

Evidence-based Literacy Intervention for Individuals with Autism Who Require AAC

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Seminar presented at ISAAC
August 2012, Pittsburgh, PA

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- Special thanks to those at Penn State who worked on this research. Without them, this project would not have been possible.
 - Lauren Karg
 - Lisa Mellman
 - Jackie Rowland
 - Marissa Ruda
 - Elizabeth Simms
 - Tina Weaver
 - Marissa Weyer
 - Bridgid Zvirblis
- Jessica Currall
- Megan Amrein
- Elizabeth Benedek Wood
- Maggie Case
- Rebecca Fullmer

Benefits of literacy skills

- Literacy skills are critically important
 - Allow fuller participation in education
 - Enhance employment opportunities
 - Support personal expression & social relationships (e.g., texting, blogs, Facebook)
 - Allow access to enjoyable leisure pursuits (e.g., reading, surfing the Internet)

Benefits of literacy skills for individuals with ASD & limited speech

- Literacy skills are even more important for individuals with ASD who have limited speech
 - Expand communication options significantly
 - Increase perceptions of competence
 - Increase self-esteem

Literacy outcomes for individuals with ASD

- Many individuals with ASD who have limited speech
 - do not have basic literacy skills
 - are underachieving in literacy skills compared to typically developing peers
- A significant barrier to improving literacy outcomes is
 - the lack of appropriate evidence-based instruction adapted to meet the needs of individuals with ASD who have limited speech
 - existing literacy curricula require spoken responses

Goals of presentation

- Share evidence-based intervention to enhance the literacy skills of individuals who require AAC
 - Describe intervention
 - Share case examples to illustrate intervention and outcomes
- Part of a larger federally funded research study
 - Focus on individuals with autism spectrum disorders

Anna

- 3 years 10 months old
- Diagnosed with autism
- Preschool with reverse integration
 - One on one aide (TSS)
- Communicated telegraphically to express needs & wants
 - Signs / gestures
 - Graphic symbols - PECS
 - Limited range of vocalizations
 - a few speech approximations
- Preliterate
 - Knew a few letter names, but not sounds
- Literacy intervention
 - one on one instruction at preschool; 2 x week
 - initially 10-20 min sessions; increase to 45 min sessions over time

Brennan

- 12 years old
- Diagnosed with autism
- Seizure disorder
- Special school
- Communicated telegraphically
 - Gestures / reaching for items
 - Vocalizations
 - PECS
 - Speech generating device
 - Approximately 15-20 vocabulary concepts
- Nonliterate
- Literacy intervention
 - one on one instruction; once per week
 - 45-60 minute sessions – initially frequent breaks; gradual decrease in breaks

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 ASD who have limited speech
5. Positive rapport & motivating instruction

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

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

Applying skills in meaningful literacy activities

- Provide frequent opportunities to apply skills in meaningful literacy activities
 - Demonstrate purpose of instruction
 -
 - Enhance generalization of skills
 -
 - Provide additional opportunities to practice skills
 -
 -

First steps in literacy intervention

- At each stage of literacy intervention, the instructor targets 3-4 skills
- Skills targeted at first stage of literacy instruction
 -
 -
 -
 - Decoding skills
 - Sight word recognition skills
 - Shared reading
 - Reading and understanding books / other texts
 - Early writing skills

Teach phonological awareness skills

- Phonological awareness refers to understanding or awareness of the sound structure of language
 - the ability to notice, think about and manipulate the phonemes or sounds of words (Torgesen, et al., 1994)
- Focus on skills most highly correlated with literacy outcomes
 - Sound blending – blending individual sounds to form words
 - Necessary for reading
 - Phoneme segmentation– segmenting words into individual sounds
 - Necessary for writing

Instruction in sound blending

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



Provide visual supports when teaching phonological awareness skills

- Learning phonological awareness skills imposes significant auditory processing demands
 - Some individuals with ASD have significant difficulties with auditory processing
- It may be helpful to use visual supports when teaching phonological awareness skills
 - Use written words when teaching sound blending
 - Use letter cards when teaching phoneme segmentation

Teaching sound blending with visual supports

- Present written word with illustration covered
- Instructor points to the letters in sequence
 - Says the letter sounds in sequence with each phoneme extended 1-2 seconds
 - If student knows letter sounds, he/she can say them also
- Student must blend the sounds and
 - select AAC symbol /picture from choices provided or
 - say/sign the word
 - student can then uncover illustration to check response



mad

Instruction in letter sound correspondences

- Goal
 - The student will match a target phoneme presented orally to the correct letter
- Task
 - Present several letters
 - Say the target phoneme (sound)
 - Student must select the letter that represents the target phoneme
- Alternative task
 - Show the student a letter
 - Student must say the letter sound

m	y
a	b

Letter sound correspondence book

- Link target letter sound to words that start with this letter sound
 - Choose words that are familiar & motivating for the student



y
youtube

y
yes

Progression of instruction in letter-sound correspondences

- Teach letter sounds, not letter names
- Introduce letters/sounds incrementally one at a time
 - a, m, t, p, o, n, c, d, u, g, h, f, i, s, b, l, e, r, w, k, x, v, y, z, j, q
- Follow these principles in teaching letter sounds
 - Teach lower case letters before upper case ones
 - Teach letters that are used most frequently first
 - Separate in the sequence letters that are similar
 - Teach short vowels before long vowels
 - Teach consonant clusters once single letter sounds mastered
 - Adapt sequence as required to accommodate student needs

Adapted keyboard

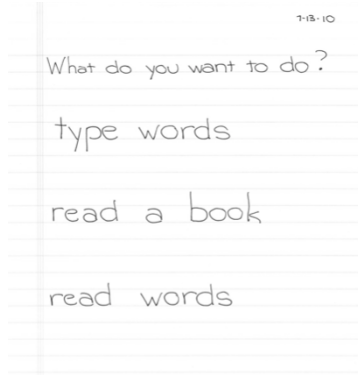


- Adapt the keyboard
 - letters in lower case
 - target letters highlighted
 - 12 letter sounds acquired

Typical early instructional session 20-30 minutes

10 minutes	Phonological awareness skills <ul style="list-style-type: none"> • sound blending & phoneme segmentation
5-10 minutes	Letter sound correspondences
5-10 minutes	Reading books to the student

Use written choices to structure instruction



A word about task adaptations

- When teaching new skills, only introduce one new learning demand at a time
 - Avoid cognitive overload
- Start by using tasks that are already familiar
 - Many students with autism perform best within familiar routines when response expectations are understood
 - Don't let confusion with task demands disrupt literacy learning
 - Adapt tasks as required to ensure task familiarity & understanding
 - E.g., Children with ASD may prefer to hand picture to instructor rather than point to picture (familiar response mode for those who use PECS)
 - Children with ASD may perform better when choices are held out to them rather than put on a table (offer of choice is made explicit)
- Later introduce new instructional tasks to build generalization

Next steps in literacy instruction

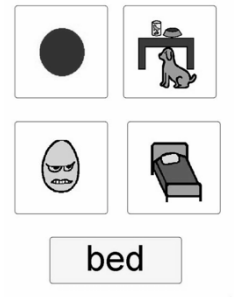
- Once student
 - Is competent with sound blending and
 - Knows approximately 6-7 letter-sound correspondences
- Teach single word decoding
- Teach sight word recognition skills
- Introduce shared reading activities
 - Provide opportunities to apply skills in meaningful contexts

Next steps in literacy instruction

- Continue to
 - Teach new letter sound correspondences; review known ones
 - As student learns new letters / sounds, introduce new decoding words using these letter sounds
 - Practice phonological awareness skills; build fluency
 - Read to the student & talk about the text

Instruction in single word 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



Instruction in sight word recognition

- Incorporate instruction in sight word recognition
 - Highly motivating words that are too complex to decode
 - Irregular words that are frequently occurring

see	play
youtube	skeeball

Instruction in sight word recognition

- Goal /task
 - Present 4 or more written words
 - Say the target sight word
 - Student must select the correct written word from the choices
 - Use this task if sight words are not easily imaged
- Alternative goal / 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

Instruction in sight word recognition Teach high interest words

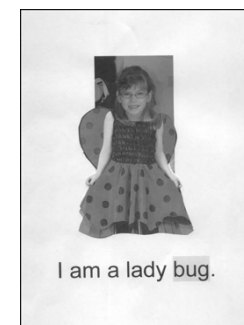


Transition to shared book reading

- Apply decoding & sight word recognition skills during meaningful reading experiences
 - Increase motivation
 - Provide additional opportunities to practice skills
 - Enhance generalization of skills
- Choose appropriate books
 - Interesting and motivating to the student
 - Familiar, meaningful content
 - Personalized books
 - Adapted story books / I Spy books or other patterned books

Instruction in shared reading

- Goal
 - The student will decode target written words during shared reading and will match target word to the correct picture or say or sign the word
- Task
 - Present the written sentence with the target word highlighted
 - Read the sentence out loud, pausing at the target word
 - Student must read target word and then
 - Say the word or
 - Sign the word or
 - Point to the picture /AAC symbol of the target word from an array of pictures /symbols



Example of a personalized story book for Halloween

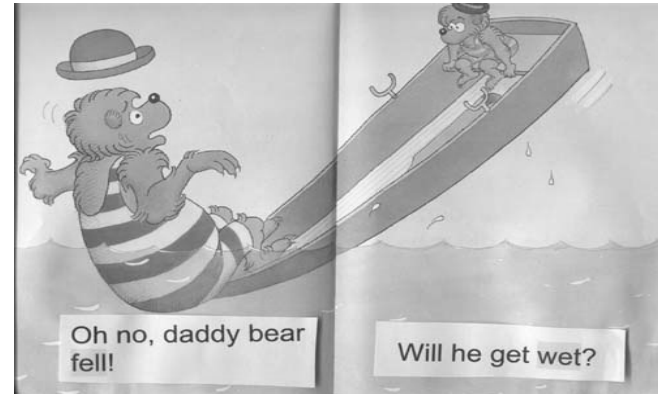


Lia is a cat.



Grant is a trash can.

Shared reading of adapted storybooks



Apply sight word recognition skills during shared reading



Bren likes youtube.

Personalized book for shared reading
Gradually target more words



Elmo and Anna hug.



Anna and mom have fun.

Typical instructional session 30-40 minutes

5 minutes	Letter sound correspondences • Teach new sounds & review known
10 minutes	Single word decoding
5-10 minutes	Sight word recognition skills
10 minutes	Shared reading activities • Apply decoding & sight word skills
5 minutes	Review sound blending & phoneme segmentation skills

Next steps in literacy instruction

- Expand decoding skills
 - Gradually increase range & complexity of words
 - E.g., regular cvcc words (e.g., wind, fast)
 - regular ccvc words (e.g., stop, flag)
 - silent e /long vowel
- Increase range of sight word recognition skills
- Provide opportunities to apply both decoding & sight word skills during shared reading
 - Gradually increase the number of target words until students are reading full sentences
- Continue to teach new vocabulary

Apply skills during shared reading Increase number of words targeted



Bren reads a book.



Janice says, wow.



Mickey and Minnie have fun.



Mickey hugs Minnie.

Typical instructional session 30-40 minutes

5-10 minutes	Sight word recognition skills
10 minutes	Single word decoding
15-20 minutes	Book reading activities • Apply decoding /sight word skills

Building reading comprehension

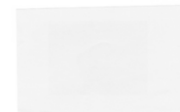
- the learner must
 - track through sentence from left to right
 - decode or recognize by sight each word in sequence
 - access meaning of words
 - process all words in sequence to derive meaning of sentence
 - relate meaning to prior knowledge to comprehend text
- In order to build reading comprehension skills
 - text
 - Then introduce more complex reading comprehension strategies

Ensure basic comprehension skills

- Goal
 - Student will
 - decode or recognize by sight each word in sentence in sequence
 - access meaning of words
 - process all words in sequence to derive factual meaning of sentence
- Task
 - Present 3 or more pictures /illustrations
 - Choose foils carefully so that student must read & understand entire sentence
 - Present the written text
 - Student must read the sentence and point to / select the correct picture
- Alternative Task
 - Student summarizes text using speech, sign, or AAC symbols/ pictures
 - Who? What happened?

Ensure basic comprehension skills “Max naps”

Student reads the text
Illustration is covered



Max naps.

Student selects the picture that
represents the meaning from choices



Basic comprehension skills “Max naps”

Student uncovers illustration



Max naps.

Student checks if picture chosen matches illustration.



Answering reading comprehension questions

- Student reads the text
 - Initially student reads one sentence/page; answers question
 - Reduce working memory demands
 - Later reads several pages; then answers questions
- Instructor asks appropriate questions
 - Start with simple factual questions
 - Later introduce more complex inference questions
- Student may respond to questions via
 - Speech
 - Signs
 - Pointing to pictures or written choices in multiple choice questions
 - Typing answers /using letter cards

Skills targeted in literacy 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
- Early writing skills

Building writing skills

- Writing skills are also critical in today’s society
 - Increased importance with increased use of technology
- Writing should be an integral part of literacy instruction
 - Often neglected
 - Teach writing skills in parallel to reading skills
- Learning to write is more difficult than learning to read
 - Writing imposes additional working memory demands
 - Requires learner to dynamically encode (Ehri, 2000)

Writing instruction

- Teach basic skills
 - Phoneme segmentation skills
 - Letter-sound correspondences
 - Keyboard knowledge
 - Encoding skills – single words

Writing instruction

- Provide opportunities to apply skills in meaningful writing activities
 - Telling stories
 - Use photos or pictures as visual supports
 - Start with familiar motivating experiences
 - Publishing books
 - Use the books for reading activities
 - Share books with others

Apply skills during meaningful writing activities

- Provide opportunities to apply skills in meaningful writing activities
 - Writing simple stories
 - Start with familiar motivating experiences / interests
 - Use photos or pictures as visual supports
 - Initially use word cards to write simple stories
 - Introduce letter by letter spelling as student develops competence with single word encoding
 - Gradually increase the length and complexity of the stories

Anna

Results after 60 hours of instruction

- 5 years 2 months old
 - Results after approximately 60 hours of instruction over 50 weeks
- Mastered basic literacy skills
 - Letter sound correspondences
 - Single word decoding / sight word recognition skills
 - Reads more than 170 words independently
 - Decodes novel regular words
 - Recognizes frequently occurring sight words

Anna
Results after 60 hours of instruction

- Reads simple books independently
 - Reads stories with 30-40 words
 - Responds to factual wh-questions with >80% accuracy
 - Learning to respond to inference questions
- Writing skills
 - spells more than 50 words
 - Attempts any word with sound spelling
 - writes simple stories
- Enters Kindergarten as a reader and writer
 - developing peers
 - Included in regular education class

Anna
Results after 60 hours of instruction

- Use of written language as visual support for speech & language development
 - Use of letters / written words to support speech production
 - Improved intelligibility
 - Increased length of utterances
 - Use of written words /sentences to support language development
 - Increased range of vocabulary
 - More complex sentence structures
 - Use of appropriate word endings

Brennan
Results after 40 hours of instruction

- 13 years old
 - Results after approximately 40 hours of instruction over a 17 month period
- Acquired early conventional literacy skills
 - Continuing to build competence
- Letter sound correspondences
 - Knows 10-12 letter-sound correspondences
- Single word reading
 - Reads more than 40 words
 - Increased rate of acquisition

Brennan
Results after 40 hours of instruction

- Shared reading
 - Participates actively in shared reading activities
 - Reads books with 3-4 words targeted per sentence with >80%
- Writing skills
 - Building competence in single word encoding
 - Some scaffolding support /adapted keyboard
 - Writing simple stories/ shared writing
- Demonstrates high levels of intrinsic motivation
 - Demonstrates increased confidence
 - Demonstrates improved attention
 - Works for 45-60 minutes without a break

Brennan Results after 40 hours of instruction

- Increased speech /language skills
 - Use of written language to enhance communication
 - Written choices
 - Use of written language to build vocabulary
 - Learn new concepts – wow, yuck
 - Use of written language to extend syntax /sentence length
 - Understand & produce word combinations
 - Use of written letters /words to increase speech attempts
 - Increased vocalizations/ speech approximations
 - Increased range of sounds
 - Attempt to imitate intonation

Research results Outcomes of literacy intervention

- 2 examples from larger federally funded research grant
- Participants in larger grant
 - 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, speech generating devices (SGDs)
- Results of larger grant
 - 100% of all participants acquired conventional literacy skills
 - 100% of participants with ASD acquired conventional literacy skills
 - Schools & families reported high levels of satisfaction with instruction and outcomes

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 autism who have limited speech
 5. **Build positive rapport and ensure motivating instruction**

The art and science of literacy intervention

-
-
- critical
 - the belief and the commitment to the right of all individuals to have the opportunity to learn & seek their full potential

Additional resources

- - *syndrome and other disabilities*
 - - *disorders and limited speech.* *Improving literacy outcomes for individuals with autism spectrum show/id/17*
 - Light, J. & McNaughton, D. (2006). *Maximizing the literacy skills of individuals who require AAC.* Webcast presented through the AAC-RERC. www.aac-rerc.com
- 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
- 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. (in press). 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.

For further information on literacy intervention, visit <http://aacliteracy.psu.edu>

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

Acknowledgements

- We are especially grateful to the students and families who participated in this project. Thank you for allowing us to be a part of your lives.
- This research is supported by
 - The Hintz Family Endowed Chair in Children's Communicative Competence
 - The Augmentative Communication Fund supported by the Forklifts annual golf tournament.
 - We are grateful for their support in helping us to make a difference in the lives of individuals with autism spectrum disorders
 - The opinions contained in this presentation are those of the grantee and do not necessarily reflect those of the granting agency.