Effects of video visual scene display technology on the symbolic communicative turns taken by preschoolers with ASD during a shared activity

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INTRODUCTION

Communication is fundamental to all aspects of learning [1,2] and essential to inclusion in society and quality of life [3,4,5]. While most young children develop language and have access to the "magic and power of communication" [6], many children with autism spectrum disorders (ASD), often have complex communication needs (CCN), meaning speech alone does not meet their daily communication needs [7].

While traditional augmentative and alternative communication (AAC) systems based on symbols and grid layouts can be challenging for very young children [6,2,8-10], recent technical developments hold promise for beginning symbolic communicators [11]. Visual scene displays (VSDs) are one type of AAC that has most recently been demonstrated to benefit young children with CCN, while supporting communication and language development [12,13]. Similarly, with videos embedded with VSD technology, familiar images and videos, linked to the interests of the child, provide opportunities for shared communication between the child with CCN and the communication partner. Reduction of divided attention demands by integrating AAC systems within the play activity, or in this sense, the preferred video, is another highly important benefit to considering the use of video VSDs to support communication and social interaction with young children with ASD and CCN [6].

Families with young children with ASD often report increased engagement in solitary video watching and media use by their child as well as the child's strong attention to certain characters or experiences within favorite videos [14]. Providing access to communication through use of video VSD technology with embedded high-interest videos allows opportunities for participation and social interaction during the video-watching routine between child and communication partner. The purpose of this study was to investigate the impact of video VSDs on symbolic communicative turns taken by preschoolers with ASD and CCN during a shared activity.

METHODS

Design

This study used a multiple-probe design [15,16,17] across three participants. Due to the young age of the participants, a multiple-probe research design was chosen to minimize boredom and fatigue that may have occurred with a multiple baseline design and the extended measures of the dependent variable necessary for that type of research design [17,18,19].

The study took place at an early childcare program that provided services to both children with and without disabilities. The study was approved by the Institutional Review Board (IRB) of The Pennsylvania State University's Office for Research Protections. Informed written consent was obtained from all participants.

Participants

Three young children with ASD and CCN participated in this study. Matthew, Bella, and Noah were 3.11, 4.11, and 5.6 years old at the beginning of the study. According to parent report, Matthew spent approximately 3-5 hours a day watching television, online videos, or playing games on a a tablet or computer, independently, or with someone at home; Parents of Bella and Noah reported that each child engaged in the same behavior approximately 3-4 hours a day. The SLP who provided speech and language support to all three participants within the early childhood program setting completed the Communication Matrix (CM) [20] to identify each child's current level of communicative behavior. According to the results, Matthew and Bella were identified to be emerging conventional communicators (Level 4). Noah's results on the CM indicated he was an emerging unconventional communicator.

Equipment

A Samsung tablet computer was used for all sessions, across all phases, of this research study. A total of eight videos were selected from popular children's shows and spliced to have a maximum runtime of five minutes per video. Videos were selected based on characters or shows identified by the parents as being of high interest to the child. Videos with embedded VSDs were presented to all participants on the Samsung tablet during intervention and generalization sessions. For this purpose, five-minute video segments were captured and added to the application. VSDs with programmed hotspots were embedded in the video using EasyVSD software app (InvoTek, http://www.invotek.org/); upon hotspot activation, speech output occurred to provide the message programmed for the hotspot.

Procedure

The participants in this study met with the researcher 2-3 times a week, depending on the attendance of the child and the center schedule for the child. As noted above, eight individualized videos were created for each child, based on the interests of the child. Each video was randomly assigned to baseline, intervention, and generalization conditions, with the provision that no single video would be used more than once in a phase unless all other videos had already been viewed.

Baseline.

Each child participated in at least five video-viewing sessions with the researcher during baseline. The researcher held the Samsung tablet within 5 inches of her face (either beside her cheek or under her chin) and within arm's length of the child. Upon every 30 second interval, the researcher pointed to an image on the screen of the tablet and stated "I see a _, what do you see?", and looked at the child providing an expectant pause for 5 seconds to allow opportunity for the child to respond. If the child took a symbolic communicative turn during baseline, the researcher responded with a brief expansion based upon the child's message. For example, while watching a video about construction vehicles if the child pointed to the bulldozer and said "digger", the researcher would say, "The digger is yellow."

Intervention.

Every intervention session included the use of the Samsung tablet, and the same eight video clips viewed in baseline, with the addition of the video VSD technology. Upon every VSD appearing within the video (every 30 seconds), the researcher stated "I see a _ (activated hotspot), what do you see?" while activating one hotspot on the screen of the tablet. The researcher looked at the child, and provided an expectant pause of at least 5 seconds to allow for an opportunity for the child to take a symbolic communicative turn. If the child did not take a turn, the researcher said, "Let's watch" and pressed play to continue the video clip. If the child did take a symbolic communicative turn, the researcher used expansion to comment on the child's communicative behavior.

Generalization.

Generalization probes occurred during baseline and intervention sessions to investigate the participants' use of the video VSD technology while viewing preferred video clips with a new communication partner. The generalization partner was trained in the baseline and intervention procedures through role-play scenarios, direct instruction (model, guided practice, independent practice), and use of a visual checklist of procedures provided by the researcher.

Analysis

All sessions were videotaped to ensure the accuracy and consistency of both procedural integrity and data scoring. A research assistant (a graduate student in the special education program) was trained to perform both procedural integrity and data scoring across all phases of the research study. To calculate procedural integrity, both the researcher and the trained research assistant used an integrity checklist that provided a summary of the steps in each phase of the study and data collection, to check randomly selected sessions, including 20% of baseline and intervention sessions, and 50% of generalization sessions per participant. The percentage of baseline steps, intervention steps, and generalization steps completed correctly equaled 100%, 97%, and 94% consecutively. For inter-observer agreement, ten 30 second-intervals were coded for each of the selected videos. Inter-observer agreement averaged 90.8% across all phases of the study, including baseline (average= 100%), intervention (average= 86.4%), and generalization (average=86.1%) sessions.

RESULTS

All three participants demonstrated an increase in the number of symbolic communicative turns taken while viewing a preferred video clip with the researcher and with the generalization partner. The three participants took very few turns (range = 0-1) during the baseline sessions (two of the participants took no turns at all). During intervention, all three participants demonstrated an increase (range = 1-46) in the number of symbolic communicative turns taken while viewing a preferred video clip with the video VSD technology. For all three participants, all intervention data points were above the highest point seen in baseline. Due to time limitations associated with the summer program of the early childhood special education program, the three children varied in the number of intervention sessions received. All children participated in two generalization sessions post intervention, and all generalization data points were above the highest level seen in the baseline generalization for all three of the participants

DISCUSSION

There is an abundance of research supporting the use of multimodal AAC to provide communication opportunities for many children with CCN, including those with ASD. Video VSD technology is very new and therefore, there is not a rich evidence-base reporting on the impact video VSD has on the communication of young children with ASD and CCN during a developmentally appropriate, shared activity. This research study extends the line of video VSD research to a new population.

There were a number of study limitations, including the limited number of participants, as well as the limited number of intervention sessions due to the end of the school year for one participant. Implications for practice include expanding use of video VSD technology within home routines with families (caregivers and siblings) to enhance joint attention skills, social communication skills, and social closeness between the child with ASD and his/her family, as well as incorporating video VSD use into typical early childhood education center routines and activities.

CONCLUSIONS

Despite study limitations and the need for further study, the results of this study offer initial evidence that when provided with video VSD supports, children with ASD and CCN increased the number of symbolic communicative turns they took during a preferred shared activity. Participation during the activity increased when the child was provided with access to an easy to understand communication app: videos with embedded VSDs.

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ACKNOWLEDGEMENTS

This research was supported through a grant from the National Institute on Disability, Independent Living, and Rehabilitation Research (NIDILRR grant #90RE5017) to the Rehabilitation Engineering Research Center on Augmentative and Alternative Communication (The RERC on AAC). NIDILRR is a Center within the Administration for Community Living (ACL), Department of Health and Human Services (HHS). The contents of this presentation do not necessarily represent the policy of NIDILRR, ACL, HHS, and you should not assume endorsement.