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AAC Applications for Beginning Communicators: Design and Application

Disclosure

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- Kathryn Drager is employed at The Pennsylvania State University, where these studies took place.
- Nimisha Muttiah is employed at Franciscan Children's, and continues research involvement.
- We have no other financial or non-financial relationships to disclose.

Potential of AAC technologies

- Individuals with complex communication needs are at significant risk in all aspects of their functioning and development
    - They require access to language and communication as much and as early as possible to improve outcomes
- AAC technologies / apps offer the potential to enhance communication and language development
    - Unfortunately this potential has not yet been fully realized, in part because of the lack of AAC technologies /apps that are appropriate for individuals with complex communication needs

Design of AAC technologies

- Lack of attention to the design of AAC technologies/apps for children with complex communication needs is ironic
    - This component of intervention substantially affects performance AND
    - It is the intervention component that is most easily changed

Effects of the design of AAC displays

- One of the most important components of AAC technologies / apps is the display
- If AAC displays are well designed,
    - They will enhance communication and language outcomes
- BUT if AAC displays are poorly designed,
    - They may impede the communication and language development of individuals who require AAC

The current situation

- Most AAC systems are designed by middle-aged European American adults without disabilities
    - The displays reflect perspectives of these adults
- However, individuals with complex communication needs have very different perspectives / experiences due to differences in
    - Age/development
    - Cultural/ethnic background
    - Disability status

The design challenge

- As a result, individuals who require AAC may not find AAC displays
  - Appealing
  - Easy to learn or use
- The challenge
  - How do we design AAC displays that
    - Are easy to learn and use?
    - Appeal to individuals with CCN and their peers?

Decreasing the learning demands for young children

- AAC technologies / apps are simply tools
  - There is no inherent value in learning how to use AAC technologies / apps
    - The value lies in the end goals
      - e.g., social interactions with peers, literacy skills, etc
  - "Cost" of learning AAC technologies should be minimized
    - Goal is to maximize learning and ease of use
      - Instructional time should be spent on the end goals, not on learning AAC technologies / apps

Model to Guide Design of AAC Systems

Considering learning demands

Aided AAC Systems

- Aided AAC systems offer the potential to enhance communication, language, and literacy development for individuals with complex communication needs
- This potential will only be realized if individuals are able to use their aided AAC system(s) effectively to communicate
- The design of the AAC system will greatly impact performance
- To date there has been only limited attention given to the design of aided AAC systems

A model to guide the design of aided AAC systems

- Light, Wilkinson, & Drager (2008) presented a model intended to guide the design of aided AAC systems
- Factors that will influence an individual's ability to use an aided AAC system effectively include:
  - Variables related to the individual
  - Variables related to the task
  - Variables related to the AAC system(s)

Individual who uses AAC — Aided AAC system — Task
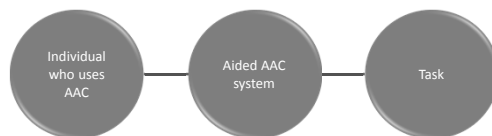
Individual, Task, and System Variables

- These individual, task, and system variables will potentially affect:
  - Rate of learning
  - Accuracy of selection
  - Speed of selection
  - Fluency / automaticity of performance
  - Preference / acceptance of the system
  - Overall communication effectiveness
- The variables will interact to affect performance
- They may have differential effects at different stages of learning / use of aided AAC systems

Variables related to the individual

- An individual's performance using aided AAC will be affected by his/her skills as well as psychosocial factors including:
  - Motor skills
  - Cognitive skills
  - Language skills
  - Sensory perceptual skills
    - Especially visual perceptual skills
  - Motivation, attitude, confidence, resilience, etc.
- It is critical to ensure that aided AAC systems are designed to
  - Accommodate the individual's skills
  - Minimize the effects of any impairment
  - Provide necessary supports to maximize performance

Variables related to the communication task

- Performance will be affected by task demands
- Communication tasks require divided attention
  - Attention to the communication process
  - Attention to the operation of the AAC system
- Typically performance decreases under conditions of divided attention

An example of communication task demands

- Face to face interaction requires the individual to:
  - Monitor the partner
  - Understand the partner's communication
  - Determine an appropriate message
  - Plan the communication message using AAC
  - Locate and recognize appropriate concepts on the aided AAC system as required
  - Select these concepts
  - Monitor the output
  - Monitor the partner to ensure comprehension, etc.

Implications of task demands

- Communication performance is apt to deteriorate if the individual must devote significant resources to operating the aided AAC system
  - Therefore, it is critical to minimize the demands of operating the aided AAC system
- One way to reduce the demands is through improved design of aided AAC systems

Variables related to the aided AAC system

- Communication outcomes will be affected significantly by the design of the aided AAC system itself
- Careful construction of this physical "space" is critical to maximize its utility for the individual
- The design of aided systems is more easily changed than
  - Variables related to the individual or
  - Communication task demands

Current practice in the design of aided AAC systems

- Typically, clinicians are left to design AAC systems based solely on their own intuition or experience
- As a result, AAC systems may not meet the needs and skills of the individual
  - Communication performance may be negatively affected

Components of aided AAC systems

- Communication performance will be affected by a range of variables related to aided AAC systems, including variables related to each of the following components:
  - Display
  - Selection technique
  - Output

Variables related to the AAC system display

- Design of the AAC system display involves consideration of 4 interrelated components
  - **Concepts** to be provided
    - The underlying meanings provided as vocabulary in the system
  - **Representation** of these concepts
    - The actual symbols used to represent these concepts
  - **Organization** of concepts
    - The underlying groupings of concepts within the system
  - **Presentation** of these concepts
    - They physical layout of the concepts within the display

Concepts

- The underlying concepts or vocabulary provided in the system may influence ease of learning/use
- Variables related to the concepts include
  - Concrete versus abstract concepts
    - Concrete concepts are easier to learn and recall than abstract ones
  - Personalized versus nonpersonalized concepts
    - Familiar personalized concepts are easier to learn and recall than nonpersonalized ones
  - Animate versus inanimate concepts
    - Infants and very young children are more apt to recognize and respond to animate (people, animals, characters) than inanimate concepts

Representation of concepts

- The representations used for these concepts may also influence ease of learning and use
- Variables related to representations include
  - Conceptualization underlying the representation
    - What is the idea underlying the representation or depiction?
  - Actual realization of this conceptualization
    - How is the symbol drawn?

Conceptualizations underlying the representations

- Individuals may think about language concepts in ways that differ significantly from the way they are depicted in traditional AAC symbol sets
  - Developmental differences
  - Cultural differences
  - Differences related to disability/experience

Realization of the conceptualization

- The actual symbol used of the concept will also affect learning and use
  - How is the representation drawn / realized?
- Different realizations may impact
  - Appeal
  - Interest
  - Understanding of meaning, etc.

Research on Representation

Summary of results
Children's representations

- Children's drawings differed significantly from the representations used in traditional AAC symbol sets
- Children's drawings/descriptions reflected similar features across concepts and across cultural groups
  - drew complete people or objects
    - seldom drew isolated parts of objects or people
  - often drew a complete scene or event
    - even though such scenes were more difficult to draw
  - drew familiar items or people from their experiences
  - did not rely on abstract symbols
    - Marks indicating movement, question marks, etc.

Young children

- Young children do not initially understand traditional AAC symbols used to represent early emerging abstract language concepts
- This lack of understanding
  - Slows down rate of language learning
  - Adds additional extraneous instructional demands
    - Teach language concept
    - AND teach representation / symbol

Organization of the concepts

- The underlying groupings of concepts may also influence learning and use
  - Groupings across pages
  - Groupings within pages
- Variables related to organization include
  - Size of groupings
  - Type of groupings

Organization

- Taxonomic
  - Grouped by hierarchical categories e.g., food, places
  - e.g., pizza and hot dogs
- Schematic
  - Grouped by event contexts e.g., playing outside
  - e.g., more and juice
- Alphabetic
  - Grouped in alphabetical order
- Idiosyncratic
  - Unique to the individual

Research on Organization

Organization

- Question
  - How do children organize language concepts?
- 4 and 5 year olds were asked to organize 40+ AAC symbols on pages

Results

- The children organized the items in pairs or small groups (2-3 concepts together)
- They did not use "page" level organizations
- They used schematic organizations the majority of the time >80%
- They used taxonomic organizations infrequently <5%

Results

- Some groupings:
  - Cow and night night
  - Shoes and school
  - Coat and cold
  - Cup and cold
  - Hot dogs and dad

Organization of the concepts

- Young children may group concepts in different ways than adults do
  - Size of groupings
    - Children only grouped 2-3 concepts together
      - They did not consider larger groupings
  - Type of groupings
    - Children are more apt to group items schematically
- Individuals using AAC may find it easier to learn / use systems that reflect their own organization

Presentation of concepts

- The physical presentations of the concepts may also influence ease of learning and use
- Variables related to presentation include
  - Permanence
    - Fixed versus dynamic displays
  - Layout
    - Visual scene displays versus traditional grid displays
  - Coherence
    - Unified versus fragmented / segmented display

Research on Layout

Traditional AAC displays

- Each language concept is represented by separate AAC symbols in "boxes" organized in rows and columns
- Language is taken out of context
- Symbols often rely on semantic memory
- Each representation must be processed separately, understood, and then integrated

## Alternative approach to AAC displays: Visual scene displays

- Vocabulary embedded under "hot spots" in integrated visual scene
- Language is presented in meaningful context
- Scene is processed as a whole unit
- Meaning is derived from the entire scene

Research on layout of AAC displays

- Series of studies to investigate the effects of different layouts
  - Grid displays
  - Visual scene displays
- Investigate performance of children across various developmental stages
  - Infants (9-12 months old)
  - Toddlers (2 ½ years old)
  - Preschoolers (4 & 5 year olds)

Presentation of concepts

- Variables related to presentation also include
  - Number of symbols presented
  - Size of symbols
  - Spacing between symbols
  - Location of symbols
    - Centrality
 - Symmetry of presentation
  - Color

Revisiting the Model
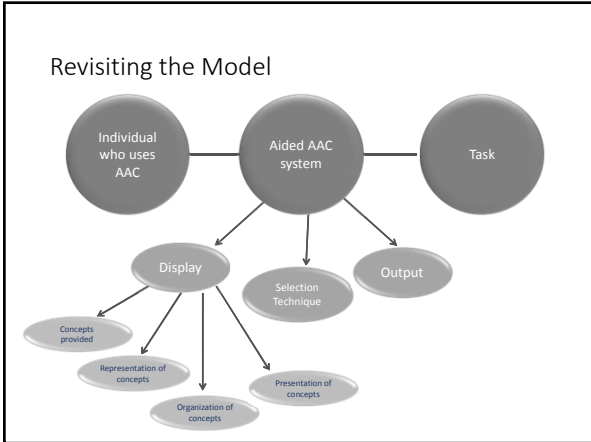
Application of the Model

Visual Scene Displays

Research on the effect of type of display

- Infant study (Wilkinson & Light)
  - 4 different contexts familiar to infants
    - Feeding, bathing, playing ball, etc
  - Infants viewed pairs of displays for each context
    - E.g., PCS grid vs. photo VSD
    - Position & order counterbalanced
  - Eye tracking technology
    - Measure visual attention / interest

Type of display affects visual attention of infants

- Infants looked first & longest at photo VSD compared to PCS grid
- Infants at "first words" stage demonstrated strong preference for photo VSDs

Mean length of viewing, VSD vs grid
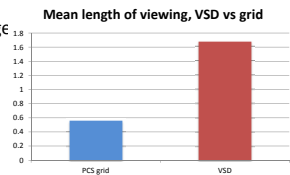
Research on the effect of type of display

- Studies with toddlers and preschoolers
  - 2 ½ year olds
    - Drager, Light, Curran-Speltz, Fallon, & Jeffries, 2003
  - 4 & 5 year olds
    - Light, Drager, McCarthy, Mellott, Parrish, Parsons, Rhoads, Ward, & Welliver, 2004
- Methods
  - Children asked to locate vocabulary using different types of displays & to use displays communicatively
    - VSDs
    - Traditional grid organized schematically (by event)
    - Traditional grid organized taxonomically (by category)

What does research tell us?

- Toddlers were more accurate locating vocabulary using VSDs than grid displays (Drager, Light, et al., 2003)
- 4 & 5 year olds performed with similar accuracy locating vocabulary using VSDs or grid displays (Light, et al., 2004)


What does research tell us?

- 4 & 5 year olds performed much more accurately with VSDs or grids than with iconic encoding (Light, et al., 2004)
- With appropriate intervention, preschoolers with complex communication needs can acquire basic literacy skills

Results /implications for designing AAC displays for young children

- Results suggest that VSDs may be better suited than grid displays for
  - Infants
  - Toddlers
  - Younger preschoolers
  - Other beginning communicators (under age 4 - 5 developmentally)
- Compared to traditional grid displays, VSDs
  - Attract more visual attention
  - Result in more accurate performance
  - May support more rapid word learning

Revisiting the Model
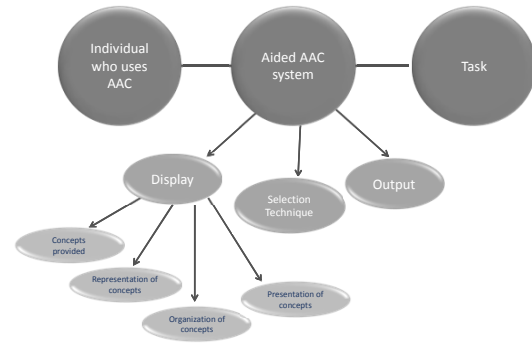
Concepts

- The underlying concepts or vocabulary provided in the system may influence ease of learning / use
  - Concrete versus abstract concepts
  - Personalized versus nonpersonalized concepts
  - Animate versus inanimate concepts
- VSDs represent familiar and personalized events and activities, maximizing meaningfulness of representations
- Language concepts are presented in familiar context, providing support for understanding and learning
- VSDs can provide motivating and interesting contexts

Representation of concepts

- Variables related to representations include
  - Conceptualization underlying the representation
  - Actual realization of this conceptualization (symbol)
- In VSDs, concepts are related visually and conceptually as in life
- Symbols derive meaning from both:
  - The specific representation
  - The relation of the symbol within the scene

Organization

- Variables related to organization include
  - Size of groupings
  - Type of groupings
- Type of groupings may include:
  - Schematic
  - Taxonomic
  - Alphabetical
  - Idiosyncratic, etc.

Presentation

- Variables related to presentation include
  - Permanence
  - Layout
  - Coherence
  - Number of symbols presented
  - Size of symbols
  - Spacing between symbols
  - Location of symbols
  - Symmetry of the presentation
  - Color
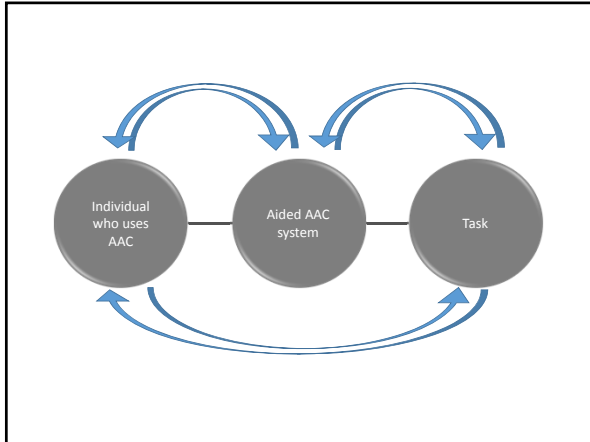
Effective Instruction

Effective Instruction

- In addition to enhancing the appeal and decreasing learning demands for young children, we must also pay particular attention to the instruction and/or the support provided to the child during the learning and use of AAC technologies.

AAC Intervention for Young Children Should…

- Focus on sustained social interaction
- Consider the design of AAC to better meet young child's needs and skills
- Provide an environment that supports social interaction and communication

AAC Intervention

- Step 1: Identifying contexts for communication
- Step 2: Providing effective means to communicate
- Step 3: Ensuring appropriate vocabulary
- Step 4: Setting up the environment
- Step 5: Using strategies to support communication

http://aackids.psu.edu

Step 1: Identifying contexts for communication

Traditional Interventions

- Traditionally, AAC interventions with children have focused on needs and wants communication (e.g., snack)
  - Emerge at an early developmental stage, well before "first words"
  - The consequences are usually obvious and reinforcing (e.g., getting the desired item or removal of the undesirable item).
  - Gives the child some control over his/her environment

Traditional Interventions

- Although children typically learn to ask for cookies or juice successfully, they often have difficulty communicating beyond these simple requests
- When intervention focuses primarily on snacks (and other needs and wants), the focus is on the preferred item (the food), not on the social interaction
  - Once the children receive the preferred item, the interaction usually ends
  - As a result, the children have few opportunities to learn to participate in social interactions

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Traditional Interventions

- Also, simple needs and wants routines typically include representations of inanimate objects
- These may not be very interesting to young children

AAC Intervention

- Start instead by teaching children to participate in social interactions
- Children are naturally drawn to social interactions with other people
  - Interactions to establish and develop social bonds emerge early on; infants communicate to connect with their caregivers and to direct their caregiver's attention to themselves well before their "first words"
- Social games and activities will give the child many opportunities to learn communication skills

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Step 1: Identifying contexts for communication

- What types of contexts are appropriate?
- Choose contexts or situations that
  - Are motivating for the child
  - Provide lots of opportunities for social interaction and occur frequently
  - Are appropriate to the child's development
  - Are fun!

Infants

- Infants benefit most from social contexts that involve only the child and the parent (or other partner)
  - peek-a-boo games
  - tickling games
  - "raspberries"
  - smiling games
  - bye bye games
  - looking at pictures

Preschoolers

- Preschoolers benefit from social contexts that involve imaginative play with a partner
  - building blocks
  - playing cars or trucks
  - playing with dolls, stuffed animals or action figures

Preschoolers

- Preschoolers will also enjoy
  - reading story books
  - singing songs
  - playing simple games like Go Fish and Candy Land

Older Children

- If the child is older, but is at the early stages of development, adapt activities so that they are age appropriate as well as developmentally appropriate
- High five games
- Sing current songs or folk songs
- Look at sports or cooking magazines
- Cooking activities
- Crafts

Pointers

- Start by selecting the contexts that are of greatest interest to the child
- Start intervention in these contexts
- As you become comfortable with the intervention gradually add more and more contexts for intervention
- This will allow many more opportunities to learn language and communication skills

Step 2:
Providing effective means to communicate

Select appropriate means for the child to communicate

- Children learn best when they are active participants in interactions
- It is important to ensure that the child has effective ways to communicate

Types of AAC

- AAC involves the use of many different means to communicate, including
  - Speech or speech approximations
  - Gestures
  - Signs
  - Communication boards with pictures
  - Picture Exchange Communication System (PECS)
  - Electronic speech generating devices or computers
- In our intervention, most children use multiple means to communicate

Will AAC Inhibit Speech Development?

- AAC does not inhibit speech development
- Research demonstrates that using AAC does NOT stop children from learning to talk
  - Millar, Light, & Schlosser (2006)
- In fact, the overwhelming majority of participants demonstrate gains in speech after AAC is introduced

Step 3:
Ensuring appropriate vocabulary

Select appropriate vocabulary

- For each context chosen for intervention, select appropriate vocabulary (words, sentences, or sound effects) to expand the child's communication
- A questionnaire that may help to choose vocabulary:

Fallon, K.A., Light, J.C., & Kramer Paige, T. (2001). Enhancing vocabulary selection for preschoolers who require augmentative and alternative communication (AAC). *American Journal of Speech-Language Pathology, 10,* 81-94.

What type of vocabulary is appropriate?

- Choose vocabulary that is
  - Motivating and fun
  - Functional and developmentally appropriate
  - Appropriate to the child's culture and personality

Introduce vocabulary to the child

- Children with special needs require lots of opportunities to see and hear parents, teachers, and others using new vocabulary in meaningful situations in their daily lives
  - When you play with the child, frequently use the new vocabulary selected
  - Say the words and sign them, or
  - Say the words and show the representations on a communication board or book, or
  - Say the words and select the representations on the computer or SGD

Introducing new vocabulary

- As children develop, they learn new vocabulary rapidly
  - They may learn as many as 5 new words a day
- Children with special needs can only learn new words if parents, teachers, and others introduce new vocabulary regularly as they play and interact each day

Step 4:
Setting Up The Environment

Step 4: Setting up the environment

- There are three things to remember when you set up the environment
  - position the child to maximize vision, hearing, and motor skills
  - position yourself to maximize interaction
  - incorporate AAC appropriately

Positioning

- In order to communicate and learn language, the child needs to learn to attend to his or her partner.
- It is difficult for some children with special needs to learn to shift their attention between his or her partner and the ongoing activity (joint attention)
  - You can help the child learn joint attention by
    - Sit directly in front of him or her
    - Position the interventionist at his or her eye level
    - Holding activities and materials in front of the interventionist in the child's line of sight
    - Use lots of expression and intonation in your voice

Step 5:
Using Strategies to Support Communication

Step 5: Using Strategies to Support Communication

- As you play and interact with the child, there are some strategies that you can use to help him or her learn to communicate.
- The research suggests that these strategies help young children with special needs learn to communicate, especially those with complex communication needs
- When you play and interact with the child
  - Use AAC as you talk
  - Wait and allow the child the opportunity to communicate
  - Respond to the child's attempts to communicate
  - Have fun!

Research Results

AAC Intervention Research

- Children with significant communication disabilities
  - cerebral palsy, Down syndrome, etc
  - 8-40 months old upon referral
- Children with autism
  - 39-66 months old upon referral
- Adolescents with developmental disabilities
  - Ages 11-20
- Adults with developmental disabilities
  - Ages 37-52

- This early AAC intervention was evaluated through a research study funded by the National Institute on Disability and Rehabilitation Research (NIDRR) as part of the Rehabilitation Research Center on Communication Enhancement (The AAC-RERC) Grants #H133E980026 and #H133E030018
- http://www.aac-rerc.com

Participants

- Participants included individuals of various ages
  - Infants, Toddlers, Preschoolers
  - Adolescents
  - Adults
- Participants included a wide range of special needs
  - Cerebral palsy
  - Down syndrome
  - Other developmental disabilities

Participants

- All of the participants had complex communication needs
- They communicated using many different means
  - Speech and speech approximations
  - Signs and gestures
  - Communication boards with pictures
  - PECS (Picture Exchange Communication System)
  - Speech generating devices / computers

Intervention

- Intervention followed the procedures described today
- With each of the participants, we
  - Identified meaningful contexts for communication and social interaction
  - Ensured access to effective means to communicate
  - Ensured appropriate vocabulary
  - Set up the environment to support communication
  - Used strategies to support the children's communication

Goals of Intervention

- Intervention was guided by a developmental model
- Goals of intervention
  - Increase active participation in social interactions
    - Increase turn taking
    - Ensure breadth of communicative functions
  - Develop a wide range of semantic concepts
  - Build greater complexity of language structures
  - Build phonological awareness skills

Intervention

- We conducted intervention
  - in one on one sessions
  - in the home with the family or in school with the teacher
  - Usually once per week for approximately 30-60 minutes per session

Examples

Infants, Toddlers, Preschoolers, and Older Individuals

VSDs for Infants

- Represent familiar social interactions that
  - are motivating & appropriate for infants
  - do not require attention to other objects (just the adult, infant & system)
    - E.g., Social games
      - peekaboo, bye bye routines
    - Shared reading with simple books
    - Singing simple songs line by line

VSDs for Infants

- Include people /characters
  - Big eyes / animated facial expression
- Include bright colors
- Include only a few vocabulary concepts
- Include large hotspots
  - Typically not yet pointing with index finger
- Use engaging voice output
  - lots of expression /sound effects

VSDs for Toddlers

- Represent familiar social interactions that
  - are motivating and appropriate for toddlers
  - may include attention to other objects /toys as well as social interaction
    - e.g., Play activities
      - Blocks, bubbles, playdoh, dolls, tickling
    - Shared reading
      - e.g., picture books
    - Singing action songs line by line

VSDs for Toddlers

- Include people /characters
  - Big eyes / animated facial expression
- Include bright colors
- Gradually increase range & number of vocabulary concepts
- Gradually increase number of hotspots
  - Decrease size of hotspots
- Use engaging voice output
  - Lots of expression /sound effects

VSDs for Preschoolers

- Preschoolers benefit from social contexts that involve imaginative play with a partner.
  - building blocks
  - playing cars or trucks
  - pretending with dolls, stuffed animals or action figures
- They also enjoy:
  - reading story books
  - singing songs, especially those with actions
  - playing simple games
  - learning preschool concepts such as shapes, colors, categories, numbers, letter sounds, etc.

VSDs for Preschoolers

- As children grow, they will learn to use grid displays and other types of displays as well as VSDs

Advancing Skills

- Begin addressing literacy at an early age
  - Literacy will be among the most powerful skills individuals who require AAC can develop
- http://aacliteracy.psu.edu

Low-Tech VSDs

- To date, information on the use of VSDs with young children has been limited to presenting these on computerized or high-tech systems.
- However, there are advantageous to implementing VSDs via non-computerized low-tech means.
  - - Can be used in communities where access to computers and high-tech devices are not easily available
  - - Can be a way of "trying out" AAC
  - - Can be incorporated in environments where a computer is not ideal such as in a swimming pool or a sand box
  - - Can incorporate motion by moving hotspots

Low-Tech VSDs + Aided Modeling

- VSDs are just a tool that provides contextual support; the success of the interaction truly depends on the interaction between a child and his or her partner.
- An intervention package combining low-tech VSDs and aided modeling may be effective for young children with complex communication needs.

Aided Modeling

- Modeling language is considered essential for language development.
- Typically developing children receive many verbal language models from their communication partners, children who use AAC receive much fewer AAC language models.
- This creates a language asymmetry between the input and output (Smith & Grove, 2003).
- Aided modeling refers to the use of natural speech while pointing to and labeling symbols on the individual's AAC system (Dada & Alant, 2009).

Current Study

- A recent study investigated implementing an intervention combining low-tech VSDs and aided AAC modeling with young children who have complex communication needs.
    - - Are Low-Tech VSDs and aided modeling effective in increasing the number of communication turns taken by young children with complex communication needs?
    - - Are Low-Tech VSDs and aided modeling effective in increasing the number of unique semantic concepts expressed by young children with complex communication needs?

Method

- A single-subject multiple probe across participants design was used.
- The independent variable was an intervention combining low-tech VSDs and aided modeling provided during naturalistic, social communication situations.
- The dependent variables were the number of communication turns taken and the number of unique semantic concepts expressed by young children with complex communication needs.

Participants

	Participants		Language Scores		
Name	Age, Sex	Disability	Communication Matrix Level	CDI Expressive	Communication Modes
Anna	4;10 F	Autism Spectrum Disorder	Level III	8	Signs and pictures.
Julia	4;8 F	Idic-15 Syndrome	Level III	1	Signs and pictures.
Barry	2;1 M	Developmental Delay	Level IV	10	Words, signs and pictures.

Setting & Materials

- All sessions took place at the children's preschools or day care centers.
- Play activities and songs served as the social communicative contexts during which interaction occurred.
- Each play activity or song was represented by a six-symbol PCS grid during baseline; or by VSDs during intervention.
- Each visual scene had between one to six hotspots embedded within the scene.

Procedures

- Sessions: All sessions were videotaped and lasted between 10-15 minutes long and took place twice per week.
- Baseline: Six-symbol PCS grids were placed in close proximity to the participants. No aided modeling was provided.
- Intervention: A binder with low-tech VSDs and aided modeling were provided. The grids used during baseline were present as well.

Research Questions

- Are Low-Tech VSDs and aided modeling effective in increasing the number of communication turns taken by young children with complex communication needs?
- Are Low-Tech VSDs and aided modeling effective in increasing the number of unique semantic concepts expressed by young children with complex communication needs?
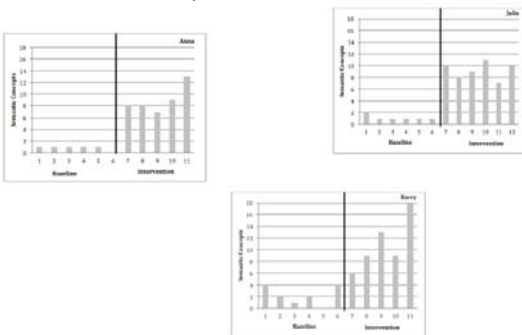
Communication Turns
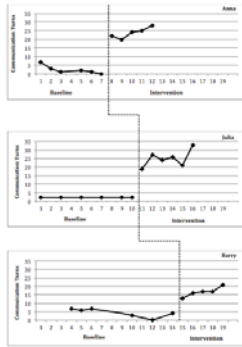
Research Questions

- Are Low-Tech VSDs and aided modeling effective in increasing the number of communication turns taken by young children with complex communication needs?
- Are Low-Tech VSDs and aided modeling effective in increasing the number of unique semantic concepts expressed by young children with complex communication needs?

Semantic Concepts

Discussion

- All three participants demonstrated significant increases in the number of communication turns taken and the number of unique semantic concepts expressed following the intervention.
- The low-tech VSDs used were consistent with young children's schematic organization of language, minimizing the time and resources needed to learn to use them to communicate.
- The children appeared to enjoy seeing themselves and their communication partners in the scenes increasing their motivation and interest to look and touch the VSDs.

Discussion (cont.)

- Low-tech VSDs may help scaffold learning of new vocabulary concepts within a familiar context as it facilitates engaging episodic memory.
- Having low-tech VSDs with moveable hotspots incorporated an additional cue of motion.
- Aided modeling may have facilitated the participants' comprehension and production of increased semantic concepts.
- For AAC interventions to be maximally effective it is not enough for children to just have access to appropriate AAC systems, but they also require appropriate instruction.

Clinical Implications

- This study demonstrated positive results for three young children who had differing diagnoses and who were mainly at a pre-symbolic level of communication.
- This intervention is a low-cost option for low-resource communities that may not have access to high technology or computers.
- These low-tech VSDs can be developed easily and incorporated into social communication contexts by speech language pathologists, teachers and parents.

VSDs for older children, adolescents, and adults with developmental disabilities

- Adapt activities so that they are age appropriate as well as developmentally appropriate.
  - High five games
  - Sing current or folk songs
  - Geographic, sports, or cooking magazines
  - Play simple charades and guessing game routines
  - Choose cooking activities to promote concept development (such as, sequencing, counting, shapes, colors, opposites, etc.)
  - Represent events that the individual participates in (e.g., sporting events)

VSDs for older children, adolescents, and adults with developmental disabilities

- Incorporate motivating content and engaging output
  - E.g., music – variety of types/styles, reflect the preferences of the individual
- Make it visually interesting
  - Using colorful pictures
  - Pictures of high interest

Summary of results

- All participants demonstrated significant increases in their rate of turn taking
  - All sustain interactions with others for significantly longer
- All participate in interactions that involve
  - Social routines
  - Play activities
  - Not just expression of needs and wants

- Participants use their AAC systems independently for play & learning as well
- Children use their systems as contexts to interact with peers
  - Shared books
  - Shared singing
  - Play
- All participants have demonstrated significant increases in their expressive vocabularies
- All participants have acquired a range of semantic concepts

- Some participants are combining concepts to communicate more complex meanings
- All participants have been able to use VSDs on initial introduction once use is modeled
  - seem to be more interested and motivated when scene displays are used to integrate AAC and play, book reading, music
- Many have learned to use other displays
  - Hybrid displays
  - Grid displays

- All children and adults started with facilitator scaffolding support to find appropriate pages in aided systems
  - They have learned some navigational tools
    - Menu
    - Forward and back arrows to change pages
  - Some participants navigate independently
- Some children are developing phonological awareness and literacy skills

Adolescents and Adults

- All participants
  - Demonstrated an increase in their rates of participation in interactions
  - Demonstrated significant increases in the number of concepts they were able to express once provided access to these words and ideas during intervention

Conclusions

- These outcomes will only be realized with:
  - AAC systems that are appropriately designed for beginning communicators
  - AAC intervention that is developmentally appropriate
  - AAC intervention that starts as early as possible

- AAC interventions can improve outcomes for young children with complex communication needs
  - Develop functional communication skills
  - Reduce challenging behaviors
  - Enhance language development
  - Promote cognitive /conceptual development
  - Provide the foundations for literacy development
  - Improve social participation
  - Enhance overall quality of life
  - Have fun!

Acknowledgements

NIDRR

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SPREAD THE WORD