

Eyes Wide Open: Technology for the Blind and Visually Impaired that Redefines Possibility

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Session Description

This session will provide an overview of technology for the blind and visually impaired, how it works, and using the WCBVI Loan Library to borrow equipment for a student with a visual impairment.

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Session Goals

This session will address the following topics:

- A basic overview of video magnification devices and other assistive technology that can be used to access hard-copy documents, worksheets, and other printed materials
- Use of apps and AI powered technology for the blind and visually impaired such as Meta Glasses, Be My AI, and similar tools.
- An overview of the WCBVI Loan Library and how to utilize this resource to borrow equipment for a student who is blind or visually impaired.
- As time permits, how screen reading technology for computers and mobile devices work (with a short video demonstration if time permits)

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Not all Visual Impairments are the Same

- Vision loss is not just a spectrum...it's more of a four-dimensional plane
- The following slides will provide some very basic information on types of visual impairment that are the most common.
- Side note: Some people are "lucky" enough to have more than one type of visual impairment.
 - It's like winning the wrong kind of lottery, but is actually more common than one might think.
- Every individual is different and their experience is different.
 - You likely already know this, but consider the statement a "friendly reminder"

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Types of Visual Impairment

- Diffuse Loss
- Central Loss
- Peripheral Loss
- Cordial/Cerebral Visual Impairment

General Challenges:

- Visual fatigue or headaches due to eye strain
- Sensitivity to light (needing more light or less depending on the student and situation)

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Diffuse Vision Loss

Diffuse Vision Loss Causes:

- Cataract or Aphakia (having no lens in the eye)
- Corneal cloudiness
- Uncorrected or uncorrectable refraction errors, including astigmatism
- Severe dry eye or inability of the eye to lubricate itself
- High Myopia

Implications:

- This is often compared to "looking at the world through a thick layer of saran wrap" or "having to wear walk around wearing +5 reading glasses"



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Central Vision Loss

Central Vision Loss Causes:

- Stargardt's (juvenile Macular Degeneration)
- Macular Edema (swelling in the macula, the part of the retina responsible for central vision)
- Some forms of retinal detachment

Implications:

- Pictures of this can be misleading...though they show a "blur" in the center of the vision, the blur does not actually exist...it is an "absence" of what is blurred out.



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Peripheral Vision Loss

Peripheral Vision Loss Causes:

- Glaucoma
- Retinitis Pigmentosa

Implications:

- Vision is often compared to "looking for something in your refrigerator though a straw".
- Moving the head to put things in view is important
- Navigating in darker environments is more difficult



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Cerebral/Cortical Vision Impairment (CVI)

Cerebral or Cortical Vision Impairment results from injury, insult, or disease of the brain. The eye itself functions normally.

Students with CVI can make up 75-85% of the caseload for a teacher for the visually impaired.

CVI Vision Loss Causes:

- Stroke or cardiac event
- Cerebral Palsy
- Shaken Baby Syndrome
- Any sort of oxygen deprivation to the brain or organic brain disease (brain tumor, whether or not it is malignant)

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Implications of Cerebral/Cortical Vision Impairment (CVI)

- Usually, though not always, CVI is found in individuals who have other physical disabilities (see previous slide)
- Even more so than other vision conditions, CVI varies by individual
- The eyes and brain do not function well together so though the eye might "see" the item, the brain may not.
- Individuals or students with CVI benefit from uncluttered environments, high contrast, and tend to see red, orange, and yellow much "better" or with greater consistency.
- Notice there is no "example image" here. This is to the highly variable nature of CVI.

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Blindness Isn't a Tragic Binary — It's a Rich Spectrum



For those interested in, this video featuring Andrew Leland offers a great perspective on blindness as a spectrum.

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Tailor your Tech to Try

Like with any technology, it's tempting to just "grab it and try it".

- Sometimes trying technology that hasn't been selected with the student's visual condition in mind can lead to frustration and disappointment for all involved
 - Think of this as "taste aversion" but for technology...
- Knowledge of the student's vision loss and other factors should drive what technology to try
- When possible, work with the student's Teacher of the Visually Impaired to narrow down the options

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Look at ALL your Options!

- With regard to technology, often the "less is more" approach is the most successful.
- Start out using built-in accessibility options available on mainstream technology devices before jumping to the high-tech options right away!
- Low profile technology is often more "accepted" by students, as is any accessibility option that is build into a device. Kids really do not like to "stick out".
 - Fun fact, having been raised by two visually impaired parents, I honestly did not care if I stuck out with my large print books and what passed for "high tech" in the 80s and 90s, but that is the exception rather than the rule.

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Handheld Video Magnifiers

- Can be held in the hand or laid on a paper or book.
- Usually have a smaller screen size of between 4.5 and 8 inches. There are some 10 inch screens, but those are usually foldable (next slide).
- Smaller screens are great for "spot check" and small tasks.
- Some can view items at a distance, but results can be mixed



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Foldable Video Magnifiers

- Usually are part of a foldable stand
- Screen size ranges between 12 and 17
- These units range from 8-15 pounds and fold down into a bag for easy transport
- Students often read, write, and work under the magnifier
- Most have the ability to view objects at a distance (posters, whiteboards, etc)



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Desktop Video Magnifiers

- These generally stay in one place and are not meant to move or can be used from a portable "cart"
- Screen size ranges between 22 and 27 inches
- These units are great for young students who stay in one room or "resource rooms" students can visit as needed to access technology.
- These usually have the same capabilities as foldable video magnifiers but with larger monitors.



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Middle to High Tech Options: Other Hardware

- Scanning Pens (C-Pens or similar) work great for students with low vision or visual fatigue challenges
- Stand-alone scanning devices (such as the Neptune from APH and the Odyssey from Humanware) can capture full pages of text and read them out loud.



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Screen Readers

There are screen readers built into Windows, Android and Apple. Android and Windows, however, have third party screen readers that have many more capabilities than what is included with the technology

For the purposes of this presentation, we will keep explanations on what screen readers are and do brief, but resources are provided for you to learn more!

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Screen Readers on a Computer

Screen readers literally read what is on the screen IF what is on the screen is formatted so it can be read using assistive technology.

Screen readers on computers have very specific skills users must possess prior to learning to use the software. For example, using key commands is a foundational concept when using a screen reader, so the user needs to have at least basic keyboarding skills.

Screen readers on mobile devices are easier to master, but still require a lot of work and practice. Since screen readers on mobile devices are mostly gesture based (since the user is interacting with a touch screen_ keyboarding is not necessary.

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Screen Readers on Mobile Devices

Screen readers on mobile devices are easier to master, especially for younger students, but still require a lot of work and practice.

Since screen readers on mobile devices are mostly gesture based (since the user is interacting with a touch screen) keyboarding is not necessary but it can be useful if using a Bluetooth keyboard and/or braille device

When screen readers on mobile devices are activated, all gestures are changed! This means sighted users will have difficulty using the device unless they have learned some of the basic techniques of using the mobile device's screen reader.

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What Screen Readers Work on Which Devices?

Windows:

- Narrator (included as part of the operating system)
- NVDA and Jaws are third party options

Android:

- Talkback (included as part of the Accessibility Suite)
- Prudence and Jieshuo are third party options

Chromebook

- ChromeVox (included on all Chromebooks and in the Chrome Browser as an optional extension)

All Apple Devices including iPhone, iPad, and Mac:

- VoiceOver (included as part of the operating system)

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Braille Displays

Braille displays are a great way to reinforce literacy skills. They also allow for more organic interaction with the technology by allowing the user to write in braille and read braille output rather than relying on speech.



There are MANY types and brands of braille displays!

[Braille Display Resources](#)



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Third Party Software

There are many software solutions for students who are blind or have low vision. There are accessibility settings and apps built into mainstream technology as well as third-party options.

Below are some links to resources to explore for further information

- [Computer Based Screen Magnifiers](#)
- [Computer Based Screen Readers](#)
- [Customize your Computer for Low Vision Access](#)
- [Mobile Device Resources for Low Vision and Nonvisual Access](#)

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Optical Character Recognition (OCR)

- OCR technology can come as a part of a video magnifier, but can also be built into apps, software, and other hardware.
- OCR is so "baked into" many of our devices that we don't even think about it. Using OCR that is already part of our technology can often solve a LOT of problems that might otherwise require purchase of specialized equipment.
 - On your Smart Phone, you can take a picture of text and select it right there in the picture
 - On a Windows PC, users can grab text from screenshots
 - On GPS and car cameras, OCR can sometimes be used to read road signs and license plates

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OCR Applications

The following apps utilize OCR and are created specifically for the blind and visually impaired (some others may have an interface that cannot be used by someone who cannot see it)

As this is not "new" tech and can be involved, Examples provided are deliberately kept minimal

- Seeing AI (iOS and Android)
- Envision AI (iOS and Android)
- VoiceDream Scanner (iOS Only)
- Google Lookout (Android Only)
- OrCam (Wearable tech with OCR and some minimal AI)
- Neptune and Odyssey Readers (standalone Scanners)

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Artificial Intelligence and Cavet

Important!

Policies and procedures related to Artificial Intelligence (AI) vary by district, school, situation, etc, and involve a variety of factors.

Please consult with your technology team prior to using any of these options. Many included options are specifically disallowed by DPI, but are included here for your information

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Artificial Intelligence Integration

Much like OCR, AI is integrated in many technologies used by the general public as well as within assistive technology

Since blindness and visual impairment is such a niche market, existing tools are often tweaked and used to meet needs of blind and visually impaired users. They also usually include OCR

Some examples are provided below:

- Smart Glasses including Meta, Envision, and others
- Smart Assistants such as Google Home and Alexa
- Apple Vision Glasses

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Seeing AI Overview and Channels

The Seeing AI app was released by Microsoft in 2018 or 2019. There are different areas of the app called "channels". Each channel has a purpose

- Read: Reads documents or text in the surrounding environment when detected
- Describe: Describe photos or live scenes using AI. The user can ask follow-up questions (i.e. what color is the shirt the man in the picture wearing")
 - The user can "explore" the scene by dragging the finger across the image to learn more information or teach the app to identify specific individual using facial recognition.

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More Seeing AI Channels

- More Channels: in the "more" section contains additional channels including:
 - Scan barcodes to identify products,
 - Learn to recognize and find things in a space
 - Identify currency
 - Recognize color
 - Detect light (useful if an individual has no light perception at all and wants/needs to know if lights are on in a space)

Learn more: [Seeing with AI The Prompt with Microsoft's Chief Questions Officer Trevor Noah YouTube](#)

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Be My Eyes Overview

Be My Eyes is an app allowing the blind user to be connected to a sighted volunteer to assist with short tasks (interpreting a picture, reading expiration dates on food that are hard to find on packaging, etc.)

Be My Eyes can be accessed either through an app or via some brands of Smart Glasses (such as the Meta Glasses)

Be My Eyes is free BUT it is important to consider what the live sighted individual can see/access and FERPA and HIPAA laws.

More information on Be My Eyes will be shared in the Visual Interpretation Services section of this presentation.

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Be My AI Overview

The Be My Eyes app has a section called "Be My AI". This area of the app is exclusively AI driven with no human interactive counterpart.

Be My AI can:

- Describe charts/graphs (though may provide more or less detail than needed depending on the context and image)
- Describe photos, scenes, and memes
- Pull text from images and provide some context for the text
- And more!

Learn More: [The Free Be My Eyes App Gets Even Better with Be My AI - YouTube](#)

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Visual Interpretation Services

Visual Interpretation Services (such as Be My Eyes) are another great tool. While Be My Eyes is a free service, there are other options.

Be My Eyes, as previously noted, depends on volunteers, though some companies such as Microsoft leverage the service to provide disability customer support.

Aira is another big name in visual interpretation. Staff are trained in the specifics of working with blind and low vision individuals. They can be contacted via the Aira app or using some brands of camera-enabled glasses.

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About Aira

Aira is free in a limited number of locations such as airports and some businesses including Walmart, Target, Starbucks, and some Walgreens locations.

With an account, members can receive a limited number of "free minutes" before it becomes necessary to have a paid plan.

Subscriptions are not inexpensive, but many say the time they save and convenience of having someone with vision "on call" is well worth the expense.

Please note that Aira is a great resource and Agents sign non-disclosure and confidentiality agreements, but is likely not appropriate for use in a school setting. Teaching students about its existence, however, may be helpful.

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Shameless Plug: WCBVI AT Loan Program

Many of the devices listed here are available for loan from WCBVI!

- [WCBVI AT Loan Page](#) (includes lists of devices available for loan grouped by category)
- [WCBVI APH Consumable and Loan Request Form](#)
 - All loans are for one semester
 - Both the Teacher of the Visually Impaired and the Local Education Agency representative must sign paperwork that will be sent to both parties as the LEA will be assuming responsibility if equipment is lost or damaged beyond what is considered "reasonable wear and tear".

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Wrap-Up and Final Thoughts

A LOT of information was presented here:

- A basic overview of types of visual impairment
- Assistive Technology Options for the Blind and Visually Impaired
- Artificial Intelligence in Technology for the Blind and Visually Impaired

If you have any further questions about any of the topic presented here, please feel free to contact me:

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