Using Eye Gaze to Communicate When You Have a Visual Impairment

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July 13, 2015
Why talk about Eye Gaze?

• It may be the only access method for students with significant motor issues
• Low tech eye gaze is easy to set up and use quickly
• Newer cameras in high-tech devices are greatly improved and more frequently prescribed
• Communication is a basic right for all people despite the severity of their disabilities
What kind of Eye Gaze systems are there for Communication?

Light Tech with a partner:

• Using objects
• Using several separate symbols together
• Communication systems using a printed Pragmatically Organized Dynamic Dynamic Display (PODD)
What kind of Eye Gaze systems are there for Communication?

High Tech with cameras:

• Computer-based AAC devices

• Tablet & iPad based Eye Gaze devices
Can students who are Visually Impaired use Eye Gaze as an Access Method?

For some VI students... 

YES!
How do I know if my VI student is an Eye Gaze candidate?

• Compare the functionality of all access methods
  – Direct selection
  – Scanning & switches including Partner Assisted Scanning
  – Eye Gaze

• Work as a team, including:
  – Teacher of the Visually Impaired (TVI)
  – Special Ed Teacher & Parents
  – S&L Therapist, AT Specialist, OT & PT
What Functional Vision Skills are needed to successfully use eye gaze?

Look at the most current Functional Vision Skills & Learning Media Assessment - done by the TVI

1. The student MUST be a VISUAL LEARNER

2. Vision must be “good enough” to discriminate and identify 2-dimensional images

3. Visual-motor skills must be steady enough to fixate their eyes on one item for a few seconds
1. The student MUST be a VISUAL LEARNER
What is a Visual Learner?

• The Learning Media Assessment (done by the TVI) evaluates what sensory channel the student primarily uses to learn
  – Visual
  – Tactual
  – Auditory

• Most students have a primary and a secondary Learning Medium

• Students MUST be Visual Learners to use Eye Gaze
2. Vision must be “good enough” to discriminate and identify 2-dimensional images
Evaluate Visual Abilities with 2-D Materials

• Most eye gaze systems use 2-D info (line drawings, photos, or text)

• Some VI students may not be able to process and understand 2-D info (primarily students with Cortical Visual Impairment and a CVI Range score of less than 6)

• VI Students with higher acuity losses may need 2-D images so large that high tech eye gaze is not functional
3. Visual-motor skills must be steady enough to fixate their eyes on one item for a few seconds
Required Visual Motor Skills

• Each time a student uses eye gaze to communicate, they must:
  – Visually scan all items in the array
  – Visually discriminate and identify each image
  – Remember what each image represents
  – Decide which one they want to select
  – Hold their gaze on the item to show their selection

• Light Tech – fixation must be clear enough for a person to read their selection

• High Tech – head control must keep eyes within the camera window
Potential Visual Motor Challenges

• Some students may struggle with high tech eye gaze if they have:
  – Nystagmus (eyes jump around uncontrollably)
  – Unusual posture and head positioning or lots of head movement
  – Difficulty maintaining their gaze in place for a second or two
I think my student who is Visually Impaired might be an eye gaze candidate...

Now what?
Involve the Entire Team

• The TVI, S&L Therapist, and SpEd Teacher need to work closely on:
  – Selecting the right kind of symbols
  – Modifying the visual elements of the system
  – Selecting the language to include

• The TVI, OT and PT need to work closely on:
  – Body positioning & seating
  – Device position & mounting
  – Supports to improve trunk and head control
Start with Light Tech Eye Gaze

• Light tech eye gaze is easier because:
  – The partner can read the student’s gaze better than a camera/computer as long as the array is small (3-6 items)
  – The partner can give auditory feedback about what each item is prior to selecting a message
  – There is less visual fatigue from screen glare
  – The partner can ask for verification of intent with a yes/no
Modify Visual Elements Based on Visual Abilities

• Try several versions of light-tech arrays
• Options that can be modified:
  – Dimension – 1x3, 1x4, 2x2, 3 or 4 across with lower L & R icons
  – Background color (do not use clear/see-through!)
  – Size of symbols and spacing in between
  – Color vs B&W symbols vs High Contrast Symbols
  – Text or no text
Choose the Right Symbols

Boardmaker High Contrast Library

[Images of symbols and objects related to making friends, playing games, and sharing]
Modify the Environment

- Reduce visual complexity behind the device
- Reduce glare from lights and screen
- Reduce visual complexity of the partner’s clothing and jewelry
- For Light Tech - reduce movement of partner holding the display by writing what each icon is on the BACK of the display
Reduce Environmental Complexity
Give the Student Time to Learn

• The student must learn:
  – To discriminate and identify the icons
  – The organizational structure of the system and the location of each item on each page
  – The motor control needed to keep their body in place for a high-tech system

• Time is needed to develop motor memory, keep icons in the same place

• A 1-time trial with a high tech AAC device may not be enough to determine whether it will work for the student
Auditory Feedback and Wait Time

• Video Example – Caroline slow response with feedback
High Tech Eye Gaze Tips

• Modify visual elements of the display based on functional visual skills and needs
• The array will be different than used for Light Tech - consider adding a blank spot for “rest”
• Keep items in the same place
• Do NOT hide items initially and show more over time as an instructional method
• Add a way for the student to ask to rest their eyes
• Improve calibration often – calibration works best in a darker room
High Tech Eye Gaze Example
Implementation Tips

• Model light and high tech systems every time you work with the student
• Show the student the location of vocabulary they may need before a lesson
• Give the student TIME to explore and use their system in a meaningful manner
• Give the student meaningful feedback after they select a message
Positioning and Sensory Experiences Matter

• Visual development is compromised if children do not have:
  – Trunk stability
  – Head and trunk support
  – Limited visual-motor experiences
Sensory and Motor Experiences for Visual Integration

Maximizing vision development in young children with complex bodies and/or multiple challenges
Gross Motor Function Classification Scale (GMFCS)

• Level IV - need trunk support to sit independently
• Level V - need head and trunk support to sit independently
Seating/Positioning for Use of Vision

• Can’t focus vision when head is constantly moving
• Hips/trunk are shifted
• Responses are inconsistent
• She will probably fail
• We must help her find a stable position first!
Seating is like stacking blocks

- There are three main blocks;
- Hips/Pelvis
- Spine
- Head

Each block (body segment) must be stable and lined up with the others to be able to balance the top block, the head.
The bottom block for children with differences in muscle tone (low tone, high tone or fluctuating tone), is not stable or flat. It is tilted and moving. This is what happens when they try to sit up. Gravity pulls them down!
Bottom Block: Hips/Pelvis

• Stabilize the pelvis/hips first
  – Contour seats are best
  – Or fill in spaces to simulate the support
  – Use firm materials

• When hips slide forward, you lose stability
  – sacrum tilts back
  – spine rounds
  – head cannot be balanced

• Heads hanging down and heads tilted all the way back are not stable.
Custom Contour Seat

- Wheelchair version usually lacks the features in the back
- Flat back stabilizes the sacrum
- Curves on the side of the back keep hips from shifting to one side
- This is critical! - Gravity pulls the head and trunk down to one side when hips are shifted
Next Block: Spine

• Support their spine OVER their hips - balance like the block tower
• Support the spine so it can be straight - Use a flat back rest
• Is their back rounded and stiff?
  – Some time on a therapy ball on their back, just before seating for function, can help.
• If it’s rigid, cushion the spine
Top Block: Head

- Bottom blocks must line up perfectly to balance top block (the head)
- Use a flat support behind the head to hold it in line with the spine
- If more head support is needed, it can go on the sides of the head
- If they have that huge headrest on their wheelchair, unzip the cover and put foam inside to provide support to the side or sides of the head
Custom Made Chair for a Child Needing Head Stability
HeadPod

- Alternative to tilting the wheelchair back
- Can attach over the headrest on their wheelchair
- Reasonably priced
- Can be funded through CRS/AHCCCS
Active Position and Resting Position

• We lean forward to interact with something
  – Leaning too far forward can be exhausting
  – Collapsing forward to rest is not optimal for engagement

• We lean back to rest
  – Strapped too far back, child cannot engage

• Teach the child to move between positions
  – Movement, in a small range of motion, can let the child continue an activity longer
Stabilize Child, Stabilize Materials

• In her custom chair, child is no longer leaning back
• Reduce problems with depth perception by consistent placement of materials
• Focus at one distance, reach at one distance
• The same each time!
Toy Frame

• Start with stationary toys
• After successful for a little while, this child will turn her head to look at new things
• Distance vision gradually increases
• Regard of faces improves
• Eventually, she makes eye contact!
Offer New Situations

• Started with custom seating and carefully placed visual targets.
• Now she is stabilized with a stretchy strap around her trunk
• Non-skid pad under her bottom keeps her from sliding
Independent mobility for vision development

• Improve vision for distance by independent mobility
• KidWalk gait trainer (right)
• Switch-operated scooter (video example)
Some Mobility Hints

• Set up as quickly as possible
• Show them how to move
• Back off - give space and time
• Don’t talk
Communication Matters

• Teach yes/no
• Literacy is a right – teach the alphabet!
• Teach letters/symbols through real experiences.
• Provide organized vocabulary
  – Pragmatic (Intent)
  – Core vocabulary
  – Categories (taxonomic)
  – Activity specific (schematic) or Topic-based
Alternative Pencils

• Center for Literacy and Disabilities Studies, Deaf-Blind Model Classroom Resources, Product Available for Purchase

Print Flip Charts

Color-Coded Eye Gaze Frame
Color-Coded Eye Gaze System
Tobii Encoding / Color-Coded
Alphabet Flip Chart
Meet Shannon

- DX: Rhett Syndrome
- Middle School Student
- Began with letters on cards, choice-boards and activity-based vocabulary
- Then used scanning arrays organized by pragmatic intent
- Moved to core vocabulary with category pages
- Added back social element with Tobii pages
Beginning Scanning Arrays

Main Board

quick words  word
wrong  
tell you something
what I think

I want  question  time  categories

X
Eye Gaze to Core Words

45-location

60-location
Supplemental/Category
Video Example – Shannon Skype w Eye Gaze
Tips from Kate about Rhett

- Eyes often work better than hands
- Anxiety is common
- Remember to give breaks
- Communication happens all day long, not just for “Tobii time”
Tips from Judy & Pati

• Prioritize social engagement & literacy
• Includes Light Tech Book to Print and Electronic Files on the CD for Speaking Dynamically, Boardmaker, and Tobii Communicator
• ECO pages available upon request
• Older 12 Location Version
Dynamic Communication Pages

I want to talk.
Let me tell you what I think.
Let me tell you how I am feeling.
Something's wrong.
I want something.
I know.

I want to build a sentence or spell.
I want to ask a question.
I want to talk about my work.
I have some news.
My Activities.
I want to talk about someone.

DOG  CAT  
MOM  DAD
GIRL  BOY  

?  

NEWS  


Activity-Specific
Classroom Talk

- What's next?
- How many?
- I know!
- This is easy.
- I can do it
- I'm bored.
- I don't want to do that.
- I need some help.
- That is too hard.
- I made a mistake.
- That's new!
- I'm finished.

Clear

Back to Main

Go back one page
Core Words

I, he, am, have, my, she, is, had, me, they, are, has, you, we, want, going, love, see, go, can, in, one, on, all, then, some, with, not, a, to, the, at, it, here, and, that.

Sentence Starters 1
Sentence Starters 2
Core Words Pronouns

- I
- my
- me
- he
- she
- we
- you
- they
- Edit page
- It's not here
- BACK TO MAIN

Core Words - Page 1
(Pronouns)
Sentence Starters

I am

I like

I am going to the

I think

I see

It is

I have

I want

It's not here

GO BACK ONE PAGE

BACK TO MAIN

Clear
Spelling
Teach Through Real Experiences

• Instructional strategies must include models and informational feedback so the student learns to refine his/her movements to match communicative intent
• Goals/data should reflect how skills are demonstrated throughout the day
• Use descriptive assessment procedures designed to demonstrate how skills with AAC can improve over time (Communication Matrix, AAC Profile)
Assessments

• AAC Profile
  – Order from www.linguisystems.com
  – Linguistic, Social, Strategic, Operational
  – 5 levels, includes communication partner behaviors

• Communication Matrix
  – Try/register at www.communicationmatrix.org
  – 4 reasons to communicate (refuse, obtain, social, information), 7 levels of competence, 9 categories of communicative behavior
## Communication Skills List

<table>
<thead>
<tr>
<th>Skill</th>
<th>Behavior</th>
<th>Mastery</th>
</tr>
</thead>
<tbody>
<tr>
<td>B4. Attracts Attention Level 2</td>
<td>head movement (moves forward, bobs head)</td>
<td>Emerging</td>
</tr>
<tr>
<td></td>
<td>arm movements (bat arms)</td>
<td>Emerging</td>
</tr>
<tr>
<td></td>
<td>coo, squeal, fuss</td>
<td>Emerging</td>
</tr>
<tr>
<td></td>
<td>smile</td>
<td>Emerging</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>Skill</th>
<th>Behavior</th>
<th>Mastery</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1. Refuses or Rejects Something Level 3</td>
<td>whole body movements (twist, turn away)</td>
<td>Mastered</td>
</tr>
<tr>
<td></td>
<td>head movements (turn head away or to side)</td>
<td>Mastered</td>
</tr>
<tr>
<td></td>
<td>arm or hand movements</td>
<td>Emerging</td>
</tr>
<tr>
<td></td>
<td>scream, whine</td>
<td>Emerging</td>
</tr>
<tr>
<td></td>
<td>frown, grimace</td>
<td>Emerging</td>
</tr>
<tr>
<td></td>
<td>pushes away object or person</td>
<td>Emerging</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>Skill</th>
<th>Behavior</th>
<th>Mastery</th>
</tr>
</thead>
<tbody>
<tr>
<td>C2. Requests More of an Action Level 3</td>
<td>whole body movements (lunge)</td>
<td>Mastered</td>
</tr>
<tr>
<td></td>
<td>arm/hand movements (bat arms)</td>
<td>Emerging</td>
</tr>
<tr>
<td></td>
<td>coo, squeal, laugh</td>
<td>Emerging</td>
</tr>
</tbody>
</table>

- Body Movements
- Early Sounds
- Facial Expressions
- Simple Gestures
- Conventional Gestures
- Concrete Symbols
- Abstract Symbols
Goal-Writing Tips

- http://www.iburkhart.com/Writing IEP Goals 1 hr 5 10.pdf
- http://praacticalaac.org/practical/more-practical-aac-goals-that-matter
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