

## **Background**

Literacy skills are critical for individuals who have complex communication needs (CCN) for they provide greater access to education, employment, social networks, and independent living. Furthermore, literacy skills provide access to more independent communication for individuals with CCN. Unfortunately many individuals with CCN do not receive effective instruction in literacy skills. Available instructional programs are not appropriate for use with individuals who have limited speech since these programs typically require spoken responses. Furthermore, current AAC technologies /apps do not support individuals with CCN who are preliterate in transitioning from graphic symbols (e.g., PCS, SymbolStix, VSDs, etc) to literacy. There is an urgent need for effective evidence-based literacy instruction and apps designed to meet the needs of individuals with CCN.

## **Goals of the Session**

This session will report on the results of several research projects, including: (a) research that developed, implemented, and evaluated the effects of instruction on the literacy skills of individuals with CCN; and (b) research that developed and evaluated innovative AAC apps to support literacy learning. Videotapes of various cases will be presented to illustrate the intervention and apps, as well as the effects on literacy skills and language development. The cases will involve individuals with a range of disabilities (e.g., autism, cerebral palsy, Down syndrome, multiple disabilities) of various ages at various stages of literacy learning.

## **Methods:**

The session will present two lines of research: one to evaluate the effectiveness of instruction and one to evaluate the effectiveness of AAC apps to support literacy skills. Both lines of research involved a series of single subject multiple baseline studies. Each study involved four phases: baseline, intervention, generalization, and maintenance. The first line of research included a series of studies that evaluated the effects of instruction (independent variable) and targeted one of the following skills (dependent variables): phonological awareness skills; letter-sound correspondences; single word decoding; shared story reading; reading comprehension; and early writing skills (i.e., single word encoding, shared writing). The second line of research included a series of single subject research studies to evaluate the effects of the AAC apps on the acquisition of literacy skills; in these studies, the independent variable was the AAC app and the dependent variable was a measure of the reading skills of the participants. Baseline measures of the dependent variables were collected for each participant prior to implementation of the literacy instruction in the first set of studies or the introduction of the AAC app in the second set of studies. The introduction of the instruction or the app was staggered across the participants to ensure experimental control.

Each line of research involved two sets of studies: one that involved young children who had a range of disabilities; and one set that involved older individuals. All participants were nonliterate at the start of the study (i.e., they read fewer than ten written words). Additional selection criteria were as follows: (a) their speech was not functional to meet

daily communication needs; (b) their hearing and vision (with or without correction) were within normal limits; (c) they were able to follow one step commands; (d) they recognized pictures of familiar objects and actions; and, (e) they were able to select a target from a group of four or more items (e.g., pointing with a finger, fist, or eyes).

The first set of studies evaluated the effects of instruction that built on the current research on effective practices with students who require AAC as well as effective practices for children who speak but are at risk for the development of literacy skills (e.g., National Reading Panel, 2000; Light & McNaughton, 2009). The intervention included systematic direct instruction in basic skills (i.e., phonological awareness, letter sound correspondences, decoding, encoding, sight word recognition) as well as numerous opportunities to use these skills in meaningful shared reading and writing activities. The transition to reading connected texts started with scaffolded reading activities where the student was called upon to read selected target words in context; gradually students progressed to reading connected texts and building reading fluency and comprehension. The instruction provided adaptations to eliminate the need for oral responses, accommodate alternative responses via AAC, and provide external scaffolding support. Instruction was conducted in one-to-one sessions.

The second set of studies evaluated the effects of AAC apps (VSD-based or grid-based) designed to support the transition from graphics-based AAC systems to literacy. These innovative apps presented text dynamically on the screen upon selection of a graphic symbol. The apps incorporated features designed to maximize attention, interest, and literacy learning according to research on visual cognitive processing, motivation, and sight word acquisition.

## **Results**

The session will present the results of both lines of research, the studies to investigate the effects of instruction and those to investigate the effects of the AAC apps on literacy learning. All of the students with CCN demonstrated significant gains in their literacy skills as a result of instruction, including gains in their knowledge of letter-sound correspondences, reading of single words, participation in shared story reading, reading comprehension, typing of single words, and participation in shared writing activities. Results will also be presented on the effects of the AAC apps on literacy learning; these studies are currently in progress, but initial results are promising with young children and older individuals with CCN demonstrating acquisition of literacy skills simply as a result of app use.

Research results from both sets of studies will be presented along with videotaped case examples to illustrate the literacy intervention and apps, and to demonstrate the effects with individuals with different disabilities of different ages at different stages of literacy learning. The session will provide professionals and families with effective evidence-based literacy intervention and apps for individuals who have CCN. With appropriate instruction and AAC apps, individuals with CCN can achieve improved literacy skills and will be able to maximize their education, employment, social networks, and independent living.

Declaration of Interest: The authors have no financial or other interest in objects or entities mentioned in the paper.



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Program Planner/Instructional Personnel’s Name: Janice Light

Course Title: Evidence-based literacy interventions and apps for individuals who require AAC

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