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Debbie B. Golos, Annie M. Moses

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DEBBIE B. GOLOS AND ANNIE M. MOSES

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Abstract

Teachers of deaf children express concern over a lack of curricular materials appropriate for and beneficial to the deaf population, particularly for language and literacy development and in early childhood classrooms. In addition, more and more deaf children are attending classrooms in which their teachers may not be fluent in ASL. This, too, indicates a need for curricular resources that support and extend language and literacy instruction for deaf children. The current study examines the potential of classroom activities designed to supplement an educational video series in ASL. The participants included one teacher, six deaf children, and one child of a Deaf adult (Coda) in an early childhood classroom. Over the course of two weeks, the teacher showed the participants an educational video and implemented six supplemental activities, all of which were designed to promote a set of early literacy skills (e.g., vocabulary, knowledge of story elements, sequencing ability). Each activity was video-recorded and transcribed for children's displays of literacy-related behaviors. The teacher also filled out a survey in order to provide feedback on the usability and

Debbie Golos is an associate professor of Deaf Education at Utah State University, and her research agenda focuses on early literacy, educational media development, bilingual deaf education and the portrayal of deaf characters in children's literature and media. Annie Moses is an assistant professor of Early Childhood/Teacher Education at John Carroll University, and her research agenda focuses on early literacy, media, and early childhood development.

effectiveness of the activities. The findings suggest that the children displayed many of the targeted skills during the classroom activities, and the descriptive statistics show higher mean scores in targeted skills following the classroom activities. Although they are exploratory, these findings suggest the potential benefit of incorporating such activities into early childhood classrooms.

The role of language, particularly in communication with others and in learning to read and write, is critical for children's success in school and in life. Researchers, educators, and others have long been interested in how and when to introduce language and literacy, and some have been especially concerned with doing so with deaf children. When children are learning a language and becoming literate, they must have a fluent language model. That model can take many forms, including parents and other family members, peers, educators, and schooling.

The statistics on deaf children's achievement in later schooling raise significant concerns. For example, the reading skills of deaf children with hearing parents lag behind those of their Deaf peers with Deaf parents (Lane, Hoffmeister, and Bahan 1996). This stems from the fact that, from birth, many deaf children are not provided with a fully accessible language (e.g., a visual language such as American Sign Language [ASL]; Mayberry 2007, 2010). Thus, often by the time these deaf children reach preschool, their literacy skills are already delayed. This places a greater responsibility on educators to provide fluent language models in the classroom, and both researchers and educators have focused on best practices for promoting language and literacy development with this population. Yet, questions remain, and perspectives on effective ways to foster such growth differ.

Recently, greater attention has been directed to multimedia and other technologies as resources for learning. Studies have demonstrated the potential of both new and old technologies to promote learning and development in language and literacy in particular. These technologies offer many opportunities to provide fluent language models by incorporating visual language and visual learning strategies, which, in turn, can become another source for facilitating deaf children's literacy and language skills. A small body of work has indicated that educational media in ASL are indeed one effective means

of teaching language and literacy skills (Golos and Moses 2013a). In addition, findings suggest that engagement and learning in this area increase with teacher mediation (Golos and Moses 2011). Yet, the field still has much to learn about the role the teacher plays when utilizing educational media to foster early literacy and language skills.

The current study extends previous research in several ways. First, it focuses on deaf children's learning when teachers are provided with materials and activities to supplement an educational media series. It also examines participants' literacy-related behaviors exhibited during the activities, and whether their knowledge of targeted skills increased after they participated in the activities. In addition, it discusses teacher feedback on the usability and perceived effectiveness of the activities and the materials.

Theoretical Frameworks for Literacy Development

Curricular resources that target effective language and literacy development in deaf children must be informed by research. For example, they must consider the range of skills that develop prior to conventional reading and writing (i.e., emergent literacy skills), including growth in vocabulary, comprehension, and print awareness. These resources must also account for the multiple ways in which deaf children can access visual language and a variety of strategies, including ways to make connections between languages (i.e., ASL and English print) and by using multimedia (i.e., multiliteracies).

Emergent Literacy

In the past several decades, more and more researchers and educators of deaf people have come to support the theoretical perspective of emergent literacy, which focuses on the literacy-related knowledge and skills that children develop from birth onward (e.g., Musselman 2000; Sulzby and Teale 1991; Whitehurst and Lonigan 2001). Deaf children can learn much, for example, from seeing a book read aloud in ASL and from having adults point to and discuss print and images. Through everyday interactions with print, young children gradually develop an understanding, for instance, of concepts of print (i.e., how to hold a book, reading left to right) and the meaning of a new word or an entire text. Children can learn these and other skills prior to

formally learning to read and write; however, they need a fluent and accessible language model (i.e., for deaf children, the fluent model of ASL) through which to access this new information.

Certainly, having a fluent language model is critical, and yet that model consists of is much debated in the field of Deaf education. Recent research indicates a growing recognition of the critical role of early exposure to ASL (e.g., Mayberry 2007, 2010). For instance, researchers have found that deaf children who have been exposed to ASL from birth (e.g., Deaf children of Deaf parents) consistently show higher rates in literacy than those who have not had that early and extensive exposure to ASL (Chamberlain and Mayberry 2000, 2008; Morford and Mayberry 2000; Hoffmeister 2000). At the same time, an increasing number of deaf children are being educated in mainstream settings or in self-contained programs, and deaf children may not receive access to fluent language models. Thus, many of them may not learn strategies for connecting ASL to English print that help promote later literacy success.

Historically, few research-based curricular resources exist for teachers of deaf children, in particular for preschool teachers, to support literacy development (Easterbrooks and Huston 2008). Resources that do exist often incorporate or focus on sound-based strategies for reading (ibid.). However, recent research reveals that deaf children may not necessarily need access to sound to learn how to read; in fact, they may benefit more from visual language and visual strategies than sound-based methods (Mayberry, del Guidice, and Lieberman 2011; Miller and Clark 2011; McQuarrie and Parrila 2009; Freel et al. 2011).

This places a high priority on the language and strategies used by those interacting with children as well as the quality of the materials used to expose children to language and literacy skills. For example, adults can introduce skills and information using ASL in face-to-face interactions (e.g., read-alouds, direct instruction, play scenarios), and children can engage with literacy-related materials (e.g., books, magnetic letters, various writing tools) in their environment. Such interactions and engagement can occur at home, at school, and elsewhere. For example, children can also engage with and learn from multimedia sources such as television, DVDs, computers, and smartphones. In

order to become literate, deaf children must have high-quality interactions with adults as well as opportunities to engage with literacy-related materials in an accessible language.

Multiliteracies

Emerging from literacy research and gaining presence in the field of Deaf education, a multiliteracies perspective broadens the concept of literacy and allows for the incorporation of multiple languages, cultures, and media (New London Group 1996). The New London Group argues that, for literacy instruction to be effective, the definition of literacy must be expanded to include students' linguistic, cultural, and background experiences as well as multiple modalities that expose children to literacy. These can include engagement with new technologies and media both inside and outside of school settings. With regard to the Deaf population, this perspective seems especially applicable because it is sensitive to the diverse linguistic (e.g., ASL) and cultural (e.g., Deaf) needs of individuals (e.g., deaf children). Recent evidence suggests that multimedia sources presented in ASL and incorporating visually based strategies may provide deaf children with additional language and literacy support (Golos and Moses 2013a). However, further work is needed to determine how teachers can foster the development of these skills when provided with research-based strategies and materials, including educational media and media-related materials, to utilize in the classroom.

Review of the Literature Deaf Children and Educational Media

Hearing children can learn language and literacy skills by viewing educational television programs that help build vocabulary, letter recognition, story knowledge, and more (Neuman 1995, 2009; Fisch 2004; Moses 2008). Although this work can provide some insights into the efficacy of educational media with regard to deaf children, empirical work has only recently begun in this area. As educators and researchers attempt to fill the gap in the resources and materials available to the deaf population and those working with its members, the focus should be on developing and using research-based and research-tested materials.

Effective Strategies for Use in Educational Media

When Deaf adults engage Deaf children in literacy activities (e.g., read-alouds), they incorporate a number of strategies that not only facilitate language development but also help make connections between ASL and English print. Such strategies can be integrated into media materials by showing ASL and English print simultaneously and by "sandwiching" or "chaining" to connect ASL to the English printed word by combining pointing, signing, and fingerspelling in various ways (e.g., Akamatsu and Andrews 1993; Erting 2001; Erting and Pfau 1997; Padden and Ramsey 1998). In addition, Deaf adults rely on other strategies to get and maintain deaf children's attention, and these can also be incorporated into media products (e.g., group vs. individual eye gaze; use of exaggerated facial expression; use of role-play) (Blumenthal-Kelly 1995; Erting 2001; Erting and Pfau 1997; Mather 1989).

Utilizing media for shared reading can also be effective (Gentry, Chinn, and Moulton 2005; Loeterman, Paul, and Donahue 2002; Snodden 2010). For example, when e-books were provided to parents, parent/child dyads spent a longer time in shared reading activities, and children's sign vocabulary increased (Mueller and Hurtig 2010). However, such an approach relies on the adults to mediate literacy content by encouraging interaction and skills development while reading.

Recently these same strategies have been embedded in various media and have shown positive results on the acquisition of literacy skills, both with and without teacher mediation (e.g., Golos and Moses 2011; Golos and Moses 2013b). An example of one such media product is a recently created video series in ASL that was developed to integrate research-based strategies reviewed earlier to elicit attention and engagement, facilitate development of both ASL and written English, and help children make connections between ASL and English print (e.g., Erting, Thumann-Prezioso, and Benedict 2000; Gale and Schick 2009; Maxwell 1988; Padden 1991). In addition, the video series was designed to teach preschool deaf children new words in different modes (e.g., ASL, picture, print) and increase their knowledge of story elements (Golos and Moses 2013b). Three studies, including a total of

fifty-six preschool deaf children, found statistically significant gains from pretest to posttest after viewing one or more videos in the series multiple times. Gains were made regardless of participants' previous exposure to ASL or their baseline ASL skills (for a more detailed description of these studies see Golos and Moses 2013a).

Learning from Educational Media with Teacher Mediation

Although both hearing and deaf children can acquire essential skills from viewing and engaging with educational media on their own, adults can enhance that learning (for hearing children, e.g., see Strouse, O'Doherty, and Troseth 2013; for deaf children, e.g., see Golos and Moses 2011; Loeterman, Paul, and Donahue 2002). Specifically, when adults mediate children's behavior by asking open-ended questions about the content of a video and encouraging children to sign along, the children's learning increases. Similar to face-to-face literacy activities, this type of mediation can occur before, during (e.g., by pausing the video for discussion), or after the video.

For example, in one study, teachers were provided with a unit plan to supplement the educational program *Between the Lions.* For two hours a day they used the unit over six to eight days with 32 deaf and hard of hearing children between six to twelve years of age. The researchers found significant gains in vocabulary skills (particularly for children between the ages of seven and nine years old) after this teacher mediation of the participants' viewing of the program (Loeterman, Paul, and Donahue 2002). For this study, episodes that were originally developed for hearing children were translated into sign language through an onscreen interpreter. An alternative approach might have entailed having the characters themselves sign.

In another study (Golos and Moses 2011), researchers trained teachers to encourage deaf preschoolers to engage in literacy-related behaviors while viewing videos. Literacy-related behaviors included signing or fingerspelling the vocabulary taught in the videos, comments or questions related to the story, and interacting with onscreen print. As a result, participants demonstrated a greater number of literacy behaviors than did participants who viewed the same video series without teacher mediation.

This small body of work provides insights into the role of teachers and educational media in promoting literacy and language skills in deaf children. However, the studies highlighted thus far have not focused on how teachers might incorporate video viewing into classroom activities. For example, they might use the same strategies shown in the videos and add others that reinforce the skills the videos have been shown to develop (Golos and Moses 2013a). Although video viewing can become an integral part of classroom life, greater potential learning can occur when skill-enhancing exercises are repeated and included in other activities (e.g., Penuel et al. 2012).

Purpose

Children learn as a result of their teachers using a research-based curriculum and methods. Yet, little is known about the extent to which deaf children learn target skills when their teacher uses materials to supplement media experiences such as video viewing. This study was designed to answer the following research questions: (1) Will children's target vocabulary scores increase after viewing videos and participating in video-related activities? (2) What are the frequency and the type of literacy-related behaviors that children demonstrate during video-related classroom activities? (3) What does the participating teacher perceive about the effectiveness of the activities on children's literacy learning?

Methods

Sample

Participants included one teacher and seven preschool children (three to six years old) from one preschool classroom at a school for deaf children in the western part of the United States. Participants had variable hearing loss: Four participants had profound hearing loss; one had a severe hearing loss; one had a moderate loss; and one was a hearing child of Deaf adults (Coda). Four of the participants used amplification (i.e., hearing aids or cochlear implants), and the other three used no amplification. One of the participants did not have complete posttest data for the researcher development measure (see the methods section); therefore, the data for that participant were removed for the analysis.

Materials

As explained further in the procedures section, the participating teacher received a training packet, which included a copy of an educational video as well as lesson plans that explained how to implement the activities and use the accompanying materials.

Educational video. One video from an original educational video series was selected for use in the current study (see Golos and Moses 2013 for a more detailed description of videos and related curriculum). This video, along with others in the series, is theme based and involves an adventure story. All of the videos are approximately forty minutes, and the actors include one Deaf adult and four deaf children all using ASL and one hearing actor learning ASL. The videos have the same overall structure (i.e., the skills and knowledge taught in each video relate to an overall theme such as going to a library or to a restaurant). In addition, all of the videos are similar in that they target specific and key early ASL and emergent literacy skills, including vocabulary, letter recognition, concepts of print, and aspects of story comprehension (e.g., characters, settings, sequence of the main events) as well as grammatical features of ASL (e.g., Musselman 2000; Sulzby and Teale 1991; Whitehurst and Lonigan 2001). With regard to vocabulary, each video focused on ten targeted words. Five words were targeted in all of the videos that related to literacy (e.g., title, story, page, word, sentence). The remaining five words varied according to the theme. During each video adventure, the main character, Peter, explicitly teaches the children (i.e., the child characters in the video, along with the viewing audience) the theme-related words, and then they go on an adventure (e.g., a country backyard). At their destination, Peter takes pictures of what the characters see and do. Then they return to his home, where they complete a series of activities (e.g., sequencing the pictures taken during their adventure; making a book using the sequenced pictures and creating sentences for each page; playing a word game using the targeted words). Finally, they read the newly created book aloud.

Each of the effective research-based strategies already described recurs throughout the videos to reinforce the targeted skills. These strategies incorporate techniques found in the literature on educational television (Crawley et al. 1999; Fisch and Truglio 2000) as well

as those used by Deaf adults when interacting with deaf children (e.g., Padden and Ramsey 1998; Blumenthal-Kelly 1995; Mather 1989). For example, in each video, Peter first introduces and explains each keyword; then he uses sandwiching or chaining to encourage the viewing audience to copy him. Next he reinforces the target words by using them in different contexts. At the end of the video Peter also employs research-based strategies (e.g., showing ASL and English print at the same time [Mather 1989]; modeling concepts of print [National Early Literacy Panel, 2008]) when he reads the story aloud (for other techniques see Golos and Moses 2013a).

Supplemental classroom activities and materials. The training packet also includes lesson plans and materials for supplemental classroom activities for the participating teacher to use in conjunction with viewing the educational video. These activities were developed to reflect the research-based strategies and activities (e.g., "word game," story retell) incorporated into the videos. The materials (e.g., printed pictures to sequence the events of the story; a book to retell the story) also match those used in the video.

Each classroom activity and set of materials targets one of the critical early language (e.g., grammatical structures in ASL) and literacy skills (e.g., vocabulary, sequencing, story knowledge; Musselman 2000; Sulzby and Teale 1991; Whitehurst and Lonigan 2001) incorporated into the video. The activities also included specific research-based strategies modeled throughout the video. For example, activities 3 and 4 were designed to show ASL and English at the same time, and the teacher was also asked to help children make connections between signing, fingerspelling, and English print during activities 1, 3, and 4.

Each activity took ten to fifteen minutes to complete. Here are brief descriptions of each activity:

- **Activity #1, Vocabulary:** Each child is given a vocabulary card with a picture and print. Children stand or raise their card when they see their word either in print or a picture or fingerspelled (demonstrated by the teacher).
- **Activity #2, Vocabulary:** The teacher mixes up five pictures and five printed words of targeted vocabulary and puts them on a table. The children match the printed words to the correct picture.

- **Activity #3, Vocabulary:** Pictures and print of the targeted words are placed so the children can see all five of them. The teacher then either signs or fingerspells one of the words, and the children choose the picture or the printed word that matches the signed or fingerspelled word.
- **Activity #4, Word Game (group or individual option):** The teacher gives each child one targeted word and then shows five sentences individually. The children are asked to match their word to the same word in each sentence.
- **Activity #5, Story Narrative and Concepts of Print:** While retelling the story using an exact copy of the book made in the video, the teacher asks the children to indicate where the title is on the book and where the word "_____" is. Next the teacher asks them to find the letter "B," where to start reading (left to right), and how we turn the pages.
- **Activity #6, Sequencing:** The teacher sets out the numbers one through five vertically. The children then arrange the pictures in the correct sequence in which the events occurred in the video. (Note: Although the teacher conducted activity #6 and commented on it in the teacher survey, the activity was not video-recorded. As a result, literacy-related behaviors for this activity are not included in the analysis.)

Coding

The teacher and the children were videotaped during each activity. The video-recorded data were then transcribed according to the signs that each child demonstrated during the activities. Transcriptions were then coded, activity by activity, for literacy-related behaviors demonstrated by each child. These behaviors fell into one of three categories: signing a target vocabulary word, fingerspelling a target vocabulary word, and comments (including questions) that related to target literacy skills and content. The third category was further divided into subcategories on the following topics:

- story elements (e.g., characters, setting, plot)
- vocabulary
- the print on-screen
- concepts about print
- the sequence of the main events of the story

Comments about the vocabulary were either a response to a teacher related to a target word or a child's question or comment about a word without the participant actually signing it. The number of occurrences of each coded category was entered into a Microsoft Excel database for analysis.

Interrater reliability. Twenty-five percent of the transcriptions were randomly selected and coded by a second coder, who was trained by the first author and first coder to use these same coding methods. The percentage of agreement (80 percent) between the two coders was calculated on the double-coded data.

Measures

A researcher-developed assessment the *Peter's Picture* Assessment Tool (PPAT) was used to evaluate the participating children's targeted ASL and early literacy skills and was carried out both before and after the video viewing and the use of classroom activities and materials. The PPAT measured the specific skills targeted in the selected educational video, including knowledge of both target vocabulary and story elements. Experts reviewed the instrument during its development, and revisions were made according to their recommendations. Revisions were also made based on feedback received during a pilot study. For the final version of the PPAT, internal consistency was calculated using Cronbach's alpha statistic and was determined to demonstrate "good" consistency at pretest ($\alpha = .84$) and posttest ($\alpha = .885$). Also, the PPAT strongly correlated with participants' scores on a validated assessment of ASL receptive skills, the ASL Receptive Skills Test (Enns et al. 2013; $r = .79$; $p < .001$). For the current study, three parts of the vocabulary subtest were totaled for each participant at pretest and posttest. Average vocabulary scores were examined in order to address the second research question.

With regard to other measures, two different surveys were administered, one at pretest to a parent/guardian of participating children and one at posttest to the participating teacher. The parent survey asked for demographic information, particulars about the child's hearing status, mode of communication used in the home, and television and video viewing habits. The teacher survey included both closed and

open-ended questions. First, the teacher was asked to rate the overall packet (including instructions, activity lesson plans, and accompanying materials) as well as each activity on a scale of 1 (strongly disagree) to 5 (strongly agree) for usability (e.g., "Teacher instruction for the materials was easy to understand") and perceived effectiveness (e.g., "Activities helped to reinforce skills targeted in the video"; "Children learned more by interacting with the activities/materials and watching the video than by simply watching the video"). Then the teacher was asked open-ended questions about what she liked about the activities and materials, what she would change about the activities and the materials, and what she believed the children learned from the activities.

Procedures

Before using the video and the accompanying classroom materials in the classroom, the participating teacher attended a two-hour training session led by the first author and the lead research assistant. The teacher received a training and implementation packet that included the educational video to view with participating children on specific occasions and a binder that detailed the five different classroom activities and materials intended to review and expand on information in the video. During the training session the lead author discussed each component of the packet, watched the video with the teacher, and instructed the teacher on how to carry out the activities and use the accompanying materials. After the training, the PPAT was administered to each participating child by a member of the research team.

During the implementation phase, the teacher followed the same set of procedures with the participating children in a classroom. First, she viewed the full episode with the children. Afterward, she spent two weeks carrying out the activities mentioned in the materials section. For each activity, the children watched a short segment of the video (making this the second viewing of a particular segment), and the teacher led the subsequent, related activity. After the two weeks of viewing both the full video and various segments and completing the classroom activities, the participating children completed the RDA a second time. Videos were coded for literacy-related behaviors, and the teacher filled out a survey on the effectiveness of the supplemental materials and activities.

Data analysis plan. Descriptive statistics were obtained in order to examine the participants' demonstration of literacy-related behaviors during the supplemental classroom activities (i.e., with teacher mediation). Means, standard deviations, and frequency scores were calculated on these behaviors and on the pretest and posttest PPAT vocabulary subtest scores. Because of the small sample size, no inferential statistics were obtained.

The teacher's responses to the close-ended survey items (i.e., rating scale) were analyzed as descriptive statistics, and the open-ended responses were compiled and aligned with the coded data on classroom activity (e.g., comments related to activity 1 vs. those related to activity 2). Her feedback was also examined as it related to the entire media packet, including the video, the classroom activities, and the materials.

Findings

Literacy Outcomes

With regard to targeted vocabulary skills, the descriptive statistics showed that, after teacher mediation of the video viewing and classroom activities, the participants' average PPAT vocabulary scores were higher (M = 11.17, SD = 4.49, min. = 3.0, max. = 16.0) than before them (M = 9.00, SD = 3.96, min. = 7.0, max. = 19.0). This provides one source of evidence that the participants benefited from interacting with their teacher on key literacy content during video viewing and the supplemental activities.

Literacy-Related Behaviors during Supplemental Activities

Observations of literacy-related behaviors were also documented for the classroom activities, and these data also indicate improvement in the targeted skills. Participants displayed a range of literacy-related behaviors during the classroom activities, with 603 such behaviors occurring in the five classroom activities. These behaviors tended to be consistent from one activity to another, with the exception of activity 5 (storytelling). Table 1 includes the sums, means, and standard deviations of each literacy-related behavior displayed by participants during each activity.

The most frequently displayed behavior involved the target vocabulary words. The children commented on these words (e.g., CHICKEN

TABLE 1. Total Number, Mean, and Standard Deviation of Literacy-Related Behaviors Displayed during Each Supplemental Classroom Activity

Literacy Related Behavior	Activity 1		Activity 2		Activity 3		Activity 4		Activity 5	
	Sum	**M (SD)**	**Sum**	**M (SD)**	**Sum**	**M (SD)**	**Sum**	**M (SD)**	**Sum**	**M (SD)**
comments about concepts of print	7.00	1.00 (0.58)	9.00	1.29 (1.89)	.00	0.00 (0.00)	.00	0.00 (0.00)	22.00	3.14 (3.18)
fingerspelling target vocabulary	3.00	0.43 (0.53)	25.00	3.57 (3.64)	12.00	1.71 (3.30)	3.00	0.49 (0.79)	1.00	0.14 (0.38)
comments about sequencing	.00	0.00 (0.00)	.00	0.00 (0.00)	.00	0.00 (0.00)	.00	0.00 (0.00)	5.00	0.71 (1.50)
signing target vocabulary	17.00	2.43 (1.62)	43.00	6.14 (4.18)	50.00	7.14 (5.11)	15.00	2.14 (2.54)	14.00	2.00 (2.16)
comments about the story	9.00	1.29 (1.60)	14.00	2.00 (2.16)	4.00	0.57 (0.79)	10.00	1.43 (1.81)	12.00	1.71 (2.63)
comments about vocabulary	62.00	8.86 (6.28)	87.00	12.43 (8.21)	90.00	12.86 (5.98)	69.00	9.86 (5.70)	20.00	2.86 (2.97)

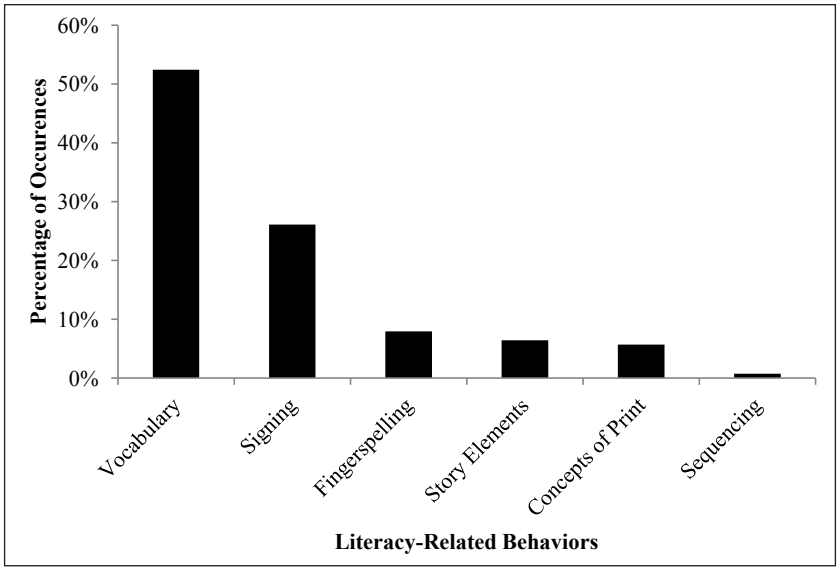

Figure 1. Percentage of literacy-related behaviors displayed during all five of the supplemental classroom activities by all of the participants (n = 7).

CL:WALK [using a classifier 3 hand] or "hop like a rabbit," RABBIT HOP) in four out of five classroom activities (328 times). The second most frequently displayed behavior was signing the target vocabulary, which occurred 139 times. For example, most of the children signed the targeted words in response to seeing the printed English word during activity 3. Beyond these, the remaining behaviors (e.g., fingerspelling targeted vocabulary words 44 times, commenting on elements of the story on 49 occasions, noticing concepts of print 38 times, and sequencing the main events of the story 5 times) occurred less frequently. Figure 1 displays the percentage of occurrences of each literacy-related behavior in five of the classroom activities.

It is not surprising that the most common literacy-related behavior that the participants demonstrated was signing the target vocabulary; three of the activities specifically addressed target vocabulary words. It is also not surprising that comments about sequencing occurred during only two of the activities. This may have been due to the (missing) data from the activity that specifically targeted sequencing skills

as well as the lack of opportunities during the vocabulary activities to comment on the order of the story's main events.

Most important, each activity was successful in eliciting behaviors related to activity-specific targeted skills as they were designed (e.g., vocabulary activities elicited vocabulary-related behaviors). For example, when prompted by the teacher to identify a target word in a sentence during the word game, one participant pointed to the correct word. In another example, this time during the storytelling activity, a different participant referenced targeted concepts of print by attempting to fingerspell the phrase "the end" when the teacher turned to the last page of the story (which contains the words "the end"). The teacher then modeled the correct fingerspelling, and the child responded with FINISH. Interestingly, participants also demonstrated additional literacy behaviors even when those skills were not targeted by the teacher. For example, the children fingerspelled targeted words during each of the activities even when vocabulary was not the targeted skill, including when two participants fingerspelled the targeted word, "rabbit," during the storytelling activity.

Teacher Feedback

Perceptions of learning. The teacher's ratings of the use of the activities and materials to supplement the video were for the most part very positive: "The benefits from watching the video and doing activities with it were many!" Her average rating was approximately a 4 out of 5 (min. = 3, max. = 5) with regard to usability, with the highest rating given to items on evaluations such as "Activity lesson plans were clear and easy to understand" and "Teacher instructions for materials were easy to understand and directions were easy to follow." The teacher's average ratings for effectiveness was also high, approximately a 4 out of 5 (min. = 2.5, max. = 5).

In response to a question about how the learned information transferred into daily classroom activities, the teacher's comments were also positive. In her open-ended survey item responses she wrote, "I saw many signs from the movie being used in the daily activities: COUNTRY, RIGHT. This was all spontaneous and from kids that have different language levels. They all benefited to some degree." In

addition, with regard to evidence that the children had learned the target vocabulary, one component that seemed particularly helpful was having the children stand up or raise their card during the corresponding segment of the video (when they saw their vocabulary word in print, signed, or fingerspelled). She wrote, "Kids remember[ed] this and carried it through to the next day's activities." She also acknowledged that research-based strategies (e.g., chaining, sandwiching) employed in the video and used again during the supplemental activities were beneficial: "These activities have helped me to see how print and fingerspelling can fit into our everyday curriculum and we will be implementing more daily!"

The teacher also noted that, during and after each of the activities, the children demonstrated that they were learning. She was "surprised at the success of this activity (children's ability to match pictures with print during activity 2)! It was great! Print recognition was happening without prompting. It wasn't 100% but more than I expected." She also wrote that "the learning outcomes were great" for activity 3. Finally, she observed children making connections between ASL and English print. For example, in response to the effectiveness of the story retelling (activity 5), she mentioned that, in addition to discussing the story in the movie, the children had learned new concepts such as "sentence" and "title" and that the printed phrase "the end" is the same as FINISH in ASL.

Suggestions for improvement. Although the ratings were mostly positive for each activity, the teacher offered some suggestions for improvement. For example, the teacher mentioned having experienced difficulty in maintaining the children's attention during activity 4 (word game), and she suggested that it might be more effective to complete this activity on a "one-to-one basis." For activity 2 she also recommended "[r]eviewing the words and pictures before mixing them up and starting the game." In addition, she recommended completing the sequencing exercise after reviewing some of the other video segments and activities. She also suggested that this activity involve either a small or the whole group so that the children with lower literacy levels could learn from those with higher levels. In the end, she provided a total of five suggestions across the activities.

Although only one teacher provided feedback, her responses show the potential of successfully implementing supplemental activities along with educational video viewing in an early childhood classroom. The teacher indicated that these specific activities were effective in reinforcing skills targeted in the video. She also noted specific information and skills the children had learned and stated that she planned to use the new strategies (e.g., chaining, sandwiching) again. Such feedback suggests directions for future research, including examining the impact of a more extensive media packet that contains multiple videos, each with its own set of classroom activities. This would allow for greater exposure to and practice with the target literacy skills over a longer period of time.

Limitations. As mentioned previously, the sample size of the current study was small. Data from the participating children and their teacher suggest the effects of this type of curricular resource; however, further research with larger samples and various age groups is needed. Also, with the teacher's feedback in mind, the classroom activities and accompanying materials can be further refined to ensure the highest level of usability and effectiveness in promoting literacy learning. In addition, the activities did not focus on all of the skills targeted in the video. Extra activities could be developed and evaluated with regard to their ability to teach these additional skills (e.g., letter recognition, grammatical features of ASL). Finally, the classroom activities and materials were designed to supplement one video in the series. Although the videos share a common structure, characters, and plotline, future work will need to investigate the design and use of activities and materials related to the other video adventures in the series.

Conclusion

Previous research has shown that deaf children can learn literacy skills from educational media presented in ASL (e.g., Golos and Moses 2013b) and that teacher mediation can enhance such learning (Golos and Moses 2011). Although the current study involved a small sample size, the findings indicate that supplemental classroom activities can facilitate the learning of skills that such media target and help children make connections between ASL and English print. Considering

the importance of early exposure to a fluent language model (e.g., ASL) and the current lack of curricular resources particularly at the preschool age and those that focus on language and literacy skills, this study offers new opportunities for early childhood educators. These findings suggest a promising new approach to developing key literacy and language skills with research-based media and media-related activities and materials.

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