Assistive Technology and Strategies for Promoting Literacy with Students who have Physical Disabilities

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Session Description

• The purpose of this presentation is to provide teachers and related service personnel with ideas for using low- to high-tech assistive technology to enhance literacy instruction for students with physical disabilities. Issues impeding the use of assistive technology with these students (e.g., different background experiences, concomitant disabilities, cultural factors) and potential solutions will be addressed. Emphasis will be placed on assistive technology devices for access as well as incorporating technology with specific strategies (e.g., the Nonverbal Reading Approach) to teach specific reading or writing skills or increase achievement in these areas. Additionally, participants will receive information about resources available to guide them in the process of selecting and using assistive technology devices for students with physical disabilities.
Agenda

• Introduction
• AT Curriculum Access Checklist
• Issues and Strategies for AT Implementation
• AT Across Curriculum Areas (except communication – last)
• AT for Reading
• AT for Writing
• Augmentative Communication Devices for Literacy Access + Specialized Strategy for Students with Physical Disabilities and Complex Communication Needs
Sources of ideas for this presentation:

- Website: Georgia Bureau for Students with Physical and Health Impairments [http://education.gsu.edu/PhysicalDis](http://education.gsu.edu/PhysicalDis)

- Coleman (in press). Successful implementation of assistive technology to promote access to curriculum and instruction for students with physical disabilities. *Physical Disabilities: Education and Related Services.*

- Assistive Technology Checklist: Curriculum Access (Available at:
  - [http://web.utk.edu/~mbc/](http://web.utk.edu/~mbc/)
Barriers to Literacy

1. Type of physical disability
2. Motor limitation
3. Restricted communication
4. Health factors, fatigue & endurance
5. Experiential deficits & differences in concept development
6. Interaction of additional disabilities
7. Psychosocial & environmental factors
Stumbo, Martin, and Hedrick (2009) found, for individuals with physical disabilities, that “appropriately chosen and implemented assistive technology” (p.108) is crucial for increasing the level of participation in education, employment, and independent living to levels similar to peers without disabilities.
Issues with AT Implementation

• 2/3 of AT devices are abandoned within the first year after purchase! (Bryant & Bryant, 2002).

• AT abandonment for students with physical disabilities:

• Reasons
  • Inadequate assessment
  • Inadequate training
  • Inconsistent use
  • Lack of ongoing support and data collection
  • Attitudes toward technology
  • Device takes too much effort and time
Checklists for Guidance...

• http://education.gsu.edu/PhysicalDis/mono.html

• Classroom Adaptations Checklist

• Literacy Profile

• Curriculum Access Checklist
Assistive Technology Checklist: Curriculum Access for Students with Physical Disabilities

- Designed to guide you through considering assistive technology services, needs, and devices to facilitate access to academic curricula for students with physical disabilities.

- SECTIONS
  - Services & Needs
  - Assistive technology devices for access across curriculum areas
  - Assistive technology for specific curriculum areas.
- Not an exhaustive list, but may be a place to start.
Assistive Technology Services / Needs to Address

Assessment
- AT Framework (e.g., SETT Framework) completed. Notes: ________________________________
- Formal assessment of AT needs (optional) completed. Notes: ________________________________
- Trials with device(s) completed. Notes: ________________________________

Training
- All school personnel who will interact with the student’s device have received training on device operation and programming. Personnel who are trained: ________________________________
- All school personnel who will interact with the student’s device have received training on ways to incorporate the device into the student’s daily activities. Notes: ________________________________
- Student has been trained to use the device including rationale for use and basic device maintenance. Notes: ________________________________
- Student’s family members have been trained to use the device. Notes: ________________________________

Implementation
- Devices that may increase curriculum access or skills in the student’s next environment have been considered: ________________________________
- Ongoing data are being collected to ensure that the device is meeting the student’s needs. Types of data/nodes: ________________________________
- Device training occurred before implementation or consideration is made for academic work completed with the device. Additional training needs: ________________________________
- Device is being used consistently. If not, strategies for increasing consistent use: ________________________________

Psychosocial, Cultural and Environmental Factors
- Attitudes toward technology for student, family, and personnel have been considered. Strategies to address attitudes: ________________________________
- Student’s family has been included in AT process and cultural values have been considered. Notes and strategies: ________________________________
- Attempts to reduce stigma of device have been made (e.g., peer training, peer helpers). Notes: ________________________________
- Environmental factors such as space, electrical outlets, and portability across settings have been addressed. ________________________________
- Student’s motivation to use the device has been addressed. Reinforcers and reinforcement schedule are in place (including plan to fade reinforcement): ________________________________
- The amount of physical, cognitive, linguistic effort and time needed to use the device has been considered. Strategies for decreasing effort and time: (e.g., additional training, strength building through practice) ________________________________
Issues in Assessment & Training

• Assessment
  • Thorough, formal assessment with ongoing data collection is vital

• Training
  • Student
    • If possible, train the student on her device prior to having her use it to complete academic tasks.
    • Use of a new device does not have to be “all or nothing.”
    • During the process of device implementation, it is important that the student’s teachers recognize that performance may not represent the student’s best work due to additional demands of learning the device.
Cultural & Social factors

• Cultural factors
  • Not all cultures view independence the same way

• Social factors
  • Some students will not use a device in general education because of the impact on self-esteem or peer relationships
    • Increase the acceptability of device by
      • Decreasing the stigma of the device by introducing the device to all students in the classroom and letting them explore and understand its purpose.
      • Assigning peer helpers who are trained in the use of the device
      • Allowing the student to learn the use of the device in a separate environment in order to become comfortable and proficient with its use prior to using the device in the general education setting.
Baker’s Basic Ergonomic Equation

- Developed in light of computer-human interactions (Baker, 1986); modified by King (1999) to fit AT

\[
\text{Motivation of AT user to pursue and complete a task} = \text{Successful or unsuccessful AT use} \\
\text{Physical effort + Cognitive effort + Linguistic effort + Time load}
\]

Increase motivation by...
- Providing rationale
- R+
- Shaping
Specific AT Solutions for Students with Physical Disabilities
AT Across Curriculum Areas

- **Physical Support (No Tech & Low Tech Solutions)**
  - Changes to position of desk or materials (e.g., higher desk, materials positioned to student’s dominant side).
  - Materials placed on a slanted surface.
  - Nonslip material placed under materials for stabilization (e.g., Dycem)
  - Positioning or seating equipment used to promote stabilization during academic work (e.g., roll placed under arms, student positioned in stander or feeder seat used during reading).

- **Vision (Low – High Tech Solutions)**
  - Text enlarged using word processing software or copier
  - Large print materials ordered from an outside source
  - Handheld magnifiers (nonelectronic or lighted)
  - Electronic magnifiers (e.g., Closed Circuit Television)
  - Computer access: accessibility features (e.g., magnifier, larger cursor)
  - Computer access: Screen enlargement software (e.g., ZoomText)
  - Computer access: Screen reading software (e.g., JAWS)
  - Audio text on CD, MP3, or specialized device (e.g., Victor Reader)
  - Braille devices: nonelectronic or electronic
AT to Promote Access to Literacy for Students with Physical Disabilities

- Across Curriculum Areas
  - Computer Access
  - Communication (*Last)
- Reading
- Writing
AT for Computer Access
Computer Access: AT for Physical Access to the Computer

- Student does not need AT to access a computer for academic purposes (skip to next section).
- Student does require AT to access a computer. Possible solutions:
  - Changes to position of monitor and/or keyboard (e.g., lower monitor, keyboard placed on slanted surface).
  - Accessibility features (e.g., Sticky Keys, Filter Keys, mouse cursor slowed down).
  - Low tech devices used to assist with computer access (e.g., handpointers, headpointers, mouthsticks).
  - Adaptive keyboard (e.g., smaller, larger, onscreen).
  - Hand-controlled adaptive input devices (e.g., trackballs, joysticks, trackpads).
  - Head-controlled input device (e.g., SmartNav) or eye tracking input system.
  - Switches with scanning software (e.g., switch with switch interface and ScanBuddy software).
Low Tech Devices for Access

- Adaptive Pointers
  - Hand pointer
  - Mouth stick
  - Head pointer
  - Arm and Wrist Supports
Keyboard Add-ons

• **Keyguards**
  • Useful for less controlled movements or difficulty with finger isolation.
  • Keeps students from hitting multiple keys

• **Moisture Guard**
  • Useful for students with poor oral motor control or for young children

• **Key Labels**
  • Visual clarity (Available in black on white, white on black, caps, lowercase)
  • Tactile information
Alternate Keyboards

- Ergonomic Keyboards
- Alternate Keyboards
  - Reduced Size Keyboards
  - Expanded Keyboards
  - One-Handed Keyboards
  - Chorded Keyboards
- On-screen Keyboards
Mouse Alternatives: **Direct Select**

- **Mouse Alternatives**
  - Trackpoint
  - Trackpad
  - Trackball
  - Joystick
  - Eyegaze or eye-tracking
  - Head-controlled devices
Directed Selection & Scanning

• **Directed selection**: making choices by moving the cursor towards the selection choice in more than one movement
  • Usually not as quick as direct but for some users it may be significantly more accurate.

• **Scanning**: presentation of choices one at a time or in a pattern until the user indicates that the desired choice has been reached.
Onscreen Keyboard Options

- QWERTY
- ABC
- *Split ABC (Head-controlled ME)
- *High Frequency (Scanning)
• Changes to position of monitor and/or keyboard (e.g., lower monitor, keyboard placed on slanted surface).
• Accessibility features (e.g., Sticky Keys, Filter Keys, mouse cursor slowed down)
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• Switches with scanning software (e.g., switch with switch interface and ScanBuddy software)
AT to Promote Access to Reading for Students with Physical Disabilities
### Assistive Technology Devices for Curriculum Access, continued

<table>
<thead>
<tr>
<th>Specific Curriculum Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reading: AT for Access to Reading Curriculum</strong></td>
</tr>
<tr>
<td>□ Student does not need AT to access reading curriculum or reading activities (skip to next section).</td>
</tr>
<tr>
<td>□ Student needs AT to access reading curriculum or reading activities. Possible solutions (check all that apply):</td>
</tr>
<tr>
<td>□ Low tech reading devices (e.g., page fluffers, slant boards, reading guides, Color Line Prompting Strategy)</td>
</tr>
<tr>
<td>□ Auditory access to text on handheld devices (e.g., MP3 player, Victor Reader)</td>
</tr>
<tr>
<td>□ Computerized text for physical access (e.g., PowerPoint book, My Own Bookshelf)</td>
</tr>
<tr>
<td>□ Text-to-speech software (e.g., Kurzweil 3000, Read:OutLoud)</td>
</tr>
<tr>
<td>□ Screen reading software (e.g., Read and Write Gold)</td>
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</tbody>
</table>
Low Tech AT for Reading Access

• Stabilization or positioning of materials
  • Dycem
  • Slant Board

• Magnifiers

• Page Turners (nonelectronic)

• Book Modifications
  • Page Fluffers
  • Other book modifications

• Book Additions
  • Reading Guides/ Typoscope
  • Color Line Prompting Strategy
Low Tech AT for Reading

- Color Line Prompting Strategy

- [http://education.gsu.edu/PhysicalDis/strategies/reading.html](http://education.gsu.edu/PhysicalDis/strategies/reading.html)
Fading to using one color line of every two lines of print:

The boy then turned and saw his friend holding his puppy. He was so happy that his lost puppy was found. Tears began to swell in his eyes. He now knew how much the puppy meant to him and how he would always take good care of him.

Fading the color line:

The boy then turned and saw his friend holding his puppy. He was so happy that his lost puppy was found. Tears began to swell in his

Further fading the color line:

The boy then turned and saw his friend holding his puppy. He was so happy that his lost puppy was found. Tears began to swell in his
Mid/High Tech AT for Reading

- Kindle – physical & visual access, some books speak

- Recorded Text
  - Tape Players
  - CD Players
  - MP3 Players

- Specialized Devices
  - Talking Book Players that require high tech (connect to computer)
    - Victor Reader
    - Classmate Reader
AT for Visual Access to Print

- Video Magnifiers (CCTV)
  - Change Size
  - Change Contrast
  - Use for pictures or objects as well as text
Computerized Visual Access: Screen Enlargement & Speech Output

• Screen Enlargement
  • Built in magnifier
  • ZoomText (also speaks)

• Speech Output
AT for Access to Reading: Computerized Text (etext)

- Computerized Books
  - Commercially available
  - Free sources of text
  - Teacher-made books
    - Classroom Suite or MyOwnBookshelf
    - PowerPoint
PowerPoint Examples

http://web.utk.edu/~mbc/PowerPoint
AT for Reading Comprehension

• Single Word
  • Reading Pen

• Text Readers that highlight text as it is spoken promote learning of word-to-word correspondence
  • Kurzweil 3000
  • Wynn
  • ReadPlease
  • Others (PPT, ebooks)
Computerized Accessible Books for Fluency and Comprehension

- PowerPoint Books
- Living Books, Ukandu, and others (e.g. Dr. Seuss)
- Start-to-Finish Books
- Other options for Etext
  - RFB&D
  - Bookshare
  - Project Gutenberg
Sources of etext

• http://www.rfbd.org/alt/

• http://www.bookshare.org/

• http://www.gutenberg.org/
ReadPlease

- [http://www.readplease.com/](http://www.readplease.com/)

- Reads any text you paste into it. All purpose text-to-speech software. FREE!

  - Copy and paste text from Project Gutenberg into ReadPlease
AT for Writing
<table>
<thead>
<tr>
<th>Writing: AT for Access to Writing Curriculum</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Student does not need AT to access writing curriculum or writing activities (skip to next section).</td>
</tr>
<tr>
<td>□ Student needs AT to access writing curriculum or writing activities. Possible solutions (check all that apply):</td>
</tr>
<tr>
<td>□ Low tech writing devices (e.g., pencil grips, weighted pencils, slant boards)</td>
</tr>
<tr>
<td>□ Portable word processors (e.g., Alphasmart)</td>
</tr>
<tr>
<td>□ Standard word processor in lieu of handwriting (e.g., Microsoft Word) including options such as abbreviation expansion (done with autocorrect feature)</td>
</tr>
<tr>
<td>□ Software to access worksheets (e.g., PDF Annotator, PaperPort)</td>
</tr>
<tr>
<td>□ Talking or symbol word processors to help with writing process (e.g., Write:OutLoud, Symwriter)</td>
</tr>
<tr>
<td>□ Word prediction to reduce keystrokes or to improve spelling and grammar (e.g., Co:Writer)</td>
</tr>
<tr>
<td>□ Graphic organizer software to increase written production (e.g., Inspiration, Draft:Builder)</td>
</tr>
<tr>
<td>□ Speech-to-text software for physical access or to increase written expression (e.g., Dragon Naturally Speaking)</td>
</tr>
</tbody>
</table>
No & Low Tech AT for Handwriting

• **Pencil/Pen Use**
  • Holds pencil/pen in a modified fashion
    • Foot, mouth
    • Headstick, mouthstick
  • Needs particular writing tools (e.g. felt tip)

• Adapted writing tools
  • Weighted, larger grip surface, brace
AT for Handwriting, Cont.

- Adapted paper (larger spacing, darker lines, raised lines)
- Paper stabilization/ Positioning
  - Slant board
  - Clip board

School Fonts
- AbcPrintDottedLined
- AbcPrintLined
AT for Handwriting, Cont.

• Alternatives to handwriting
  • Magnetic words and letters
  • Label makers
  • Letter stencils
  • Letter and name stamps
Low Tech: Eye Gaze for Writing

• Coleman-Martin, M. B., & Heller, K. W. (2004b). Using an eye gaze board with encoding for written expression or communication for students with severe speech and physical impairments. Online article, *Georgia Bureau for Students with Physical and Health Impairments Website*, from

• [http://education.gsu.edu/physicaldis/using_an_eye_gaze_board_with_enc.htm](http://education.gsu.edu/physicaldis/using_an_eye_gaze_board_with_enc.htm)
Mid Tech AT for Writing

• Dictating
  • Tape player
  • Digital recorder
Mid Tech AT for Writing

- Handheld Dictionaries/Spellers
  - Franklin Speller
    - Recognizes approximations
    - Definitions
    - Auditory output
Mid Tech AT for Writing

• Portable Word Processors
  • Access to writing & notetaking
Physical Access to Documents

• PDF Manipulation software
  • Paperport
  • PDF Annotator
Standard Word Processors:

- Features for access
  - Template
  - Auto Correct (Abbreviation Expansion)
  - Find/Replace
  - (Word count)

- Features for written production—
  - Auto Correct
  - Spell and Grammar checks
  - Word Count/Writing Level
  - Dictionary and Thesaurus
  - Grammar Settings
Adaptive Word Processing

- Word Prediction
  - Originally developed to speed word processing for individuals with physical disabilities
  - Mixed findings in research
  - May significantly reduce keystrokes and fatigue
AT for Written Expression

- Graphic Organizers
  - Especially helpful because of difficulties with concept development
AT for Communication: AAC and Literacy
AT for Communication

• Augmentative and Alternative Communication (AAC)

<table>
<thead>
<tr>
<th>Communication: AT for Curriculum Access or Participation in Classroom Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Student does not have communication needs that require AT (skip to next section).</td>
</tr>
<tr>
<td>☐ Student does have communication needs that require AT. Possible solutions (check all that apply):</td>
</tr>
<tr>
<td>☐ No tech solutions such as signing or gestures.</td>
</tr>
<tr>
<td>☐ Low tech communication devices (e.g., picture boards, flip books) or mid tech communication devices (e.g., BigMack, GoTalk) to provide the student with quick access to frequently used words and phrases.</td>
</tr>
<tr>
<td>☐ High tech communication devices (e.g., Dynavox, laptop with Speaking Dynamically Pro software) to meet multiple communication needs.</td>
</tr>
<tr>
<td>☐ Low, middle, or high tech communication device with questions and comments for classroom participation.</td>
</tr>
<tr>
<td>☐ Low, middle or high tech communication device with activity-specific vocabulary and phrases.</td>
</tr>
</tbody>
</table>
Using AAC for Literacy

- Responding to questions
- Participation in literacy activities
- Literacy activities on high tech devices
AT for Literacy: Communication

• FIRST....

• **Reliable Means of Response (RMR)**
  How will student respond? If student has limited verbal abilities, must determine most reliable, consistent means of response.

• Determine by:
  • 1) consistency of response
  • 2) isolated movement
  • 3) least fatiguing
  • 4) ability to see target & touch/access it
  • 5) secondary RMR
AAC: Responding to Instructional Requests

- One choice

  yes

- Choice arrays

  dig  log  dog  doll

  A  B  C

- Multiple responses
AAC: Participating in Literacy Activities

- Single word/phrase
  - Participation: “My turn,” “I want it”
  - Phrase in repetitive book: “…what do you see?…”

- Levels of words/phrases
  - Brown Bear..... “I see a yellow duck...” “I see a red bird...”

- Multiple words/phrases
Reading Strategy for Students with Complex Communication Needs

• Nonverbal Reading Approach
  • Developed by Dr. Kathy Heller at Georgia State University

• Teaches the students a strategy for decoding using internal speech

• Provides a method for assessment of words through diagnostic distractor arrays

• Instructions available on Georgia Bureau for Students with Physical and Health Impairments website.
NRA

• Based on Vygotsky’s principle of inner speech for self-regulation of learning

• Used with any phonics-based program

• Should be combined with multiple types of literacy experiences: reading connected text, spelling, writing

• Research-based
NRA: Components

1) GUIDED PRACTICE
   • Teach student the strategy to decode words using inner speech / modeling of sounds

2) EVALUATION
   • Use diagnostic distractor arrays, error analysis, error correction

3) EXPANSION
   • Word level: Decode, automaticity, sound out larger words
   • Read line of print, check accuracy & comprehension
   • Spell & write target words
Before you begin

- Teach the student to use inner speech
Nonverbal Reading Approach: GUIDED PRACTICE

**Introduction**
Teacher shows word to student and says, “Look at this word. I’ll say the sounds and you say it with me in your head.”

**Say each sound/phoneme**
Teacher shows first sound/phoneme and says, “In your head, say this sound” then models sound aloud. Then repeats with the rest of sounds.

**Blend sounds/phonemes**
Teacher shows student the word and says, “In your head, say the sounds altogether without stopping between sounds” then models blending slowly while pointing to each sound.

**Say sounds/phonemes fast**
Teacher shows student the word and says, “Say the word fast in your head” then models word aloud while pointing quickly across word.

**Additional Instruction**
Teacher provides additional instruction (optional). (Examples: definition of word, picture that accompanies word, location of word on AAC device, word spelling)
Nonverbal Reading Approach: EVALUATION

**Introduction**
Teacher says, "I am going to test you on some words. Sound them out first in your head using the three steps and then I will give you choices." Shows student the word and says, "Sound out this word." (Provide guidance of steps but not model of sounds - optional).

**Provide diagnostic distractor array**
Teacher says, "I'll give you 4 choices. Listen to the choices: [choice 1], [choice 2], [choice 3], [choice 4]. Is it [choice 1]" (waits 2-5 seconds for response). *Teacher must be careful not to cue student for correct choice.

**Record student response**
Teacher records the student's response on the data sheet.

**Respond to student's selection**
If student answered correctly, teacher provides positive reinforcement. If student answered incorrectly, teacher provides guided practice procedure with modeling of sounds.

**Complete error analysis**
Teacher analyzes data after each session to examine error patterns and determine additional instructional needs and possible changes in distractor arrays.

**Student**
Student uses inner speech to say each sound and blend sounds together.

**Student uses reliable means of response to select from the diagnostic distractor array**
If answered correctly, student is guided through the process of using inner speech to read the sounds/word.
Evaluation:
Diagnostic Distractor Array

**Diagnostic Distractor Array Considerations:**

1) Carefully choose a set of words that are similar to the answer

2) Put in sounds/words confused in past after retaught sounds/word

3) Record exact error

4) Analyze errors and correct
Evaluation:
Diagnostic Distractor Array

Examples of poor / good arrays:

Sound out this word: **cat**
I will give you 4 choices. Listen to the choices:

- cat  dog  bird  mouse
- can  call  cat  come
- cat  cot  can  dig
Evaluation:
Diagnostic Distractor Array

WHY IT’S A DIAGNOSTIC DISTRACTER ARRAY:

- Carefully planned out
  - one has different vowel
  - one has different ending
  - one is very different

- Carefully analyze errors
  - If chose “cot” what could that tell you?
  - If chose “can” what could that tell you?
  - If chose “dig” what could that tell you?
<table>
<thead>
<tr>
<th>Words</th>
<th>Distractor Array Oral Choices</th>
<th>Trials:</th>
</tr>
</thead>
<tbody>
<tr>
<td>cat</td>
<td>cot can mat</td>
<td>cot</td>
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<td></td>
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<td>mat</td>
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<td>cot</td>
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<td>can - sat</td>
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<td>dog</td>
<td>dig dot log</td>
<td>dig</td>
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<td>dot - dug</td>
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<td>man</td>
<td>men map fan</td>
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<td>C</td>
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<td></td>
<td>map - mean</td>
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</tbody>
</table>

**Key:** C = Correct

**PERCENT CORRECT:**

0% 0% 33.33%
NRA: Expansion

- Additional Instruction
  - Definitions, onset/rime, working with words
  - Mnemonic to memorize strategy: SAM (Say the sounds, Altogether, Make it fast)
- Sound out larger words (recognizing “chunks”)
- Recognize words without sounding them out
- Read a line & stop at unknown words
- Check for accuracy & comprehension
  - Random word checks
  - Comprehension questions
- Spell & write target words
Using Technology with the NRA

• Evaluation – student response to diagnostic distractor array

• Guided Practice & Independent Practice

• Expansion Activities
Student Responding to the Diagnostic Distractor Array

• One selection response: Student listens to auditory choices and only responds using the device when his/her choice is spoken.
  - Low tech AAC (paper board, eye gaze board): create a board with “Yes” or “That one” along with “I don’t know.”
  - Mid tech AAC (voice output communication aid such as the BigMack or LittleMack): program the device to say, “Yes” or “That one.” (Alternately, student responds to selection with a physical movement and device is programmed with, “I don’t know. I need to sound it out again.”)
  - High tech AAC (dynamic display device such as Dynavox or laptop with Speaking Dynamically Pro): Program two buttons: “Yes” or “That one” and “I don’t know.”

• Multiple selection response: Student listens to auditory choices that are paired with multiple “buttons” for selection
  - Low, Mid, High Tech AAC: Create a board with four buttons: A, B, C, D
Guided & Independent Practice

AAC

- Self-operated auditory prompt for remembering the strategy
  - use a Step-by-Step programmed to speak the steps aloud to the student when he/she is “stuck” on a word
  - program the steps into the student’s dynamic display AAC device (e.g., Dynavox, Speaking Dynamically Pro)
- Program words onto student’s high tech AAC device
Guided & Independent Practice

PowerPoint

• Presentation of words: Teacher-Assisted Instruction
  • Create a PowerPoint presentation with the student’s words (no voice) rather than using flashcards

• Presentation of words: Computer-Assisted Instruction
  • Create a PowerPoint presentation with the student’s words with recorded narration that models the strategy steps and the sounds
PowerPoint: Computer-Assisted Instruction

• Allows for Independent Practice

• Reduces 1:1 Adult Instruction Time

• Coleman-Martin, Heller, Cihak, & Irvine (2005) found that NRA script delivered by PPT was equal to teacher-directed instruction
PowerPoint and the NRA

- PowerPoint presentations constructed to present words
- Presentations set up to match script from NRA
- Different colors used to emphasize letter(s) for sound being heard
Method

• Instruction using the NRA
  • Teacher Instruction Only
  • Teacher + Computer-Assisted Instruction
  • CAI only

• Approximated natural progression of instruction
Teaching Implications

- PPT may be more efficient than teacher-directed instruction
- Provides multiple opportunities to practice words with less teacher time
- Students are able to practice in multiple environments
- Computer-assisted instruction may be more motivating for some students
  - Students with autism spectrum disorders
  - Allows for independent work
Technology: Expansion

- Additional Instruction
  - Create electronic dictionary of words that have been taught
- Sound out larger words (recognizing “chunks”)
  - Program boards on AAC device with common parts of words (prefixes and suffixes, onsets and rimes) for student to practice/refer to
- Read a line & stop at unknown words
  - Program a page on AAC device with steps and a button to ask for help when he/she does not recognize the word
- Check for accuracy & comprehension
  - Use software (SDPro, Kurzweil, Write:OutLoud) for student to read along with story to check himself or herself, have student write/type words he/she did not know
  - Program boards on AAC device or create PowerPoint that checks for comprehension
- Spell & write target words
  - Using computer or onscreen keyboard on AAC device
AAC Reading Activities

• General Reading Page
• Book Activities
• Word Recognition/Decoding
  • Sight words
  • Picture dictionaries
  • Word walls
  • Phonemic awareness
  • Phonics
• Reading Fluency
• Reading Comprehension
AAC Writing Activities

- Spelling/ single word
- Sentence construction
- Passage construction
Sources of ideas for this presentation:

- Website: Georgia Bureau for Students with Physical and Health Impairments [http://education.gsu.edu/PhysicalDis](http://education.gsu.edu/PhysicalDis)

- Coleman (in press). Successful implementation of assistive technology to promote access to curriculum and instruction for students with physical disabilities. *Physical Disabilities: Education and Related Services.*

- Assistive Technology Checklist: Curriculum Access (Available at:
  - [http://web.utk.edu/~mbc/](http://web.utk.edu/~mbc/)
THANK YOU FOR ATTENDING!

If you have questions:

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Resources:
My site: http://web.utk.edu/~mbc

Bureau site: http://education.gsu.edu/PhysicalDis