Visual Scene Displays With Dynamic Text: Supporting Early Reading in Adults With Intellectual Disability

Christine Holyfield, Lauramarie Pope, Janice Light, David McNaughton, and Kathryn Drager

Pennsylvania State University

Acknowledgements

- Transition to literacy (T2L) was developed under a grant from the National Institute on Disability, Independent Living, and Rehabilitation Research (NIDILRR grant number #90RE5017) to the Rehabilitation Engineering Research Center on Augmentative and Alternative Communication (RERC on AAC). http://rerc-aac.org
- 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 by the Federal Government.

Acknowledgements

- Christine Holyfield receives funding through U.S. Department of Education grants #H325D110008
- Lauramarie Pope receives funding through U.S. Department of Education grants #H325K080333
- We are very grateful to the adults who participated in this study. Thank you for allowing us to be a part of your lives.

RERC on AAC

Disclosures

- The authors have no relevant financial or nonfinancial interests to disclose

Presenting Authors: Background and Contact Information

- Christine Holyfield is an SLP and doctoral candidate in the Communication Sciences and Disorders department at Pennsylvania State University. With any questions or comments about the presentation, please contact her at ceh244@psu.edu
- Lauramarie Pope is a graduate student in speech language pathology at Pennsylvania State University

AAC technologies to support transition from graphic symbols to literacy (T2L)

- **The problem**
  - More than 90% of individuals with complex communication needs (CCN) enter adulthood without literacy skills (Foley & Wolter, 2010)
  - As a result, they are severely restricted in education, employment, healthcare, & community living

Limitations of current AAC technologies/apps with picture symbols

- Individuals with complex communication needs (CCN) as a result of intellectual and developmental disability typically use AAC devices/apps with picture symbols
- The design of these apps does not seem to support literacy learning

Limitations of current AAC technologies/apps with picture symbols

- Visual Scene Displays (VSD):
  - Generally have no orthographic component

Limitations of current AAC technologies/apps with picture symbols

- Grids with picture symbols:
  - Text may be displayed above picture symbol, but individuals do not attend to static text (Brown et al., 2015)
  - Text may be displayed in message bar upon selection of picture symbol, but displacement of text from picture selection does not support learning association

AAC technologies to support transition from graphic symbols to literacy (T2L)

- **A possible solution**
  - Transition to literacy (T2L) software features for AAC technologies /apps (Light, McNaughton, Jakobs, & Hershberger, 2014)

AAC technologies to support transition from graphic symbols to literacy (T2L)

- The T2L software feature utilized in the current study was designed to support sight word acquisition only
- The feature represents only a first step in the transition from use of picture-based AAC technologies/apps to literacy for communication (i.e., orthographic communication)
- Future developments for additional features are required to further support the full transition to literacy

Research-based design of T2L feature

- 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)
  - Individual selects graphic symbol from personalized AAC system
    - Literacy learning is driven by the individual's interests & needs and utilizes personally relevant vocabulary, thus increasing motivation & engagement (Light & McNaughton, 2009)
  - 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)

Aims of the Study

- The purpose of the present study was to investigate the effects of this T2L feature of an AAC app used in a social interaction context on the single word reading of adults with intellectual and developmental disability with CCN and only emergent literacy skills.
- From a clinical standpoint, T2L features on apps should be used to **complement, not replace** literacy instruction.
  - However, in order to isolate the benefits of the T2L feature from a research standpoint, the study introduced the app on its own without instruction.

Research Questions and Hypotheses

- What is the effect of use of an AAC app with this T2L feature within the context of social interaction on the single word reading of adults with intellectual and developmental disabilities with CCN?;
- Do any observed effects maintain over time?; and
- Do any observed effects generalize to novel stimuli?
- Hypothesis
  - Given the limited literacy skills of the participants and their long history of being excluded from - or having limited success with - literacy instruction, it was hypothesized that the data may show an extended learning curve before an effect was observed. However, it was further hypothesized that after demonstrating an initial effect, participants would start to experience success more rapidly and those effects would be robust enough to maintain and generalize.

Method: Design

- Single subject, multiple baseline across participants
- The study contained four phases:
  - (a) baseline,
  - (b) intervention,
  - (c) generalization, and
  - (d) maintenance

Method: Participants

- Six adults with intellectual and developmental disability (e.g., autism spectrum disorder, Down syndrome)
- All adults had complex communication needs (CCN) where their speech did not meet their daily needs, and demonstrated only emergent literacy skills
  - Participants were familiar with 0-20 sight words
- The adults' ages ranged from 22 to 55 years

Method: Probe task materials

- In order to assess learning, participants completed probes evaluating their identification of 10 target sight words
- Words were individualized based on participants' lives and interests
  - E.g., names of favorite pop culture icons or family members
- Printed and laminated words and interests

Method: Intervention materials

- Samsung Tablet housing a communication app utilizing VSDs
- T2L Software Features
  - dynamically displaying text
  - Text emerging from its graphics-based referent within the AAC software
  - Speech output with exact match to dynamic text

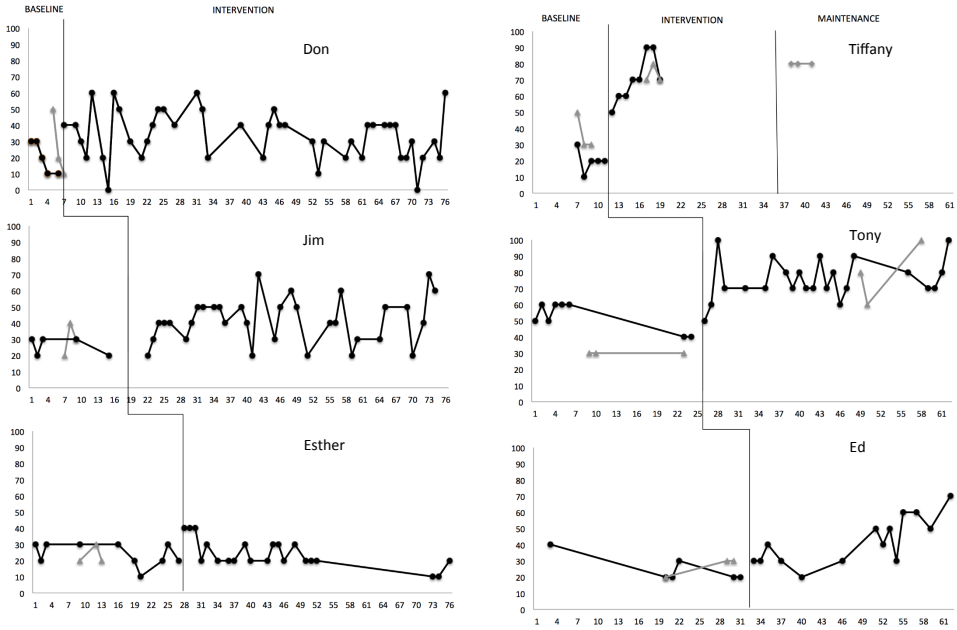
Method: Procedures

- (a) Baseline condition (prior to exposure to tablet technology);
  - Probe of target words only
    - Present photographic representation of word & 4 word choices
- (b) Exposure to tablet technology with the AAC applications;
  - Before intervention sessions, probes occurred with same procedures as baseline
  - Following each probe, the investigator and the participant engaged in 10 min semi-structured interactions in which the participants used the app to communicate
  - Two words were introduced at a time, with 12 exposures to each new word per session (word was on the screen for 3 s for each exposure)
  - Two words were reviewed each session, with 6 exposures to each review word per session (word was on the screen for 3 s for each exposure)

Method: Procedures

- (c) Generalization to different stimuli
  - Probes of target words only
    - Procedures same as baseline, except photographic representations of words were novel
- (d) Maintenance of acquired sight words
  - Probes of target words only
    - Same procedures as baseline

Results to date



Exposure data to date

- To date, participants have been exposed to each word for an average of about 3 min
  - That is, about 3 total minutes of each word being displayed on the tablet
- For the two participants who have completed intervention
  - Tiffany was exposed to each word for an average of about 1 min and 20 s
  - Tony was exposed to each word for an average of about 2 min and 45 s

Implications

- Using an AAC app with a T2L feature in a social interaction context might support the development of single-word reading in some adults with intellectual and developmental disability with CCN
- Paired with appropriate instruction, use of an AAC app with this T2L feature may be an early step in supporting literacy development
- Based on the current study, clinicians should consider using highly meaningful and motivating words and social contexts to support literacy

- For handouts, please visit http://aac.psu.edu
- Thank you!