



# Demystifying Assistive Listening Devices: The Devil is in the Detail

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<http://www.wou.edu/nwoc/demyst.htm>

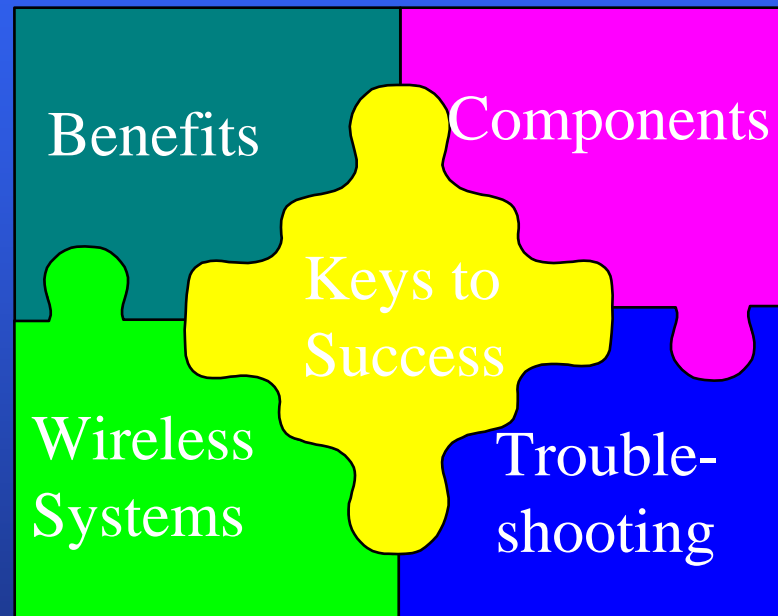
# PEPNet Regional Centers



<http://www.pepnet.org>

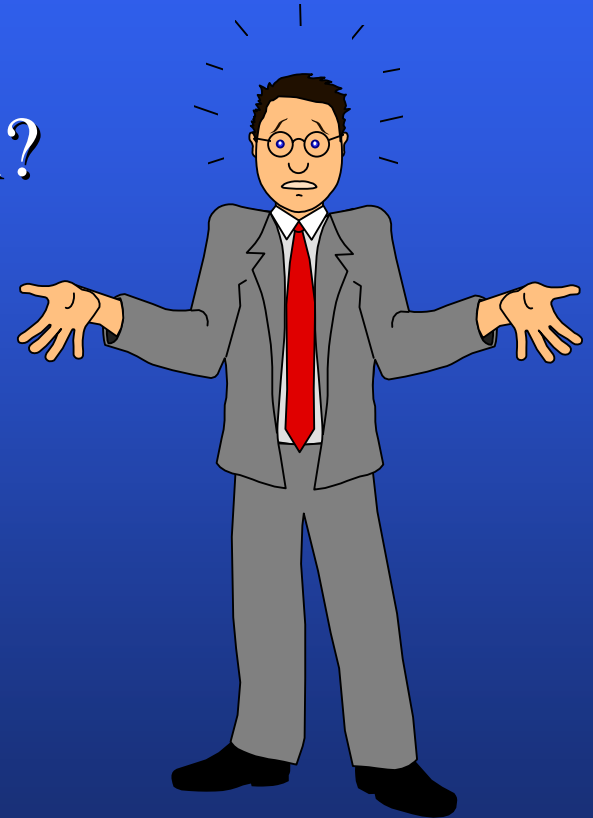
# Agenda

- Benefits
- Components
- Wireless systems
- Troubleshooting
- Keys to success



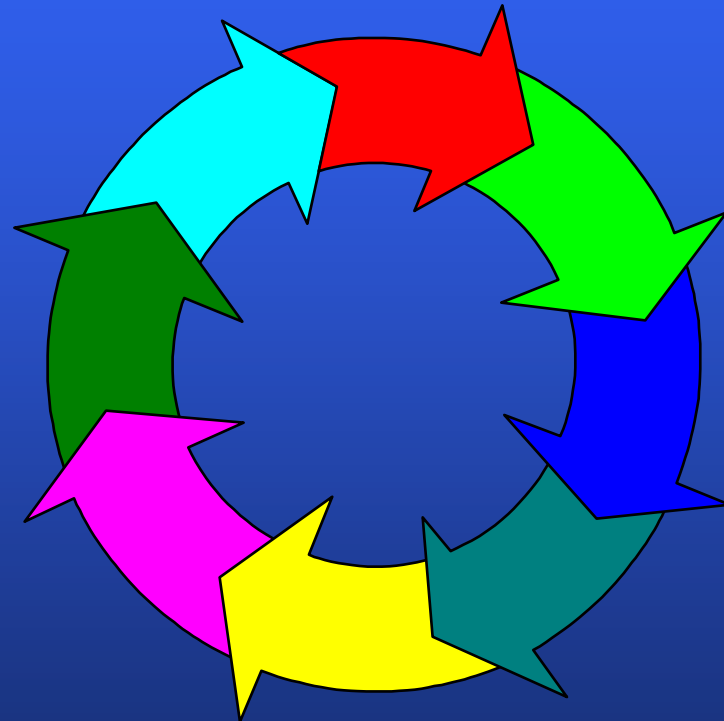
# Why use assistive listening devices?

- Why aren't hearing aids enough?
- What do hearing aids do?
  - sounds > sounds
- What do ALDs do?
  - sounds > **sounds**
- ADA mandates *effective* communication



# Components

- Individual
- Sound
- Environment
- Sound Source
- Microphones
- Transmitter and Receiver Systems
- Coupling Devices
- Telecoils



# Components: Individual

- Hearing loss
  - binaural or monaural
  - severity (dB) and frequency (Hz)
  - conductive or sensorineural
  - may fluctuate or be progressive
- Age at onset of loss
- Acceptance of loss
- Speech reading ability
- Hearing aid/T-coil use
- Knowledge of and comfort with ALDs



# Components: Sound



## ■ Dimensions

- Frequency
- Loudness

## ■ Impact on Speech Intelligibility

- Distance
- Signal-to-Noise Ratio
- Reverberation



# Speech Sounds: Frequency & Loudness



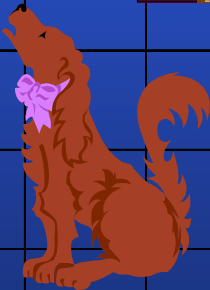
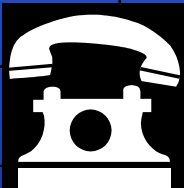

Normal  
#6

Mild  
21-40 dB  
#10

Moderate  
41-60 dB  
#9

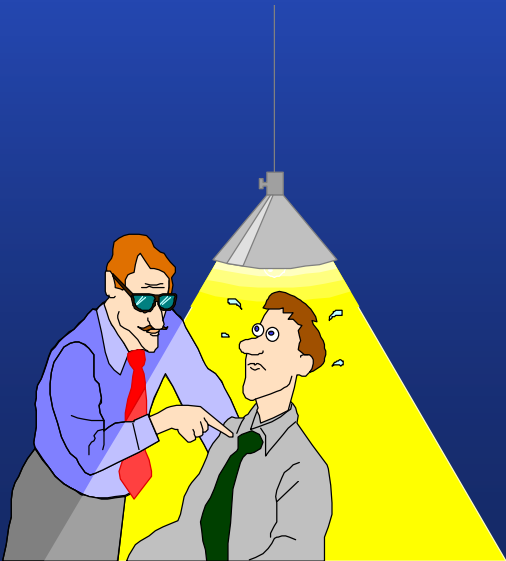
Severe  
61-80 dB  
#8

Profound  
81 or more  
#7

| 0   | 125 | 250  | 500  | 750 | 1K | 1.5K | 2K | 3K  | 4K | 6K | 8K |
|-----|-----|--|--|-----|----|------|----|---|----|----|----|
| 10  |     |   |  |     |    |      |    |   |    | f  | th |
| 20  |     | Zv   |  |     |    |      |    |   |    | S  |    |
| 30  | j   | mbd  | Ia   |     | Ph | G    |    | K   |    |    |    |
| 40  |     | Nel<br>ng  | o  | r   | Ch | sh   |    |   |    |    |    |
| 50  |     | u  |  |     |    |      |    |   |    |    |    |
| 60  |     |  |  |     |    |      |    |   |    |    |    |
| 70  |     |  |  |     |    |      |    |   |    |    |    |
| 80  |     |  |  |     |    |      |    |   |    |    |    |
| 90  |     |  |  |     |    |      |    |   |    |    |    |
| 100 |     |  |  |     |    |      |    |   |    |    |    |
| 110 |     |  |  |     |    |      |    |   |    |    |    |
| 120 |     |  |  |     |    |      |    |  |    |    |    |

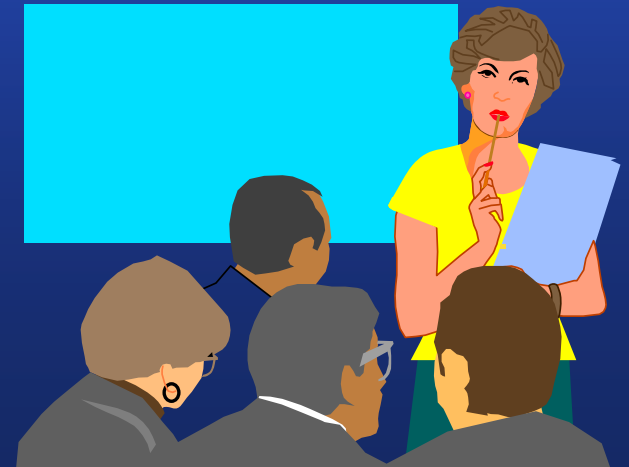
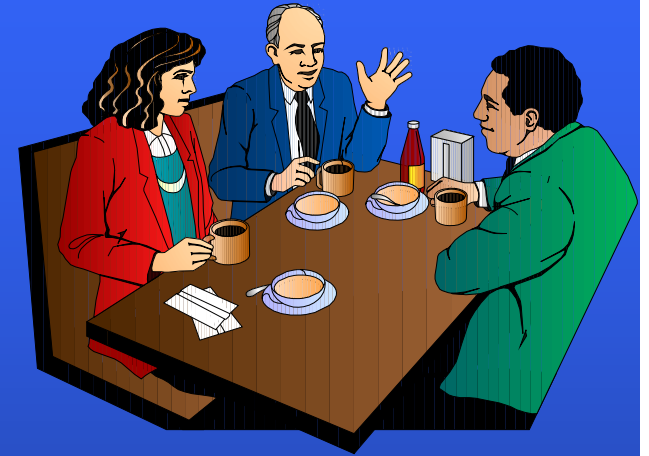
# Components: Environment

- Light or dark
- Uncovered windows
- Distance from speaker
- Room acoustics and noise



# Components: Sound Source

- Instructor giving a lecture
- Panel of speakers
- Video or audio recording
- Q&A from the audience
- Hard of hearing student
- Neighboring student



# Communication Tips

- Face-to-face communication
- Maximal lighting conditions
- Don't yell
- Be patient
- Don't be afraid to write



# Components: Microphones

- Omnidirectional
- Unidirectional
- Lavalier or Lapel
- Table top or conference
- Environmental mic
- Placement is vital!
  - Remember effect of distance on sound



# Components: Transmitter and Receiver Systems

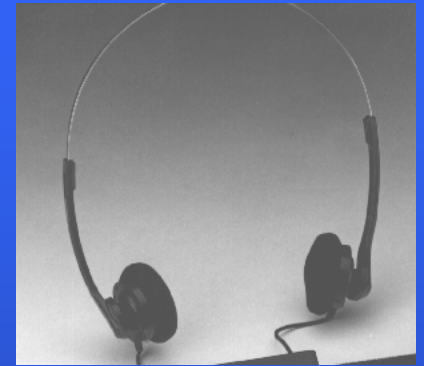
- FM
- Infrared
- Electromagnetic induction loop
- Hardwired systems



# Components: Coupling Devices

- No hearing aid OR no T-coil

- headphones
- earbuds



- Hearing aid with T-coil

- neckloop
- silhouette
- headphones



- Other methods

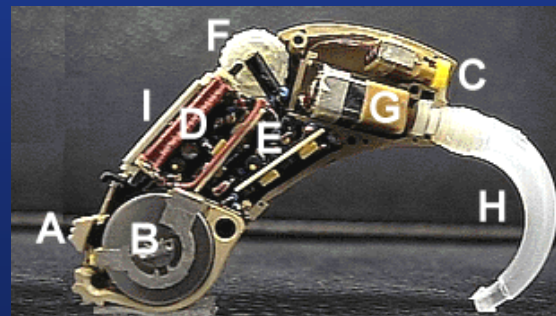
- Direct Audio Input
- FM Boot
- Cochlear implants



# Components: Telecoils



- Hearing Aids: Microphone vs T-coil
- Not all hearing aids have T-coils
- T-coils are not as sensitive as hearing aids
- Proximity is important
- Commonly found in telephones and speakers
- Susceptible to electromagnetic interference



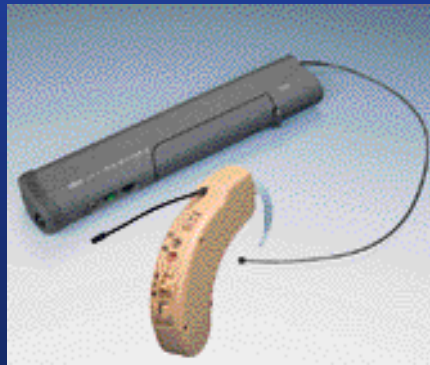


# T-coils & Couplers & Mics! Oh My!

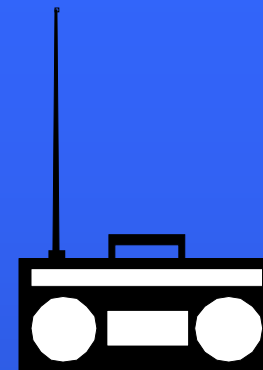
- Encourage T-coil purchase and usage.
- Inform students about the possibility of a Mic/T/Both switch.
- Make environmental mics available.
- Experiment with different coupling devices.

# FM

- Uses radio waves
- Transmitter
  - a radio station
- Receiver
  - a radio
- Crib Monitor



## True or False?



- You can leave the room and still hear the presentation.
- This system can be used indoors or outdoors.
- You must have a receiver to use this system.
- You must have a hearing aid to use this system.
- You can use FM in multiple rooms in a building.
- I can use my FM receiver with your FM transmitter.

# FM Advantages

- Very portable
- Very easy to set up and use
- Offers great flexibility of movement
- Used indoors or outdoors
- Appropriate for mild to profound losses
- Receiver can be covered or put in pocket
- No fluctuation in strength of signal



# FM Disadvantages

- Receivers are required for everyone
- Receivers vary in quality and durability
- Potential for outside interference
  - 72-76 MHz bandwidth allotted by FCC
  - police band, construction walkie talkies, pagers
- Receivers and transmitters must be on the same channel
- There must be 1 free channel between systems used in close proximity



# Infrared

- Uses infrared light
- Transmitter-emitter panel
  - like the infrared diode on a remote control
  - emits signal in 60 degree cone-like a flashlight
- Receiver
  - like the infrared receiver area on a TV or VCR
- TV headphones



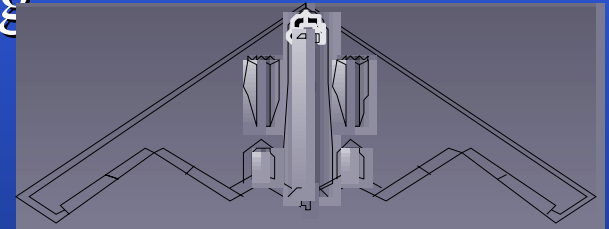
# True or False?



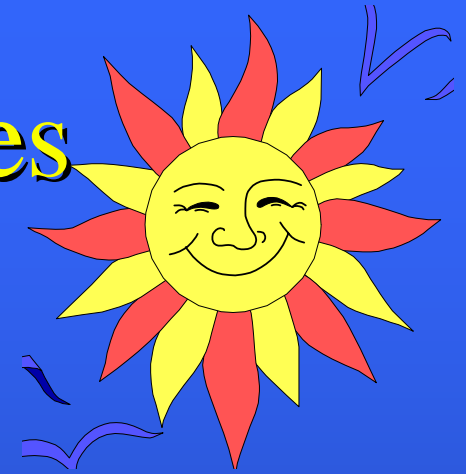
- You can leave the room and still hear the presentation.
- This system can be used indoors or outdoors.
- You must have a receiver to use this system.
- You must have a hearing aid to use this system.
- You can use infrared in multiple rooms in a building.
- I can use my IR receiver with your IR transmitter.

# Infrared Advantages

- Compatibility: 95 kHz is industry standard
  - Home receivers can be used with public transmitters
  - 250 kHz if high intensity lighting
- No spillover means security
- Can be used in adjacent rooms
- Widest bandwidth and best sound reproduction
- Appropriate for mild to moderate/severe loss
- Not affected by radio transmission

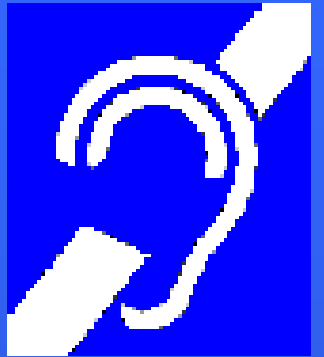


# Infrared Disadvantages

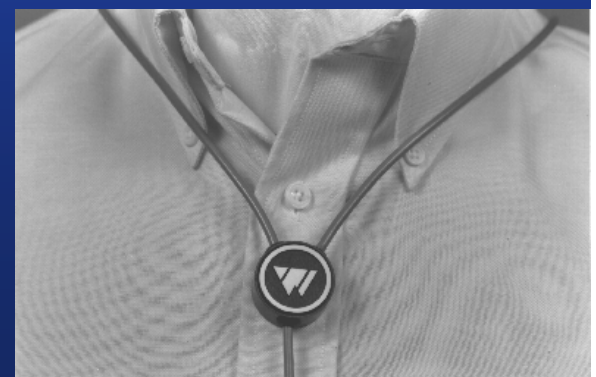


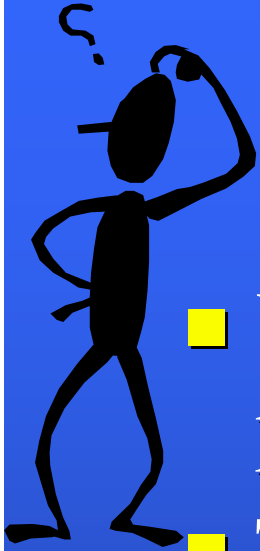
- Receivers required for everyone
- Must have direct line of sight
- Can't cover the receiver or put in pocket
- Indoor or evening use only
- High intensity or fluorescent lights cause interference
- Large areas require multiple emitter panels
- Quality varies with company

# Electromagnetic Induction Loop



- Uses electromagnetic fields of energy
  - Power lines
- Transmitter-Loop of several wires
- Receiver
  - T-coil in hearing aid
  - desktop receiver
- Telephone and other speakers
- As small as a neck loop or as large as an auditorium



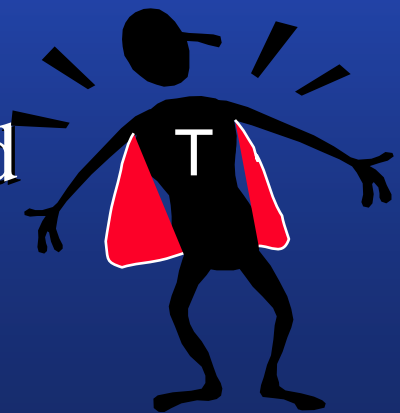


## True or False?

- You can leave the room and still hear the presentation.
- This system can be used indoors or outdoors.
- You must have a receiver to use this system.
- You must have a hearing aid to use this system.
- You can use induction loops in multiple rooms in a building.
- I can use my loop receiver with your loop transmitter.

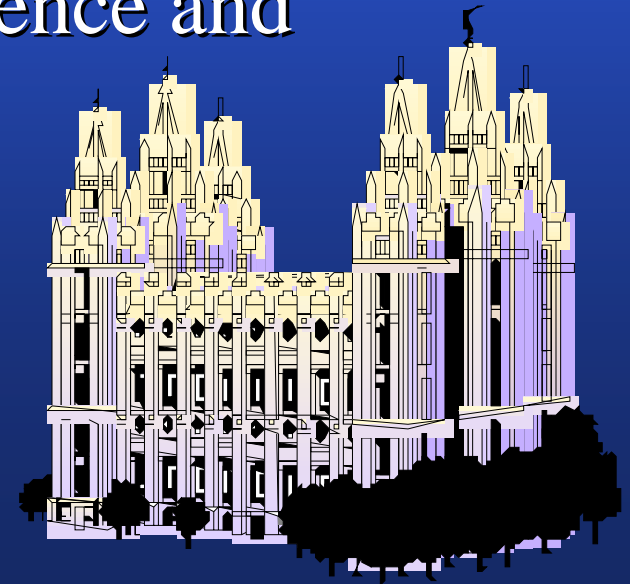
# Induction Loop Advantages

- Low equipment costs after installation
- Easy operation
- Lasts forever
- Induction receivers are compatible with ALL loop systems
- Unobtrusive with T-coil hearing aid



# Induction Loop Disadvantages

- Installation costs may be high
- Installation may not be possible in historic buildings
- Can't assume everyone will have a T-coil
- Susceptible to electrical interference and spill over
- Must sit around looped area
- May be dead areas within loop

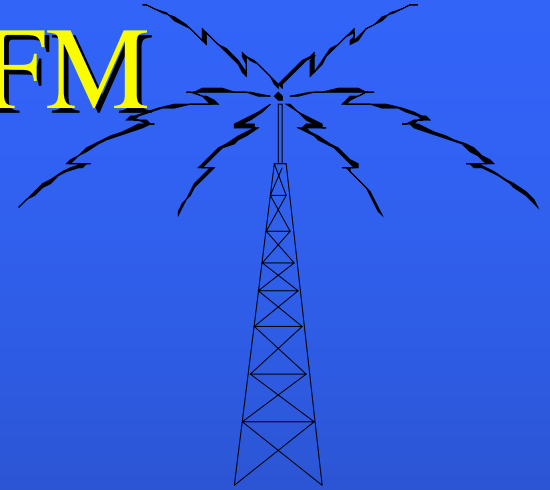


# Troubleshooting: General

- Batteries charged?
- Deductive reasoning
  - T-coil working? try it out with a phone call
  - try different couplers
- Ultrasonic sensors
- Check with local SHHH group
- Cultivate an expert
- Call the company!



# Troubleshooting: FM



- Are the receiver & transmitter on the same station (frequency)?
  - Color code or number them
- What sources of interference are close by?
  - Station drift-your system OR someone else's
  - police band, construction walkie talkies, pagers
- Must have one free channel difference if 2 different stations are being used in rooms next to each other.

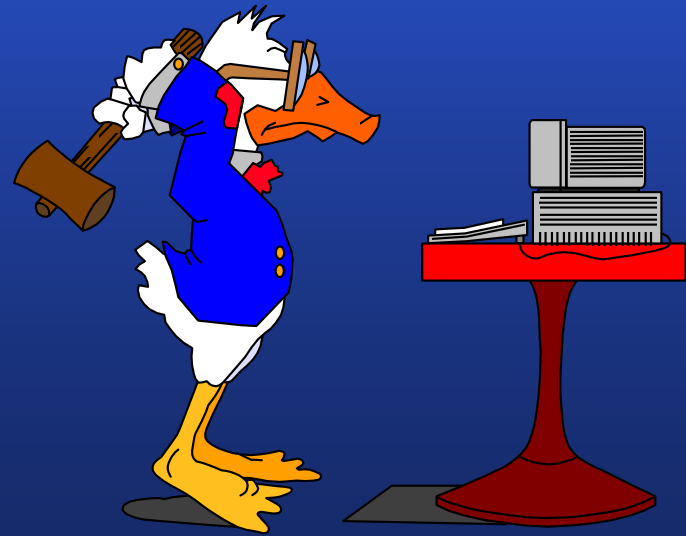
# Troubleshooting: Infrared

- Is the room bright, or is direct sunlight present?
- Is anything blocking the line of sight?
- Are high intensity fluorescent lights present?



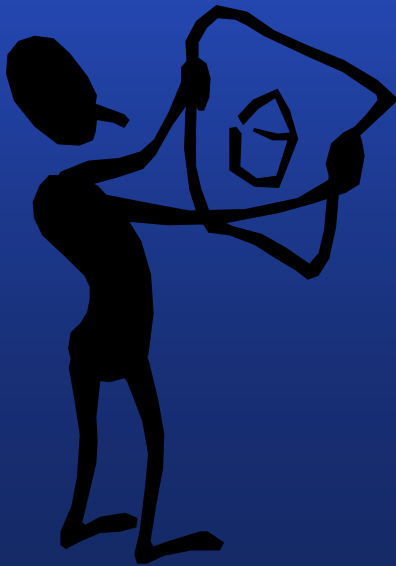
# Troubleshooting: Induction Loop

- Are there sources of electrical interference and spillover nearby?
- Portable systems can be a mobility hazard. Are wires protected?



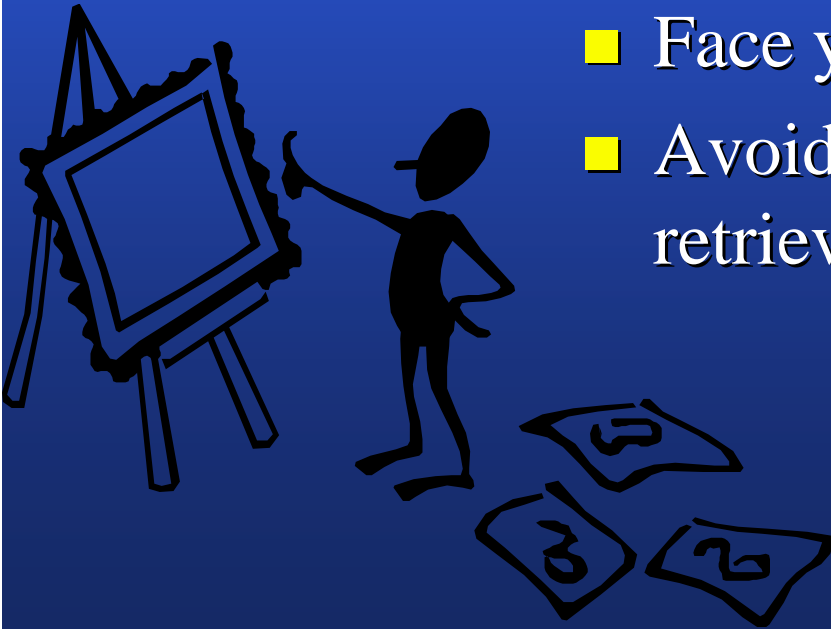
# Keys to Success for the Speaker

- Avoid drawing attention to the individual user
- Repeat questions from the audience
- Place mic close to mouth (or other sound source)but NOT in front of the mouth
- Use an unidirectional mic when possible
- Turn off or step away from overhead when not in use
- Do not direct their attention away from your face, and then start talking!



# Keys to Success for the Speaker

- Repeat questions from the audience
- Rephrase instead of repeat
- Don't stand in front of windows or bright lights
- Face your audience when speaking
- Avoid talking while the class is retrieving materials



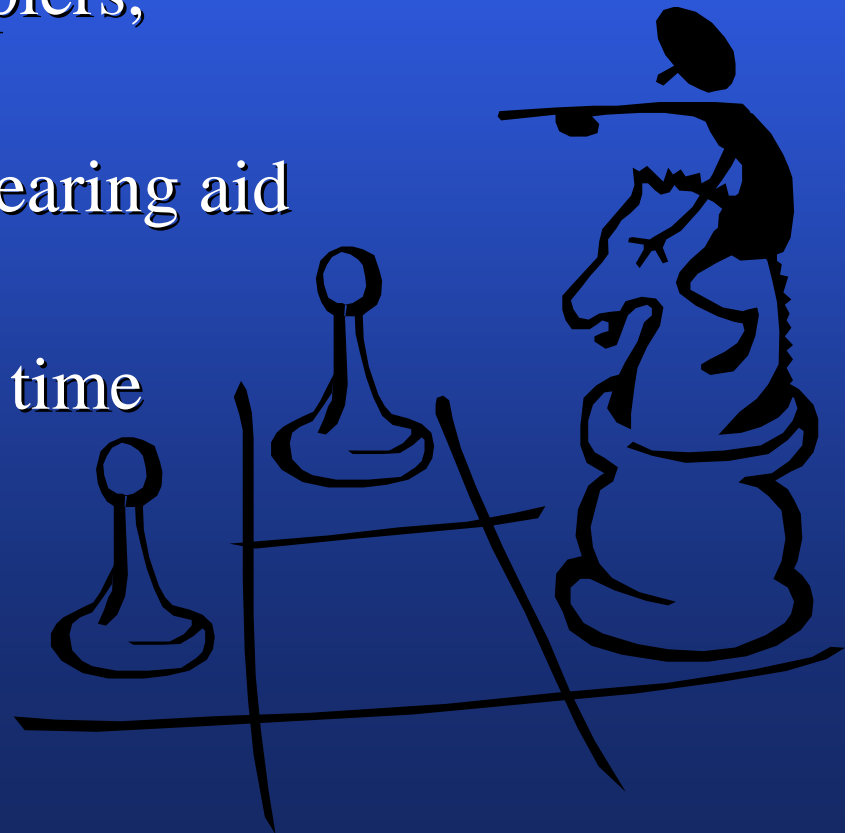
# Keys to Success for the Student

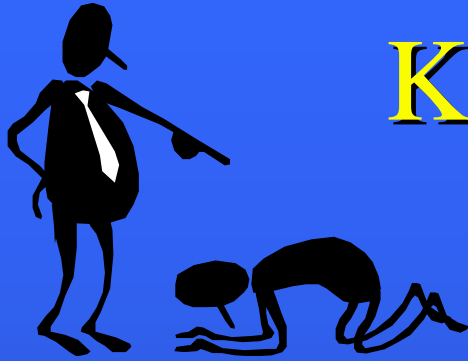
- Batteries charged and T-coil working
- Proximity to T-coil
- Proximity to interference
  - just changing seats may help
- Continue to sit within 20 ft. of the speaker if you will use speech reading
- Interact with others about coping techniques-SHHH, Beyond-Hearing



# Keys to Success for the Student

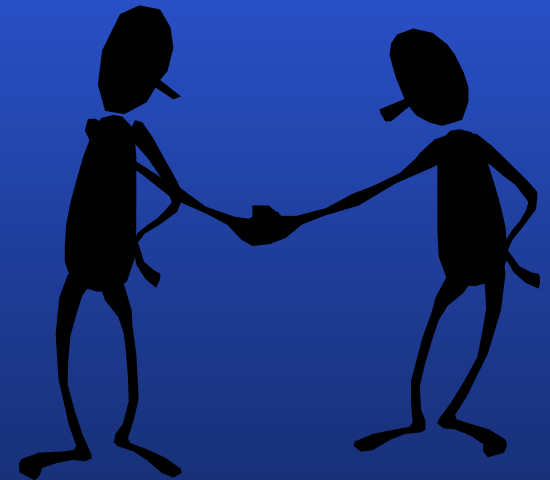
- Make sure the volume is down when you first put the coupler on
- Experiment with different couplers, locations, and environments
- Get an environmental mic or hearing aid with mic/t/both position
- Check out equipment ahead of time
- While you are at it, check out the instructors too!
- Be specific





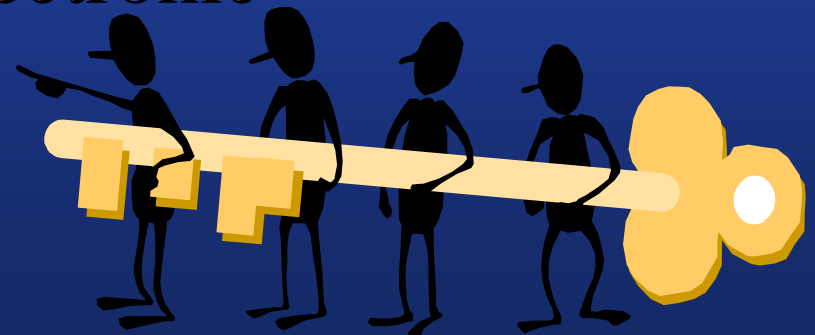
# Keys to Success for the Service Provider

- Cultivate an expert for troubleshooting
- Always check out the system ahead of time
- Experiment
- Encourage users to experiment
- Show how ALDs can be unobtrusive
- Advertise that the systems are available
- If the user isn't ready yet
  - SHHH or ALDA meetings or web sites
  - e-mail lists like Beyond-Hearing
  - provide a fact sheet on the devices available from your program
  - provide info about impact of distance, room noise on understanding



# Review

- Consider the individual first.
- Evaluate the requirements of the setting and the properties of the equipment.
- Buy equipment from companies that will help you troubleshoot.
- Don't forget the non-electronic communication tips!



# Contact Information

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