

Evidence-based Literacy Intervention and Apps for Individuals Who Require AAC

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Handouts at <http://aac.psu.edu>



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Benefits of literacy skills

- Literacy skills are critically important
 - Support participation in education
 - Enhance employment opportunities
 - 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)



Benefits of literacy skills for individuals with CCN

- Literacy skills are even more important for individuals with CCN
 - Expand communication options significantly
 - Increase perceptions of competence
 - Increase self-esteem

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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
 - Community living

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Barriers to literacy learning

- Lack of literacy curricula adapted to meet the needs of individuals with CCN
 - Existing literacy curricula assume spoken language foundation & require spoken responses
- Lack of AAC technologies that support the transition from graphic symbols to literacy



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Goals of presentation

- Share evidence-based instruction to enhance the literacy skills of individuals who require AAC
 - Describe instruction
 - Share research results with case examples to illustrate
- Share evidence-based apps designed to support the transition from graphic symbols to literacy
 - Describe the apps
 - Share research results & case examples to illustrate
- Funded through the RERC on AAC
 - NIDILRR grant #90RE5017
 - Authors have no financial interest



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Instruction to build literacy skills of individuals who require AAC



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Components of effective evidence-based literacy intervention

1. Sufficient time allocated for instruction
2. Appropriate instructional content
3. Appropriate instructional procedures
4. Adaptations to allow active participation of individuals with CCN
5. Positive rapport & motivating instruction
6. AAC technologies that support the transition from graphic symbols to literacy

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Skills targeted in intervention

- Reading to student & talking about texts
- Phonological awareness skills
- Letter-sound correspondences
- Decoding skills
- Shared reading
- Sight word recognition skills
- Reading and understanding books / other texts
- Early writing skills

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Direct instruction in basic skills

- Model
 - Instructor demonstrates the skill for the student
- Guided practice
 - Instructor provides scaffolding support /prompts to help the student perform the skill successfully
 - Instructor gradually fades the scaffolding support
- Independent practice
 - Student performs the skill independently
 - Instructor provides feedback

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Applying skills in meaningful literacy activities

- Provide frequent opportunities to apply skills in meaningful literacy activities
 - Demonstrate purpose of instruction
 - Increase motivation for learning to read & write
 - Enhance generalization of skills
 - Encourage generalization to new materials /contexts
 - Provide additional opportunities to practice skills
 - Build fluency in basic skills
 - Practice integration of skills required to read and write

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Checklist for effective literacy instruction

- Make instruction meaningful
 - Target important literacy skills
 - Include motivating words & topics
 - Make connections to personal experiences

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 - Make connections to personal experiences
- Modify the activity to support participation
 - Utilize familiar content /task formats
 - Provide pictures or signs as response options
 - Select foils carefully
 - Provide oral scaffolding support as required

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 - Provide oral scaffolding support as required
- Provide effective instruction
 - Model task
 - Provide guided practice to promote success/ minimize error
 - Provide feedback on responses
 - Promote independence by fading support

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 - Select foils carefully
 - Provide oral scaffolding support as required
- Provide effective instruction
 - Model task
 - Provide guided practice to promote success/ minimize error
 - Provide feedback on responses
 - Promote independence by fading support
- Ensure multiple opportunities to practice skills
 - Provide focused instruction at least 3-5 times per week
 - Practice new skills and review previously learned skills in meaningful activities
 - Provide 10 or more opportunities to practice each skill

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Case Example: MF

- MF started intervention at 3;2
- Diagnosis of ASD
- Delayed expressive, receptive, and social development
- At start of study, very limited speech – yet speech progressed throughout literacy intervention
- Vision, hearing, and mobility all within functional limits
- Receiving speech therapy and ABA services through Pre-K

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Skills Targeted at First Stage of Literacy Instruction

Skill	Instruct	Mastered
Sound Blending	+	
Initial Phoneme Segmentation		
Letter Sound Correspondences	+	
Decoding		
Sight Words		
Shared reading	+	
Reading Comprehension		
Writing		

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Instruction in sound blending

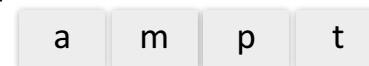
- Goal
 - The student will blend phonemes presented orally & determine target word
- Task
 - Present 4 or more AAC symbols/ pictures & label orally
 - Say the target word orally with each phoneme extended 1-2 seconds
 - Student must blend the phonemes and
 - point to /select the AAC symbol or
 - say/sign the word



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Letter-Sound Correspondences

- Goal
 - The student will match a target phoneme presented orally to the correct letter
- Task
 - Present 4 or more letters
 - Say the target phoneme (sound) e.g., m
 - Student must select the letter that represents the target phoneme
- Alternative task
 - Show the student a letter
 - Student must say the letter sound



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Letter-Sound Correspondence Knowledge:

- Knew all 26 letter names
- Did not know all 26 letter sounds
 - MF initially stated letter names instead of letter sounds during letter-sound correspondence activities

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Next steps: Introducing basic skills

Skill	Instruct	Mastered
Sound Blending		+
Initial Phoneme Segmentation		
Letter Sound Correspondences		+
Decoding	+	
Sight Words	+	
Shared reading	+	
Reading Comprehension		
Writing		

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Decoding

- **Goal**
 - The student will decode a written word & match it to the correct AAC symbol /picture or say/sign the word
- **Task**
 - Present 4 or more AAC symbols/pictures; review
 - Present the target written word
 - Student must read the word and
 - point to / select the AAC symbol /picture of the target word or
 - match the word card to the symbol /picture or
 - say/sign the word



bed

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Sight Words


- **Teach sight word recognition**
 - Highly motivating words that are too complex to decode
 - Irregular words that are frequently occurring
- **Goal /task**
 - Present 4 or more written words
 - Say the target sight word
 - Student must select the correct written word
 - Use this task if sight words are not easily imaged

swim	eat
horse	school

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Shared Reading

- **Goal:** The student will read sight words and/or decode target written words during shared reading activity
- **Task:**
 - Present a 5-10-page book
 - Present the simple written sentence with the target word highlighted
 - Read the sentence out loud and pause at the target word
 - *Student should read the target word and sign/say/point to pictures from an array*





Theo is on a cat.


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Shared Reading Book Examples:


Book Example 1.



 Theo is on a cat.



 Theo is on the bed.


 Theo is on the hat.


Book Example 2.



 Alvin is under the cat.



 Alvin is under the bag.


 Alvin is under the bus.

Book Example 3.


 Simon sees the black cat.


 Theo is on the red bed.


 Alvin is under the hat.

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Case Example: MF

Checklist for effective literacy instruction

<ul style="list-style-type: none"> ☑ Make instruction meaningful ☑ Modify the activity to support participation ☑ Provide effective instruction ☑ Ensure multiple opportunities to practice skills 	<ul style="list-style-type: none"> ▪ Include motivating words & topics <ul style="list-style-type: none"> ▪ <i>Alvin and the Chipmunks</i> ▪ Provide picture options in earlier sessions, then faded <ul style="list-style-type: none"> ▪ <i>E.g., Field of 4 pictures in decoding</i> ▪ Provide guided practice to promote success/ minimize error <ul style="list-style-type: none"> ▪ <i>E.g., saying each sound and helping to decode when needed, also reading words that hadn't been introduced to him yet</i> ▪ Books from decoding were included into shared reading ▪ Books were 10 pages in length
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Next steps: Putting it all together

Skill	Instruct	Mastered
Sound Blending		+
Initial Phoneme Segmentation		
Letter Sound Correspondences		+
Decoding		+
Sight Words		+
Shared reading	+	
Reading Comprehension	+	
Writing (Encoding)	+	

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Writing (Steps towards encoding)


- **Goal:** The student will acquire high-interest/frequency words that are difficult to decode
- **Task:**
 - Present six (or more) letters in a circle (not a line)
 - Present the target word in picture form (e.g., cat)
 - *Student must select the right letters and put them in the right order to encode/spell the target word*
- **Considerations:**
 - Start with CVC words with known letter-sound correspondences
 - Start with letter tiles, then transition to keyboard
 - Start with one or two high-interest words and slowly build from there (for sight words)



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Reading With Comprehension

- **Goal:** The student will decode or recognize by sight each word in a sentence and process the words to derive the meaning of the full text
- **Task:**
 - Student reads the text (illustrations are covered)
 - *Student selects the picture that represents the meaning from the group*



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MF – Example of Summary of Sessions

Sessions (February-June)	Sessions (August-September)	Sessions (September-December)
<ul style="list-style-type: none"> • Sound blending • Letter sounds • Decoding • Shared reading 	<ul style="list-style-type: none"> • Letter sounds • Decoding • Sight words • Shared reading 	<ul style="list-style-type: none"> • Decoding • Sight words • Comprehension • Encoding • Shared reading

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Case Example: MF

Checklist for effective literacy instruction

<ul style="list-style-type: none"> ☑ Make instruction meaningful 	<ul style="list-style-type: none"> ▪ Include motivating words & topics <ul style="list-style-type: none"> ▪ <i>Alvin and the Chipmunks, Pete the Cat, Nemo</i> ▪ Related to personal experiences <ul style="list-style-type: none"> ▪ <i>Talked about family members and pets</i>
<ul style="list-style-type: none"> ☑ Modify the activity to support participation 	<ul style="list-style-type: none"> ▪ Provide picture options <ul style="list-style-type: none"> ▪ <i>E.g., Field of 4 pictures in decoding</i> ▪ Select foils carefully <ul style="list-style-type: none"> ▪ <i>E.g., One icon with similar initial letter in decoding</i>
<ul style="list-style-type: none"> ☑ Provide effective instruction 	<ul style="list-style-type: none"> ▪ Model task ▪ Provide guided practice to promote success/ minimize error <ul style="list-style-type: none"> ▪ <i>E.g., saying each sound aloud during guided practice for encoding</i> ▪ Provide feedback on responses
<ul style="list-style-type: none"> ☑ Ensure multiple opportunities to practice skills 	<ul style="list-style-type: none"> ▪ Practice new skills and review previously learned skills in meaningful activities ▪ Provide 10 or more opportunities to practice each skill <ul style="list-style-type: none"> ▪ <i>E.g., decoding trials were out of 10, shared reading books were 10 pages long</i>

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MF – Summary

- MF made significant gains in literacy in 1 year
 - Participating in ~20 hours of instruction
 - No literacy instruction by family (other than shared reading) and limited literacy instruction by Pre-K (letter names and sounds)
- MF will be entering Kindergarten fully included
 - As his mom adds – with better literacy skills than his twin sister!

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Krista

- 8 years old
- Weissenbacher-Zweymuller Syndrome
- Tracheotomy
- Visual impairment
- Bilateral sensorineural hearing loss
- Uses a power wheelchair
- Limited fine motor skills
- Attends life skills class
- Communicates telegraphically using
 - Sign approximations & gestures
 - Facial expressions
 - Speech Generating Device (SGD) with limited vocab
- Nonliterate
 - History of failure & low expectations

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Adapt instruction to meet complex needs

- **Accommodate visual impairment**
 - Ensure appropriate correction/ glasses
 - Provide large print – 80 point font
 - Provide color contrast
 - black text on yellow background
- **Accommodate hearing impairment**
 - Utilize FM system / bilateral hearing aids
 - Provide augmented input
 - speech + sign or writing
 - Use visual cues



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Adapting instruction to meet complex needs

- Support comprehension & language skills
 - Use written words, pictures, & sign to augment input
 - Start with familiar, high interest concepts
 - Teach new language concepts in context as required
- Adapt instructional sequence to meet needs and skills

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Initial instruction

Skill	Instruct	Mastered
Sound Blending		
Initial Phoneme Segmentation		
Letter Sound Correspondences		
Decoding		
Sight Words – high interest	+	
Shared reading – favorite topics	+	
Reading Comprehension		
Writing		

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- ### Adapting instruction to meet complex needs
- Incorporate instruction in sight words early
 - Provide access to shared reading as soon as possible
 - Increase motivation
 - Apply skills in the context of meaningful reading activities from the beginning
 - Utilize highly motivating reading materials
 - Focus on personal experiences
 - Enhance motivation
 - Provide context to support understanding
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Initial instruction

Skill	Instruct	Mastered
Sound Blending		
Initial Phoneme Segmentation		
Letter Sound Correspondences	+	
• Introduce incrementally		
Decoding		
Sight Words	+	
Shared reading	+	
Reading Comprehension		
Writing		

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- ### Adapting instruction to meet complex needs
- Adapt instruction in letter-sound correspondences
 - Modify sequence of letter-sounds to accommodate hearing loss
 - Provide visual cues
 - Provide visual supports when teaching phonological awareness skills
 - Reduce demands on auditory processing
 - Introduce sound blending with written words (visual cues of letters)
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Initial instruction

Skill	Instruct	Mastered
Sound Blending		
Initial Phoneme Segmentation		
Letter Sound Correspondences • Introduce incrementally	+	
Decoding with known letters	+	
Sight Words	+	
Shared reading	+	
Reading Comprehension		
Writing		

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Personalized Books for Shared Reading

Krista's Summer



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I went on a boat with
dad.



43

I hit the ball with mom.



44

Mom, dad, and I went on a train.



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Next steps: Expanding basic skills

Skill	Instruct	Mastered
Sound Blending	+	
Initial Phoneme Segmentation	+	
Letter Sound Correspondences	+	10 letter sounds
Decoding	+	cvc words with known letters
Sight Words	+	30+ sight words
Shared reading	+	with known words
Reading Comprehension		
Shared writing/ encoding	+	

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Next steps in literacy instruction Expanding basic skills

- Continued instruction in
 - sight word recognition
 - decoding skills
 - letter sound correspondences
 - Introduce keyboard as soon as acquires 6-7 letter-sounds
 - Highlight letters as acquired
 - Introduce phoneme segmentation to support writing



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Early writing instruction

- Offer choices of familiar and motivating topics
- Provide visual supports
 - Photos or images of interest
- Generate text
 - Start with very short stories
 - Gradually increase length & complexity
- Complete shared writing
 - Student generates text for known words; instructor helps with difficult words
 - Chunk text for writing to reduce working memory demands
 - e.g., subject phrase first, then verb phrase, etc
- Provide guided practice to support phoneme segmentation and encoding as required
 - Fade prompts to support independence
- Publish books and use them for shared reading

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Next steps in literacy instruction: Expanding basic skills

- Application of sight word & decoding skills in context of shared reading
 - Introduce wide range of reading materials
 - Personal books
 - Curriculum-related materials
 - Introduce reading buddy program
 - Target more words per sentence
 - Transition to reading sentences & simple stories
 - Introduce basic comprehension activities

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Results for Krista

- Results
 - after approximately 55 hours of instruction
 - over 16 month period
 - 9 years old
- Letter sound correspondences
 - Knows 19 letter-sound correspondences
 - a, m, t, b, i, r, o, c, e, g, u, l, n, s, d, h, f, p, and j
 - >90% accuracy from keyboard
 - Increased rate of acquisition over time

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Results for Krista

- Single word reading/ decoding
 - Reads 60+ words
 - >90% accuracy
- Reads wide range of books
 - Reads short sentences / simple stories independently
 - >90% accuracy
 - Reads successfully with adults and peers
- Early writing
 - Locates letters on keyboard
 - Types known cvc words accurately
 - Learning to type simple sentences
- Continued increases in language skills
 - Use of written language to build language skills
 - Expanding vocabulary
 - Building syntax

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Next steps: Putting it all together

Skill	Instruct	Mastered
Sound Blending	+	
Initial Phoneme Segmentation	+	
Letter Sound Correspondences	+	19 letter sounds >90% accuracy
Decoding	+	cvc words with known letters
Sight Words	+	>60 words >90% accuracy
Shared reading	+	Short sentences /simple stories
Reading Comprehension	+	Simple factual questions
Shared writing/ encoding	+	Known cvc words

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Case Example: Krista

Checklist for effective literacy instruction

<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Make instruction meaningful 	<ul style="list-style-type: none"> ▪ Started with sight word /shared reading to build motivation ▪ Then taught basic skills; always provided opportunities to apply skills in meaningful activities ▪ Included motivating familiar topics – family, Zac Efron
<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Modify the activity to support participation 	<ul style="list-style-type: none"> ▪ Utilized familiar content /task formats ▪ Provided pictures & signs as response options ▪ Provided visual supports ▪ Modified sequence of letter sounds to accommodate hearing ▪ Used large font; contrasting color (black on yellow)
<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Provide effective instruction 	<ul style="list-style-type: none"> ▪ Provided model, guided practice, independent practice ▪ Promoted independence by fading support ▪ Provided feedback on responses
<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Ensure multiple opportunities to practice skills 	<ul style="list-style-type: none"> ▪ Provided instruction 1-2 times per week <ul style="list-style-type: none"> ▪ Ideally more intensive instruction ▪ Practiced new skills & reviewed old skills ▪ Provided at least 10 opportunities to practice each skill³

Outcomes of literacy intervention

- 15 participants in larger literacy study
 - 3 years old to adolescents
 - Wide range of special needs
 - autism, cerebral palsy, developmental apraxia, Down syndrome, multiple disabilities
 - Using various means of communication
 - speech approximations, signs, PECS or other low tech systems, speech generating devices (SGDs), mobile technology and AAC apps
- 100% of participants learned to read
 - Time to acquisition varied across participants
 - Schools & families reported high levels of satisfaction with instruction & outcomes

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Barriers to literacy learning

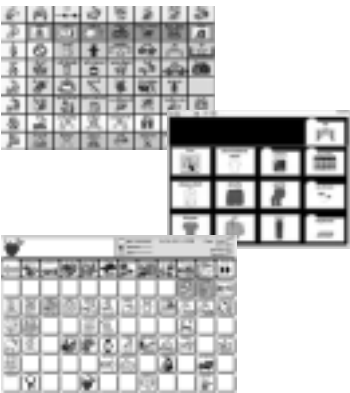
- Lack of literacy curricula adapted to meet the needs of individuals with CCN
 - Existing literacy curricula require spoken responses
- **Lack of AAC technologies that support the transition from graphic symbols to literacy**



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Current AAC technologies /apps


- Individuals who require AAC who are nonliterate use AAC systems/ apps with graphic symbols
 - E.g., Grid displays with PCS, Symbolstix, etc.
 - Minspeak icons
 - Visual scene displays, etc
- These systems/ apps do not support the transition from graphic symbols to literacy
 - Static presentation of text
 - Displaced presentation of text in message bar



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AAC apps to support the transition from graphic symbols to literacy


These apps are intended to complement, not replace, literacy instruction



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AAC technologies to support the transition to literacy (T2L)

- AAC apps that support the transition to literacy (T2L)
 - Individual selects a picture symbol from AAC display
 - Written word appears dynamically
 - Written word is spoken by the app
- 2 apps
 - Grid-based T2L app developed by Saltillo (Hershberger)
 - VSD T2L app developed by InvoTek (Jakobs)
 - Incorporated into SnapScene by TobiiDynavox



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Research-based design of T2L apps

- Design of T2L apps grounded in state of the science in visual cognitive processing & literacy learning
 - Individual selects graphic symbol on screen
 - Learning is driven by the individual's interests & needs
 - Text is dynamically presented on the screen
 - Movement is strong attractor of visual attention
 - Text is paired with graphic symbol & speech output
 - Pairing supports learning of link between written word and referent

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Investigating the effects of T2L apps on literacy learning

- Series of single subject experimental designs
 - Children and adults with ASD, CP, & IDD
- Research hypothesis
 - Individuals with CCN will increase literacy skills as a result of T2L app
- Design
 - IV = T2L app (VSD or grid)
 - DV = Accuracy reading single words

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Evaluating the grid-based T2L app

- 2 studies to evaluate effects of **grid-based T2L app**
 - School-aged nonliterate children with ASD (Jessica Caron & Clark Knudtson)
 - School-aged children with ASD with limited literacy skills (Jessica Caron, Christine Holyfield & Clark Knudtson)

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STUDY 1: TRANSITION TO LITERACY – GRID DISPLAY INDIVIDUALS WITH ASD, CCN, AND SOME BASIC LITERACY SKILLS

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Research Question:

- **What is the effect of the T2L app on the acquisition, maintenance, and generalization of single word reading by children with ASD, CCN, and some basic literacy skills?**



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Materials/Procedures:

Sight Word Probe Materials (how we assess learning)

- Word printed on yellow
- Images representing targeted words
- All “Angry Birds” related words
 - Shared interests across participants
 - Age appropriate
 - App is available for leisure on iPads
 - Selected words that would expand their vocabulary and that they didn’t already know
- Words range in length (4-8 letters)

Exposure Materials (“intervention”)

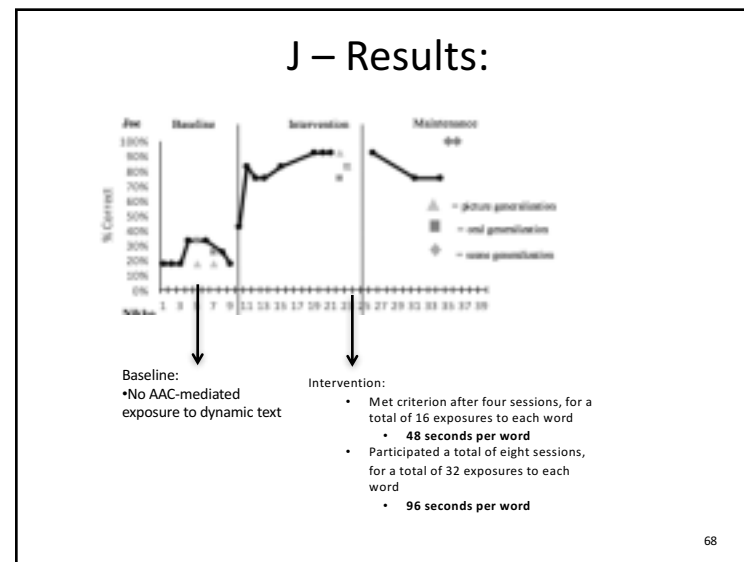
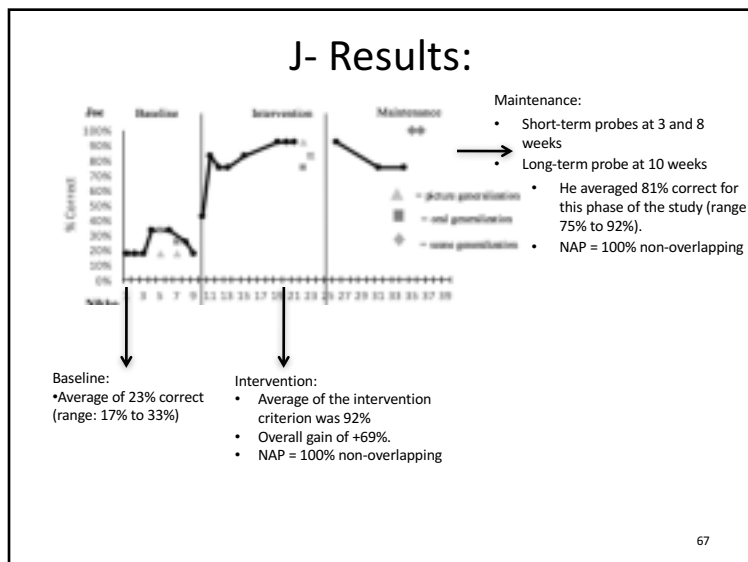
- T2L App
 - NovaChat Device
 - dynamically displaying text within graphics-based AAC software
- exposure to tablet technology with the AAC applications;
 - 12 words total (and 2 models)
 - Showed picture- was told to match/find the picture on the AAC T2L app
 - 4 exposures to the word per session (word was on the screen for 3 sec)

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J

- Age: 10;9
- ASD Diagnosis:
 - CARS assessment – “Severe”
- Communicates:
 - Echolalic and scripted speech
- Educational Setting:
 - Elementary School Autism Support Class, 1:1 aide
- Literacy Skills:
 - WRMT-II scores - <1 % ile
 - TACL-3 - <1% ile
 - Not independently decoding
 - ~200 Sight words

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W

- Age: 14;0
- ASD Diagnosis:
 - CARS assessment – “Severe”
- Communicates:
 - iPad with Assistive Chat
 - 5-10 Signs
 - Physical Communication
- Educational Setting:
 - Middle School Autism Support Class, 1:1 aide
- Literacy Skills:
 - WRMT-II scores - <1% ile
 - TACL-3 - <1% ile
 - Not independently decoding
 - ~200 Sight words

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WJ- Results:

Maintenance:

- Short-term probes at 3 and 5 weeks
- Long-term probe at 11 weeks
- He averaged 72% correct for this phase of the study (range 58% to 83%).
- NAP = 100% non-overlapping

Baseline:
 • Average of 18% correct (range: 8% to 25%)

Intervention:
 • Average of the intervention criterion was 80% (range: 67% to 83%)
 • Overall gain of +62%.
 • NAP = 100% non-overlapping

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WJ – Results:

Baseline:
 • No AAC-mediated exposure to dynamic text

Intervention:
 • Met criterion after three sessions, for a total of 12 exposures to each word
 • **36 seconds per word**
 • Participated a total of six sessions, for a total of 24 exposures to each word
 • **72 seconds per word**

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Summary

- Most errors with words that are more abstract
 - Lower (W)
 - Higher (J)
- Least errors with characters
 - Bubbles (W)
 - Bubbles (J)
- J and W provide evidence that a redesign in AAC apps, including the provision of dynamic text features and speech output, positively impacts the single-word reading of individuals with ASD, CCN, and some literacy skills.

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Investigating the effects of the VSD T2L app

- 4 studies to evaluate effects of **VSD T2L app** in progress
 - Young preliterate children with ASD (Kelsey Mandak & Maggie Lamb)
 - Young preliterate children with IDD (Shelley Chapin & Ethen Richtsmeier)
 - Young preliterate children at risk and their peers in small groups (Suz Boyle & Ashley McCoy)
 - Adults with IDD (Christine Holyfield & Lauramarie Pope)



STUDY 2: TRANSITION TO LITERACY EFFECT OF VSD APP ON ADULTS WITH IDD



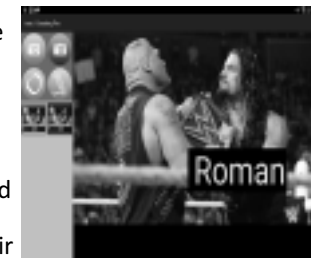
Case Study: Tiffany

- 22 years old
- Lives with parents
- Attends a post-high school educational program for adults with intellectual and developmental disabilities
- Has Down syndrome and a history of seizures
- Communicates primarily through speech, but is highly unintelligible to unfamiliar communication partners
- Recognizes less than 10 sight words and demonstrates knowledge of less than 5 letter-sound correspondences (both estimated from performance on informal literacy tasks and guardian report)

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Intervention

- To promote single-word reading skills, Tiffany participated in structured, 10 min interactions with the interventionist during which she used the app to initiate conversation, and the researcher expanded on her activations
- Two words were introduced on the tablet at a time based on her performance in the probes identifying the words out of a field of four
- Words were chosen based on their meaningfulness to Tiffany, and the likelihood she would encounter the words on YouTube or Facebook (two of her favorite pastimes)



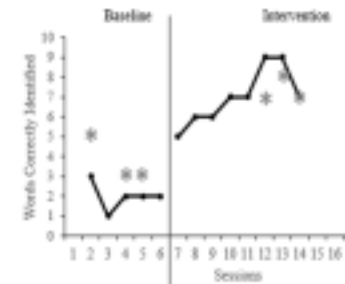
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Results

- Tiffany participated in a total of 8 intervention sessions
- She accurately identified 8 of the words introduced (four pairs) after only one session; the other two words (one pair) she accurately introduced after two sessions
- She accurately identified 9 of the 10 target words after only 6 intervention sessions; this translates to about 1 hr of intervention and about 10 min of exposure to target words paired with their auditory representations (i.e., voice output)
- That is to say, Tiffany may have doubled her sight word inventory with less than an hours time using the app with a dynamic text feature

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Results



Tiffany increased her identification of words as a result of the intervention utilizing the app with dynamic-text features. Her success reading single words also generalized when presented with photo stimuli that were not used during intervention, suggesting the literacy knowledge she developed in the intervention might be accessible for her to use in daily life, rather than just tied to the particular visual scene displays with which words appeared in intervention.

Summary of preliminary results Impact of AAC T2L apps on literacy learning

- Introduction of the T2L apps resulted in successful acquisition of written words by children & adults with range of disabilities
 - VSD T2L app
 - Grid-based T2L app
- Most individuals acquired the written words successfully with only minimal exposure to the words via the app
- Individuals who had some beginning literacy skills learned faster than those who were nonliterate at the start
 - Ideally individuals with CCN would use the T2L AAC app as an extension to effective literacy instruction
- Remember that these are preliminary results and should be interpreted with caution

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The art and science of literacy intervention

- The science of literacy intervention
 - Implement effective evidence-based instruction
 1. Allocate sufficient time for instruction
 2. Target appropriate instructional content / skills
 3. Implement effective instructional procedures
 4. Provide adaptations to allow active participation of individuals with CCN
 5. Provide access to AAC systems that support the transition to literacy
 6. Build positive rapport and ensure motivating instruction

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Checklist for effective literacy instruction

- | | |
|---|---|
| <ul style="list-style-type: none"> <input type="checkbox"/> Make instruction meaningful | <ul style="list-style-type: none"> ▪ Target important literacy skills ▪ Include motivating words & topics ▪ Make connections to personal experiences |
| <ul style="list-style-type: none"> <input type="checkbox"/> Modify the activity to support participation | <ul style="list-style-type: none"> ▪ Utilize familiar content /task formats ▪ Provide pictures or signs as response options ▪ Select foils carefully ▪ Provide oral scaffolding support as required |
| <ul style="list-style-type: none"> <input type="checkbox"/> Provide effective instruction | <ul style="list-style-type: none"> ▪ Model task ▪ Provide guided practice to promote success/ minimize error ▪ Provide feedback on responses ▪ Promote independence by fading support |
| <ul style="list-style-type: none"> <input type="checkbox"/> Ensure multiple opportunities to practice skills | <ul style="list-style-type: none"> ▪ Provide focused instruction at least 3-5 times per week ▪ Practice new skills and review previously learned skills in meaningful activities ▪ Provide 10 or more opportunities to practice each skill ▪ Introduce T2L apps to support literacy learning |

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The art and science of literacy intervention

- The science alone is not enough
- The “art” of literacy intervention is also critical
 - the belief and the commitment to the right of all individuals to have the opportunity to learn & seek their full potential

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Additional resources

- Websites
 - Light, J. & McNaughton, D. *Literacy instruction for learners with autism, cerebral palsy, Down syndrome and other disabilities.* <http://aacliteracy.psu.edu>
 - The RERC on AAC <http://rerc-aac.org>
- Webcast
 - Light, J. & McNaughton, D. (2010). *Improving literacy outcomes for individuals with autism spectrum disorders and limited speech.* Webcast presented at <http://aacliteracy.psu.edu/index.php/page/show/id/17>
 - Light, J. & McNaughton, D. (2006). *Maximizing the literacy skills of individuals who require AAC.* Webcast presented through the RERC on AAC <http://rerc-aac.org>
- Instructional resources
 - Light, J. & McNaughton, D. (2009). *Accessible Literacy Learning (ALL): Evidence-based reading instruction for learners with autism, cerebral palsy, Down syndrome and other disabilities.* San Diego, CA: Mayer-Johnson

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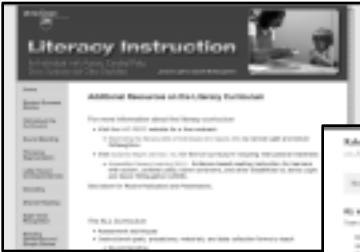

Additional resources

- Literacy apps
 - Grid-based T2L app see Saltillo <https://saltillo.com/>
 - VSD T2L app see InvoTek <http://www.invotek.org/>
 - ALL app and SnapScene app with T2L feature see TobiiDynamox <http://www.tobiiidynamox.com/>
- Selected publications
 - Light, J. & McNaughton, D. (2009). Meeting the demands of the curriculum for conventional and advanced readers and writers who require AAC. In G. Soto & C. Zangari (Eds.). *Practically Speaking: Language, literacy, and academic development for students with AAC needs.* Baltimore, MD: Paul H. Brookes Publishing Co.
 - Light, J., McNaughton, D., Weyer, M., & Karg, L. (2008). Evidence-based instruction for individuals who require augmentative and alternative communication: A case study of a student with multiple disabilities. *Seminars in Speech and Language, 29*, 120-132.
 - Light, J. & McNaughton, D. (2013). Literacy intervention for individuals with complex communication needs. In D. Beukelman & P. Mirenda (Eds.) *Augmentative and alternative communication: Supporting children and adults with complex communication needs.* Baltimore, MD: Paul H. Brookes Publishing Co.

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For further information on literacy intervention & apps, visit

<http://aacliteracy.psu.edu> <http://rerc-aac.org>

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For handouts, visit <http://aac.psu.edu>



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Acknowledgements

- We are especially grateful to the individuals who participated in this project. Thank you for allowing us to be a part of your lives.
- The contents of this presentation were 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.

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