Building Language & Literacy Skills with Children Who Require AAC

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Development of language & literacy skills

- During the first 5 years of life, typically developing children make a remarkable transition
  - from birth where they are
    - preintentional and presymbolic
  - to the school years where they
    - express a wide range of intents
    - know a wide range of vocabulary concepts
    - generate complex sentences to communicate ideas
    - acquire conventional literacy skills to read & write

Language & literacy development

- Pragmatic development
  - development of turn taking skills
  - expression of communicative intents
- Semantic development
  - acquisition of symbolic concepts
- Syntax and morphological development
  - development of more complex communication
- Development of phonological awareness skills
  - ability to notice /think about sound structure of words
- Development of literacy skills
  - acquisition of conventional reading and writing skills

Children with complex communication needs

- Face significant challenges at each stage
  - Low expectations
    - Limited opportunities for communication, language & literacy learning
  - Lack of early AAC intervention
    - 80% were older than 2 years of age (Hustad, et al., 2005)
  - Lack of effective evidence-based interventions
  - Lack of appropriate AAC systems for young children
    - May not fit their developmental needs & skills
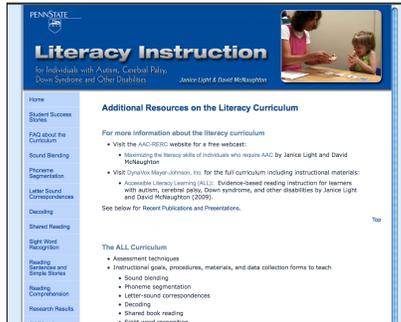   - May not appeal & may be difficult to learn and use

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Goals of the session

- Describe the components of successful evidence-based interventions to support the language & literacy development of children with CCN
- Illustrate effective evidence-based practices through a series of longitudinal case studies describing intervention over a number of years
- Report on language & literacy outcomes for the children
- Discuss implications for evidence-based practice

For additional information on early intervention visit http://aackids.psu.edu

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

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Goals of intervention with young children with CCN

- Intervention is guided, but not bound by, a developmental model
- Goals of intervention
  1. Increase active participation in social interactions
     - Increase turn taking
     - Build breadth of communicative functions
  2. Develop a wide range of semantic concepts
  3. Build greater complexity of language structure
  4. Build phonological awareness skills & conventional literacy skills

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Case #1

- 9 month old girl
- Down Syndrome
- Lives at home with mom & dad, 3 siblings
- Some vocalizations; very low tone
- Low expectations
  - Few opportunities for interaction

Intervention Phase 1
Increasing social participation

- Goal
  - To increase active participation in social interactions with familiar adults & siblings
  - To express range of communicative functions
  - To establish the foundations for language learning

Intervention Phase 1

- Intervention departed from traditional AAC interventions
  - Focused on social interaction
    - Not just on needs & wants
  - Redesigned AAC systems to better meet needs and skills of very young child
    - Provided contextual support to support language learning
  - Encouraged language learning through AAC
    - Did not require language learning prior to AAC
    - Used AAC as a medium for learning language

Intervention Phase 1
Select appropriate contexts

- Work with families in home environment
- Select appropriate contexts to build language and communication skills
  - Interactive / reciprocal
  - Meaningful / familiar
  - Motivating for the child
  - Valued by the family
  - Fun!!

Select appropriate contexts

- Examples of social contexts
  - Social games
    - E.g., peek a boo, Who's hiding
  - Singing songs (line by line)
    - E.g., Itsy bitsy spider, Wheels on the Bus, Old McDonald
  - Book reading
    - Brown Bear, Brown Bear
  - Play activities
    - Musical instruments

Intervention Phase 1
Ensure access to means to communicate

- Incorporate existing modes of communication
  - E.g., vocalizations, facial expressions
- Introduce AAC to enhance communication
  - Gestures / signs
  - Low tech symbols /Speech generating devices (SGDs)
  - ** Be careful not to overwhelm parents

Maximize the power of communication/ support language development

- Introduce new language concepts through AAC regularly in context
  - Do not externally limit language development through use of AAC systems with limited capacity
  - Expect significant language learning over the first 5 years
    - Introduce new concepts & contexts for communication regularly
    - Provide numerous models of AAC use in meaningful contexts

Ensure the appeal of AAC systems

- Motivating content
  - Fun interactive
    - E.g., songs, books, games
- Multiple bright colors
- Engaging characters
- Engaging output
  - Library of sound effects, music, animal sounds etc
  - Speech output with animated expression

Reduce the learning demands of AAC systems

- Introduce AAC systems for immediate use
  - Plan for the future
- Use developmentally appropriate representations, organizations, and layouts
  - Use visual scene displays (VSD) with very young children / beginning communicators
  - VSDs are digital photos or other images that depict the child's experiences / activities
  - Language concepts are embedded under "hot spots" in visual scenes

Potential advantages of VSDs

- VSDs represent familiar events and activities
  - replicate the contexts in which children learn language
- VSDs present language concepts in context
  - provide support for understanding & learning of the concepts
- VSDs preserve conceptual & visual relationships between symbols that occur in life
  - preserve the location, proportionality of concepts
- VSDs provide motivating & interesting contexts
  - stimulate interaction
- VSDs offer visual processing advantages
  - regularly process scenes visually within daily life
  - rapidly process scenes (<200 milliseconds)

Light, Drager, & McNaughton (2013)

Intervention procedures Phase 1
Use strategies to promote communication

- Model AAC + speech in all interactions to fulfill a wide range of functions
  - Sign + speech; aided AAC + speech
- Wait
  - Provide the opportunity for the child to communicate
- Recognize the child's communication attempts
- Respond to the child
  - Fulfill the child's intent
  - Expand and model more complex language

Intervention Phase 1
Outcomes for Case #1

- Outcomes
  - Used AAC technology on initial introduction once use was modeled
    - Highly motivated to use VSDs during play, book reading, singing, etc
  - Demonstrated significant increases in rate of participation after introduction of AAC
    - Increases of more than 20 times the rates observed at baseline
  - Sustained interactions with others for significantly longer after AAC intervention
    - Many more opportunities to learn language and other skills

Intervention Phase 1
Outcomes for Case #1

- Learned to participate in a range of interactions
  - Social routines
  - Play activities
  - Not just expression of needs and wants
- Demonstrated first "words" at 10 months
  - Expressed via sign & aided AAC

Intervention Phase 2
Expanding vocabulary
Extending pragmatic development

- Goals
  - To build a range of semantic concepts
  - To foster development of early semantic-syntactic relations
  - To expand range of communicative functions
  - To expand range of partners
    - Peer interactions as a "testing" ground for her language skills

Intervention Phase 2

- Intervention in motivating social contexts in natural environment
  - Greater involvement in interactive play contexts
    - Playing ball, dolls, farm, cars, blocks, Simon Says
    - More complex books and songs
  - Greater involvement with peers
    - Interactions with younger brother
    - Opportunity to test competencies

Intervention Phase 2

- Expansion of AAC systems to promote more complex communication
  - Multimodal communication
    - Use of speech, signs/ gestures, aided AAC systems
  - Addition of new vocabulary
    - Wide range of concepts
    - New concepts introduced regularly in meaningful contexts
  - Use of various types of displays
    - Ongoing use of VSDs
    - Introduction of hybrid displays (VSDs & grid displays)
    - Modeling of navigation between displays

Intervention Phase 2

- Scaffolding support to promote communication
  - Model AAC + speech
    - Signs + speech; aided AAC + speech
  - Wait
    - Provide opportunities for communication
  - Respond to communicative intent
    - Expand and model more complex communication
      - via AAC + speech
  - Have fun!!

Intervention Phase 2
Outcomes

- Outcomes
  - Continued to increase rate of participation
    - Actively engaged in interactions
  - Demonstrated significant increases in vocabulary
    - Acquired a range of semantic concepts
      - AAC provided a powerful visual support to facilitate language learning
      - AAC provided a means to independently explore language
    - Learned to combine concepts to communicate more complex meaning

Intervention Phase 2

- Outcomes for Case #1
  - Used a range of means to communicate
    - Speech, gestures /signs, aided AAC
    - Use of AAC enhanced communication and language development at early age
    - Use of AAC did NOT inhibit speech development

Intervention Phase 2

- Outcomes for Case #1
  - Used AAC systems
    - With parents and older sisters to communicate, learn new concepts, and play
    - With other children as contexts for interaction
      - Shared books, singing, play activities
    - By self for play and learning

Case #2

- 25 month old boy
- Cerebral palsy
- Tracheotomy
- No vocalizations, gestures, or signs
- A few digital photos
- Expresses requests for objects only
- Participates minimally

Intervention Stage 1
Increasing communicative turns

- Goal
  - To increase participation with familiar adults
    - Provide more opportunities to learn language
- AAC systems
  - Low tech symbols using meaningful representations
  - Speech generating device with VSDs

Work with parents to enhance participation

- Identify opportunities for communication
- Model use of aided AAC plus speech
  - Speech + light tech symbols; Speech +SGD
- Provide scaffolding support for AAC use
  - Locate low tech symbols to offer choices
  - Help locate appropriate pages in SGD
- Respond to child's communicative attempts
  - Fulfill communicative intent
  - Expand & model more complex messages
- Have fun!

Case #2
Results after 4 weeks

- After 4 weeks of intervention (age: 26 months)
  - Much more active participant in interaction
    - Takes approximately 20 turns per 20 minute interaction
  - Expresses >180 words via light tech & high tech AAC
    - Increased vocabulary by >5 words per day
  - Communicates in single word telegraphic messages
  - Expresses 4-5 different semantic relations
    - agent, action, object, locative, attribute/adverbial

Intervention Stage 2
Developing semantic concepts

- Goals
  - To expand expressive vocabulary to communicate more diverse meaning
  - To teach early questions as a means to control vocabulary acquisition
    - E.g., What's that?

Intervention Stage 2
Developing semantic concepts

- AAC systems
  - Add new vocabulary regularly
  - Introduce a range of concepts
- Intervention strategies
  - Provide numerous opportunities
  - Model use of AAC to communicate
  - Respond to communicative attempts

Case #2
Results after 12 weeks

- After 12 weeks of intervention (age: 28 months)
  - Participates actively in interactions with familiar adults
    - Expresses >48 concepts per 20 minute interaction
  - Expresses >480 words via light tech & high tech AAC
    - Increased vocabulary by >5 words per day
  - Expresses wide range of semantic relations
    - agent, action, object, attribute/adverbial, locative, demonstrative, possessor, quantifier, instrument, questions, etc.
  - Communicates in 1-2 word messages
    - Beginning to combine concepts

Intervention - Stage 3
Learning syntax and morphology

- Goals
  - To continue to expand vocabulary
    - Reading books
  - To encourage communication of more complex, novel meanings by combining symbols
    - Telling stories

Case #2
Results Phase 3

- After 12 months of intervention (age: 37 months)
  - Expresses >1,000 words
    - Increases vocabulary by >5 words per day
  - Expresses wide range of semantic relations
    - agent, action, object, locative, demonstrative, possessor, quantifier, instrument, questions
  - Communicates in 1-4 word messages
    - Understands use of many grammatical markers
    - Beginning to use some grammatical markers

Ongoing intervention challenges

- Seating and positioning / access
- Balancing priorities
- Managing the programming demands
- Finding an appropriate "voice"

Intervention Stage 4
Phonological awareness / literacy

- Goals
  - To continue to expand expressive vocabulary
  - To continue to develop syntax and morphology
  - To teach phonological awareness skills and conventional literacy skills
- AAC systems
  - Support literacy development
    - Access to letters and sounds on SGD at 2 years
    - Increased reliance on alphabet and words

Literacy instruction

- Instruction focused on the following skills
  - Phonological awareness skills
    - Sound blending skills
    - Phoneme segmentation skills
  - Letter-sound correspondences
  - Decoding skills
  - Sight word recognition skills
  - Reading comprehension strategies
  - Early writing skills

Literacy instruction

- Instructional procedures
  - Direct instruction in basic skills
    - Model the skill
    - Provide guided practice
    - Provide independent practice with feedback
  - Frequent opportunities to apply skills during meaningful, motivating literacy activities
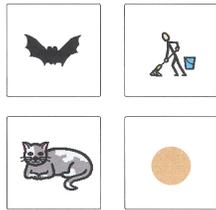
Instruction in sound blending

- Goal
  - The student will blend 3 sounds presented orally in sequence (with each sound extended 1-2 sec), determine the target word, and then point to the correct AAC symbol for the target word

Light, Drager, & McNaughton (2013)

Instruction in phoneme segmentation

- Goal
  - The student will match a target sound presented orally to the AAC symbol of a word that starts with the target sound
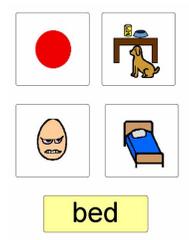
Instruction in letter-sound correspondences

- Goal
  - The student will match a target sound presented orally to the letter that represents the target sound

b	m
t	o

Instruction in single word decoding

- Goal
  - The student will look at the letters, retrieve their sounds, blend the sounds together to decode the target word & then match the word to the correct AAC symbol

bed

Applying decoding skills during shared book reading

- Provide opportunities to apply decoding skills during shared reading
  - Highlight target words
  - Read sentence out loud / track words with finger
  - Pause at highlighted target word
  - Child decodes target word and then selects AAC symbol from communication display or VOCA

Case #2
Results for Phase 4

- After 23 months of intervention (age: 48 months)
  - Acquisition of conventional literacy skills
    - phonological awareness skills
      - initial phoneme segmentation >90% accuracy
      - sound blending >90% accuracy
    - letter-sound correspondences >90% accuracy
    - decoding single words in isolation >80% accuracy
    - decoding during shared reading >80% accuracy

Intervention Phase 4
Ongoing literacy instruction

- Read & talk about stories
- Expand decoding /sight word recognition skills
- Teach writing skills
  - Writing stories
- Build reading comprehension skills
  - decode or recognize by sight each word in sentence
  - process all words in sequence to derive meaning of sentence (or longer text)
  - relate meaning to prior knowledge /experience

Case #2 –5 years old

- Outcomes
  - Enters Kindergarten as a reader and writer
  - Fully included in regular education class
  - Full time assistance of aide
  - Uses light tech symbols / alphabet board and SGD as primary means of communication
  - Literacy skills exceed those of most typical peers

Case #3

- 15 month old boy
- Down Syndrome, otitis media
- Lives with parents & sister
- <5 spoken words
- A few baby signs

Intervention Stage 1
Increasing communicative turns

- Goal
  - To increase participation in social interactions
- AAC systems
  - Speech approximations
  - Signs /gestures
  - Low tech symbols
  - Speech generating device with VSDs

Working with parents
to enhance participation

- Identify opportunities for communication
- Model use of AAC plus speech
  - Help locate appropriate pages in SGD
  - Position SGD to support communication
- Wait
  - Allow opportunity to take turns independently
- Respond to communicative attempts
- Expand & model more complex messages

Case #3 – 20 months old

- After 4 months of intervention
  - Active participant in interactions with familiar adult
    - Takes 160-200 turns per 20 minute interaction
    - Rate of 8-10 turns per minute
  - Acquired >100 concepts
  - Communicates via multiple means
    - Vocalizations / Speech approximations (10%)
    - Signs /gestures (30%)
    - Aided AAC (60%)

Intervention Stages 2 & 3
Developing more complex language

- Goals
  - To expand receptive and expressive vocabulary
    - Introduce a wide range of concepts, including early preschool concepts
  - To build expression of more complex meaning

Intervention Stages 2 & 3
Developing more complex language

- AAC systems
  - Introduce a wide range of concepts
    - Introduce early preschool concepts
    - Letters & numbers
- Intervention strategies
  - Teach new concepts in context
  - Model use of AAC to communicate
  - Respond to communicative attempts

Case #3 – 2 years 9 months

- After 18 months of intervention
  - Participates actively in interactions
    - Approx. 200 turns per 20 minute interaction
    - Rate of 10 turns per minute
  - Relies on multimodal communication
    - Speech (26%)
    - Signs/ gestures (25%)
    - Aided AAC (48%)
    - Increased use of speech
    - AAC does not inhibit speech

Case #3 – 2 years 9 months

  - Acquired >1,000 words
  - Expresses 45-80 different concepts in 20 minutes of interaction
  - Expresses wide range of semantic relations
    - agent, action, object, entity, attribute, adverbial, recurrence, locative, greetings, demonstrative, quantifier, question, affirmation, negation
  - Typically uses single words
    - Increased use of 2-3 word combinations
  - Navigates aided AAC system independently

Intervention Stage 4
Phonological awareness / literacy

- Goal
  - To teach phonological awareness /literacy skills
  - To use literacy to build language skills
    - vocabulary knowledge
    - syntax and morphology
- AAC systems
  - Provide access to alphabet on high tech system
    - Speech output letter sounds not names
  - Introduction to standard keyboard

Stage 4
Literacy instruction

- Instruction targeted
  - Phonological awareness skills
    - Sound blending skills
    - Phoneme segmentation skills
  - Letter-sound correspondences
  - Decoding skills
  - Sight word recognition skills
  - Reading comprehension strategies
  - Early writing skills

Case #3 – 5 years old

- Outcomes
  - Participates actively in interactions
  - Relies on speech as primary means of communication
    - Augments with signs & aided AAC as required to clarify
  - Knows thousands of words
    - Expresses wide range of semantic relations
  - Communicates in short sentences
  - Literacy used to enhance language skills
    - Acquisition of vocabulary
    - Learning of syntax/ morphology
    - Speech production

Case #3 – 5 years old

- Literacy skills
  - Demonstrates phonological awareness skills
    - Sound blending
    - Phoneme segmentation
  - Knows all letter-sound correspondences
  - Decodes regular cvc words
  - Reads simple books independently
  - Types simple regular words / short sentences
  - Enters Kindergarten as a reader

Building language and literacy skills with children with CCN

- With appropriate evidence-based AAC intervention, it is possible to build language and literacy skills with young children with complex communication needs
  - Pragmatic skills
  - Semantic skills
  - Syntactic /morphological skills
  - Phonological awareness /literacy skills

The challenge

- The challenge is to raise the bar
  - To increase expectations
  - To implement evidence-based AAC intervention with children with CCN from the earliest ages
  - To maximize results
- The challenge is to ensure
  - That the "possible" becomes reality for all children with CCN

Acknowledgements