Therefore they are important for children to recognize automatically for basic reading skills and compression. Overall, the students in this study

were much more successful in mastering the Dolch sight words. In fact, the students mastered more than an 80% average of the sight words from the Dolch word vocabulary, compared to 60% of the Bridge phrases. This difference in mastery may have been due to the construction of the different lists. That is, many of the phrases listed on the Bridge list were either not sight words as identified by Edward Dolch, or were at a higher grade level. For instance, the Bridge phrase pre-primer list was made up of the following examples, "every year," "went to sleep," and "all afternoon." The Dolch list identified "every" as a first grade word, and "year" was not on the list. For the phrase "went to sleep," "went" was considered a Dolch primer word and "sleep" was a second grade word. Finally, the phrase "all afternoon," "all" was a Dolch primer word and "afternoon" was not on the list. These examples provide support for the finding that the students in the present study had more difficulty with the Bridge phrase vocabulary, since these phrases were not necessarily sight words or even on the same grade level as the sight words the students were learning. Therefore, it was more difficult for the students to master these phrases.

Consistent variability among the students' responses for Bridge phrases was also found in this study. This variability was also consistent across all variables (recognition, production, and comprehension). Several theories might assist with explaining this finding. First, The Bridge phrases appeared to be more conceptually complex when compared to the Dolch words. Since Dolch words were "sight" words, they may have been easier to understand and put into working memory. Bridge phrases comparatively may have been more complex for students to understand the conceptual meaning of the phrase and sign or were not conceptually equal in difficulty. For instance, time phrases

such as "all month" or "every day," may have been more difficult to understand conceptually when compared to the phrase "fall down' or the Dolch word "come." Kelly (2003a; 2003b) applied to deaf/hh readers, the working memory theory as suggested by Baddley and Hitch (1974) that readers use working memory for "comprehension, at the same time, to store words, ideas and partial products of processing acted on by those reading operations" (pp. 171-172). Kelly suggests that deaf/hh readers often lack automaticity in word recognition and syntactic analysis. Therefore, when a deaf/hh reader expends considerable amount of time on one basic reading operation, such as word recognition, working memory is overloaded. Applying Kelly's theory to this study, the Bridge phrases may not have been automatically recognized by the students, because they were too difficult for the students to recognize in sign, print, and ultimately comprehension. Therefore their working memory was overloaded or taxed, since it has a limited capacity for processing and storing information (Kelly, 2003a).

Further, Paul (2003) and Perfetti and Sendak (2000) also suggest that working memory is most efficient for processing and understanding an alphabet based language, such as English and that phonological knowledge supports successful readers. Successful deaf/hh readers use phonological coding in their working memory (Hanson, 1989; Leybaert, 1993; Musselman, 2000; Paul, 1998). Given the difficulty that deaf/hh readers have accessing the phonological code of English, alternative encoding strategies or routes for English have been suggested, such as using fingerspelling, signs, morphological analysis, or orthography. Unfortunately, none of the alternative codes have been as successful as the phonological coding for reading or processing English (Hanson, 1989; Kelly, 1996; Lichtenstein, 1998; Musselman, 2000), because it represents the

grammatical structure of English more efficiently. Therefore, phonological coding ultimately allowed for better use of working memory and better decoding of non-linear grammatical structures (Lichtenstein, 1998). This study used conceptually based signs to teach deaf/hh students vocabulary, which as suggested by Paul (2003) would be an alternative code for English. In this case, results indicated that students had the most difficulty recognizing, producing, and comprehending the Bridge phrases, which were more difficult conceptually. Therefore it appears, that the alternative code for English (i.e., sign language) was not successful with this type of vocabulary (i.e., Bridge phrases), supporting previous findings by Hanson, (1989) Kelly (1996), Lichtenstein (1998), and Musselman (2000).

Another explanation for the variability among the students' performance includes the notion that students were less engaged at various points during in the intervention. This lack of engagement could have been caused by several factors. First, student engagement is frequently influenced by the teacher's ability to motivate his/her students (Bogner, Raphael, & Pressley, 2002; Dolezal, Welsh, Pressley, & Vincent, 2003). For instance, in Bogner et al., (2002), teachers whose students were the most engaged had teachers who were highly motivating to their students. These teachers also taught in ways that increased academic engagement, such as scaffolding student learning, cooperative learning techniques, and favored depth of understanding rather than breadth etc., (Pintrich & Schunk, 1996; Stipek, 2001; Verhoeven & Snow, 2001). Therefore, the possibility that the classroom teacher in this study was less motivating, causing her students to be less engaged could have influenced her students performance. However, the classroom teacher in this study was rated very high on the Classroom AIMS Instrument (Roehrig et

al., 2004), which rates effective teacher practices, and includes a sub-category for student engagement. An additional explanation for lack of student engagement could be that students lacked the prerequisite skills needed to respond accurately (Skinner, 2004). Skinner, Pappas, and Davis (2005) suggests that when a student can not engage in "accurate academic responding" (p. 389), one reason is because they do not have the prerequisite skills necessary. Therefore to assist students with responding accurately during academic tasks, teachers must implement strategies for students to learn or relearn prerequisites and make necessary accommodations. As suggested previously, the Bridge phrases may have been too difficult conceptually for the students to master, thus resulting in inaccurate responding or low engagement caused by lack of prerequisite skills.

The finding that students in this study gained an average of 23-30 words and 19-22 phrases per student across all three variables over a 5-8 week intervention period, appears to be a considerable gain in vocabulary development. Most of the students in this study were from hearing parents (five of six), and research has shown that deaf/hh children of hearing parents who are not fluent signers demonstrate a much different rate of vocabulary growth compared to hearing children of hearing parents. For instance, these children often have very delayed vocabulary development and may not experience a spurt in vocabulary acquisition until they are much older (Lederberg & Spencer, 2001). Vocabulary development has also been found to be delayed and variable for deaf/hh children of hearing parents (Lederberg and Spencer, 2001; Mayne, Yoshinga-Itano et al., 2000; Moeller, 2000). Findings concerning the rate of vocabulary growth deaf/hh children of hearing parents learn has varied across studies. For example, in longitudinal studies of children age four years and older conducted by several authors (Ertmer &

Mellon, 2001; Gregory & Mogford, 1981; Ouellet et al., 2001), ten children learned between 2 to 4 new words per week and four children learned no new words during the course of a year. Compared with the students in this study, students mastered about 4 words and 3 phrases per week, per student, which is slightly more than previous research (Ertmer & Mellon, 2001; Gregory & Mogford, 1981; Ouellet et al., 2001).

Few studies have investigated teaching vocabulary to deaf students with a conceptual focus. One study conducted by Schimmel et al., (1999) researched a commercially made program (Fairview Reading Program) which incorporates several components including phonemic awareness, reading comprehension, Dolch word vocabulary instruction, Bridge phrase instruction, and ASL development. Schimmel et al., (1999) utilized the entire "package" of the program and found that student improved their phonemic awareness, word identification, reading comprehension, and communication skills. In the Schimmel et al., (1999) study, students within the same age range as the students in this study mastered less Dolch words. For instance, the Schimmel et al., (1999) students mastered less than 20% to about 95% of the Dolch words. In this study, students mastered 78% to 100% of the Dolch word vocabulary across all variables. With respect to Bridge phrase mastery, again the Schimmel et al., (1999) students mastered fewer phrases than the students in this study. With this phrase vocabulary, Schimmel et al., (1999) students mastered fewer than 5% to about 62% of the Bridge phrases. In this study students mastered 5% to 97% of the Bridge phrases. These findings indicate that overall, the vocabulary intervention utilized for this study, using the same Dolch words and Bridge phrases assisted students with making better progress when compared with previous research (Schimmel et al., 1999).

The immediacy of the students' positive improvement in their behavior was noted across almost all students, which could be explained by several factors. For instance, the students were exposed to new and different learning strategies through the vocabulary intervention. The vocabulary intervention in this study also incorporated an additional learning time focused on vocabulary and strategies (semantic mapping) not currently used by the classroom teacher. In addition, although every effort was made to select vocabulary words that the students did not know or had not been taught previously through the use of a pretest assessment, the possibility remains that some of the vocabulary words were known. Finally, it was also possible that the teacher's expectations were different at the beginning of the intervention and she was more lenient in the responses she accepted. However, inter-rater agreement was high (e.g., 97%), thus indicating a consistent level of rater agreement during the assessment session.

The most recent survey conducted by Gallaudet Research Institute (2003) identified almost 40% of the deaf student population across the United States to have an "additional disability." Children with additional disabilities can include cognitive impairment, autism, visual impairment, specific learning disability, emotional or behavioral problems, or physical disabilities (McCracken, 1998; Jones, Jones, & Ewing, 2006). As this study was being formed, the researcher anticipated a group of five students, four of whom were typical deaf students. One student was identified with Landau Kleffner's Syndrome, in addition to deafness. However as the study began, the composition of the participants began to change, adding an interesting dimension to the research. A sixth student transferred into the classroom and the researcher found herself with six students. Within the first week of the baseline data collection, one student was

diagnosed with autism and a second student was diagnosed with "autistic like behaviors." What began as a study of "typical" deaf students became a study of "two groups:" typical deaf students and deaf students with an additional disability. As such, several findings were found when comparing these two groups of students.

Deaf students with additional disabilities present unique challenges for language and communication, instruction in literacy, functional academics, social/behavioral skills, motor skills, and life skills (Jones et al., 2006; Knoors & Vervloed, 2003). Jones et al., (2006) suggest that functional literacy and language arts programs might be appropriate for students with additional disabilities. In addition, several authors (Browder & Snell, 2000; Ford, Schnorr, Meyer, Davern, Black, & Dempsey; Westling & Fox, 2000) suggest that reading instruction for deaf students with additional disabilities take the form of learning sight words (e.g., Dolch words) because many of the words on the Dolch lists are useful in daily life. Further, Brower and Snell (2000) and Westling and Fox (2000) also suggest that reading instruction be practical for compression to take place.

Few studies have been conducted investigating instruction of deaf students with multiple or additional disabilities. One study, conduced by Walker (1977) focused on producing and understanding sign language with deaf students who had cognitive impairments. Fourteen deaf/cognitively impaired students were taught 110 signs over 9 months. Results indicated that students learned a large percentage of signs and increased expression and comprehension. In addition, more than half of the students mastered 90% of the signs. Unfortunately, no signs were observed spontaneously. The three deaf students with an additional disability in this study, learned Dolch word vocabulary, and mastered an average of 78% for recognition, 77% for production, and 56%

comprehension, much lower comparatively than the Walker (1977) study. However, when viewing their performance individually, Charlie mastered 100% for recognition, 96% for production, and 69% comprehension. Dave mastered 73% for recognition, 82% for production, and 88% comprehension. Bob mastered 62% for recognition, 53% for production, and 21% for comprehension. Clearly, these individual results provide a different picture of the students' mastery (except for Bob), a picture closer to those results found by Walker (1977).

An additional factor that may have influenced the vocabulary learning of students with additional disabilities includes the teaching strategy and the size of their current lexicon. Lederberg et al., (2001) studied children's abilities to learn new words by being explicitly taught or by fast-mapping (i.e., infer that a novel word refers to an unfamiliar object without being explicitly taught). Results indicated that the size of a children's lexicon influences their word learning. For instance, children with small vocabularies did not consistently learn new words by either being taught explicitly or by fast-mapping. Children with moderate size vocabularies were able to learn words by explicit instruction, but not by fast-mapping. Children with larger vocabularies learned either strategy, because they had developed internal word-learning strategies that allowed them to take advantage of either word learning instruction (Lederberg and Spencer, 2001). Instruction in this study was more explicit and students were exposed to the words only a few at a time, therefore students with additional disabilities may also have had smaller vocabulary sizes, thus affecting their ability to learn the new vocabulary, as suggested by Lederberg and Spencer (2001).

Finally, the effect of cognitive ability has been shown to affect student's learning ability (Marschark, et al., 2002). Specifically, students with an additional disability may have cognitive developments that varied when compared to typical deaf students. In this case, the cognitive impact of the student's disability could have affected their response to the intervention. For instance, both the rate and the type of learning may have been different depending on the impact of the student's disability. In addition, learning strategies could also have varied based on the impact of the additional disability and its relative impact. Data on the students' cognitive ability based on IQ was not collected, yet could have illustrated the impact of cognitive functioning and assist with demonstrating the differences among the students' scores.

Implications

Based on the findings and conclusions discussed above, the following educational implications are discussed below.

1. IDEA stipulates an individualized education for students with disabilities. The vocabulary intervention investigated in this study offered the teacher the opportunity to individualize vocabulary instruction for her deaf/hh students. Strengths of this study were the individual assessment and the ability to customize the student's weekly vocabulary based on their needs, rather than through curricula that denotes pre-selected words. This intervention also allows teachers to choose vocabulary based on each student's needs, and keep track of weekly progress through assessments. Graphing the student's weekly progress will assist teachers with visually assessing their student's development, which in turn can be used for updating IEP goals. Further, the methodology utilized for this study was

such that classroom teachers could easily replicate and display their students' data in a powerful manner to demonstrate learned and emerging vocabulary growth.

2. Vocabulary instruction with an emphasis on conceptual understanding may provide an enhanced instructional component for deaf/hh students. The vocabulary intervention for this study utilized a conceptual format for teaching students vocabulary. Across all three variables (recognition, production, and compression), all students who participated in the study improved their mastery of these dependent variables. Overall, students improved their Dolch word vocabulary mastery by an average of over 80%, and added an average of 23-30 vocabulary words per student and variable over a 6-8 week intervention period. Previous research by Schimmel et al., (1999) also supported the use of conceptual instruction of vocabulary and found students also made improvements in the mastery of vocabulary. Further, students mastered an average of more than 60% Bridge phrases, and added an average of 19-22 phrases per student and variable. Although the improvement was not as robust, both types of vocabulary words taught through conceptual focus, utilizing the vocabulary intervention procedure produced positive results for all the students involved.
3. One of the strengths of this study was the clinical impact the intervention had on the students' improvement in vocabulary knowledge. Although statistical analyses were not utilized for this study, given the nature of the design, the clinical significance for all students was clearly apparent and dramatic. For instance, the researcher observed on several occasions during assessment sessions and in conversations with students in this study their spontaneous use of vocabulary

learned in previous weeks. The classroom teacher also commented that she had observed students using the vocabulary spontaneously during class and in conversations with others. Unfortunately, these spontaneous uses were not recorded if the vocabulary was not target vocabulary for the week. In addition, two students with additional disabilities (Bob and Charlie) did not have as much success with the vocabulary intervention, yet their improvement from baseline levels was considerable given the extent of their autism. In this case, both the classroom teacher and the researcher commented on how exciting it was to see both boys using the vocabulary in correct context. During one assessment session, Bob was asked to give an example of the word "green." For about a minute, Bob sat in his chair and stared at the camera. The classroom teacher asked again, "Bob, show me green." Almost immediately this time, Bob sprang up from his chair, kicked the blue screen from behind him and ran across the room giggling. He came back a moment later with a book, sat down in his chair, pointed to the book and signed "green, grass green." Another time, when the researcher was packing up to leave for the day, the students were lined up at the door heading out for lunch. As they walked through the door, Charlie stopped and called for his teacher. He pointed to the door as he shut it and signed to her "lock. You (pointing to the teacher) need lock." Both the words "lock" and "need" were vocabulary Charlie had learned in previous weeks. Finally, the classroom teacher stated on several occasions she felt strongly that the intervention was very successful and practical for her students. In addition, she also planned on

continuing the program during the next school year with the same students and will utilize the same assessment procedures and testing sheets.

4. Vocabulary instruction for deaf students with additional disabilities should include the incorporation of sight word mastery. The students in this study had more success with the mastery of Dolch word vocabulary. Jones et al., (2006) suggests that the mastery of sight words is essential for deaf students with additional disabilities. Mastery of vocabulary can assist students by improving their comprehension skills as well as communication skills, which can be difficult for deaf students with additional disabilities. In addition, these vocabulary skills can offer students the opportunity to enhance daily living activities such as following recipes, personal management, transportation, and leisure activities.
5. Although deaf students with additional disabilities had difficulty mastering the Bridge phrases, these phrases can provide students with a means to better comprehension. To enhance the vocabulary achievement for deaf students with additional disabilities utilizing Bridge phrases, vocabulary learning should be reinforced with the use of pictures and real-life experiences (Jones, et al., 2006). Students in this study were not exposed explicitly to the support of picture use during the vocabulary instruction, however this type of support may further enhance vocabulary learning and should be explored in future research. In addition, because some deaf students with additional disabilities may also struggle with attending to instruction as a result of co-morbidity, the use of combining modalities other than only visual, such as through kinesthetic and tactile modes and providing increased time to attract and maintain attention during instruction

may also support vocabulary learning. Therefore, experiences and interaction with vocabulary tailored to meet the unique needs of students with additional disabilities may assist with improving the vocabulary, comprehension, and overall reading achievement of deaf students with additional disabilities.

Limitations

Several factors need to be considered when interpreting the data presented in this study. The following limitations should be considered when interpreting the data as well as generalizing beyond those findings presented in this study.

1. Results representing the students' spontaneous use were difficult to interpret due to the limited data. The most difficult component of this study was collecting data on was the students' spontaneous use of the vocabulary words and phrases. As a researcher, I was unable to remain in the classroom all day for eight consecutive weeks. In addition, the amount of weekly words and phrases (72) was very large, therefore difficult for the classroom teacher to collect data.
2. The design chosen for this study, single-subject multiple baseline across subjects presents limitations. It is not certain if the positive behavioral effects observed in the students were due to the intervention or if the intense focus on specific vocabulary intervention caused the positive effects. First, the use of this design can cause ambiguity when interpreting the interdependence of baselines. It is possible that altering the behavior of one of the students could affect the behavior of the other students who had not received the intervention yet. Second, this design may also produce inconsistent effects of the intervention on the behaviors or students. That is, although some behaviors were altered, some were not. In this

case, each behavior may not have changed when the intervention was introduced, which may have been caused by extraneous factors. Third, the existence of prolonged baselines over several elapsed days caused the last group of students to remain out of the intervention. Withholding students from intervention when positive effects appear to be demonstrated by students could be seen as unethical or clinically inappropriate (Kazdin, 1982). Therefore, students in this study began the intervention as soon as possible, when their baselines were stable. Finally, when compared to traditional experimental designs, The Institute of Education Sciences (IES, 2006) suggests that single subject design is the lowest level of experimental designs and thus does not meet the standards for evidence based research. Further, given this type of design, it may be difficult to determine that the behaviors changed as a result of the intervention. However, careful considerations were taken when drawing inferences about the effects of the intervention, based on: (a) choosing the appropriate duration of phases, and time to alter the phases to maximize the clarity of demonstrating intervention effects, (b) observing trends in data during baseline and intervention, and (c) evaluating through visual inspection of the data (Kazdin, 1982; Tawney & Gast, 1984).

3. The manner in which the variables were studied may also have affected the results of the intervention. For example, the variables were studied as if they occurred simultaneously, rather than being treated sequentially. If studied sequentially, utilizing a different design, the effects of the intervention could have been different.

4. It was anticipated that follow-up assessments would be conducted on all students to determine if the impact of the intervention maintained on all dependent variables. Unfortunately the school year ended, therefore leaving insufficient time to complete follow-up assessments.
5. Other mitigating factors may have influenced the performance of students. For example, three students with an additional disability (Bob, Charlie, and Dave) which may have influenced the students' ability to fully benefit from the vocabulary intervention. However, all three students did show improvement in their ability to recognize, produce and comprehend both types of vocabulary words. In addition, future investigation might delve into the accommodations necessary for this intervention to have a greater impact on students with additional disabilities. For instance, paring a picture with the words might improve the student's ability to produce or comprehend the vocabulary or spending additional time practicing through games, spelling practice, or repetition to provide more exposure to the vocabulary. Finally, additional factors such as student engagement, affect, attention, illness or the presence of the researcher and the video camera, may have affected student performance.
6. Students participated in a total communication classroom, therefore caution should be taken when generalizing to students in bilingual-bicultural classrooms or auditory-aural/oral classrooms.
7. The amount of time the students were involved in the vocabulary intervention was affected by factors uncontrolled by the researcher, such as absences, field trips, special school assemblies, and teacher illness. In addition, one student (Joe) left

the study early due to absences. Therefore he was unable to complete the entire vocabulary intervention. His continued participation in the intervention may have influenced the trend of his data, the percent of mastery of the vocabulary, and the number of words/phrases he was able to master.

Directions for Future Research

Several areas of future research emerged from this study to improve deaf/hh students' literacy achievement. First, the need for literacy interventions that are grounded in scientifically-based research warrants future examinations that focus on research supported strategies for deaf/hh students. There is also a growing population of students with additional disabilities as well as low functioning deaf students (Bowe, 2002) who require ancillary supports to enhance their learning. In addition, exploring the link between a student's spontaneous use of vocabulary and their evolving learning can also provide insight into how students' vocabulary learning develops. These areas for future directions in research will be addressed below.

The use of the single subject design for this study was a beginning step in determining the efficacy of conceptually based vocabulary interventions. However, given the call for empirically based intervention strategies, this design may not provide sufficient power to support this type of intervention. Therefore, further research is warranted. Specifically, NCLB (2001) requires the use of experimental or quasi-experimental designs. Unfortunately, many of the typical literacy practices currently being utilized with deaf/hh students are those practices that have not been thoroughly examined for effectiveness. In fact, there have been very few studies in deaf education that meet the U. S. Department of Education's criteria for "Scientifically-based research"

(Slavin, 2002, p. 15). Luckner et al., (2005) conducted a review of 40 years of literacy research in deaf education and a meta-analysis to determine evidence-based practices. An initial 964 articles were identified by the authors as related to literacy and hearing loss. Upon reviewing for the following inclusion criteria: (1) peer reviewed article, (2) deaf/hh participants, (3) participants between the ages of 3 and 21 years old, (4) statistical information provided for effect sizes, and (5) include a control group, only 22 articles remained for review. Results of this meta-analysis found that none of the studies investigated the same aspect of literacy and no replications of previous studies were found. Further, based on the findings of Luckner et al., (2005), the authors suggest the need for more experimental studies to determine "educational interventions for promoting the literacy development of students who are deaf or hard of hearing" (p. 438). Therefore, to meet the standards set forth by NCLB, future research investigating the use of conceptually based vocabulary interventions would need to be quasi-experimental or experimental to determine statistical effectiveness. However, Luckner et al., (2005) utilized a stringent criterion, excluding studies that were similar to this study, which incorporated the use of multiple case study research to determine the effects of intervention. Results were substantial and dramatic for the students involved, both clinically and academically. Given the variability among deaf/hh students currently being served across the nation (Gallaudet Research Institute, 2003), this type of design may bridge the gap between statistical and clinical significance, if we are interested in emphasizing the individual needs of deaf/hh students. Further, the emphasis on statistical significance may take away from the impact that interventions have on a deaf/hh student's everyday life (Kazdin, 1982).

However, to provide empirical scientifically-based evidence to support this intervention, it is necessary to further validate the effects through either an alternating treatments design (Kazdin, 1982) or ultimately conduct research utilizing an experimental or quasi-experimental design. Although this study was not experimental, it does provide a starting place for research to begin. Future investigations might include comparing the effects of this intervention with other methods, across deaf students, hearing students, and a control group.

An additional area of research with conceptually based vocabulary interventions involves the finding in this study that students with additional disabilities experienced difficulty learning some of the vocabulary presented here. Supports may be needed for students with additional disabilities to assist them with developing a deeper understanding of vocabulary. Therefore exploring the supports necessary such as picture prompts or combining learning modalities may provide the support necessary. Beginning stages of this area of investigation could involve case study and progress to quasi-experimental or experimental designs. In addition, students with additional disabilities in this study had difficulty learning the vocabulary taught. In this case, students with additional disabilities may present different learning patterns, thus affecting their ability to learn vocabulary. Future research may investigate the pattern of errors observed by students with additional disabilities to determine the differences between deaf/hh students with and without additional disabilities and create interventions that are responsive to their learning styles.

Finally, a third area of future research that emerged from this study was drawn from the difficulty collecting students' spontaneous use of the vocabulary. This type of

data collection was thought to provide support for the students' developing learning of the vocabulary words. It was anticipated that the greater the spontaneous vocabulary use, the more mastery would occur. However, given the difficulty collecting data on the large number of weekly words, this dependent variable was unable to be thoroughly investigated. Therefore, future research should focus on designing techniques to accurately collect spontaneous use and investigate if there is a link between spontaneous use and vocabulary mastery.

Conclusion

In conclusion, the goal of the research was to investigate the effect of a conceptually based vocabulary intervention on recognition, production, comprehension, and spontaneous use of vocabulary of deaf/hh students. Results indicated that the vocabulary intervention had a positive effect for all students involved across all variables, and with both types of vocabulary (Dolch words and Bridge phrases). Vocabulary plays an integral role in a deaf/hh student's ability to understand and comprehend language and reading. This ability is paramount to their success in literacy achievement. Stewart and Kluwin (2001) made the observation that more than 10,000 words are used in everyday speech. By providing deaf/hh students with experiences and interventions that can expose them to a plethora of words and meanings, literacy achievement can be positively enhanced (Stewart & Clarke, 2003). The vocabulary intervention investigated in this study may play a role in that achievement.

APPENDICES

Appendix A

Testing Sheets

TESTNG SHEET

DOLCH WORD RECOGNITION

BRIDGE PHRASE RECOGNITION

DIRECTIONS: Sign the word or phrase to the student. Ask the student to tell you what the sign means in either voice, fingerspelled, or by pointing to the word from a small set of three words. Put a check in the box indicating whether the student's response is mastered, emerging, or incorrect.

KEY: V=VOICE; FS= FINGERSPELLED; P= POINT

Word		Mastered	Emerging	Incorrect
	v			
	fs			
	p			

Phrase		Mastered	Emerging	Incorrect
	v			
	fs			
	p			

Word		Mastered	Emerging	Incorrect
	v			
	fs			
	p			

Phrase		Mastered	Emerging	Incorrect
	v			
	fs			
	p			

KEY: V=VOICE; FS= FINGERSPELLED; P= POINT

Word		Mastered	Emerging	Incorrect
	v			
	fs			
	p			

Phrase		Mastered	Emerging	Incorrect
	v			
	fs			
	p			

DOLCH WORD PRODUCTION

BRIDGE PHRASE PRODUCTION

Directions: Show the word or phrase card to the student. Ask the student to sign the word to you. Put a check in the box indicating whether the student's response is mastered, emerging, or incorrect.

Word		Mastered	Emerging	Incorrect
	s			

Phrase		Mastered	Emerging	Incorrect
	s			

Word		Mastered	Emerging	Incorrect
	s			

Phrase		Mastered	Emerging	Incorrect
	s			

Word		Mastered	Emerging	Incorrect
	s			

Phrase		Mastered	Emerging	Incorrect
	s			

TESTING SHEET:
COMPREHENSION

Directions: Sign the word/phrase to student. Ask student to give you an example of the word/phrase.
Write the student's response down and check the appropriate category.

Student Name

Dolch Word: WEDNESDAY

Word↓	Mastered	Emerging	Incorrect

Word↓	Mastered	Emerging	Incorrect

Word↓	Mastered	Emerging	Incorrect

Bridge Phrase: WEDNESDAY

Phrase↓	Mastered	Emerging	Incorrect

Phrase↓	Mastered	Emerging	Incorrect

Phrase↓	Mastered	Emerging	Incorrect

DOLCH WORD: FRIDAY

Word↓	Mastered	Emerging	Incorrect

Word↓	Mastered	Emerging	Incorrect

BRIDGE PHRASE: FRIDAY

Phrase↓	Mastered	Emerging	Incorrect

Phrase↓	Mastered	Emerging	Incorrect

Spontaneous Use of Target Words/Phrases

Student Name

Word/Phrase	Accurate	Emerging	Incorrect

Student Name

Word/Phrase	Accurate	Emerging	Incorrect

Student Name

Word/Phrase	Accurate	Emerging	Incorrect

Appendix B

Daily Teacher Checklist for Procedural Integrity

Directions: At the end of each session, please complete the following questions based on today's session.

Date: **Number of minutes for session:**	Completed: √
Lesson Components	
Word Introduction: • Introduces words with signs, signed by teacher	
Word Activity: • Semantic mapping	
Practice: • Word Boxes	
• Choose the right meaning	

Daily Likert Scale of Student Participation

Directions: At the end of each session, please rate each student's participation in the activities by circling the number that describes their level of participation. Use the following scale to rate each student's participation:

0: No participation in activities and discussion
1: Infrequent involvement in activities and discussion
2: Consistent and ongoing involvement in activities and discussion
3: Ongoing and very active involvement in activities and discussion

Student:
Level of Participation:
0 1 2 3

Student:
Level of Participation:
0 1 2 3

Student:
Level of Participation:
0 1 2 3

Student:
Level of Participation:
0 1 2 3

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