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SENSORY TECHNOLOGIES: PREPARING FOR THE ATP EXAM

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Learning Objectives

After this course:

1. The participant will be able to list 3 assistive technologies commonly used by people who are hard of hearing.
2. The participant will be able to list 3 assistive technologies commonly used by people who are deaf.
3. The participant will be able to list 3 assistive technologies commonly used by people who have low vision.
4. The participant will be able to list 3 assistive technologies commonly used by people who are blind.

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What we will be covering:

- **Hearing**
 - Hard of hearing
 - Deafness
- **Vision**
 - Low vision
 - Blindness
- **Deaf/Blind technologies**



Baby Cry Sound
Signaler

M. Lange 9.2016

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The ATP Certification

- The Assistive Technology Professional (ATP) certification is offered through the Rehabilitation Engineering and Assistive Technology Society of North America (RESNA)
- This demonstrates a basic level of competence in the practice area of Assistive Technology
 - Over 4000 people hold the ATP certification
- This series of courses will include information to prepare the candidate for this examination



The ATP Certification

- The candidate must fulfill specific pre-requisites before taking the examination
- For Occupational Therapy Practitioners with a Bachelor's or Master's degree, 1000 hours of work experience is required over 6 years.
- For further information:
 - <http://www.resna.org/get-certified/exam-eligibility-requirements>



Context

- Many clients using Assistive Technologies have multiple impairments: motor, cognitive, and/or sensory
- The Assistive Technology Professional must address all of these needs in provided interventions
- Clients who solely have a sensory impairment are typically seen by professionals who are highly trained in this area
 - Important to identify these resources and refer

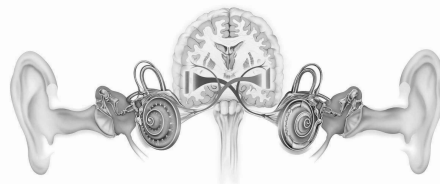
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Hearing

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Hearing

- **Hearing Impaired**
 - Describes any degree of hearing loss
 - Offensive to many deaf and hard of hearing individuals
- **Hard of Hearing**
 - Mild to moderate hearing loss
- **Deaf**
 - Very little or no functional hearing



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Types of Hearing Loss

- **Conductive**
 - Sound is not conducted efficiently through the outer ear canal to the eardrum and ossicles of the middle ear
 - Reduction of sound level or ability to hear faint sounds
 - This can often be corrected medically or surgically
- **Sensorineural**
 - Damage to the inner ear (cochlea) or to the nerves from the inner ear to the brain
 - Most common type of permanent hearing loss
 - Reduces the ability to hear faint sounds
 - Even loud speech may sound unclear or muffled
- **Mixed**

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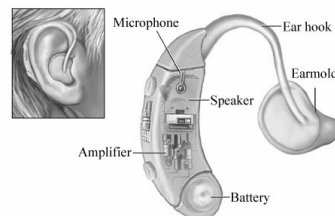
Goals of Hearing Technologies

- Communication
- Information access

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Hearing Aids

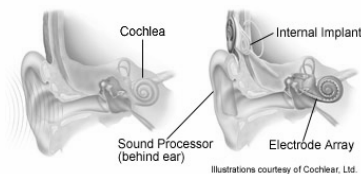
- Hearing aids
- Fits in or on the ear
- Amplifies sound
- Electroacoustic system that transforms environmental sound to make it more intelligible or comfortable
 - Sound processing
- Audiologist



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Cochlear Implants

- Cochlear Implants
- Small electronic device consisting of surgically implanted internal components with an externally worn speech processor
 - Microphone
 - Speech processor
 - Transmitter and receiver/stimulator
 - Electrodes
- Does not provide normal hearing
- Used by persons with significant hearing loss who cannot recognize speech with hearing aids



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Hearing Technologies

- These technologies may be used with or without hearing aids or a cochlear implant
- Some of used by people who are hard or hearing, deaf, or either
 - Alerting Devices
 - Telecommunication Devices
 - Assistive Listening Devices
 - Captioning

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Alerting Devices

- These devices use a loud tone, flashing lights or vibration to alert people to environmental sounds
- Device may respond to one specific signal, such as a doorbell
- Devices may respond to a variety of signals, such as the doorbell, telephone or a baby's cry
- Signals may be transmitted to receivers through a home, activating a light to flash or a device to vibrate

Wireless Doorbell and
Telephone Signaler



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Alerting Devices

- **Baby cry signaler**
 - Adjustable sensitivity
- **Doorbell signaler**
 - Works with or without an existing doorbell system
- **Carbon Monoxide detector**
- **Smoke alarm signaler**
 - Often built-strobe lights



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Alerting Devices

- **Telephone signaler**
 - One type plugs into the telephone line and electrical outlet
 - One type attaches to the side of a telephone to detect the sound of the ringer
- **Wake-up alarm signaler**
 - Portable alarm clocks with built-in strobe lights
 - Alarm clocks with built-in outlet to plug in lamp or vibrating alert
- **Weather alert**
 - Gives notice of upcoming storms or dangerous weather conditions
 - Can be used in conjunction with optional alerting accessories

Combination Alarm
Clock with Super
Shaker



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Telecommunication Devices

- These devices provide an augmentative or alternative means of telephone communication
- **Amplified ringers**
 - Various types of ringers attached to the telephone line
- **Amplified telephone (listening)**
 - Telephone with built in amplifier (25-55 decibels)
 - Often includes loud ringer
- **Portable phone amplifier (listening)**
 - Fits over an existing phone headset
 - Adjustable volume control



Amplified Corded Telephone

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Telecommunication Devices

- **TTY or TDD**
 - Keyboard with a visual display screen that allows communication over telephone lines by typing and reading
 - Portable and wireless versions
 - Computers can function as TTYs with software and additional equipment
- **Video Phone**
 - Telephone with video screen
 - Allows communication via sign language
 - Video Relay Service (VRS) can be used to interpret the sign language to the "listener"

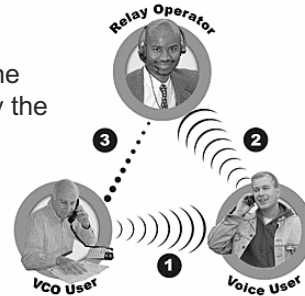
TTY



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Telecommunication Devices

- For people unable to hear over the phone, but who want to use their voice to communicate:
- Voice Carry Over (VCO) telephone
 - Relay service required
 - Hard of hearing person uses voice, but reads the response of the other person (which is typed by the relay service)
 - Portable version which can be attached to cell phones, pay phones, or cordless phones
- CapTel
 - Relay service required
 - Hard of hearing person uses voice, but reads the response of the other person (which is typed by the relay service)



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Assistive Listening Devices (ALDs)

- These devices are a personal listening device which receives signals from the person speaking, amplifying the sound
- Can be used with an existing hearing aid, but limits background noise
- Audio Induction Loop
 - Microphone, amplifier, and wire (which encircles the seating area)
 - Hearing aid is turned to the "T" (telecoil) switch
 - Person must sit within or near the "loop" of wire
- Neck loop
 - A telecoil neckloop is worn around the neck and transmits information to the hearing aid telecoil through a magnetic field
 - Plugs into a headphone jack of the receiver



Self-contained portable loop

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Assistive Listening Devices (ALDs)

• FM System

- Wireless system transmits sounds via radio waves
- Speaker wears transmitter and microphone
- Listener wears a portable receiver
- Think “tour group”



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Assistive Listening Devices (ALDs)

• Infrared System

- Wireless system transmits sound via invisible IR light
- Receiver has to be in direct line of sight of the transmitter
- Must be used indoors
- Often used for home television listening

• Personal Amplified System

- Portable
- Can be used indoors or outdoors
- Used for one-on-one conversations or TV listening



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Captioning



- **Closed captioning**
 - Captions on TV programs and DVDs
 - Closed caption decoder chip build into TV
 - DVDs often used SDH (Subtitles for the Deaf & Hard of Hearing)
- **Activating closed captioning**
 - Activation and options vary by TV model
- **Open captioning**
 - Captions are a permanent part of the picture, rather than an option
 - No decoder required

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Captioning

- **Real time captioning**
 - Captions are simultaneously prepared and transmitted at the time of the presentation
 - Trained real-time captioners using a stenotype machine

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Emerging Technologies

- Many hearing aids and cochlear implants are equipped to enable digital audio streaming from Bluetooth devices
 - Cell phones
 - TVs
 - Computers

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Emerging Technologies

• Smartphones

- Vibration alerts
 - Incoming calls
 - Alarms
- Apps
 - TapTap, Braci, MyEardroid, OtoSense, etc.
 - Vibrates and screen flashes to alert user to nearby sounds
 - RogerVoice, Pedius
 - Subtitling phone app, translates conversation into text
 - Vox Sciences
 - Transcribes voice mails into text
- Texting



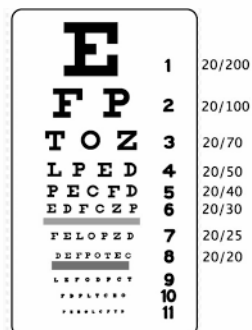
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Vision

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Vision

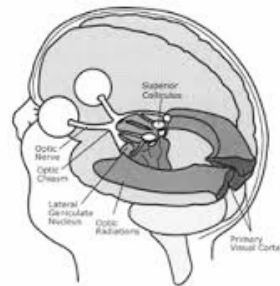
- Visual impairment means that eyesight cannot be corrected to a normal level
- Functional limitation of the eye or the vision system
 - Acuity
 - Visual field
 - Photophobia (light sensitivity)
 - Diplopia (double vision)
 - Visual distortion
 - Visual perceptual difficulties



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Vision

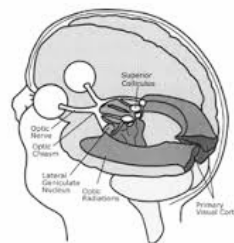
- Cortical Visual Impairment (CVI)
- Not an acuity problem
- Cortical problem – how the brain processes the information
- Vision may fluctuate
- Vision may improve over time in children



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Vision

- Cortical Visual Impairment (CVI)
- Clients often see better out of the sides of the eyes
- Clients tend to glance at an object and may not be able to sustain visual contact
- Clients may move and hold their head in unusual orientations to see optimally



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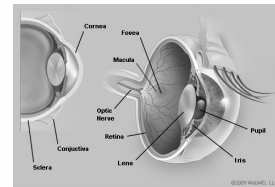
Vision

•Low Vision

- Visual acuity between 20/70 and 20/400 with correction, or
- Visual field of 20 degrees or less

•Blindness

- Visual acuity worse than 20/400 with correction, or
- Visual field of 10 degrees or less
- Legal blindness (US)
 - 20/200 or worse with correction or visual field of 20 degrees or less



•*CDC and WHO

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Goals of Vision Technologies

- Information
- Navigation

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Vision Assessment

- Doctor of Optometry
- Ophthalmologist
- Specialist in low vision rehabilitation



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Brightness

- Low Vision – improve brightness
 - Improve lighting
 - Reduce glare
 - Increase contrast

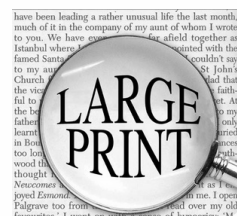


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Size

- Low Vision – increase size

- Move closer
- Enlarge
 - Large print
 - Phones, clocks, remotes, calendars, keyboards, playing cards, checks, etc. ➡
- Magnify



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Size

- Low Vision - Magnify

- Many powers and types
- Hand-held
 - Price tags, menus
- Stands and Video Magnifiers (CCTVs or closed circuit TVs)
 - Reading text



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Organization

• Low Vision - Organize

- Less background information
 - i.e. cluttered drawer
 - Familiar environment
- Labels
 - High contrast
 - Enlarged text



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Alerting Technologies

• Low Vision or Blind - Alerting Indicators

- Liquid level indicators
- Talking clocks
- Mail chime – indicates mail is in mailbox



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Reading Technologies

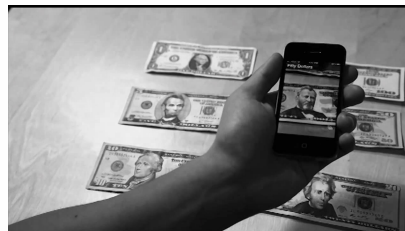
- Kindle, other e-readers and tablets are portable and less costly than CCTV
- Adjust font size
- Adjust contrast
 - White text on black background reduces glare
- Text-to-Speech
- Magnification
 - Not as high a level as CCTVs



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Low Vision: Smartphones and Tablets

- Accessibility features
- Flashlight
- Take a photo and enlarge it to see small print
- Siri
- Magnification Apps
 - iRead
 - iLoupe
 - Magnify
- EyeNote App
 - Scans and identifies the denomination of US paper money



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Audio Technologies

• Low Vision or Blind: Audio information

- Reading
 - Electronic books
 - E-book readers
 - Audio books
- Devices with auditory feedback
 - Talking watches
 - Clocks
 - Calculators
 - Glucometers
 - Tape measures



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Reading Technologies

• Reading for the Blind

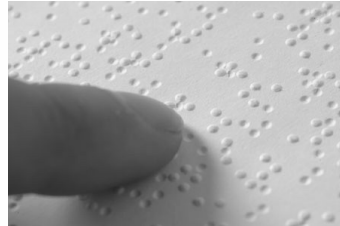
- Braille
- Optical Character Recognition (OCR)
- Screen Readers

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Tactile Technologies

- Tactile - Blind

- Tactile cues
- Braille
 - Text
 - Keyboards
 - Braille labels



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Writing Technologies

- Writing for the Blind

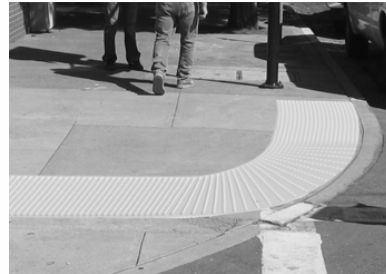
- Keyboard
- Braille notetakers

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Navigation Technologies

- Navigation tools for the Blind for Orientation and Mobility

- Canes
- Guide dogs
- Tactile warning surfaces

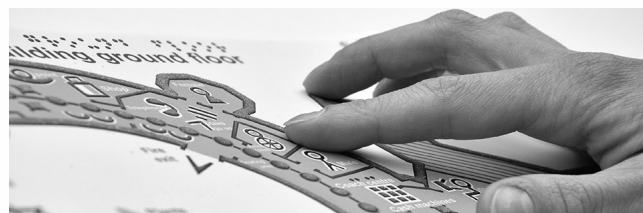


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Navigation Technologies

- Navigation tools for the Blind for Orientation and Mobility

- Electronic Travel Aids
- Accessible signage
- GPS and camera based Apps are emerging
- Wayfinding



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Deaf Blind Technologies

- This is a highly specialized area
- If vision and hearing are not present, the main strategy is tactile
 - Braille

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Conclusion

- Many of the clients we work with have multiple disabilities which may include sensory limitations
- Clients who solely have sensory limitations are typically seen by a clinician who is trained in this highly specialized area
- It is important that we are generally aware of intervention considerations and technologies

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3. Collins, J., Goynes, T. R., & McCabe, P. C. (2013). Deafness and Hard of Hearing in Childhood: Identification and Intervention through Modern Listening Technologies and Other Accommodations. *Communique*, 41(6).
4. Kenney, M. J., Jain, N. R., Meeks, L. M., Laird-Metke, E., Hori, J., & McGough, J. D. (2015). Learning in the Digital Age: Assistive Technology and Electronic Access. *The Guide to Assisting Students With Disabilities: Equal Access in Health Science and Professional Education*, 119.
5. Hatakeyama, T., Watanabe, T., Takahashi, K., & Fukuda, A. (2014). Development of Communication Assistive Technology for Persons with Deaf-Blindness and Physical Limitation. *Studies in health technology and informatics*, 217, 974-979.

Resources - Hearing

- Assistive Equipment and Technology, Minnesota Department of Human Services
 - http://www.dhs.state.mn.us/main/idcplg?IdcService=GET_DYNAMIC_CONVERSION&RevisionSelectionMethod=LatestReleased&dDocName=id_003399
- Hearing Loss Association of America
 - <http://www.hearingloss.org/content/hearing-assistive-technology>
- National Federation of the Blind
 - <https://nfb.org/fact-sheet-blindness-and-low-vision>
- National Center on Deaf-Blindness
 - <https://nationaldb.org/>

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Resources - Vision

- American Academy of Ophthalmology
- <http://www.aao.org/eye-health/diseases/low-vision-aids-rehabilitation>

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Thank you!

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