Speech, Language, and Hearing Sciences Graduate Theses & Dissertations

Speech, Language and Hearing Sciences

Spring 3-23-2015

Teacher Language in Oral Deaf and Hard of Hearing Kindergarten Classrooms

Hannah L. Kovach
University of Colorado Boulder, hannah.kovach@colorado.edu

TEACHER LANGUAGE IN ORAL DEAF AND HARD OF HEARING KINDERGARTEN

CLASSROOMS

by

HANNAH L. KOVACH

B.A., University of Colorado—Colorado Springs, 2012

A thesis submitted to the

Faculty of the Graduate School of the

University of Colorado—Boulder in partial fulfillment

of the requirement for the degree of

Master's in Speech-Language Pathology

Department of Speech, Language, and Hearing Sciences

2015

This thesis entitled:
Teacher Language in Oral Deaf and Hard of Hearing Kindergarten Classrooms
written by Hannah L. Kovach
has been approved for the Department of Speech, Language, and Hearing Sciences

_____

Brenda Schick, Ph.D.

_____

Anne Whitney, Ed.D.

_____

Jeff Coady, Ph.D.

_____

Amy Lederberg, Ph.D.

Date_____

The final copy of this thesis has been examined by the signatories, and we
find that both the content and the form meet acceptable presentation standards
of scholarly work in the above mentioned discipline.

IRB protocol # 12-0539

Kovach, Hannah L. (MA, Speech, Language, and Hearing Sciences)

Teacher Language in Oral Deaf and Hard of Hearing Kindergarten Classrooms

Thesis directed by Professor Brenda Schick, Ph.D., CED

The present study was designed to observe teachers' use of facilitative language techniques (FLTs; types of language that facilitate children's language; e.g., models, recasts, repetitions) in oral deaf and hard of hearing (DHH) kindergarten classrooms and to determine correlations between these FLTs and students' language skills. It was expected that few FLTs would be used in the classroom. The use of higher level FLTs that promoted higher level thinking was predicted to be positively correlated with children's language scores, while the use of lower level FLTs that elicited less critical thinking was predicted to be unrelated to children's language scores. Videos of 5 oral DHH kindergarten classrooms gathered by the Center on Literacy and Deafness were coded, and a Pearson product moment correlation was run to determine correlations among the 5 teachers' FLT use and the 17 children's language scores on the *Expressive One Word Picture Vocabulary Test, Fourth Edition* (EOWPVT-4), the Elaborated Sentences and Phrases subtest of the *Test for Auditory Comprehension of Language, Third Edition* (TACL-3), and the Word Structures subtest of the *Clinical Evaluation of Language Fundamentals, Fourth Edition* (CELF-4). Results indicated a low use of high level FLTs in relation to low level FLTs and housekeeping language, and negative correlations were found between numerous FLTs and children's language scores. These findings indicate the need for further detailed analysis of FLTs and interactions between children and teachers.

ACKNOWLEDGEMENTS

I would like to acknowledge the many people who have made this thesis possible. First of all, many thanks to my adviser, Brenda Schick, who guided me through this process. You were a constant support and always an advocate of the learning process. I greatly appreciate your frequent advice, your answers to my many questions, and your care for me as a person. Thank you for your realistic expectations, your feedback, and your encouragement. I never could have completed this without you.

I would also like to thank the entire Center on Literacy and Deafness grant team who graciously allowed me to use their data and videos to accomplish my thesis. I extend special thanks to Amy Lederberg, Victoria Burke, Mi-Young Webb, and the graduate student assistants who extracted the data, sent me videos, and helped my adviser and me to set up Interact and to run statistics. Thank you so much! Thank you also to Anne Whitney, Jeff Coady, and Amy Lederberg for sitting on my thesis committee and offering me support and advice. I greatly appreciate you and your expertise.

Finally, I would like to thank my family, my mom, my dad, and my sister Sarah, for their constant support. Thank you for consoling me in my moments of struggle and for rejoicing with me in my moments of excitement. You are amazing!

CONTENTS

TABLES

TEACHER LANGUAGE IN ORAL DEAF AND HARD OF HEARING

KINDERGARTEN CLASSROOMS

With the advent of improved hearing aid technology, cochlear implants, and other

hearing technologies, spoken language is increasingly available to children who are deaf or hard-

of-hearing (DHH; e.g., Blamey & Sarant, 2013). More children now respond to early

intervention and spoken language instruction in the classroom. Likewise, newborn hearing

screening protocols have improved the age of identification and intervention by requiring that

children receive a hearing screening by one month of age, full evaluation by three, and

intervention by six. Both of these factors have resulted in improved developmental outcomes for

DHH children in recent years (Lederberg, Schick, & Spencer, 2012). However, despite these

changes in hearing technology and early intervention, many DHH children are still delayed in

their spoken language skills (e.g., Blamey & Sarant, 2013; Lederberg et al., 2012; Moeller,

2007). This emphasizes the need for intervention in spoken language beyond the early years and

into the school years.

Unfortunately, early language exposure is not always available to DHH children. About

96% of children born DHH are born to hearing parents and may therefore be exposed to a limited

amount of language, signed or spoken, until their parents have learned sign language and/or they

have received a cochlear implant or hearing aid (Mayberry & Eichen, 1991; NIH, 2010). This

delay in language exposure may significantly affect language outcomes and later academic skills.

In fact, researchers have found that early language exposure in the DHH population leads to

better outcomes across a variety of domains including grammatical correctness, word recall, and

syntactic sequencing (Mayberry & Eichen, 1991; Mayberry, 1993). Mayberry and Eichen (1991)

found that age of acquisition affects both vocabulary and syntax abilities. Mayberry (1993) later

extended this study by comparing language outcomes among children who learned American

Sign Language (ASL) as a first language from birth, before age 8, and after age 8 and children

who acquired it as a second language between the ages of 8 and 15. Native speakers had a

significant advantage over the later-language learners, and the second-language learners often

outperformed late first language learners although they did not perform as well as native signers

(Mayberry, 1993). This research indicates the importance of early language acquisition whether

it is sign or spoken language. For families who choose spoken language as their child's primary

means of communication, spoken language competence is essential for communication as well as

literacy (Paulson & Moats, 2010, p. 7) and academic achievement.

Research has shown that vocabulary, one piece of language, is a significant predictor of

reading comprehension (e.g., Conner & Zwolan, 2004) and that expressive spoken language is

significantly correlated with DHH children's phonological awareness, word attack, reading

vocabulary, letter-word identification, and passage comprehension (DesJardin, Ambrose, and

Eisenberg, 2009), all essential components of reading success and therefore academic

achievement. In addition, spoken language itself is an important means for communicating ideas

and processing others' language.

Delays in spoken language indicate a need for early intervention and language

stimulation in the spoken DHH population. However, early hearing technology and intervention

does not ensure that DHH children will enter school with speech and language skills

commensurate with their hearing peers. DHH children, on the whole, tend to lag behind their

peers in multiple domains of spoken language including phonology, morphology, semantics,

pragmatics, and syntax, although research indicates a great deal of variability in skills (e.g.,

Blamey & Sarant, 2013; Moeller, 2007). In one study (Sarant, Holt, Dowell, Rickards, &

Blamey, 2009), only 28% of DHH children between one and six years old demonstrated receptive and expressive skills comparable to normal hearing peers. Geers et al. (2009) found similar results. Only 33 to 58% of the 5- and 6-year-old DHH children in their study scored within one standard deviation of their hearing peers on various measures, indicating that only 33 to 58% of these children had language skills comparable to hearing peers. Likewise, Keollinger, Van Horne, and Moeller (2013) found that hard of hearing children between 3 and 6 years of age had poorer overall language (as measured by mean length of utterance) and grammatical skills than their hearing peers, although large overlaps were observed between the groups. They note that "[t]he median child who is HH [hard of hearing] at both 3 years and 6 years of age had an utterance length that was similar to children at the 25th percentile in the NH [normal hearing] group." Rinaldi and Caselli (2008), who compared preschool and kindergarten DHH children via scores on the MacArthur Bates Communicative Development Inventory (CDI), also found that DHH children use fewer complete sentences as well as fewer words but more gestures to express meaning.

Not surprisingly then, DHH children also tend to lag behind their peers in academic achievement (e.g., Marschark, Spencer, Adams, & Sapere, 2011). Antia, Jones, Reed, and Kreimeyer (2009) followed DHH children in second through eighth grade general education classrooms for five years. They found that a majority of these students were performing within the average range with standard scores averaging 94 and falling between 82.4 and 105.6. The researchers noted that these scores were steady throughout the five years of research with little closing of the achievement gap (Antia et al., 2009). As DHH children gain better opportunities for spoken communication through the use of hearing technology, it will be important to help

3

them develop the skills necessary to access this communication, both receptively and expressively.

Possible reasons for skill variability in DHH children include nonverbal intelligence, which appears to be the greatest predictor of achievement (Geers et al., 2009; Geers, 2002), age at cochlear implantation (e.g., Conner & Zwolan, 2004; Geers et al., 2009; Kanda et al., 2012), parental education (Geers et al, 2009), length of rehabilitation (Kanda et al., 2012), and early intervention (Moeller, 2000). Niparko et al. (2010) found that although cochlear implantation resulted in improved spoken language trajectories, significant differences between the skills of hearing and DHH children remained even after age 3; this suggests a need for intervention and rich language environments during the school years in addition to technology and early intervention.

Much research has supported the idea that rich language environments provided by caregivers are essential to language learning in hearing and DHH children (e.g., DesJardin & Eisenberg, 2007; Hart & Risley, 2003; Quittner et al., 2013). Hart and Risley's seminal study of 42 families with hearing children demonstrated that quantity and quality of parent language is correlated with children's language growth in the first three years of life (2003), and Quittner et al. (2013) determined that 11% of variability in language growth trajectories for DHH children could be attributed to parenting behaviors such as maternal sensitivity and linguistic stimulation. This indicates that appropriate interventions and language stimulation techniques are essential components for maximizing spoken language skills in all children.

Many researchers use the term "facilitative language techniques" (FLTs) to describe the types of language that caregivers use when interacting with their children (e.g., Cruz et al., 2014; DesJardin et al., 2009; DesJardin et al., 2014). FLTs include such language techniques as models

4

in which caregivers provide an example of language use (e.g., "The bear is in the tree."), open-ended questions (e.g., "Why do you think she is sad?"), imitations (i.e., repeating the child's utterance verbatim), and many others. Table 1 provides some examples of higher and lower level FLTs as reported by DesJardin et al. (2014).

Table 1. *"Description and Examples of Facilitative Language Techniques (FLTs)."*

Facilitative Language Technique	Description	Example
Lower Level		
Linguistic mapping	Putting into words or interpreting the child's vocalization that is not recognizable as a word.	Child vocalizes as she is looking at the storybook and parent says, "doggie."
Comments	Statement or phrase that signals that a message has been received or an utterance to keep conversation going.	Mother says, "yeah!" or "thank you."
Imitation	Repeating verbatim the child's preceding vocalization without adding any new words.	Child says, "baby" and mother says, "Yes, baby."
Label	Stating the name for a picture in the storybook.	Father says, "There is a doggie."
Directive	Tells or directs child to do something.	Parent says, "Look at this picture."
Closed-ended question	Stating a question in which the child can only answer with a one-word response.	Father asks child, "Do you like this book?"
Higher level		
Parallel Talk	Parent talks aloud about what the child is directly looking at or referencing.	Child is looking directly at a picture of a frog and parent says, "The frog is jumping off the log."
Open-ended question	Parent provides a phrase/question in which the child can answer using more than one word.	While looking at a picture, parent says, "What is happening in this picture?"
Expansion	Parent repeats child's verbalization providing a more grammatical and complete language model without modifying the child's word order or intended meaning.	Child says, "baby cry" and the caregiver says, "The baby is crying."
Recast	Parent restates the child's verbalization into a question format.	Child says, "baby cry" and the caregiver says, "Is the baby crying?"

Maternal use of higher level FLTs such as recasts and open-ended questions are predictive of DHH toddlers' and preschoolers' expressive and receptive language, while lower level FLTs such as imitations and labels are negatively correlated with toddlers' and preschoolers' language development (Cruz, Quittner, Marker, DesJardin, & CDaCI Investigative Team, 2013). DesJardin and Eisenberg (2007) found maternal use of open-ended questions, in particular, to be associated with improvements in expressive language skills for DHH children between the ages of 2.5 and 7.2 years and maternal use of recasts to be related to improved receptive language. These two techniques (i.e., open-ended questions and recasts) have also been correlated with improved phonological awareness and reading skills (DesJardin, Eisenberg, & Ambrose, 2009), and spoken language intervention in general appears to improve reading comprehension in hearing children (Fricke, Bowyer-Crane, Haley, Hulme, & Snowling, 2013), which will in turn contribute to academic and vocational success.

Since teachers spend a great deal of time with children, language stimulation in the classroom is an important avenue for continuing spoken language development beyond the toddler years. The quality of classroom language scaffolding may be particularly important in the early school years (Paulson & Moats, 2010, p. 7). Because children with cochlear implants and hearing aids may be delayed in language stimulation before implantation (unless they are exposed to sign language) and must learn more quickly in order to catch up with peers, appropriate instructional practices early in life are imperative to their language development and academic achievement (Sarant et al., 2009). Marschark et al. (2011) noted the following:

Investigators have hypothesised that at least 50% of the variability in DHH students' achievement may be because of instructional factors, and several studies have indicated

that when taught by experienced teachers of the deaf in mixed classrooms, DHH students

may gain just as much as their hearing peers. (p. 3)

This emphasizes the need for appropriate instructional practices and teacher language input in addition to caregiver input in order to boost children's language skills to their highest potential.

Although classroom research is limited, findings with hearing children are emerging to support the idea that both quality and quantity of teacher talk can impact children's language growth in multiple areas—vocabulary, comprehension, quantity of talk, syntax, et cetera (e.g., Dickinson & Porche, 2011; Gamez & Levine, 2013; Gonzalez et al., 2014; Justice et al., 2013; Meacham, Vukelich, Han, and Buell, 2013; Wasik & Hindman, 2014). Many of these researchers have studied teacher talk in the context of shared storybook reading, a context in which teachers tend to use richer language, defined as "new vocabulary, varied grammar, challenging concepts, and decontextualized talk" (Gest, Holland-Coviello, Welsh, Eicher-Catt, & Gill, 2006, p. 307), but research is also emerging to support the impact of teacher talk in settings across the school day (e.g., Gest et al., 2006; Meacham et al., 2013).

In a longitudinal study, Dickinson and Porche (2011) found that quality of teacher talk in preschool was correlated with children's vocabulary and comprehension in kindergarten and in fourth grade. Specifically, teachers' use of high-level vocabulary predicted fourth grade comprehension, while teachers' use of analytic and corrective talk during book reading predicted fourth grade vocabulary. Gonzalez et al. (2014) also studied the effects of quantity and quality of teacher talk during shared book reading on preschoolers' receptive and expressive vocabulary. These researchers found that associative teacher talk (i.e., questions associating, correlating, and relating information versus labeling and defining) was significantly correlated with children's expressive and receptive vocabularies and that duration of this talk was predictive of children's

vocabulary skills (Gonzalez et al., 2014). Other researchers (Wasik & Hindman, 2014) have confirmed the correlation between children's vocabulary growth and the amount of talk teachers devoted to vocabulary during book reading. Although decontextualized and contextualized talk did not specifically account for children's gains, teachers' repetitions of children's vocabulary use were correlated with increased vocabulary skills (Wasik & Hindman, 2014). These studies suggest the importance of both quality and quantity of teacher talk to support the vocabulary growth of preschool children.

Although much of the research has considered teacher language in the context of shared book reading, teacher language across all settings is important to children's language development. Children who are exposed to vocabulary across multiple settings are more likely to deeply encode those words (Wasik & Bond, 2001). Types of teacher talk within multiple settings also appears to affect children's language in various ways (e.g., Gest et al., 2006; Meacham et al., 2013). Teacher talk tends to vary across book reading, free play, and meal time (Gest et al., 2006). Teachers tend to use richer language (i.e., vocabulary, varied syntax, and difficult ideas) during book reading, but they use more decontextualized talk during meal time and more pretend talk during free play (Gest et al., 2006). Gest et al. (2006) point out that this variation in talk across contexts may help children learn to use language flexibly. Meacham et al. (2013), who observed types of teacher talk during socio-dramatic play, also found that different types of teacher talk were correlated with different aspects of children's language use. When teachers used language to play with children by assuming a particular role in the scene, children's talk increased in frequency; and when teachers taught specific vocabulary words within the play context, children's use of those vocabulary words increased as did child-to-teacher talk ratios

(Meacham et al., 2013). This variety of talk across settings enhances different aspects of children's language development from vocabulary to cognition to socio-emotional skills.

Research also demonstrates that teacher talk affects children's syntactic skills (e.g., Gamez & Levine, 2013; Justice et al., 2013). Justice et al. (2013) examined 39 preschool teachers interacting with students and found that a teacher's use of syntactically complex utterances was predictive of children's use of syntactic complexity in their responses; interestingly, the researchers also found that teachers were more likely to use complex utterances when the children used complex utterances. This research indicates that there may be a bi-directional effect of language complexity in preschool classrooms in which language use of teachers affects that of children and vice versa.

Gamez and Levine (2013) found more global effects of teacher language in kindergarten transitional bilingual education programs. Specifically, they compared children's language gains across the year to certain attributes of teacher language (e.g., word types and syntactic complexity). They found children's expressive language to be positively correlated with the teachers' complex utterances and word variety (Gamez & Levine, 2013). This research indicates the importance of the quality of teacher talk for language improvements in all early childhood and elementary classrooms, both monolingual and bilingual. Although research has addressed the impact of many types of teacher language, particularly that related to vocabulary, syntax, and decontextualized talk, no one has researched the effect of teachers' use of FLTs in the classroom context despite the fact that this type of language, when used by caregivers, supports children's language growth. In addition, no studies have focused on teachers' talk in classrooms with DHH children. An analysis of teachers' use of FLTs in oral DHH kindergarten classrooms will contribute to the understanding of classroom instruction and lay the foundation for interventions

aimed at the types of teacher language that are effective in supporting DHH children's spoken language skills.

The present study seeks to determine current language stimulation practices/FLTs in oral DHH classrooms, an understanding that will lay the foundation for future research and for the development of effective intervention programs in the classroom. The goal of this study is twofold: 1) to describe the types of teacher language currently used in oral DHH kindergarten classrooms and 2) to determine whether correlations exist between teachers' FLTs and children's language skills. It is predicted that teachers' use of higher level FLTs will be associated with improvements in children's language, while the use of lower level FLTs will be unrelated to improvement.

Method

Participants

Seventeen deaf and hard of hearing (DHH) kindergarten children and their five teachers were observed via videotapes obtained from the Center on Literacy and Deafness (CLAD; http://clad.gsu.edu/content/home). CLAD refers to a group of researchers who are dedicated to identifying child and instructional variables that contribute to literacy success in DHH children. The team, including researchers from Georgia State, University of Colorado—Boulder, Arizona State University, University of Arizona, and the Rochester Institute of Technology, and led by Amy Lederberg, Ph.D., is currently testing the efficacy of interventions targeted at the literacy skills of DHH children. They have collected classroom videotapes and administered child assessments across placements types in Florida, Georgia, South Carolina, Arizona, Colorado, Missouri, Minnesota, New York, Washington DC, and Canada. Consent was obtained from all recorded teachers, and parents of the DHH children received parent notification. No identifying information was attached to the videos. For demographic information, see the results section.

Materials

Classroom observation data source. Spring videotapes of five oral kindergarten classrooms from the United States and Canada were obtained from the CLAD dataset. The videos used in this study were recorded during periods of language arts instruction. This included snack time, storybook reading, vocabulary instruction, calendar, oral language discourse, and science lessons. Most videos occurred within the classroom environment with participants seated either at a table or on the floor; a limited number of videos were taken in an outdoor setting where instruction was occurring. Cameras were set up with a wide angle to include views of both the teacher and children. Taping was as non-intrusive as possible, and the cameramen/women

were rarely included in classroom discourse. Field notes were taken during videotaping. For more information on the specific methods of videotaping, please see the CLAD Classroom Observation Field Guide (http://clad.gsu.edu/content/reports-publications-and-presentations-0).

Coding system. To code quality of teacher talk in these videos, the software program Interact was used. Interact allows researchers to attach predetermined codes to a video and to view different sections of that video based on the codes. Codes can also be organized and exported for analysis. In the present study, event coding (i.e., coding of one language technique rather than coding of the duration of an interaction) was used to determine the number of times teachers used each language code.

The coding system was developed on the basis of past research on language stimulation/facilitative language techniques (FLTs) in mother-child and teacher-child interactions and on preliminary paper coding. Preliminary coding was performed on several kindergarten, first, and second grade classrooms obtained from CLAD and served to determine the majority of language techniques used by the teachers in the videotaped classrooms. Higher and lower level FLTs as well as "housekeeping" language (e.g., instruction, behavioral management) were incorporated into the coding system. Higher level FLTs refer to language techniques that evoke more critical thinking or more complex language from the child (e.g., more complex syntactic forms or higher level vocabulary) or provide a greater level of language exposure, while lower level FLTs refer to language techniques that elicit and/or provide less complex language (i.e., more basic syntax, semantics, et cetera).

Except for instructional directives, utterances targeted towards code-based literacy skills (e.g., phonological awareness, sight words, phonics, decoding) and speech skills were not coded in order to avoid codes that targeted literacy and speech versus oral language. Every new teacher

13

utterance type was counted separately unless the teacher immediately rephrased a question or cue within three seconds of the first utterance and thereby did not provide sufficient time for the child to respond to the first cue. Table 2 lists the complete set of language codes used in the present study.

Table 2. *Types of Teacher Language.*

Teacher Language Type	Definition	Example
Higher Level FLTs		
OPEN-ENDED QUESTION	The teacher asks a question that requires higher level thinking (i.e., Bloom's taxonomy levels III-VI—*application, analysis, synthesis, evaluation*) and generally requires a phrasal response.	"How do you think she feels?"
RECAST (Paul, 1995)	The teacher reformulates the child's utterance into a different sentence type (e.g., declarative to interrogative), offers an alternative way of saying something, or *adjusts* incorrect grammatical forms.	Teacher says, "What are they?" after child asks, "What is those?"
EXPANSION (Paul, 1995)	The teacher *adds* grammatical markers and/or semantic details to reformulate the utterance into a complete form.	Teacher says, "They're black," after child says, "Black."
EXTENSION (Paul, 1995)	The teacher adds new semantic information to a child's utterance.	After the child says, "It's a truck," the teacher says, "The truck is speeding down the road."
EXPLANATION	The teacher explains a concept, a story, or the reason for a directive.	"A nurse is someone who works at a hospital."
CUE	The teacher provides a non-explicit cue for the child to adjust his/her language. This includes metacognitive cues that encourage the child to reflect on his/her response.	"…with…."
MODEL	The teacher demonstrates the correct use of a target prior to the child's production.	"The bird is *above* the tree."
Lower Level FLTs		
REPETITION	The teacher repeats the child's utterance. She may adjust the pronoun (e.g., from "I" to "you"), repeat the utterance verbatim, or repeat the correct form of a word approximation. The addition of an article (e.g., "the bird" after child says, "bird") is acceptable.	Teacher says, "You think in an egg," after child says, "in an egg."
MULTIPLE CHOICE	The teacher gives two *spoken* options from which the child chooses an answer.	"Is the bird above the tree or below the tree?"
YES/NO QUESTION	The teacher asks a question that requires that a child respond nonverbally and/or answer yes/no.	"Are you ready?"

15

Table 2. *Types of Teacher Language (continued).*

CLOSED QUESTION	The teacher asks a question that requires lower level thinking (i.e., Bloom's taxonomy levels I and II—*knowledge and comprehension*) and generally requires a shorter response or movement.	"Who helps children learn?"
FILL-IN-THE-BLANK	The teacher provides the beginning of a sentence or answer and either waits for the child to finish the utterance or asks "what" in order to stimulate the child to finish the sentence.	"Can you please…"
VOCABULARY PROVISION	The teacher names something that a child describes or directly instructs vocabulary.	"It's called a sharpener."
Housekeeping Language		
SUGGESTION	The teacher makes a suggestion for what the child could do in the immediate situation.	"You can ask for a hug."
BEHAVIORAL DIRECTIVE	The teacher gives directions not related to content but to behavior or positioning.	"I want you to go pack your backpacks."
INSTRUCTIONAL DIRECTIVE	The teacher provides directions on how to perform an activity or asks the child to complete a school-related task. These may occur in the form of questions. This occurs any time that a teacher asks or states something directly related to the child's performing the task at hand or gives directions for any activity (including literacy activities).	"Tell me about a nurse."
PROCEDURAL INSTRUCTION	The teacher explains the sequence of one activity or the sequence of multiple activities.	"Five more minutes."
REQUEST FOR CLARIFICATION	The teacher asks a question to clarify a child's answer/comment/action.	"You can make what?"
OBSERVATION	The teacher makes an observation of her own or a child's behavior, observes something in a book or on a paper, or observes something that will happen.	"I'm listening to ____."
GENERAL COMMENT	The teacher makes a general comment, greets a child, or responds to a child's comment.	"I thought you would like sweet things."

Table 2. *Types of Teacher Language (continued).*

ANSWER TO OWN PROMPT	The teacher provides the answer to her own question or prompt. Must occur more than 3 seconds after prompt or after child has responded (verbally or nonverbally); otherwise, code as explanation.	"Pudding is ---- (pause) soft."
PRAISE/ENCOURAGE-MENT	The teacher provides a child with feedback regarding his/her performance on oral language only.	"Good job."
EXCLAMATION	The teacher makes an exclamation that is not a part of another utterance.	"Wow!"
COUNTING	The teacher counts forwards or backwards for any reason.	One-Two-Three-
OTHER	The teacher uses some other form of language.	Singing

Hearing measures. In addition to auditory information obtained through parent- and teacher-completed forms, results of the *Early Speech Perception Test* (ESP; Moog & Geers, 1990) were obtained for each child as a measure of his/her auditory skills.

Functional communicative and cognitive measures. For information about the children's cognitive and communicative functioning, scores on the *Functional Rating Scale* (FRS; Antia, Jones, Reid, & Kreimeyer, 2009; Karchmer & Allen, 1999; in Appendix A) and the *Differential Abilities Scale* (DAS-2; Elliott, 2007) were obtained from CLAD. The FRS, a Likert-type scale completed by a teacher, caregiver, or other significant adult in the child's life, assesses DHH children's thinking/reasoning, attention, social skills, communication, and hearing ability in everyday environments. Both expressive and receptive abilities are rated in sign language, spoken language, and simultaneous communication. The DAS-2 is a measure of overall cognitive ability and provides two component scores: General Conceptual Ability and Special Nonverbal Composite. The scores from these two measures provided information about functional hearing ability and cognitive skills.

Language measures. To assess children's language skills, their fall and spring scores on a variety of language measures were obtained from the CLAD dataset. Scores on the *Expressive One Word Picture Vocabulary Test, Fourth Edition* (EOWPVT-4; Brownell, 2010), were obtained in order to assess children's expressive vocabulary. Scores on the Elaborated Sentences and Phrases subtest of the *Test for Auditory Comprehension of Language, Third Edition* (TACL-3; Carrow-Woolfolk, 1999), were used to assess receptive syntactic skills. Scores on the Word Structures subtest of the *Clinical Evaluation of Language Fundamentals, Fourth Edition* (CELF-4; Wiig, Secord, & Semel, 2003), were obtained to assess morphosyntactic knowledge including understanding of plurals, pronouns, and tense.

18

Procedures

Five language arts classrooms, videotaped in the spring, were coded for teacher language use. This amounted to a total of 7.8 hours of classroom coding. To determine correlations, frequency of teachers' use of specific language techniques were then compared to children's language scores on the measures listed above.

Reliability

To determine inter-rater reliability, a graduate student in speech-language pathology at the University of Colorado—Boulder coded 1.8 hours of video (23% of the total coded by the primary investigator). Prior to official coding, this student learned the system and paper coded about 1.5 hours of video. She was compensated for her time. Videos for reliability were chosen quasi-randomly with a randomly chosen video selected for each of four teachers.

Reliability determined by the Kappa statistic, calculated using Interact, consistently fell around 0.65 for three of the four teachers, while reliability for one teacher was an outlier at 0.45. See Table 3 for complete information. A Kappa of 0 indicates chance agreement, while a value of 1 indicates perfect agreement. According to a commonly used scale, these Kappa values indicate moderate agreement for the majority of the teachers (Viera & Garrett, 2005), thereby effectively establishing the reliability of the coding system.

Table 3. *Inter-rater Reliability*.

	Kappa (within 1.15 seconds)	**Interpretation of Kappa**
Teacher 1	0.63	Moderate Agreement
Teacher 2	0.65	Moderate Agreement
Teacher 3	No Inter-rater Reliability	NA
Teacher 4	0.45	Fair Agreement
Teacher 5	0.66	Moderate Agreement

Analysis

The Interact software and developed coding system provided a descriptive analysis of the frequency and quality of teachers' behaviors and instruction. Fall/spring gain scores were calculated by taking the difference between fall scores and spring scores, and statistical significance in these scores was obtained through statistical analyses. Finally, the relationships between number and percentage of teacher FLTs and their students' language scores were obtained via a Pearson product moment correlation.

Results

Children's Demographic Data

Seventeen oral DHH children (11 female; 6 male) were coded in the videotapes. Children were between the ages of 5 years 2 and 6 years 11 and represented a variety of races and ethnicities (29% African American; 29% White/Non-Hispanic; 18% Hispanic/Latino; 18% Other/Non-Hispanic; 6% Asian). Twelve children had cochlear implants, and only one had an additional disability. All were exposed to spoken English in the home. Most children were rated by mothers and teachers as mildly limited to normally functioning in the areas of receptive and expressive language. Tables 4 through 7 contain complete information regarding the children's demographics, hearing status, cognitive abilities, and language skills.

Table 4. *Student Demographic Information*.

	Chronological Age*	Gender	Race and Ethnicity	Home Language	Disabilities	*Differential Abilities Scale Percentile Rank*	Fall *Early Speech Perception Test*
Child 1	6;1	Female	White/Non-Hispanic	English	None	62	Consistent word identification
Child 2	6;3	Female	Hispanic/ Latino	Spanish	None	10	Consistent word identification
Child 3	5;11	Male	African American	English	Attentional Disability	No data	Pattern Perception
Child 4	5;8	Male	African American	English	None	50	Consistent word identification
Child 5	6;6	Female	Other/Non-Hispanic	English; Bosnian	None	5	Consistent word identification
Child 6	6;4	Female	African American	English	None	16	Consistent word identification
Child 7	6;4	Male	Asian	English; gujarati (Indian)	None	8	Consistent word identification
Child 8	6;6	Male	African American	English	None	14	Consistent word identification
Child 9	6;2	Male	White/Non-Hispanic	English	None	34	Consistent word identification
Child 10	6;10	Female	White/Non-Hispanic	English	None	79	Consistent word identification
Child 11	5;11	Female	Other/Non-Hispanic	English	None	97	Consistent word identification
Child 12	6;0	Male	African American	English	None	14	Consistent word identification
Child 13	6;6	Female	Hispanic/ Latino	English; Spanish	None	16	Consistent word identification
Child 14	6;0	Female	White/Non-Hispanic	English	None	34	Consistent word identification

Table 4. *Student Demographic Information (continued).*

Child 15	5;10	Female	Other/Non-Hispanic ("hybrid")	English	None	42	Consistent word identification
Child 16	5;10	Female	Hispanic/ Latino	English; Spanish	None	90	Consistent word identification
Child 17	5;2	Female	White/Non-Hispanic	English	None	34	Consistent word identification

*Note: Student's chronological age is based upon their age at the time of video recordings.

Table 5. *Student Expressive and Receptive Language Information*.

	Receptive Spoken Language Score on FRS**	Receptive Spoken/Sign Ability as rated by Mother	Expressive Spoken Language Score on FRS**	Expressive Spoken/Sign Ability as rated by Mother
Child 1	No data	Most	No data	Most
Child 2	No data	A Little	No data	A Little
Child 3	Functions normally	Some	Functions normally	Some
Child 4	Functions normally	Some	Functions normally	Some
Child 5	Mildly limited	No data	Mildly limited	Unknown-Question not completed
Child 6	Mildly limited	Everything	Mildly limited	Everything
Child 7	Mildly limited	Everything	Mildly limited	Most
Child 8	Functions normally	Everything	Functions normally	Everything
Child 9	Functions normally	Everything	Functions normally	Everything
Child 10	Mildly limited	Everything	Functions normally	Most
Child 11	Severely limited	Unknown-Question not completed	Severely limited	Unknown-Question not completed
Child 12	Functions normally	Unknown-Question not completed	Functions normally	Unknown-Question not completed
Child 13	Mildly limited	Unknown-Question not completed	Mildly limited	Unknown-Question not completed

Table 5. *Student Expressive and Receptive Language Information (continued).*

Child 14	Functions normally	Unknown-Question not completed	Mildly limited	Unknown-Question not completed
Child 15	Functions normally	Most	Functions normally	Everything
Child 16	Mildly limited	Unknown-Question not completed	Mildly limited	Unknown-Question not completed
Child 17	Functions normally	Everything	Functions normally	Most

**FRS = *Functional Rating Scale* (See Appendix A.) This scale was completed by the teachers.

Table 6. *Student Spring Language Scores.*

	EOWPVT-4 Standard Score WNL[1] 100 ± 15		TACL-3 Standard Score WNL[1] 100 ± 15		CELF-4 Standard Score WNL[1] 10 ± 3	
	Raw	**Standard**	**Raw**	**Standard**	**Raw**	**Standard**
Child 1	68	96	22	9	16	6
Child 2	20	—	6	2	0	1
Child 3	31	64	3	1	2	1
Child 4	58	91	15	7	9	4
Child 5	59	82	15	5	6	1
Child 6	76	100	24	9	11	4
Child 7	78	102	21	8	23	10
Child 8	81	101	18	6	13	4
Child 9	71	101	22	8	25	11
Child 10	64	85	18	6	17	6
Child 11	59	90	18	8	2	1
Child 12	58	89	32	12	14	7
Child 13	77	101	31	11	10	3
Child 14	63	93	29	11	19	8
Child 15	74	104	30	11	20	8
Child 16	76	104	23	9	8	3
Child 17	73	108	30	12	11	7

[1]WNL = within normal limits

Table 7. *Student Hearing Information.*

	Age of Identification	Cochlear Implant	Use of Amplification at School	Better Ear Pure Tone Average	Type of Hearing Loss	Family Members DHH	Mode of Communication in the Home
Child 1	Birth	Yes; Bilateral	No data	No data	Auditory Neuropathy	None	Spoken English
Child 2	Birth	Yes; Bilateral	No data	No data	Sensorineural	None	Spoken Spanish
Child 3	2 years	Yes; Unilateral	No data	No data	Sensorineural	Mother and Sibling(s)	Spoken English
Child 4	Birth	No	Almost always	51.67dB	Sensorineural	None	Spoken English
Child 5	Birth	Yes; Unilateral	No data	73.33dB	Sensorineural	Father	Spoken English; Bosnian
Child 6	Birth	No	Almost always	25dB	Sensorineural	None	Spoken English
Child 7	Birth	Yes; Unilateral	No data	71.67	Mixed	None	Spoken English; gujarati (Indian)
Child 8	Birth	No	Almost always	18.33dB	Sensorineural	None	Spoken English
Child 9	Birth	Yes; Bilateral	No data	No data	Sensorineural	None	Spoken English
Child 10	Birth	Yes; Bilateral	No data	No data	Sensorineural	None	Spoken English
Child 11	2 years	Yes; Bilateral	No data	No data	Sensorineural	None	Spoken English
Child 12	4 years	No	Almost always	70dB	Sensorineural	Question not completed	Spoken English
Child 13	Birth	Yes; Unilateral	No data	No data	Sensorineural	None	Spoken English; Spanish
Child 14	Birth	No	Almost always	41.67dB	Mixed	None	Spoken English
Child 15	4 years	Yes; Unilateral	No data	No data	Question not completed	None	Spoken English
Child 16	1 year	Yes; Bilateral	No data	No data	Question not completed	None	Spoken English; Spanish
Child 17	1 year	Yes; Bilateral	No data	No data	Question not completed	None	Spoken English

Teachers' Demographic Data

      Five self-contained oral kindergarten classrooms were coded. All five teachers were hearing females with a state certification in DHH education and at least one year of experience teaching elementary DHH students. Each held a bachelor's degree, and four held a master's degree. Table 8 contains demographic information for each teacher, and Table 9 contains classroom information.

Table 8. *Teacher Demographic Information.*

	Gender	Hearing Status	Role in the Classroom	Years of Experience Teaching DHH	Years of Experience Teaching K-2 DHH	Level of Education	State Certification	Total Time Coded
Teacher 1	Female	Hearing	Teacher	2 years	1 year	Master's in Deaf Education	DHH Education P-12	114 minutes
Teacher 2	Female	Hearing	Teacher	6 years	2 years	Bachelor's in Deaf Education	DHH Education K-12	147 minutes
Teacher 3	Female	Hearing	Teacher	2.5 years	2.5 years	Master's in Deaf Education	DHH Education K-7	56 minutes
Teacher 4	Female	Hearing	Not Indicated; Likely Teacher	3 years	3 years	Master's (field not specified)	DHH Education K-12	96 minutes
Teacher 5	Female	Hearing	Teacher	9 years	6 years	Master's in Auditory/ Oral Deaf Education	DHH Education K-12	57 minutes

Table 9. *Classroom Information.*

	Classification	Mode of Communication	Audio Technology
Classroom 1	Self-contained	Oral	FM System
Classroom 2	Self-contained	Oral	None Specified
Classroom 3	Self-contained	Oral	Rhythmic Phonetics
Classroom 4	Self-contained	Oral	None Specified
Classroom 5	Self-contained	Oral	Sound Field

Frequency of Teacher Language Types

  As Tables 10 through 13 show, an analysis of teacher language in these five oral DHH kindergarten classrooms revealed that housekeeping language constituted the majority of teacher talk (43.15%) followed by lower level FLTs (36.61%). Higher level FLTs were used least often at 18.47% of all teacher talk. General comments and observations alone constituted over 15% of all teacher language. In regards to FLTs, closed questions and yes/no questions were by far the most frequently used at 10.34% and 11.40% of all teacher talk. They were followed closely by repetitions (7.66%). Higher level techniques such as models and explanations were used relatively infrequently (3.69% and 4.03% of all teacher language). Recasts, in which the teacher rephrased a child's utterance; expansions, in which the teacher added semantic and/or syntactic information to make a child's utterance more complete and accurate; and open-ended questions, which require higher level thinking and more complex responses, were all used very rarely, composing 2.13%, 1.09%, and 2.00% of all teacher language, respectively. It is apparent from these data that higher level FLTs were used infrequently in comparison to lower level FLTs and housekeeping language.

Table 10. *Frequency of Higher Level FLTs*.

	Open-ended Question		Recast		Expansion		Extension		Explanation		Cue		Model		Total Higher Level FLTs	
	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Teacher 1	14	1.25%	16	1.43%	5	0.45%	72	6.42%	60	5.35%	17	1.52%	42	3.74%	226	20.16%
Teacher 2	23	1.96%	36	3.06%	24	2.04%	30	2.55%	59	5.02%	47	4.00%	35	2.98%	254	21.61%
Teacher 3	25	6.01%	5	1.20%	2	0.48%	7	1.68%	7	1.68%	0	0.00%	0	0.00%	46	11.05%
Teacher 4	14	1.32%	27	2.55%	11	1.04%	15	1.42%	26	2.46%	21	1.98%	63	5.95%	177	16.72%
Teacher 5	7	1.89%	4	1.08%	3	0.81%	6	1.62%	15	4.05%	14	3.78%	13	3.51%	62	16.74%
Total	83	2.00%	88	2.13%	45	1.09%	130	3.14%	167	4.03%	99	2.39%	153	3.69%		

Table 11. *Frequency of Lower Level FLTs*.

	Repetition		Multiple Choice		Yes/No Question		Closed Question		Fill-in-the-Blank		Vocabulary Provision	
	#	%	#	%	#	%	#	%	#	%	#	%
Teacher 1	129	11.50%	23	2.05%	134	11.94%	140	12.48%	30	2.67%	24	2.14%
Teacher 2	76	6.47%	55	4.68%	130	11.06%	94	8.00%	27	2.30%	5	0.43%
Teacher 3	37	8.89%	8	1.92%	72	17.31%	27	6.49%	5	1.20%	0	0.00%
Teacher 4	59	5.58%	5	0.47%	109	10.30%	110	10.40%	63	5.95%	31	2.93%
Teacher 5	16	4.32%	2	0.54%	27	7.30%	57	15.41%	9	2.43%	12	3.24%
Total	317	7.66%	93	2.25%	472	11.40%	428	10.34%	134	3.24%	72	1.74%

Table 12. *Frequency of Housekeeping Language, Part 1*.

	Suggestion		Behavioral Directive		Instructional Directive		Procedural Instruction		Request for Clarification		Observation	
	#	%	#	%	#	%	#	%	#	%	#	%
Teacher 1	1	0.09%	51	4.55%	64	5.70%	79	7.04%	25	2.23%	101	9.00%
Teacher 2	7	0.60%	43	3.66%	137	11.66%	53	4.51%	23	1.96%	97	8.26%
Teacher 3	0	0.00%	16	3.85%	38	9.13%	22	5.29%	14	3.37%	68	16.35%
Teacher 4	6	0.57%	57	5.39%	114	10.78%	63	5.95%	13	1.23%	92	8.70%
Teacher 5	0	0.00%	21	5.68%	45	12.16%	8	2.16%	2	0.54%	75	20.27%
Total	14	0.34%	188	4.54%	398	9.61%	225	5.43%	77	1.86%	433	10.46%

Table 13. *Frequency of Housekeeping Language, Part 2*.

	General Comment		Answer to Own Prompt		Praise / Encouragement		Exclamation		Counting		Other	
	#	%	#	%	#	%	#	%	#	%	#	%
Teacher 1	51	4.55%	12	1.07%	15	1.34%	13	1.16%	0	0.00%	4	0.36%
Teacher 2	77	6.55%	2	0.17%	69	5.87%	3	0.26%	1	0.09%	22	1.87%
Teacher 3	42	10.10%	2	0.48%	5	1.20%	12	2.88%	0	0.00%	2	0.48%
Teacher 4	79	7.47%	6	0.57%	59	5.58%	4	0.38%	11	1.04%	3	0.28%
Teacher 5	25	6.76%	0	0.00%	10	2.70%	0	0.00%	0	0.00%	0	0.00%
Total	274	6.62%	22	0.53%	158	3.82%	32	0.77%	12	0.29%	31	0.75%

Correlations

A Pearson product-moment correlation analysis (2-tail) was run to determine correlations between teachers' use of higher and lower level FLTs and students' spring scores on the EOWPVT-4, the Elaborated Sentences and Phrases subtest of the TACL-3, and the Word Structures subtest of the CELF-4. See Table 14 for a list of significant correlations.

No significant correlations were found between students' spring scores and teachers' use of open-ended questions, recasts, expansions, cues, models, multiple choice questions, or fill-in-the-blank prompts ($p > .05$). None of the teacher FLTs were correlated with the standard scores on the Word Structures subtest of the CELF-4 ($p > .05$), and percentage of explanations was the only FLT correlated with the CELF-4 raw scores ($r = -.491$, $p < .05$). Extensions, explanations, repetitions, yes/no questions, closed questions, and vocabulary provision were all negatively correlated with at least one score from the EOWPVT-4 and/or the TACL-3 (See Table 14 for statistics.). In other words, the more of these techniques the teacher used, the worse the children's language scores.

Table 14. *Significant Correlations between Students' Spring Scores and Frequency of Teachers' FLTs.*

		EOWPVT-4 Raw Score	EOWPVT-4 Standard Score	TACL-3 Raw Score	TACL-3 Standard Score	CELF-4 Raw Score
Extension #		-.704**	-.587*	-.642**	-.569*	
	Sig. (2-tailed)	0.002	0.017	0.005	0.017	
Extension %		-.717**	-.540*	-.610**	-.526*	
	Sig. (2-tailed)	0.001	0.031	0.009	0.03	
Explanation #		-.537*	-.539*			
	Sig. (2-tailed)	0.026	0.031			
Explanation %		-.501*				-.491*
	Sig. (2-tailed)	0.041				0.045
Repetition #		-.656**	-.625**	-.660**	-.609**	
	Sig. (2-tailed)	0.004	0.01	0.004	0.01	
Repetition %		-.713**	-.592*	-.583*	-.511*	

	Sig. (2-tailed)	0.001	0.016	0.014	0.036	
Yes/No Question #			-.558*	-.486*	-.487*	
	Sig. (2-tailed)		0.025	0.048	0.048	
Closed Question #				-.696**	-.671**	
	Sig. (2-tailed)			0.002	0.003	
Vocabulary #				-.493*	-.505*	
	Sig. (2-tailed)			0.044	0.039	

*Correlation is significant at the 0.05 level (2-tailed).
**Correlation is significant at the 0.01 level (2-tailed).

A Pearson product moment correlation was also run between teachers' FLTs and students' gain scores on the EOWPVT-4, Elaborated Sentences and Phrases subtest of the TACL-3, and the Word Structures subtest of the CELF-4. Because the difference between fall and spring standard scores was so low ($M = 2.62$ for the EOWPVT-4, 1.12 for the TACL-3, and 1.06 for the CELF-4), only the raw scores were included in this analysis. TACL-3 scores were positively correlated with percentage of cues (r = .587, $p < .05$) and negatively correlated with number of models (r = -.486, $p < .05$), number of closed questions (r = -.490, $p < .05$), and number of vocabulary provisions (r = -.565, $p < .05$). No other correlations were significant.

Discussion

Teachers' Use of FLTs

  In the oral DHH kindergarten classrooms under investigation in this study, higher level FLTs were used infrequently in comparison to lower level FLTs and housekeeping language. Although housekeeping language is necessary for the maintenance of the classroom, the low use of higher level FLTs is concerning since these techniques have been correlated with improvements in children's language skills (e.g., Cruz et al., 2013 DesJardin & Eisenberg, 2007; DesJardin et al., 2009; DesJardin et al., 2014). Recasts, which were used rarely in the classrooms, have been correlated with children's receptive skills; and open-ended questions, which were also used rarely, have been correlated with expressive skills (DesJardin & Eisenberg, 2007) as well as phonological awareness (DesJardin et al., 2009). The type of vocabulary teachers use, particularly their references to thematic material and their repetitions of children's vocabulary, has also been associated with increases in children's vocabulary knowledge (e.g., Wasik & Hindman, 2014). The limited number of higher level FLTs found in the current study may therefore have important implications for students' language growth.

Correlations

  The negative correlations between children's language skills and teachers' use of lower level FLTs that were found in the current study are not surprising given past research. DesJardin and Eisenberg (2007) and Cruz et al. (2013) also found negative correlations between mothers' use of lower level FLTs (e.g., labels, repetitions, and directives) and children's language skills, and these lower level techniques have not been consistently correlated with children's language skills as have the higher level FLTs (e.g., DesJardin et al., 2009). The large number of negative

correlations found in the present study is not unexpected given the high number of low level FLTs used in the classrooms.

Interestingly, the correlations between children's language skills and teachers' use of higher level FLTs found in the present study are incongruent with the research hypothesis and with the results of past research. Whereas previous research has found positive correlations between children's language skills and the higher level FLTs used by their teachers and mothers (e.g., Cruz, et al., 2013; DesJardin & Eisenberg, 2007; DesJardin et al., 2009; DesJardin et al., 2014), the present study found negative correlations between some higher level FLTs (i.e., extensions and explanations) and students' language scores on two separate standardized measures. Specifically, the more extensions and explanations a teacher used, the lower the children's scores on the EOWPVT-4; and the more extensions a teacher used, the lower the children's scores on the Elaborated Sentences and Phrases subtest of the TACL-3.

The reasons for this discrepancy are unclear. It is important to remember that the present study analyzed correlations; therefore, it is impossible to determine the direction of the correlations or the causes and consequences of the events. It cannot be assumed that more higher level FLTs created lower level language skills; in fact, lower level language skills may elicit more higher level FLTs. Teachers may have used fewer higher level FLTs with children who had higher level language skills in the first place and more higher level FLTs with children who had delayed language skills. Teachers may have adjusted their own language use to facilitate language growth in children whom they perceived as having lower language abilities, and they may have used fewer higher level FLTs with children who had developed near typical language skills and did not need the additional support to be successful in the immediate classroom environment. Perhaps teachers only used these techniques when they perceived that a child

39

needed them in the immediate situation. If this were the case, then it is reasonable to assume that more higher level FLTs were used with children who had lower level language skills.

Another possibility for the negative correlations and the discrepancy between this study and past research is that the quality of expansions, explanations, recasts, et cetera has a greater impact upon children's language skills than the quantity of these techniques. It is possible that the variety and complexity of teachers' vocabulary and sentence structure is more important than the sheer quantity of linguistic input. It is also possible that a teacher's emphasis upon various aspects of her techniques (e.g., accurate syntactic form) impacts children more so than the use of the technique itself. An expansion, explanation, or recast may be insufficient for eliciting changes in children's language. Rather, teachers may need to place emphasis on the changes that they make in their language. For example, if a child says, "He go to the store," the teacher may need to respond with an emphasis on "went"—"He *went* to the store,"— in order for the child to change his/her language in the future. Perhaps adjustments in language need to be made salient to children so that they are attentive to the differences between their own language and the language of those around them. Especially for language-delayed children, the emphasis and attention paid to language adjustments and expansions may be just as important as the adjustment or expansion itself. Children must attend to and encode information in order for changes to occur, and it may be necessary to explicitly bring the information to the child's attention in order for him/her to encode that information. Direct instruction may even be necessary at the kindergarten level.

In fact, the impact of various techniques may change across a child's age and language skills. Most of the research to date has focused on toddlers and preschoolers between 1 and 5 years of age (e.g., DesJardin & Eisenberg, 2007; DesJardin et al., 2014; Gest et al., 2006;

Gonzales et al., 2014; Justice et al., 2014; Meacham et al., 2013), whereas the present study focused on kindergarten students between 5-2 and 6-10 years old. Techniques that enhance language in the early years may be insufficient for effecting change in the later years. The effectiveness of various techniques may wax and wane as children develop.

It is also possible that children who are expected to repeat a teacher's adjusted or expanded utterance make greater gains than those who are not expected to reproduce a response. An expectation that the child repeat an utterance makes the subtle changes more salient to the child and fulfills the need for a child to practice language for himself/herself, thereby encouraging solid encoding of the concept. If children are expected to respond or repeat the teacher's utterance, they engage in kinesthetic practice and receive feedback on their performance, two components which may be essential to the encoding process and the cognitive-motor learning experience. Expectations placed upon the children and children's responses were not captured in the present study, and only teacher language was coded. Children's responses and sequences of teacher-child language were not analyzed to determine steps of scaffolding or child practice. Future researchers should observe these sequences of teacher-child talk to determine if the expectations placed upon the child, the accuracy of the child's repetitions or responses, and/or the teacher's emphasis on various aspects of their own language affect the child's language use and language growth.

A final consideration is the relevance of the language measures used in this study. The EOWPVT-4, the TACL-3, and the CELF-4 were all chosen as reliable and valid standardized language measures that had been administered by the CLAD team. However, these tests may not be the best representatives of the types of language that are affected by higher level FLTs. Perhaps higher level FLTs affect vocabulary and receptive skills less so than expressive syntactic

41

and conversational skills. The TACL-3, for example, tests only comprehension. It is possible that expressive skills would have been positively correlated with higher level FLTs. Interestingly, the CELF-4 Word Structures was correlated only with explanations, and this was likely due to the limited amount of time directed towards morphological instruction and correction in the classrooms. Perhaps measures of mean length of utterance, syntactic skills, and use of vocabulary during conversation would have yielded different results. Future research should address this concern to determine whether FLTs impact certain types of language more so than others.

It will be important for future researchers to continue exploring and determining appropriate techniques for improving language skills in oral DHH children across a variety of domains (e.g., syntax, semantics, morphology). Different techniques may very well affect different aspects of children's language development (e.g., Teachers' expansions may improve children's expressive syntactic skills and utterance length while complexity of teachers' vocabulary may expand children's vocabulary.). In order to effectively address children's specific needs and deficits, it will be essential to determine the differential effects of various aspects of teachers' language on their students' overall language growth.

Reliability

Reliability in the present study, although adequate to establish functional conclusions, could have been improved. The moderate rather than strong reliability may be explained by a number of factors. First of all, the moderate reliability demonstrates the difficulty of a coding system designed to identify language types. Determining codes for each type of utterance is a challenging task that requires descriptive, exhaustive, and mutually exclusive codes. Determining the appropriate codes for each utterance can also be a difficult task as it requires the

rater to determine the best fit for an utterance that may seem to fit in multiple categories. Secondly, the moderate reliability may be partially explained by the nature of the Kappa statistic, which may underestimate reliability for rare events (Viera & Garrett, 2005). Some of the codes used in the present study (e.g., suggestions) were rare events in the classroom. This may have depleted the reliability determined by the Kappa statistic. A third possibility is that timing of code input may have impacted the reliability of the system. Codes must have been input by both raters within 1.15 seconds of one another in order to be viewed as consistent. This was necessary since the data contained instances of two independent codes identified within 2 seconds of one another. However, other teacher utterances were many seconds long (e.g., an observation that lasted 8 seconds), and it is possible that one rater coded these utterances at the beginning while the other coded at the end. If these inputs were separated by more than 1.15 seconds, they were not considered reliable. In fact, the coders simply placed the event code anywhere in the language string, and reliability might have been improved if both coders tried to target the beginning of the language event. Finally, reliability may have improved if some of the categories had been collapsed. The definitions for some categories (e.g., observations and general comments) were so closely linked that they were difficult to distinguish on the videos. Had codes such as these been collapsed into one code, reliability may have increased. The effects of these four factors may have decreased the reliability of the coding system. Future researchers should consider these factors when developing their own coding systems.

Conclusions

The present study sought to determine the amount of facilitative language techniques used by teachers in oral DHH kindergarten classrooms and to assess whether these techniques are correlated with children's language skills. The results indicated a low use of higher level FLTs in relation to lower level FLTs and housekeeping language. In direct contrast to previous research, correlation analyses indicated that greater use of higher level FLTs was associated with lower level language skills. The reasons for this discrepancy have been considered above. It is important that future researchers replicate this work on a larger scale with more detailed analyses to determine the critical qualities of teacher talk that facilitate children's language skills.

References

Antia, S. D., Jones, P. B., Reed, S., & Kreimeyer, K. H. (2009). Academic status and progress of deaf and hard-of-hearing students in general education classrooms. *Journal of Deaf Studies and Deaf Education*, *14(3)*, 293-311.

Antia, S., Jones, P., Reid, S., & Kreimeyer, K. (2009). Academic status and progress of deaf and hard-of-hearing students in general education classrooms. *Journal of Deaf Studies and Deaf Education, 14(3)*, 293-311. Adapted from: Karchmer, M.A. & Allen, T.E. (1999). The functional assessment of deaf and hard-of-hearing students. *American Annals of the Deaf, 144(2)*, 1999.

Blamey, P. J., & Sarant, J. Z. (2013). The consequences of deafness for spoken language development. In A. Kral, A. N. Popper, & R. R. Fay (Eds.), *Deafness* (pp. 265-299). New York: Springer.

Brownell, R. (2010). *Expressive One-Word Picture Vocabulary Test-4* (EOWPVT-4-4). Novato, CA: Academic Therapy Publications.

Carrow-Woolfolk, E. (1999). *Test for Auditory Comprehension of Language-Third Edition* (TACL-3-3). Austin, TX: PRO-ED.

Connor, C. M., & Zwolan, T. A. (2004). Examining multiple sources of influence on the reading comprehension skills of children who use cochlear implants. *Journal of Speech, Language and Hearing Research, 47(3)*, 509–526.

Cruz, I., Quittner, A. L., Marker, C., & DesJardin, J. L. (2013). Identification of effective strategies to promote language in deaf children with cochlear implants. *Child development*, *84*(2), 543-559.

DesJardin, J. L., Ambrose, S. E., & Eisenberg, L. S. (2009). Literacy skills in children with cochlear implants: The importance of early oral language and joint storybook reading. *Journal of Deaf Studies and Deaf Education*, *14*(1), 22-43.

DesJardin, J. L., Doll, E. R., Stika, C. J., Eisenberg, L. S., Johnson, K. J., Ganguly, D. H., ... & Henning, S. C. (2014). Parental support for language development during joint book reading for young children with hearing loss. *Communication Disorders Quarterly*, *35*(3), 167-181.

Dickinson, D. K., & Porche, M. V. (2011). Relation between language experiences in preschool classrooms and children's kindergarten and fourth-grade language and reading abilities. *Child Development*, *82(3)*, 870-886.

Elliot, C. D. (2007). *Differential Abilities Scale—II* (DAS-II). Boston, MA: Pearson.

Fricke, S., Bowyer-Crane, C., Haley, A. J., Hulme, C., & Snowling, M. J. (2013). Efficacy of language intervention in the early years. *Journal of Child Psychology and Psychiatry*, *54*(3), 280-290.

Gamez, P. B., & Levine, S. C. (2013). Oral language skills of Spanish-speaking English language learners: The impact of high-quality native language exposure. *Applied Psycholinguistics*, *34*(04), 673-696.

Geers, A. E. (2002). Factors affecting the development of speech, language, and literacy in children with early cochlear implantation. *Language, Speech, and Hearing Services in Schools, 33(3)*, 172–183.

Geers, A. E., Moog, J. S., Biedenstein, J., Brenner, C., & Hayes, H. (2009). Spoken language scores of children using cochlear implants compared to hearing age-mates at school entry. *Journal of Deaf Studies and Deaf Education*, *14*(3), 371-385.

Gest, S. D., Holland-Coviello, R., Welsh, J. A., Eicher-Catt, D. L., & Gill, S. (2006). Language development subcontexts in Head Start classrooms: Distinctive patterns of teacher talk during free play, mealtime, and book reading. *Early Education and Development*, *17*(2), 293-315.

Gonzalez, J. E., Pollard-Durodola, S., Simmons, D. C., Taylor, A. B., Davis, M. J., Fogarty, M., & Simmons, L. (2014). Enhancing preschool children's vocabulary: Effects of teacher talk before, during and after shared reading. *Early Childhood Research Quarterly*, *29*(2), 214-226.

Hart, B., & Risley, T. R. (2003). The early catastrophe. *Education Review, 17*(1), 110-118.

Justice, L. M., McGinty, A. S., Zucker, T., Cabell, S. Q., & Piasta, S. B. (2013). Bi-directional dynamics underlie the complexity of talk in teacher–child play-based conversations in classrooms serving at-risk pupils. *Early Childhood Research Quarterly*, *28*(3), 496-508.

Kanda, Y., Kumagami, H., Hara, M., Sainoo, Y., Sato, C., Yamamoto-Fukuda, T., ... & Takahashi, H. (2012). What factors are associated with good performance in children with cochlear implants? From the outcome of various language development tests, research on sensory and communicative disorders project in Japan: Nagasaki experience. *Clinical and experimental otorhinolaryngology*, *5(Suppl 1)*, S59-S64.

Koehlinger, K. M., Van Horne, A. J. O., & Moeller, M. P. (2013). Grammatical outcomes of 3- and 6-year-old children who are hard of hearing. *Journal of Speech, Language, and Hearing Research*, *56*(5), 1701-1714.

Lederberg, A. R., Schick, B., & Spencer, P. E. (2013). Language and literacy development of deaf and hard-of-hearing children: Successes and challenges. *Developmental psychology*, *49*(1), 15.

Marschark, M., Spencer, P. E., Adams, J., & Sapere, P. (2011). Evidence-based practice in educating deaf and hard-of-hearing children: Teaching to their cognitive strengths and needs. *European Journal of Special Needs Education, 26(1)*, 3-16.

Mayberry, R. I. (1993). First-Language acquisition after childhood differs from second-language acquisition: The case of American Sign Language. *Journal of Speech, Language, and Hearing Research*, *36*(6), 1258-1270.

Mayberry, R. I., & Eichen, E. B. (1991). The long-lasting advantage of learning sign language in childhood: Another look at the critical period for language acquisition. *Journal of memory and language*, *30*(4), 486-512.

Meacham, S., Vukelich, C., Han, M., & Buell, M. (2013). Preschool teachers' language use during dramatic play. *European Early Childhood Education Research Journal*, *21*(2), 250-267.

Moeller, M. P. (2000). Early intervention and language development in children who are deaf and hard of hearing. *Pediatrics*, *106(3)*, e43-e43.

Moog, J. S., & Geers, A. E. (1990). *Early Speech Perception Test* (ESP). St. Louis, MO: Central Institute for the Deaf.

National Institute on Deafness and Other Communication Disorders (2014). *Quick Statistics*. Retrieved from http://www.nidcd.nih.gov/health/statistics/pages/quick.aspx.

Nicholas, H., Lightbown, P. M., & Spada, N. (2001). Recasts as feedback to language learners. *Language Learning*, *51*(4), 719-758.

Niparko, J. K., Tobey, E. A., Thal, D. J., Eisenberg, L. S., Wang, N. Y., Quittner, A. L., ... & CDaCI Investigative Team. (2010). Spoken language development in children following cochlear implantation. *Jama*, *303(15)*, 1498-1506.

Paul, R. (1995). *Language Disorders from Infancy through Adolescence: Assessment and Intervention*. St. Louis, MO: Mosby-Year Book.

Paul, R., & Norbury, C. (2012). *Language disorders from infancy through adolescence: listening, speaking, reading, writing, and communicating* (4th ed.). St. Louis, MO: Elsevier Health Sciences.

Paulson, L. H., & Moats, L. C. (2010). *Language Essentials for Teachers of Reading and Spelling (LETRS) for Early Childhood Educators*. Longmont, CO: Cambium Learning Sopris West.

Quittner, A. L., Cruz, I., Barker, D. H., Tobey, E., Eisenberg, L. S., & Niparko, J. K. (2013). Effects of maternal sensitivity and cognitive and linguistic stimulation on cochlear implant users' language development over four years. *The Journal of Pediatrics*, *162*(2), 343-348.

Rinaldi, P., & Caselli, C. (2009). Lexical and grammatical abilities in deaf Italian preschoolers: The role of duration of formal language experience. *Journal of Deaf Studies and Deaf Education*, *14*(1), 63-75.

Roberts, J. E., Bailey, D. B., & Nychka, H. B. (1991). Teachers' use of strategies to facilitate the communication of preschool children with disabilities. *Journal of Early Intervention*, *15*(4), 358-376.

Sarant, J. Z., Holt, C. M., Dowell, R. C., Rickards, F. W., & Blamey, P. J. (2009). Spoken language development in oral preschool children with permanent childhood deafness. *Journal of Deaf Studies and Deaf Education*, *14*(2), 205-217.

Viera, A. J., & Garrett, J. M. (2005). Understanding interobserver agreement: The kappa statistic. *Family Medicine*, *37*(5), 360-363.

Wasik, B. A., & Bond, M. A. (2001). Beyond the pages of a book: Interactive book reading and language development in preschool classrooms. *Journal of Educational Psychology*, *93*(2), 243.

Wasik, B. A., & Hindman, A. H. (2014). Understanding the active ingredients in an effective preschool vocabulary intervention: An exploratory study of teacher and child talk during book reading. *Early Education and Development*, (ahead-of-print), 1-22.

Wiig, E. H., Secord, W. A., & Semel, E. (2003). *Clinical Evaluation of Language Fundamentals—Fourth Edition* (CELF-4-4). Boston, MA: Pearson.

APPENDIX: FUNCTIONAL RATING SCALE

Directions for completing the Functional Rating Scale

The purpose of the Functional Rating Scale is to obtain information about the student's typical functioning at school and at home. Please complete all three parts of the scale by circling the descriptor that best fits each area.

- When completing the Cognitive Social Scale (Part 1) indicate if you are unable to rate the student.

- When completing the Expressive and Receptive Communication scale (Part 2), rate the student separately for each form of communication: sign communication, oral communication and simultaneous (oral and sign) communication. You can rate the student as not using one of these forms of communication. If you are unfamiliar with the student's ability to communicate through any of these means you can circle "Unable to rate".

- When completing the Functional Hearing scale (Part 3) rate the student's functioning when s/he is using his/her typical amplification.

Child's Name: _____   Today's Date: _____

Child's Date of Birth: _____ _____

Person completing form:

Name: _____   Relation to child: _____

Please mark one box for each row that best describes the child's functioning

FUNCTIONAL RATING SCALE

Part 1: Cognitive and Social

	Functions Normally	*Mildly limited*	*Severely limited*	*Unable to rate*
Thinking /Reasoning	Student thinks and reasons normally, plays games, solves puzzles and problems comparably to other students the same age	Student is slow to solve age-appropriate puzzles and problems or learn new things, but may acquire these intellectual skills with instructional supports	Student has considerable difficulty solving age-appropriate puzzles and problems, lags far behind peers and may require individualized instruction to master even simple tasks.	Rater not familiar with student's thinking/reasoning
Maintaining attention to classroom tasks	Student usually attends to classroom instruction sufficiently to learn material.	Student's attention in class frequently wanders, sufficient to impair instruction, but the student can master classroom tasks with some instructional support.	Student has extreme difficulty attending to classroom material, even for short periods of time; student may act impulsively or withdraw frequently from classroom activities.	Rater not familiar with student's attention to classroom tasks
Social Interaction /classroom behavior	Student exhibits social skills and behavior that are appropriate for his/her age	Student exhibits some inappropriate behavior that may include fighting, biting, hitting, screaming. However, this behavior is not disruptive enough to require frequent separation of the student from the classroom.	Student frequently exhibits inappropriate social behavior and is often disruptive of classroom activities. Student often needs to be separated from the class.	Rater not familiar with student's social interaction and classroom behavior.

Part 2: Expressive and Receptive Communication

	Functions Normally	*Mildly limited*	*Severely limited*	*Does not know*	**Unable to rate**
Expressive sign (only) communication	Student communicates in sign expressively with his/her teacher and peers fluently and easily.	Student has some difficulty expressing him/herself in sign. However, difficulties can be overcome by repetition and explanation.	Student has considerable difficulty expressing him/herself using sign.	Student does not know or use sign.	Rater not familiar with student's expressive sign communication
Receptive sign (only) communication	Student comprehends the sign communication of others accurately and easily.	Student has some difficulty comprehending sign communication from others. Difficulties can be remediated by repetition and explanation.	Student has considerable difficulty comprehending sign communication from others.	Student does not know or use sign.	Rater not familiar with student's receptive sign communication
Expressive spoken (only) communication	Student communicates in spoken language expressively with his/her teacher and peers fluently and easily.	Student has some difficulty expressing him/herself in spoken language. However, difficulties can be overcome by repetition and explanation.	Student has considerable difficulty expressing him/herself in spoken language.	Student does not know or use spoken language.	Rater not familiar with student's expressive oral communication
Receptive spoken (only) communication	Student comprehends the spoken communication of others accurately and easily.	Student has some difficulty comprehending spoken communication from others. Difficulties can be remediated by repetition and explanation.	Student has considerable difficulty comprehending spoken communication from others.	Student does not know or use spoken language.	Rater not familiar with student's receptive oral communication

	Functions Normally	*Mildly limited*	*Severely limited*	*Does not know*	**Unable to rate**
Expressive simultaneous (spoken and signed) communication	Student communicates using both spoken and sign language expressively with his/her teacher and peers fluently and easily.	Student has some difficulty expressing him/herself using spoken and sign language. However, difficulties can be overcome by repetition and explanation.	Student has considerable difficulty expressing him/herself in spoken and sign language.	Student does not know or use spoken and sign language simultaneously.	Rater not familiar with student's simultaneous expressive communication
Receptive simultaneous (spoken and signed) communication	Student comprehends the simultaneous (spoken and sign) communication of others accurately and easily.	Student has some difficulty comprehending simultaneous (spoken and sign) communication from others. Difficulties can be remediated by repetition and explanation.	Student has considerable difficulty comprehending simultaneous (spoken and sign) communication from others.	Student does not know or use simultaneous (spoken and signed) communication.	Rater not familiar with student's receptive simultaneous communication

Part 3: Functional Hearing

	Functional Normally	*Mildly limited*	*Severely limited*	*No functional hearing*	*Unable to rate*
Functional hearing	Student has negligible difficulty in receiving auditory information.	Student needs frequent spoken repetitions, occasional visual or tactile communication support or both.	Student realizes some benefit from auditory communication although unable to function adequately without visual or tactile communication.	Student receives no benefit from spoken communication.	Rater not familiar with student's functional hearing.