Research In Focus: A Weekly Digest of
New Research from the NIDILRR Community

# Digital Books with Dynamic Text May Show Promise to Help Young Children with Autism Spectrum Disorders Learn Sight Words

*A study funded by the National Institute on Disability, Independent Living, and Rehabilitation Research (NIDILRR).*

Up to 1 in 59 children has an Autism Spectrum Disorder (ASD), according to the Centers for Disease Control and Prevention. Children with ASD may have difficulties learning to read, due to challenges with language processing. Learning to visually recognize common words, or "sight words," is an important skill for all children learning to read. Sight word recognition may be especially helpful for children with ASD, who may find it easier to recognize words visually than to use phonics-based reading strategies like sounding out letters.

Visual scene displays (VSDs) may provide an engaging way for young children to learn sight words. VSDs are photographs displayed on a tablet screen than can be programmed with "hot spots," which a child can touch to hear words associated with the images. For example, if the photographs are of individual images in a picture book, a digital book could be created with a series of VSDs. Until recently, VSDs only produced recorded speech when touched. In a recent NIDILRR-funded study, researchers preliminarily tested a new software feature, called "Transition to Literacy" or the "T2L feature", which produces dynamic text along with the recorded speech when a hot spot is touched. The researchers tested the feature in a tablet application called EasyVSD in order to teach common sight words to preschool-aged children with ASD. The researchers wanted to find out whether the children could learn to reliably identify 10 common sight words after using EasyVSD with the T2L feature.

Researchers at the Rehabilitation Engineering Research Center on Augmentative and Alternative Communication (AAC) enrolled 3 children with ASD in a study. The children were all boys ages 3.5 to 4.5, who had an ASD diagnosis and attended preschool in a class containing 4 children with ASD and 8 children without ASD. The participating children could recognize less than 25 words when they entered the study.

At the start of the training series, the children were tested on their ability to recognize 10 sight words: bear, cat, bird, dog, duck, sheep, horse, fish, frog, and teacher. All of these words appeared in the popular children's book *Brown Bear, Brown Bear, What Do You See?* Each child was presented with the sight words one at a time, each word paired with a series of four pictures. The pictures were images of each animal from the book. The child was asked to match the word with the correct picture in 10 seconds or less. When they started the study, the children could accurately match words to pictures less than 30% of the time.

The children had individual training sessions with EasyVSD approximately twice per week during the regular school day, with each session lasting about 10-15 minutes. The

EasyVSD application was programmed with pictures from *Brown Bear, Brown Bear, What Do You See?* Each page of the digital book included a picture that could be programmed to either speak, display, or both speak and display a targeted sight word. Before the start of each session, the children were given the same test of those 10 sight words. Then, the VSD was set up to target two of the sight words at a time. When the child pressed on the pictures associated with the target sight words, the word appeared on the screen, paused for 3 seconds while spoken, and then faded away. For example, when the child pressed on a picture of a bear, the word “bear” was spoken aloud and also displayed on the screen for 3 seconds. During each session, the child was exposed to each target word five times. Each session focused on one pair of sight words. After a child could accurately match that pair of sight words to their respective images in two consecutive pre-session tests, another pair of sight words was targeted. The sessions continued until the children had learned all 10 sight words and could consistently match words to pictures in the pre-session tests. The researchers did not set a limit for the number of sessions offered: Each child progressed at their own rate, taking up to 27 sessions to learn these words.

Two of the three children took the sight word matching test again eight weeks after they acquired all of the sight words and finished the training; the third child could not be tested eight weeks after the training because of summer vacation.

The researchers found that before starting the training, the children could match the sight words to the correct pictures only about 25% of the time, meaning that they tended to randomly guess which picture corresponded with each word. It took the children an average of about 12 sessions to consistently recognize the first 2 words, bear and cat. After learning the first two words, the children learned the other eight words after an average of about ten more sessions. At the end of the training, the children could accurately recognize all of the sight words. Two of the children could still accurately recognize all of the sight words when they were tested again eight weeks later. They were also able to recognize the words in other contexts in the classroom and one child’s parent reported that he spontaneously recognized the word “dog” outside of school.

The children’s teachers were also asked what they thought of the EasyVSD application with the T2L feature. Both of the teachers said that they thought the children in the study enjoyed using application, that the feature could be helpful to other children with ASD, and that the feature could be used in their classrooms.

The authors noted that VSDs with the T2L feature may provide a fun, engaging way for children with ASD to quickly learn common sight words. The use of VSDs may be more effective than traditional paper books because they support the strengths of many children with ASD, such as strong visual processing skills and aptitude with technology. However, the authors also noted that sight word reading is only one part of a complex literacy curriculum, and that the use of the T2L feature is not meant to replace formal literacy instruction. Future research may be useful to test the T2L feature in larger

samples of children with ASD and to understand how and if the T2L feature can be integrated into a more comprehensive literacy curriculum.

## To Learn More

Learn more about this study and see VSDs with the T2L feature in action from the project's website at https://rerc-aac.psu.edu/research/r2-investigating-aac-technologies-to-support-the-transition-from-graphic-symbols-to-literacy/

AbleData's database of assistive technology products lists more than 75 products to support literacy, from computer programs to print aids. Search the full database at https://abledata.acl.gov

## To Learn More About this Study

Mandak, K., Light, J., & McNaughton, D. (2019) Digital books with dynamic text and speech output: effects on sight word reading for preschoolers with autism spectrum disorder. Journal of Autism and Developmental Disorders, 49(3), 1193-1204. This article is available from the NARIC collection under Accession Number J80092.

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