Sensory Technologies

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Learning Outcomes

- Recognize the most common personal needs for assistive technology associated with deafness or hearing impairment.
- Recognize appropriate technologies for people who are deaf or have a hearing impairment.
- Recognize appropriate technologies for people who have vision loss or blindness

Hearing Technologies

Evaluating Hearing

Who:

- Audiologist
- ENT Physician

What:

- Auditory thresholds
  - Amplitude
  - Frequency
- Nature of impairment
  - Progressive
  - Non-progressive

Amplitude

Barely Audible, Whisper	10 dB
Watch Ticking	20 dB
Conversational speech	**40-80 dB**
Car horn nearby	100 dB
Power lawn mower	105 dB
Jackhammer	120 dB
Jet takeoff	130-150 dB
Stereo speakers	> ???

Noise rated 80dB or higher, if heard for prolonged periods, can cause permanent damage to the hairs in the cochlea.

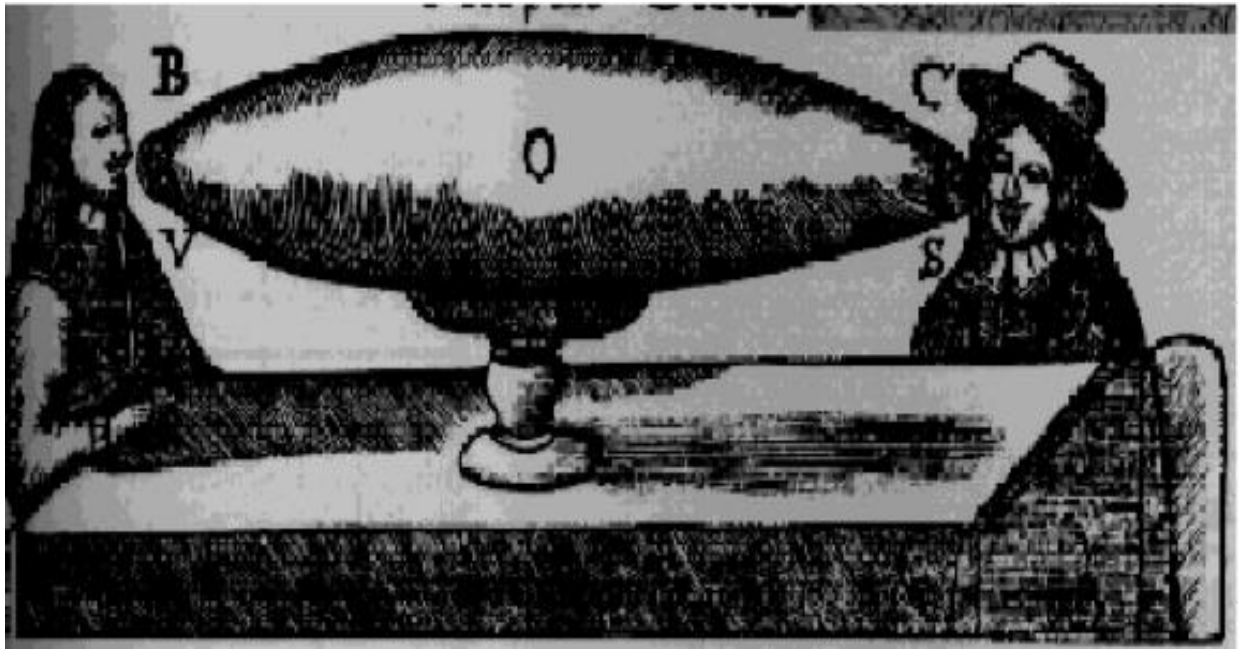
Frequency

Lowest piano key	27 Hz
Normal hearing	20 - 20,000 Hz
Conversational speech	250 - 4,000 Hz
Highest piano key	4,000 Hz

Goals of Hearing Technologies

- Communication
  - Improve social interaction
  - Improve speech articulation
  - Improve personal communication skills
- Ability to access information
  - Provide alternative feedback
  - Improve safety

Technologies for Deafness and Hearing Impairments



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Technologies for Deafness

For personal communication

- Interpreters, sign language, lip reading
- Fax machines
- Telephone usage
  - TDD or TTY
    Telecommunication Device for the Deaf
  - Relay operators
- Internet
- Cochlear implants
- Texting

Technologies for Deafness

- Interpreters, sign language, lip reading

Telephones for Deafness

- Telecommunication Device for the Deaf (TDD)
- Text phones

Ultratec Minicom IV TTY

Cleartext Textphone (T307)

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Telephones for Deafness

Telecommunication Relay Services (TRS)

- 7-1-1 access
- Text Communication: Relay services can handle calls from traditional TTYs, TTYs with Turbocode™, computer modems (ASCII), as well as via Internet (IP relay)
- Video relay service
- Speech-to-speech service
- Voice carry-over
- Hearing carry-over

Technologies for Deafness

Internet, PDAs, Smartphones

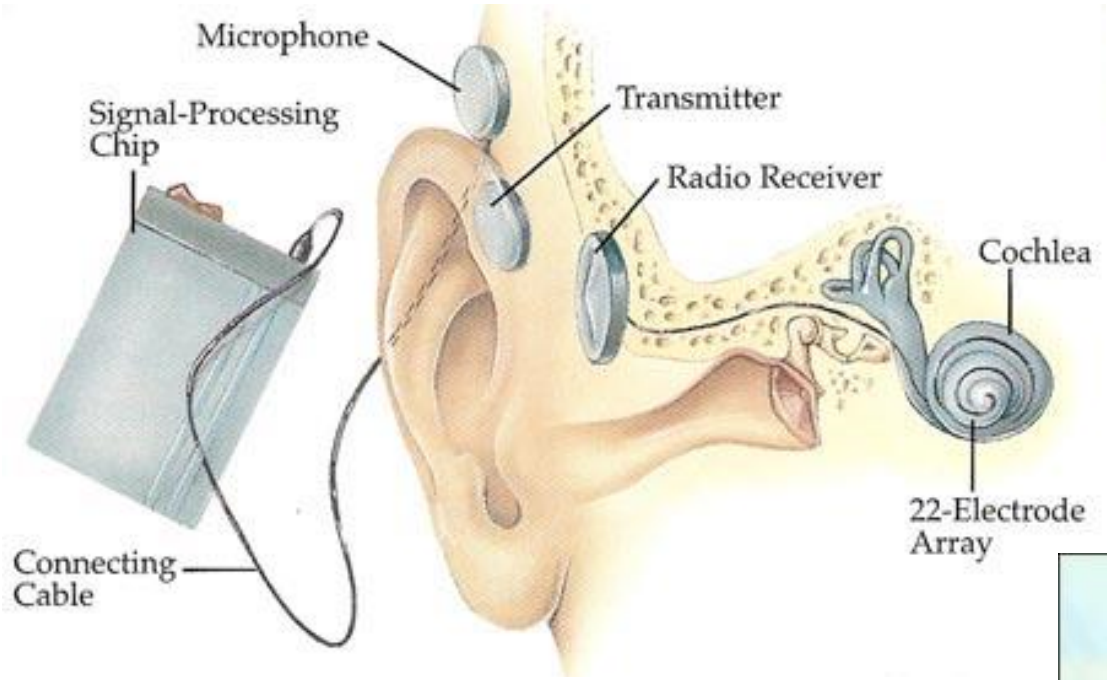
- Text Messaging
- TTY option
- Freedom of Mobile Multimedia Access (FOMA)

Technologies for Deafness

Internet

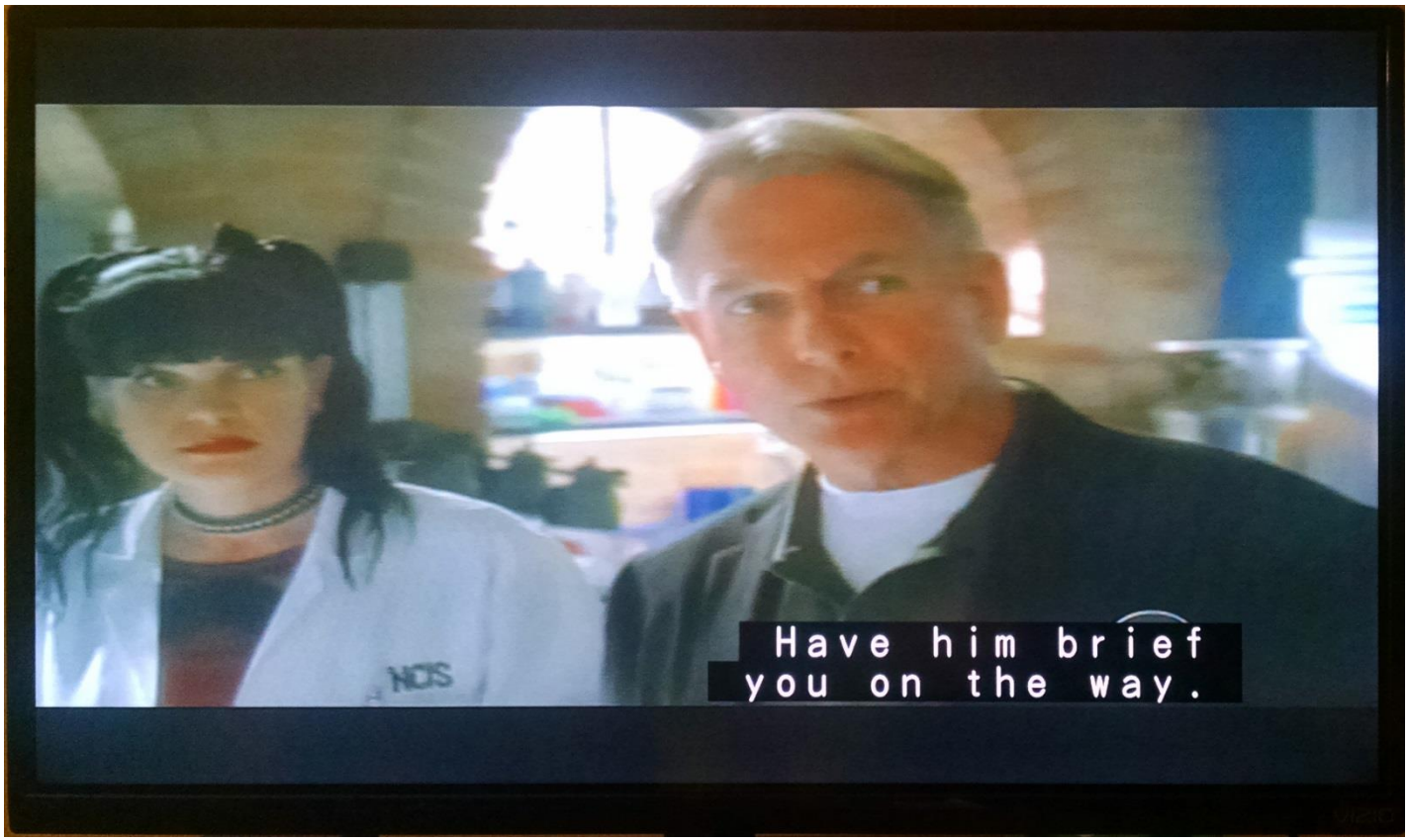
- Signed Video Chat
  - Video Cam
  - Skype, Net Meeting
  - Face Time

Cochlear Implant



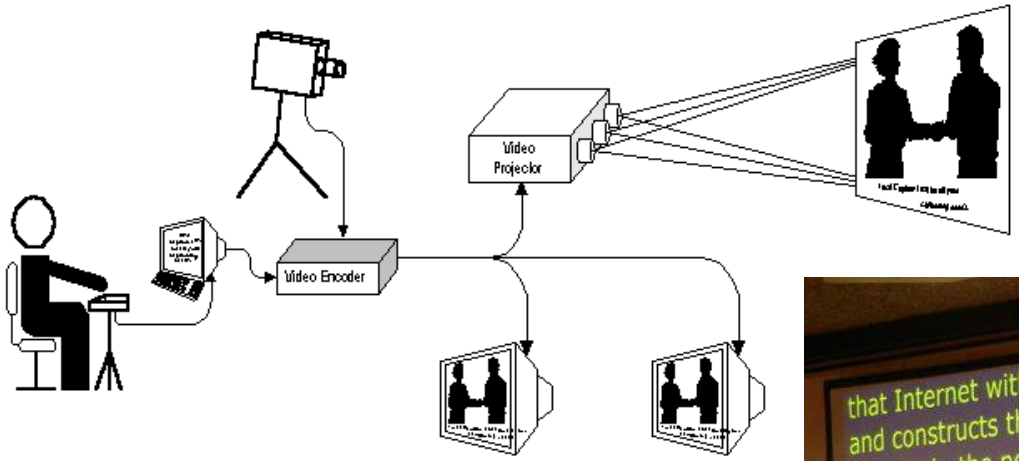
Technologies for Deafness

- For access to audio information
  - Closed-captioning of TV and video



Technologies for Deafness

- For access to audio information
  - Computer-Aided Real Time captioning



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Technologies for Deafness

For access to audio information

- Captioning

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Technologies for Deafness

For access to environmental sounds

- Audio-to-Visual Signaling Devices
- Audio-to-Vibrating Signaling Devices
- Service dogs

Bellman Visit Vibrating Pager Receiver

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Technologies for Hearing Impaired

For personal communication

- Hearing Aids

Technologies for Hearing Impaired

For personal communication

- Hearing Aids
- Cell phone compatibility

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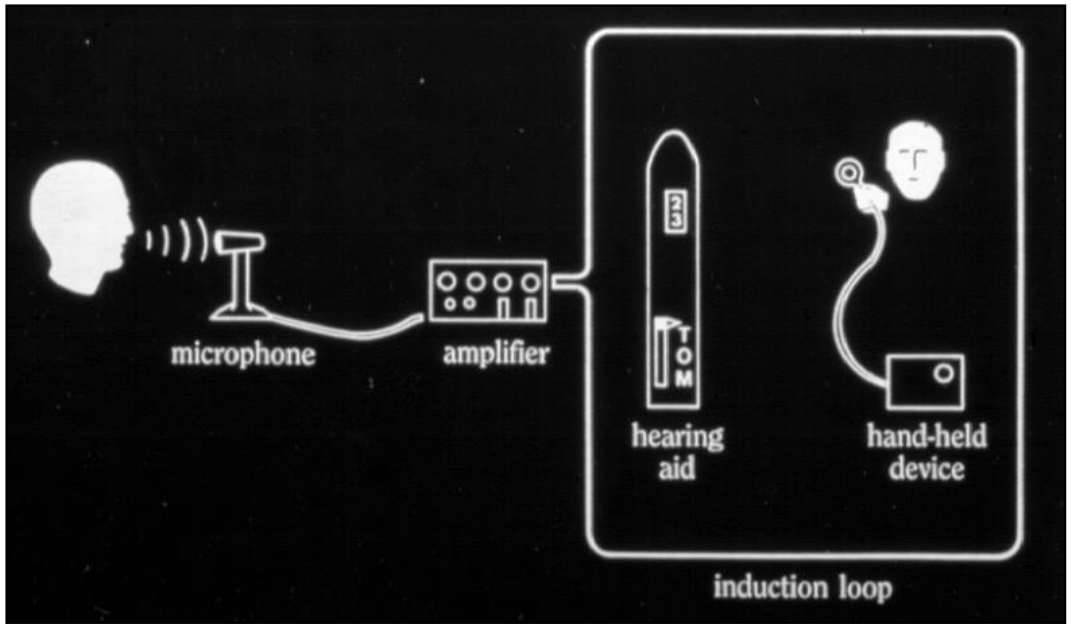
Technologies for Hearing Impaired

Large Area Assistive Listening Systems

- Induction Loop Amplification



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Technologies for Hearing Impaired: Personal Communication

Large Area Assistive Listening Systems

- Infrared Systems
- FM Assistive Listening Systems

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Vision Technologies

Evaluating Vision

Who:

- Optician
- Optometrist
- Ophthalmologist
- Neuro- Ophthalmologist
- Occupational Therapist
- Mobility Trainer

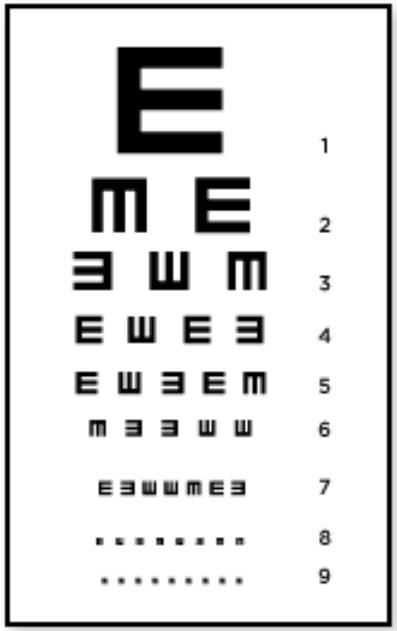
What:

- Visual acuity
- Field
- Tracking
- Scanning
- Function
- Perception
- Orientation and mobility skills

Vision Impairments

Visual acuity impairments

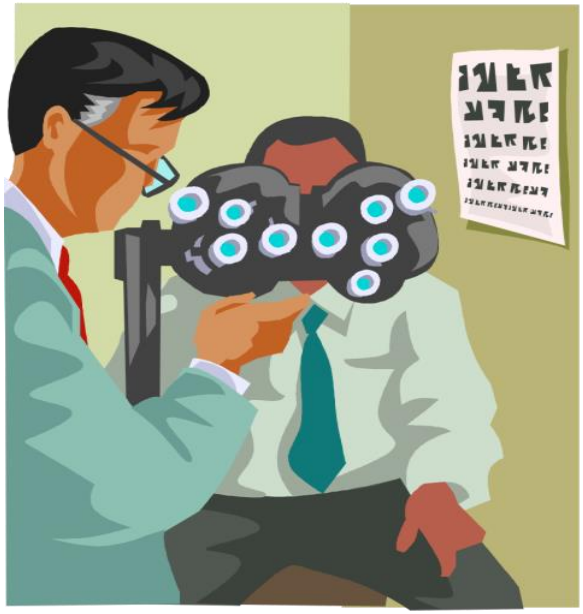
- Size of the object
- Contrast
- Pattern frequency



Vision Impairments

Oculomotor control impairments

- Tracking and scanning
- Disjunctive eye movements
- Diplopia



Problems Caused by Vision Impairments

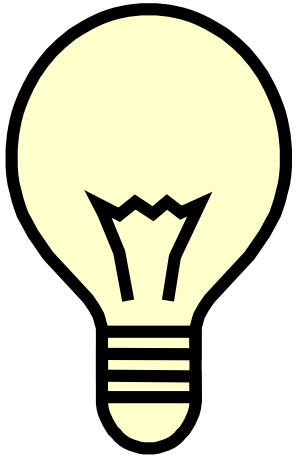
- Access to Information
- Orientation & Mobility
  - Distance between objects (depth perception)
  - Determining position in space
  - Navigation between locations
- Activities of Daily Living
- Recreation

Goals of Vision Technologies

- Provide access to information & reading
- Enhance writing ability
- Independence in orientation and community mobility
- Independence in activities of daily living
- Allow participation in recreational activities

Strategies for Compensation

- To enhance visual acuity
  - Enlarge the object
  - Increase illumination
  - Increase contrast
- To improve visual control
  - Reduce speed
  - Reduce depth of field
  - Enlarge target size
  - Glasses with prism lenses or patch



Technologies for Blind

For Reading

- Recorded audio materials
- Braille
- Electronic Reading Machines
- Optical Character Recognition, Screen Readers
- WWW with speech and Braille displays

For Writing

- Typewriter
- Computer
- Braille Embossers
- Portable Braille notetaker

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Technologies for Blind

Cell phone use - Access Features

- Comprehensive voice output of information on the visual display
- Audio alerts, e.g. tones to indicate critical information
- Accessible input and controls
  - Voice control
- Displays with enhanced accessibility for individuals with some usable vision

Technologies for Blind

- Audio

Technologies for Blind

- Braille

Technologies for Blind

Braille Embossers and Printers

Technologies for Blind

- Refreshable Braille notetaker
- Voice activated organizer

Technologies for Blind

- Electronic Reading Machines (Kurzweil)
- Optical Character Recognition, Screen Readers

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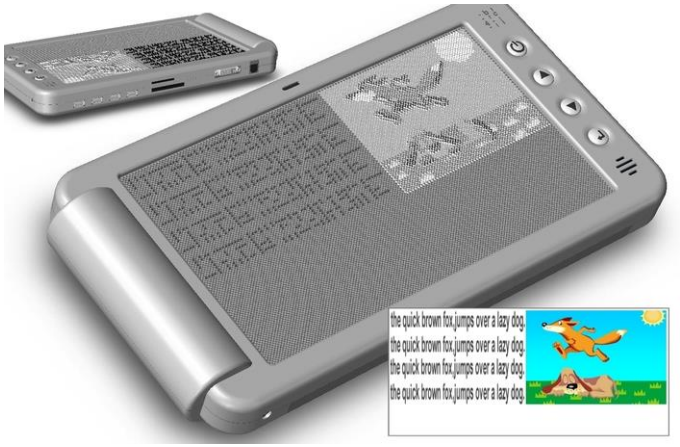
Technologies for Blind

For Writing

- Computer
- Screenless laptops
- Speech Synthesizer
- Tactile graphics



Technologies for Blind

Web Accessibility

- Users' technology
  - Screen readers
  - Special browsers
    - IBM Home Page Reader
  - Screen magnification for those with some sight

Technologies for Blind

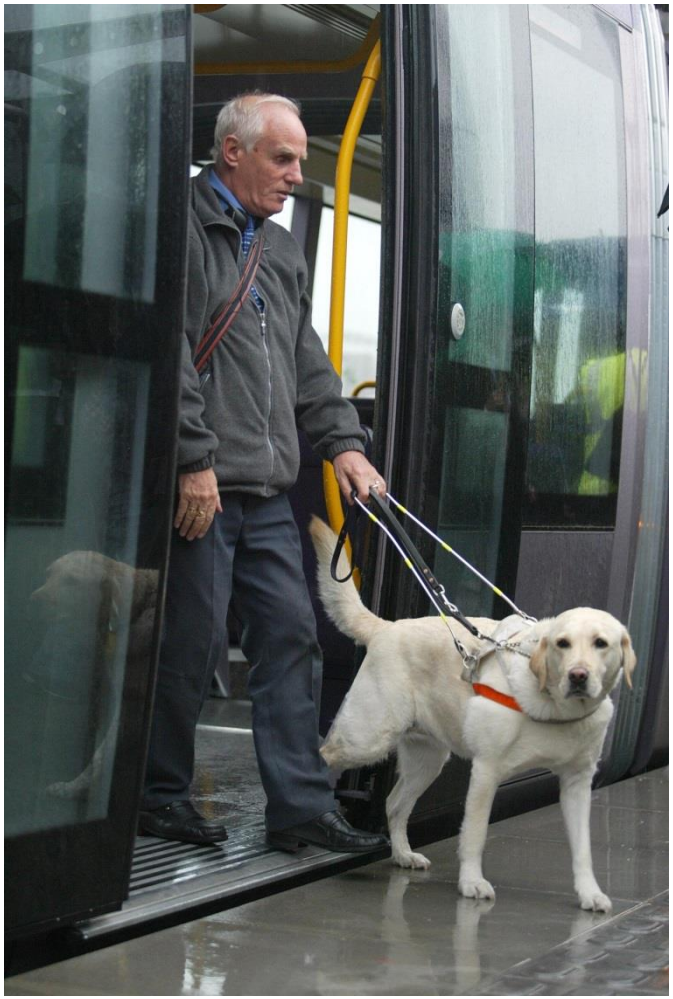
Web Accessibility

- Web DesignLabel graphics and images (Alt text)
- Images of text versus text
- Label the structure
- Label links
- Minimize JAVA, JAVA Script

Technologies for Blind

For Orientation & Mobility

- Long-canes
- Dog-guides



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Technologies for Blind

For Orientation & Mobility

- Long-canes
- Dog-guides
- Electronic Travel Aids
- Accessible Signage

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Technologies for Blind

For Orientation & Mobility

- Braille compass
- Talking compass

Technologies for Blind

For Orientation & Mobility

- BrailleNote GPS
- Trekker
- Digital maps

Technologies for the Blind

For recreation

- Games, cards
- Sports

Technologies for the Blind

For Activities of Daily Living

- Talking Appliances
- Tactile Labels

Technologies for Low Vision

For Reading

- Large-Print Materials
- Optical Magnifiers
- High-Illumination Lamps
- Closed-Circuit Televisions (CCTV)

Technologies for Low Vision

For Writing

- High illumination
- Contrast script against surface
- Computer

Technologies for Low Vision

For orientation & mobility

- Monoculars & Binoculars
- Cameras
- Flashlights
- Night Vision Goggles

Technologies for Low Vision

For Daily Living and Recreation

- High illumination
- Large-Character Labels
- Large-Character books, magazines, games
- Optical Magnifiers

Technologies for Low Vision

For Daily Living and Recreation

Bar code reader

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Review Questions (feel free to discuss with your neighbors)

1. The most common personal needs for assistive technology by individuals with hearing impairment of deafness, include all of the following, EXCEPT:
    a. Improved social communication
    b. Access to auditory information
    c. Devices to improve memory and retention
    d. Concerns for safety

2. Appropriate technologies for individuals with hearing impairment or deafness include all of the following, EXCEPT:
    a. Computer screen reader software
    b. Visual signaling devices
    c. Text messaging for smartphones
    d. Captioning software for video and TV

3. Appropriate technologies for individuals with vision loss or blindness include all of the following, EXCEPT:
    a. Audio amplification to aid recall and retention for verbal instructions.
    b. Screen reader software for computer access
    c. Navigational aids (including GPS) for travel and mobility
    d. Audio translation for text files

Review Questions (Here are the answers. How did you do?)

1. The most common personal needs for assistive technology by individuals with hearing impairment of deafness, include all of the following, EXCEPT:
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Questions ?

The End

To Receive CEUs for this course…

You will receive an email from RESNA with a link to the course quiz and a link to the course evaluation survey.

- You must successfully pass a quiz based on the course's learning outcomes. The quiz has 28 multiple-choice questions; you must answer 20 questions correctly to pass. If you do not pass the quiz, you must wait two days before reattempting the quiz.
- You must complete an evaluation survey to give us feedback about the course content and the instructors. Your feedback will help us continue to improve the course.

Within 2 weeks of your passing the quiz and completing the evaluation survey, RESNA will email your CEU transcript for the course.

If you have questions later…

You may contact today's instructors.

Jerry Weisman jerryweisman@gmail.com

Jill Sparacio otspar@aol.com

For questions about CEUs, the evaluation survey, and the quiz, please contact RESNA's Education Manager:

Charlie Raphael

craphael@resna.org

(703) 524-6686, ext 316

Thank you!