Supporting Literacy in Individuals with Autism through the use of Assistive Technologies

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Objectives

✓ Gain understanding of common reading barriers for students with ASD

✓ Gain understanding of features of technology that address reading barriers

✓ Gain an understanding of the process for feature matching student needs and technology features
The reading problems of those with autism spectrum disorder may not be obvious initially and may worsen over time.
## Autism Spectrum Disorder Characteristics

<table>
<thead>
<tr>
<th>DSM-5</th>
<th>Federal Definition of Autism</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fixated Interests and Repetitive Behaviors</strong></td>
<td></td>
</tr>
<tr>
<td>a) Stereotyped or repetitive speech, motor movements, or use of objects</td>
<td>• Engagement in repetitive activities and stereotyped movements</td>
</tr>
<tr>
<td></td>
<td>• Disability affecting verbal communication</td>
</tr>
<tr>
<td></td>
<td>• Disability affecting nonverbal communication</td>
</tr>
<tr>
<td></td>
<td>• Disability affecting social interactions</td>
</tr>
<tr>
<td>b) Excessive adherence to routines, ritualized patterns of verbal or nonverbal behavior, or excessive resistance to change</td>
<td>• Resistance to environmental change or change in daily routine</td>
</tr>
<tr>
<td>c) Highly restricted, fixated interests that are abnormal in intensity or focus</td>
<td>• Engagement in repetitive activities</td>
</tr>
<tr>
<td>d) Hyper-or hypo-reactivity to sensory input or unusual interest in sensory aspects of environment</td>
<td>• Unusual responses to sensory experiences</td>
</tr>
</tbody>
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<tr>
<th>DSM-5</th>
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<tr>
<td><strong>Qualitative Impairments in social communication</strong></td>
<td></td>
</tr>
<tr>
<td>a) Deficits in social-emotional reciprocity</td>
<td>• Disability affecting social interactions</td>
</tr>
<tr>
<td></td>
<td>• Disability affecting verbal communication</td>
</tr>
<tr>
<td></td>
<td>• Disability affecting nonverbal communication</td>
</tr>
<tr>
<td>b) Deficits in nonverbal communicative behaviors used for social interaction</td>
<td>• Disability affecting social interactions</td>
</tr>
<tr>
<td></td>
<td>• Disability affecting verbal communication</td>
</tr>
<tr>
<td>c) Deficits in developing and maintaining relationships, appropriate to developmental level</td>
<td>• Disability affecting social interactions</td>
</tr>
</tbody>
</table>
## Socialization and Literacy Impact

Adapted from Iland 2011

<table>
<thead>
<tr>
<th>Area of Developmental Concern</th>
<th>Possible Effect on Literacy and Comprehension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Play skills</td>
<td>Cognitive development, learning and literacy</td>
</tr>
<tr>
<td>Shared enjoyment</td>
<td>Decreased time in shared activities including reading</td>
</tr>
<tr>
<td>Joint attention</td>
<td>Limited attending to reading activities with others</td>
</tr>
<tr>
<td>Imitative play</td>
<td>Practice of roles and actions in real life may impact understanding of those roles and actions in storybooks</td>
</tr>
<tr>
<td>Imaginary play</td>
<td>Understanding of imaginary content in books</td>
</tr>
<tr>
<td>Conversations with adults</td>
<td>Decreased language development</td>
</tr>
<tr>
<td>Social experiences</td>
<td>Limited SE yields limited understanding of vocab and storyline (plot, characters, etc.)</td>
</tr>
<tr>
<td>Social understanding</td>
<td>Difficulty relating to story lines and characters</td>
</tr>
<tr>
<td>Perspective taking</td>
<td>Understanding of characters and interactions</td>
</tr>
</tbody>
</table>

## Communication and Literacy Impact

Adapted from Iland 2011

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<thead>
<tr>
<th>Area of Developmental Concern</th>
<th>Possible Effect on Literacy and Comprehension</th>
</tr>
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<tbody>
<tr>
<td>Language development</td>
<td>Comprehension of word, sentence and text</td>
</tr>
<tr>
<td>Oral language</td>
<td>Spoken language relates to written language</td>
</tr>
<tr>
<td>Recognizing and responding to non-verbal language</td>
<td>Misses context cues and foreshadowing</td>
</tr>
<tr>
<td>Literal interpretation of language</td>
<td>Difficulty with idioms, connotation, multiple meaning words, metaphors, figurative language, hyperbole and personification</td>
</tr>
<tr>
<td>Understanding relationships between words and meaning</td>
<td>Difficulty organizing and categorizing words impacting recall of information</td>
</tr>
<tr>
<td>Interpretative language abilities</td>
<td>Generating inferences, resolving ambiguity, cause and effect, monitoring comprehension</td>
</tr>
<tr>
<td>Difficulties with pronouns</td>
<td>Loss of meaning and confusion of characters</td>
</tr>
<tr>
<td>Difficulty generating questions while reading</td>
<td>Difficulty establishing meaning and relevance</td>
</tr>
<tr>
<td>Listening and understanding oral language</td>
<td>Misses out on content of oral literacy activities</td>
</tr>
</tbody>
</table>
## Restrictive and Repetitive Behavior and Literacy Impact

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<tr>
<th>Area of Developmental Concern</th>
<th>Possible Effect on Literacy and Comprehension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limited general fund of knowledge</td>
<td>Understands less</td>
</tr>
<tr>
<td>Narrow focus of interest/knowledge</td>
<td>Generalization of info may be difficult</td>
</tr>
<tr>
<td>Exposure and then repeated exposure to a narrow range of topics</td>
<td>General reading materials less motivating and interesting, socialization impacted</td>
</tr>
<tr>
<td>Restricted or repetitive play, leisure, or academic activities</td>
<td>World, word and social understanding may result in decreased flexible thinking</td>
</tr>
<tr>
<td>Reading as a restricted and repetitive activity</td>
<td>Isolation results in decreased social understanding and application to materials</td>
</tr>
<tr>
<td>Literal, specific, and concrete understanding</td>
<td>Generalization and imagination may be limited and impact understanding</td>
</tr>
<tr>
<td>Restricted focus</td>
<td>Difficulty with multiple meaning words</td>
</tr>
<tr>
<td>Over-selective attention</td>
<td>Shifting focus or attends to multiple details</td>
</tr>
<tr>
<td>Self stimulatory behaviors</td>
<td>Limits engagement in reading activities</td>
</tr>
</tbody>
</table>

Digital Text
What can you do with digital text?

- Text-to-Speech
- Size
- Spacing
- Alternate Access
- Summarize
- Highlight
- Background
- Color
- Reading Level

Digital text can be found in many places........

- e-mail
- Download it
- WWW (html)
- Create it
- Textbook CDs
- PDFs
Text books published prior to 2006 may not be available

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SETT Framework

- Student
- Environment
- Task (what is the purpose?)
  - Connected to the standards
  - Need identified in the IEP
  - ID of weak skills through formative assessment
- Tool
Kim

- Very happy and social preschooler (4 years old)
- Word reading ability at a 5th grade level (Hyperlexic)
- Vocabulary understanding is below age range
- Generally gross and fine motor manipulation skills appropriate, but some difficulty with coordination and imitation
- Communication skills are delayed with difficulties in using vocabulary appropriately and word ordering
- Recites content of many different TV commercials and shows
- Visual motor skills delayed for prewriting
- ESL but family speaks primarily English
- Special interest is Nascar racing

Environments

- Integrated preschool program in elementary building
- Twelve students (8 students neuro-typically developing, 4 students with special needs), one preschool teacher, one paraprofessional
- Center based activities involving hands-on/experiential learning, kinesthetic, music, sensory, etc.
- Receives speech and language therapy in classroom in small group (2 x’s weekly)
### Tasks

- Ask and answer questions and comments about characters and major events in familiar stories
- Retell or re-enact familiar stories
- Communicate with others about text, listens to others, takes turns talking and stays on topic
- Recognize and read familiar words or environmental print

### Matching Features to Student Needs

<table>
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<tr>
<th>Needs</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ask and answer questions and comments about characters and major</td>
<td>Picture communication supports of relevant vocabulary text to aid in</td>
</tr>
<tr>
<td>events in familiar stories</td>
<td>retelling and connecting words with the vocabulary meaning</td>
</tr>
<tr>
<td>Retell or re-enact familiar stories in appropriate order</td>
<td>Picture communication supports with sequencing features</td>
</tr>
<tr>
<td>Continue vocabulary development</td>
<td>Picture supports for vocabulary development</td>
</tr>
<tr>
<td>Find alternate ways to show what he knows since drawing, writing, &amp;</td>
<td>Manipulatives and/or technology choices</td>
</tr>
<tr>
<td>speaking skills are delayed</td>
<td>Use of Nascar when needed</td>
</tr>
<tr>
<td>May need to capitalize on his special interest when possible to</td>
<td>Social narratives to support appropriate behavior</td>
</tr>
<tr>
<td>foster motivation and engagement</td>
<td></td>
</tr>
<tr>
<td>Communicates with others (e.g., listens to others, takes turns</td>
<td></td>
</tr>
<tr>
<td>talking and speaking about the topic or text being discussed)</td>
<td></td>
</tr>
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Tools for Trial

Picture Supports –Creating

Boardmaker
Mayer-Johnson

Writing with Symbols
Mayer Johnson (Win Only)

Symbolstix
Symbolstix by N2Y
Symbols for book adaption


Picture Supported Digital Books and Supplemental Activities

Power Point Books
http://www.setbc.org/setbc/accessiblebooks/
Tar Heel Reader

http://tarheelreader.org/

Sentence Strips

Speechie Speaking
https://www.youtube.com/watch?v=Xi7tv4LoMGU
Picture Supported Digital Books and Supplemental Activities

Digital Book

Sentence Construction

Clicker

My Turn
Social Narratives-Apps

Jonah

- Third grader in general education setting
- Enjoys electronic media
- Uses iPad at school for recreation and leisure
- Excels in math computation
- Good word recognition and spelling but has difficulty understanding the true meaning of many vocabulary words
- Struggles with sequencing, listening capacity, cause-effect, interpreting, predicting, summarizing and making inferences
- Tends to keep to himself in social situations
Environments

• 3rd grade general education classroom
• 24 students in the class
• Students sit at tables (4 students per table)
• Jonah sits at table next to teacher’s desk
• Attends small group social skills lesson once a week for 30 minutes with SLP/Guidance Counselor

Tasks

• Can share own point of view and identify how it is different from that of the narrator or characters
• Describe the relationship between events, steps and ideas in a text, using time, sequence, and cause/effect language
• Follow conversational rules (i.e. listening to other, taking turns and speaking one at a time)
# Matching Features to Student Needs

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<tr>
<td>Describe the relationship between events, steps and ideas in a text, using time, sequence, and cause/effect language</td>
<td>Graphic organizers</td>
</tr>
<tr>
<td>Can share own point of view and identify how it is different from that of the narrator or characters</td>
<td>Embedded notes and prompts within a story, Highlighting of key points in books</td>
</tr>
<tr>
<td>Understand meaning of vocabulary words in text</td>
<td>Picture/video dictionaries</td>
</tr>
<tr>
<td>Follow conversational rules (i.e. listening to others, taking turns and speaking one at a time)</td>
<td>Video Modeling</td>
</tr>
</tbody>
</table>

## Tools for Trial
Math View
Students use visual math tools to understand essential math concepts.

Writing View
Students expand their ideas into written expression.

Reading/Writing Software

Read&Write GOLD
http://www.texthelp.com/North-America/our-products/readwrite


http://donjohnston.com/solo/#.UvpmuF6prGs
Embedded Notes

Kurzweil 3000

http://youtu.be/6TJlpZKlasQ

Highlighter Feature with Extraction

http://www.youtube.com/watch?v=Hy_OWdFlc20&feature=share&list=PLD2510358B7CFD5A5&index=1
Picture Supported Dictionary

Picture Dictionary-Read Write Gold
http://youtu.be/8Nf0KZEKYYrA

Vocabulary Support

Using Read&Write GOLD's Vocabulary List Builder for New Word Attainment

Vocabulary List Builder
http://www.youtube.com/watch?v=2lq8UjZ506E&list=PL942D07588DD28062&feature=share
UDL Book Builder Editions by CAST

http://bookbuilder.cast.org

GCF Vocabulary Videos

http://www.gcflearnfree.org/
Video Modeling-Apps

My Pictures Talk
Grembe

Jada
- Seventh grader
- Enjoys listening to music and dancing
- Likes animated movies
- Limited verbal language
- Fine motor limitations and no standard keyboard access
- Cognitively delayed
- Behavior and engagement are communication modes
- Auditorily sensitive
- No word recognition
- Hits, screams, bangs head and throws objects when frustrated
Environments

- Resource room for language arts and math
- 12 students, one special education teacher, two paraprofessionals
- Attends social studies, science, all related arts classes in general education setting with shared paraprofessional
- Receives speech and language therapy once a week for 42 minutes in resource room
- Receives occupational therapy once a week for 42 minutes in resource room or related arts class when applicable

Tasks

- Determine the meaning of words and phrases in text
- Compare and contrast a text to other media versions of text content
- Read and comprehend science/technical texts independently and proficiently
### Matching Features to Student Needs

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<tr>
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<tr>
<td>Fine motor support to show what she knows</td>
<td>Alternate access (touch screen vs expanded keyboard)</td>
</tr>
<tr>
<td>Read and comprehend science/technical texts independently and proficiently</td>
<td>Alternate access software that includes the features of embedding video presentation of content, picture supported text, text-to-speech with highlighting, expanded keyboard access, custom layouts/content of supporting activities</td>
</tr>
<tr>
<td>Compare and contrast a text to other media versions of text content</td>
<td>See above features</td>
</tr>
<tr>
<td>Determine the meaning of words and phrases in text</td>
<td>Picture supports of words and content</td>
</tr>
<tr>
<td>Communication supports that are durable due to destructive behaviors, to show what she knows, to comment, request, etc.</td>
<td>AAC, cells, voice output vs. no voice output, d/t auditory sensitivities, picture supports of vocabulary</td>
</tr>
<tr>
<td>Reduce auditory input</td>
<td>Noise cancelling devices (headphones, ear-buds)</td>
</tr>
</tbody>
</table>

### Tools for Trial
Picture Supported Digital Books and Supplemental Activities

Intellitools Classroom Suite and Intellikeys

http://www.intellitools.com/classroom-suite.html

You Tube Video of Biomes

https://www.youtube.com/watch?v=ZouWLVyz9v8
Video: Showing What You know with Symbols and Biome Activity

http://sda.doe.louisiana.gov/ResourceFiles/Literacy/Informal%20Assessment%20Using%20Symbols.wmv

Mid Tech Leveled Communication System with Voice Output
Tech Speak
http://amdi.net

Low Tech Content Specific Communication Board
http://fdlrsregion3curriculumvisuals.wikispaces.com/Biomes
Auditory Sensory Support

Noise Cancelling Headphones
Earbuds and sound choices

Adam

- Junior in high school
- Attends career center
- Prefers working independently
- Interested in how technology works (repair/technician)
- Literal comprehension skills are fairly good
- Detail oriented
- Deficits in working memory, organization skills, sequencing and planning and accessing relevant background knowledge
- Pragmatic skills deficits
- Verbalization skills more advanced than comprehension of vocabulary
Environments

- Attends high school for required language arts and math courses
- Participates in Interactive Technology Program at career center (2 year program)
- “Case manager” connects with Adam weekly at career center

Tasks

- Determine meaning of symbols, words and phrases when used in scientific or technical context
- Organize self, materials and information for school and work
- Answer questions or solve problems using a variety of media or formats
- Respond appropriately to social situations in the work place
## Matching Features to Student Needs

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</thead>
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<tr>
<td>Mobile solutions for school and work environment</td>
<td>Mobile technologies</td>
</tr>
<tr>
<td>Determine meaning of symbols, words and phrases when used in scientific or technical context</td>
<td>Dictionary support, homophones, Confusable words in DJ or RWG</td>
</tr>
<tr>
<td>Organizational skills support</td>
<td>Graphic Organizers</td>
</tr>
<tr>
<td>Answer questions or solve problems using a variety of media or formats</td>
<td>Adapted websearch tools, video chat tools, voice activated electronic personal assistant “tell me the definition of…..”</td>
</tr>
<tr>
<td>Pragmatic skills support</td>
<td>Video modeling</td>
</tr>
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</table>
Full Featured Reading/Writing Software

- Read&Write GOLD

- SOLO

- Kurzweil
  - http://www.kurzweiledu.com/default.html

- Merriam-Webster Dictionary
Electronic File Management Systems
Inspiration and Inspiration Maps

http://www.inspiration.com/

Google Search
Reading Levels
You Tube Tutorials

https://www.youtube.com/watch?v=GHloD6zECsM

Siri
Apple iOS

“Tell me the definition of circuit”

Here’s some information:

Input Interpretation

- circuit definition

Result:
A closed trail is called a circuit when it is specified in cyclic order but no first vertex is explicitly identified.

* WolframAlpha
Virtual Mentoring-Synchronous

https://www.apple.com/ios/facetime/

http://www.skype.com

Virtual Mentoring-Asynchronous/Video Modeling

http://voicethread.com/
Making Final Decisions

✓ Trials of tools
✓ Data collection on relevant variables related to the tasks, environments, and needs
✓ Ongoing progress monitoring

Assessment Tool for Technology Based Reading Accommodations

Access for Learning

Welcome to the National Center on Accessible Educational Materials. This site provides resources for educators, parents, students, publishers, conversion houses, accessible media producers, and others interested in learning more about AEM and implementing AEM and NIMAS.

Learn about Accessible Educational Materials

http://aem.cast.org/navigating/aem-navigator.html#.Vbfg88bFilw

Language and Communication
Restricted Patterns of Behavior, Interests, and Activities
Sensory Differences
Overview of Social Skills Functioning and Programming
Visual Supports
Speech Generating Devices (SGD)

www.autisminternetmodules.org
ASSISTIVE TECHNOLOGY
INTERNET MODULES

Reading Access – WATI – Part 1
Reading Access – WATI – Part 2
Communication – WATI – Part 1
Communication – WATI – Part 2 (coming sooner)
Communication – WATI – Part 3 (coming soon)

www.atinternetmodules