Effects of an AAC App on Single-word Reading of Preliterate Preschoolers with Autism Spectrum Disorder

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Introduction

Benefits of Literacy Skills

- Strongly associated with educational achievement
- Enhance employment opportunities (Nearly 90% of the jobs in the US require functional literacy skills)
- Support the development of generative language and communicative competence for individuals who use AAC
- Facilitate personal expression & social relationships (e.g., texting, blogs, Facebook)
- Allow access to enjoyable leisure pursuits (e.g., reading, surfing the Internet, accessing social media)

For individuals with autism spectrum disorder (ASD) who have complex communication needs (CCN)

- Expand communication options significantly
- Increase perceptions of competence
- Increase self-esteem

THE PROBLEM

More than 90% of individuals with CCN enter adulthood without functional literacy skills (Foley & Wolter, 2010)

As a result, they are severely restricted in their participation in:

- Education
- Employment
- Healthcare
- Society

Barriers to Literacy Learning

- Eventually, children who use symbol-based AAC need to transition to an orthographically based system
  - Currently no AAC apps to support this transition from the use of graphic AAC symbols to the use of orthographic text

Current AAC technologies/apps

Individuals with ASD & CCN who are non-literate typically use AAC systems/ apps with picture symbols

Children do NOT learn these words.

- Text is provided above symbol, however the text is small and static
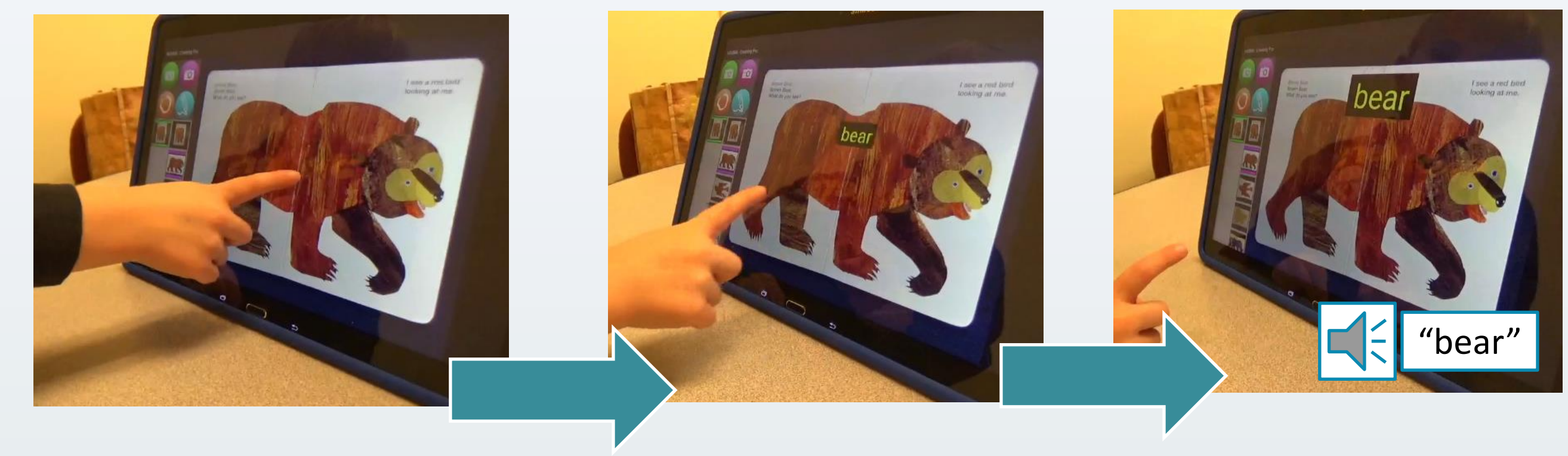- Text may be provided in message bar, however it is displaced from its referent

Solution → AAC technologies to support the transition to literacy (T2L)

Transition to literacy (T2L)

- a software feature for AAC technologies/apps
- provides dynamic presentation of text with speech output when a picture symbol is selected
- provides a first step in the transition from use of picture-based AAC technologies /apps to literacy

Transition to Literacy (T2L) software feature

- Child selects a picture symbol from AAC display
- Written word appears dynamically
- Written word is spoken by the app

"bear"

Design of T2L feature is grounded in the state of the science in **visual cognitive processing, literacy instruction, and instructional design** (Light et al., 2014)

Text is dynamically presented on the screen

- Movement is strong attractor of visual attention, increasing learner's attention to the text (Wilkinson & Jagaroo, 2004)

Text is paired with graphic symbol & speech output

- Direct active pairing supports learning of association between written word & referent (picture symbol and/or spoken word) (e.g., Browder & Xin, 1998)

Text is consistently incorporated into communication

- Integration of literacy supports into AAC provides increased opportunities for functional learning & use throughout the day (Light & McNaughton, 2014, 2015).

Research Question

What is the effect of the T2L app with dynamically displayed text on the acquisition, maintenance, and generalization of single word reading by pre-literate preschoolers with ASD?

Participants

- 3 children diagnosed with Autism Spectrum Disorder
- 3-5 years old
- 3 Males
- All were pre-literate
- All attend a LEAP preschool
  - Each classroom has 4 children with ASD and 8 children who are typically developing

Design

Single-subject across participants multiple probe design
Phases: baseline, intervention, generalization, and maintenance

a) baseline condition (prior to exposure to tablet technology);
b) exposure to tablet technology with the AAC app;
c) generalization (to new photographs of target words not used in intervention);
d) maintenance

Independent Variable

Exposure to T2L VSD app during storybook reading

Brown bear book displayed on the app on Samsung Tablet

- Dynamic text for each of the animals in the book
- Text appeared with speech output upon selection of the animal
- No other instruction during intervention

Dependent Variable

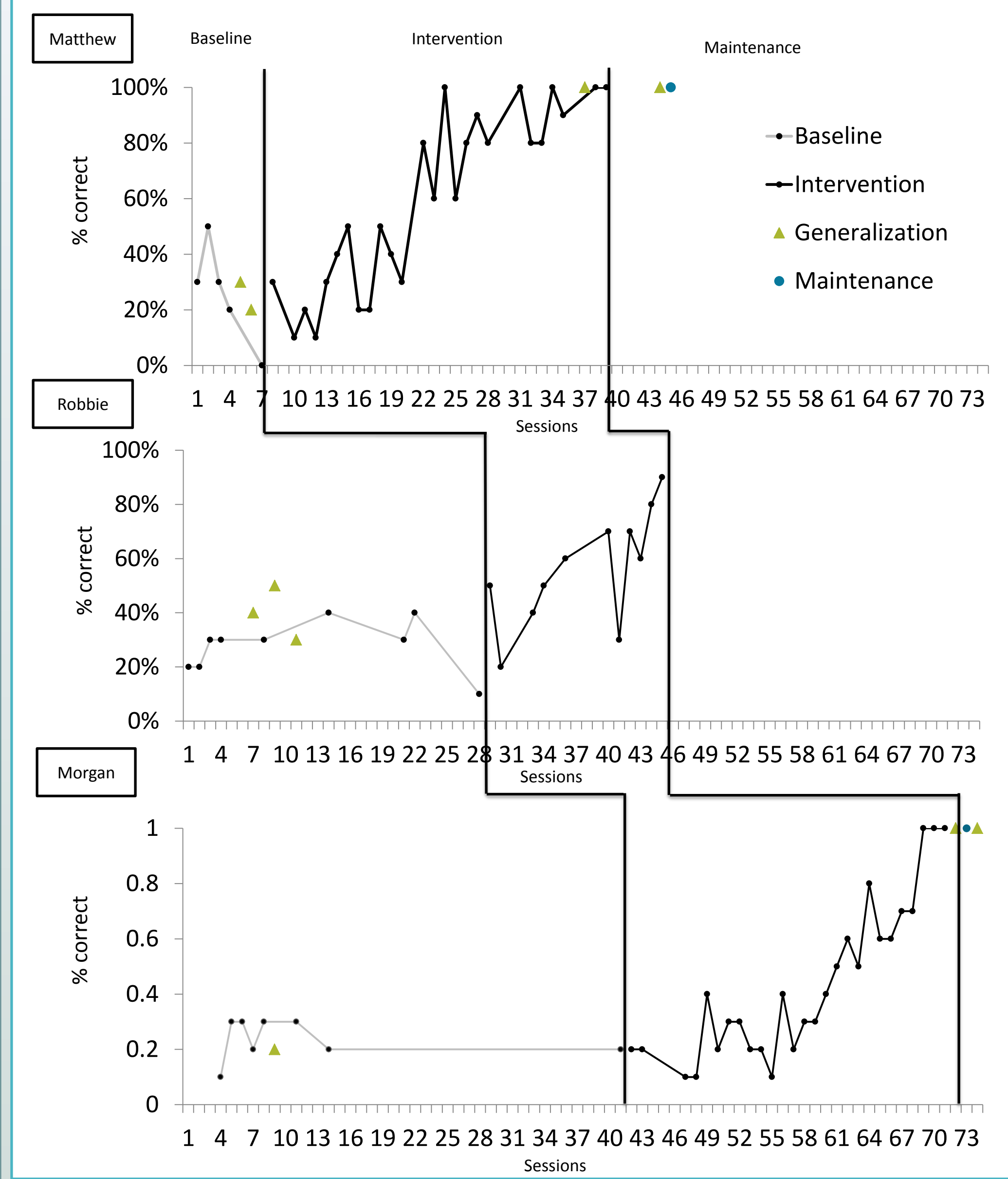% accuracy reading single words (matching written word to picture)

Materials

10 words from Brown bear book
Images from Brown bear book

Results

	Length of Exposure per word (# of sessions)		
Pairs of words	**Matthew**	**Robbie**	**Morgan**
Bear, cat	3 min 15 sec *(13)*	1 min *(4)*	4 min 30 sec *(18)*
Bird, dog	45 sec *(3)*	45 sec *(3)*	30 sec *(2)*
Duck, sheep	30 sec *(2)*	1 min *(4)*	45 sec *(3)*
Horse, fish	1 min *(4)*	1 min *(4)*	30 sec *(2)*
Frog, teacher	1 min *(4)*	1 min *(4)*	30 sec *(2)*

Matthew acquired 10 target sight words after 26 intervention sessions (2 hours, 10 minutes of intervention)

Robbie acquired 9 target sight words after 11 intervention sessions (55 minutes of intervention)

Morgan acquired 10 target sight words after 27 intervention sessions (2 hours, 15 minutes of intervention)

Summary of Findings

The three students provide preliminary evidence that a software feature for AAC apps, including the dynamic presentation of text paired with graphics and speech output, positively impacts the single-word reading of pre-literature preschoolers with ASD.

The three students acquired the written words successfully with only minimal exposure to the words via the app.