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

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
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

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

- 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!!

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

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

- Examples of social contexts
  - Social games
    - E.g., peek a boo, Who’s hiding
  - Singing songs (line by line)
    - E.g., It’sy 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**

- 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 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

• 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!!

• 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

• 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

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
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

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

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
  - 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
  - Literacy used to enhance language skills
    - Acquisition of vocabulary
    - Learning of syntax/ morphology
    - Speech production

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Light, Drager, & McNaughton (2013)
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

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