Classroom Solutions and Modifications for Children with Listening Challenges

PHONAK
life is on

Disclosures

- **Lisa Dyre, MA**

- Lisa Dyre has been with Phonak US for several years and is currently a member of the Phonak Pediatric team, She is responsible for the states of Texas, New Mexico, Oklahoma, and Louisiana. Her primary focus is pediatric amplification and Roger/FM fittings in both clinical and school settings. She attended the University of Texas at Austin, where she received a Master of Arts in Audiology. Lisa's previous experience includes Pediatric Audiology and Educational Audiology, Private Practice, and Hearing Aid Manufacturing.

- *Financial – Phonak employee who receives a salary for teaching/speaking.*
- *Nonfinancial – No relevant nonfinancial relationship exists*

PHONAK
life is on

PHONAK
life is on

Learning objectives

- Participants will be able to identify 2 pre-post questionnaires/surveys that assist in establishing benefit from classroom modifications for children with listening challenges
- Participants will be able to name a minimum of 4 populations that may benefit from classroom modifications that boast signal to noise ratios
- Participants will be able to describe 3 classroom modifications that may have significant benefit for children with listening challenges.

Agenda

1. Who is at risk?
2. What can we do about it?
3. How do I know my interventions are helping?

Hearing and listening

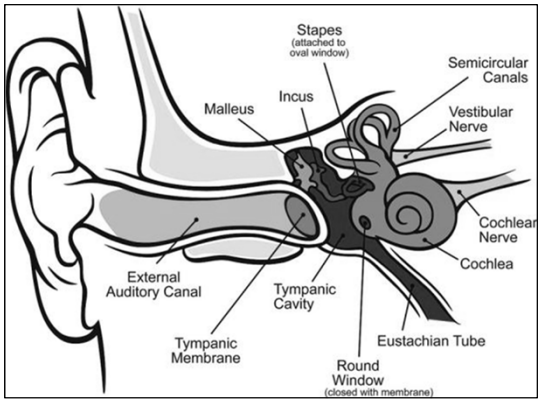
- School-age children spend as much as 45-75% of the day engaged in listening activities (Dahlquist,1998., Smaldino, & Crandell 2000)
- Classroom acoustics can affect how a child is hearing which in turn can affect the access to the auditory signal needed to learn

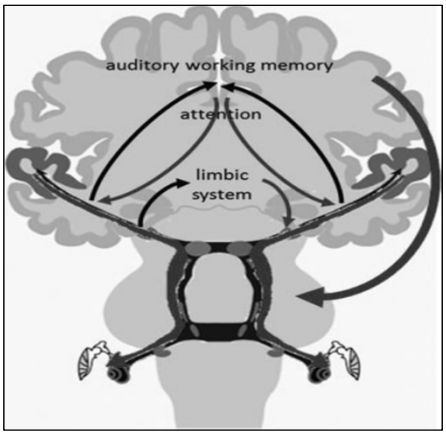
PHONAK life is on

Hearing and listening

PHONAK life is on

Hearing and listening





PHONAK life is on

PHONAK life is on

Hearing and listening

PHONAK life is on

Hearing and listening

CHILDREN AND NOISE: SETTINGS

Noise at home	50 - 80 dB A
Home appliances	78 - 102 dB A
Noise in incubators	60 - 75 dB A, peak sounds 120 dB A
Noise in hospitals	> 70 dB A
Day-care institutions	75 – 81 dB A
Noise from toys peak sounds	79 - 140 dB A
Background noise in schools	46.5 – 77.3 dB A

20

These ranges represent excessive everyday exposures of children to sound.

References:

•Committee on Environmental Health. Noise: A Hazard for the Fetus and Newborn. *Pediatrics*, 1997, 100:724-27.

PHONAK life is on

PHONAK life is on

Hearing and listening

Reference	Number of classrooms (n)	Mean L (range) dB	Activity
Sato & Bradley 2004	41	44	No student activity
Shield & Dockrell 2004	110	56	Silent reading / exam
		61	One person speaking
		65	Individual work (most common)
		72	Individual work and movement
		73	Group work
		77	Group work and movement
		72	Overall average
Picard & Bradley 2001	1	71 (39-87)	28 pupils in co-operative instruction
		61	Written exam (including instructions)
Mackenzie & Airey 1995	56	56 (31-68)	Pupils silent
		77 (52-101)	Pupils working
		70 (42-84)	Teacher talking

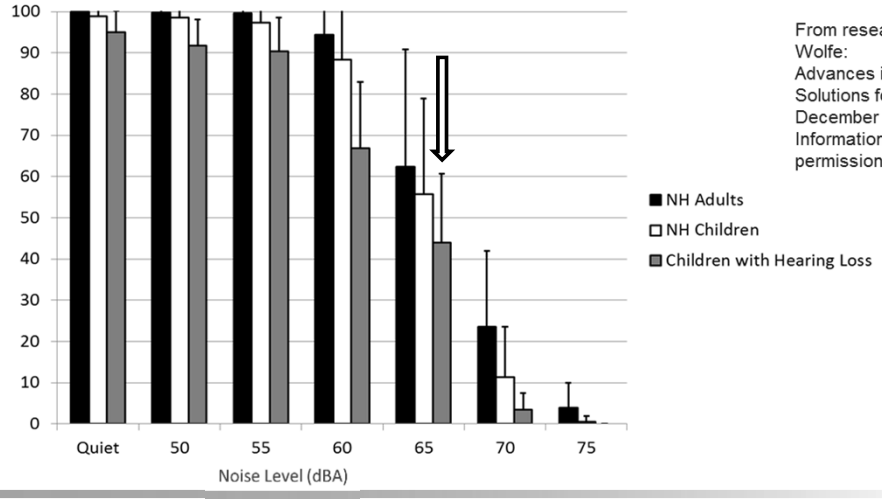
Greenland (2009)

11 2/22/2016

PHONAK life is on

Hearing and listening

- Speech recognition without FM



HEARTS for HEARING

Dr. Jace Wolfe, 2012

From research presented by Dr. Jace Wolfe:
Advances in Audiology - Tomorrow's Solutions for Today's Challenges
December 2-5 2012, Las Vegas, USA
Information and slides shared with permission

12 2/22/2016

PHONAK life is on

PHONAK life is on

Hearing and listening

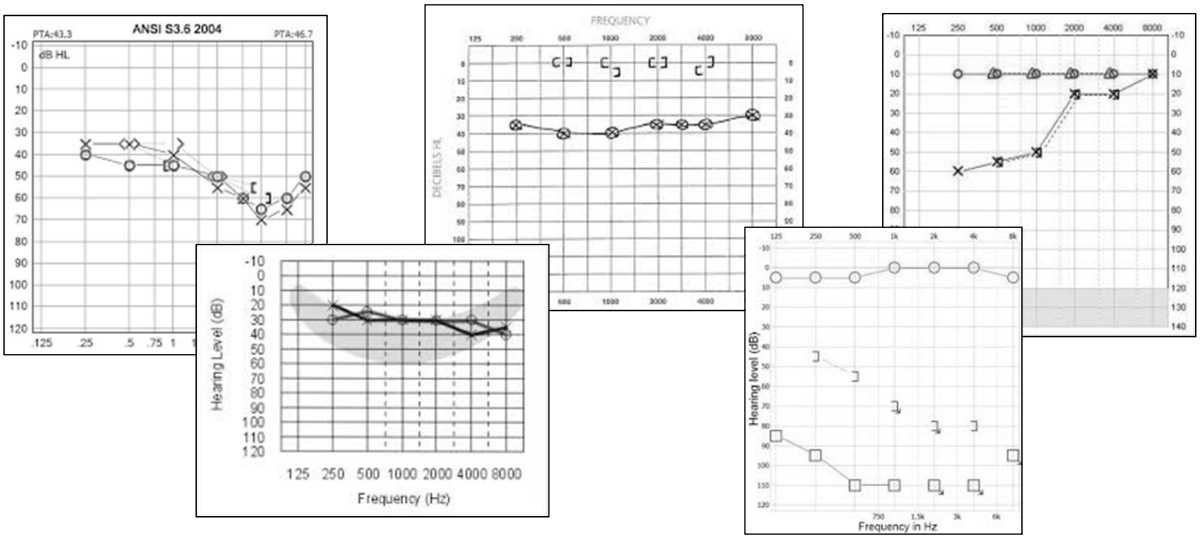
- What story do you hear?

PHONAK life is on

Who is at risk?

PHONAK life is on

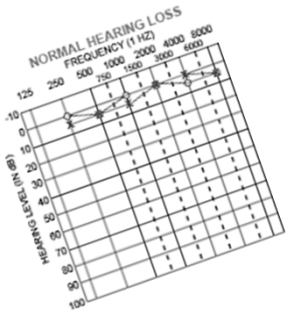
Peripheral hearing loss



PHONAK life is on

Who is at risk?

- Auditory processing disorders



Int J Audiol. 2009;48(6):371-83. doi: 10.1080/14992020802687516.

Multiple benefits of personal FM system use by children with auditory processing disorder (APD).

Johnston KN[1], John AB, Kreisman NV, Hall JW 3rd, Crandell CC.

PHONAK life is on

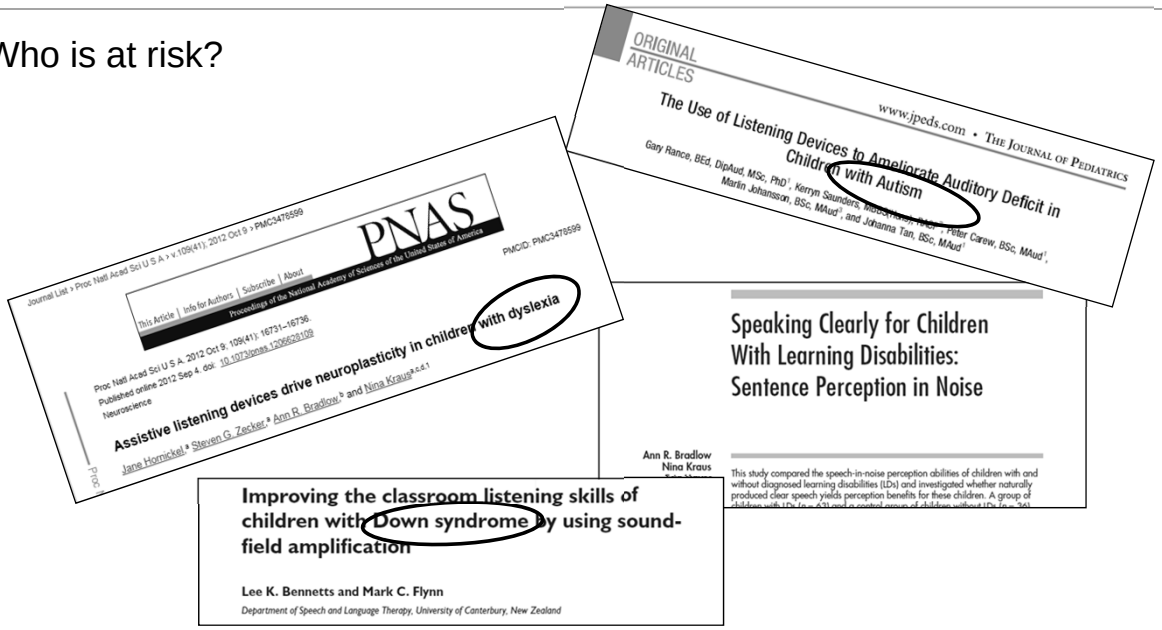
PHONAK life is on

Who is at risk?

- Students with significant hearing loss or diagnosed **auditory processing problems** are not the only students facing listening challenges

PHONAK life is on

Who is at risk?



PHONAK life is on

PHONAK life is on

Audibility in the classroom for all children

- All children need an adequate SNR
- All students benefit with reducing from Noise, Distance, and Reverberation in the modern classroom.

Classroom acoustics

PHONAK life is on

PHONAK life is on

Reduce reflective surfaces

High ceilings

Hard walls

Windows

Hard floors

PHONAK life is on

Reduce reflective surfaces

PHONAK life is on

PHONAK life is on

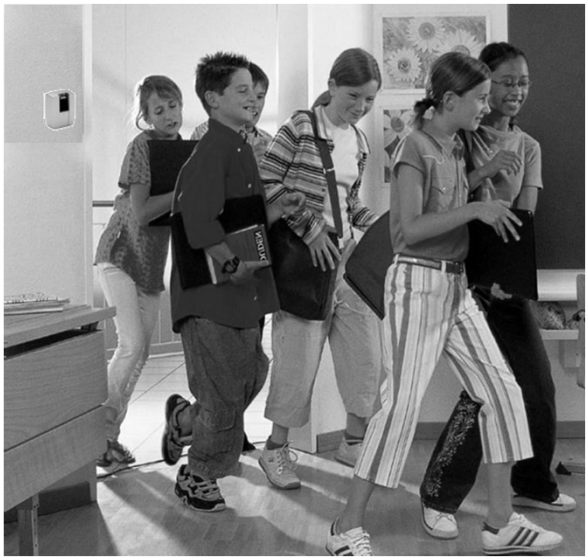
Be aware of additional noise sources

- HVAC or AC unit
- Classroom technology
- Classroom furniture
- Classroom pets
- Hallway noise
- Outside noise when windows are present



Be aware of additional noise sources

- Students



Classroom acoustics – classroom management

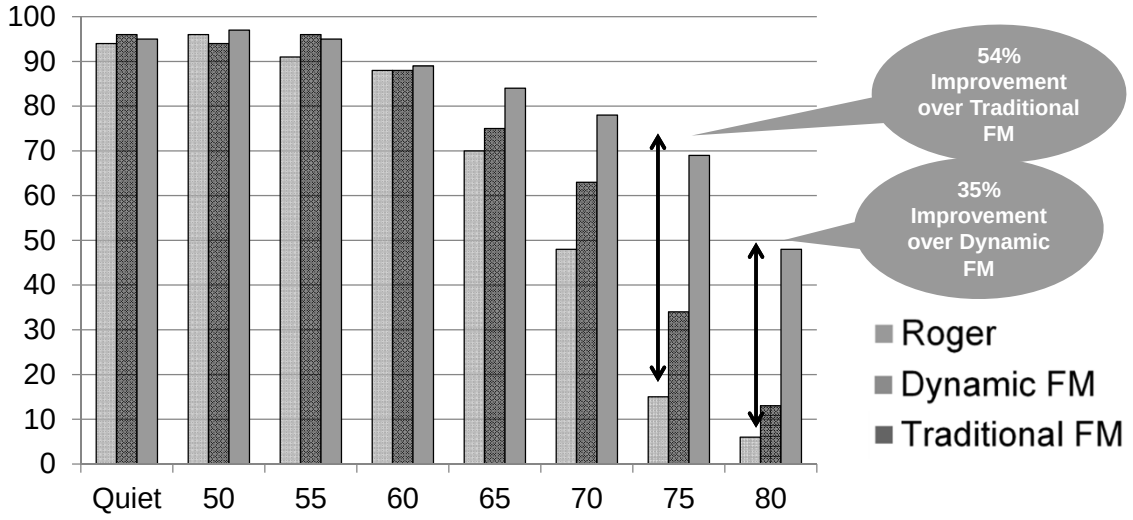
- Create a respect for the importance of quiet and calm in the classroom
- Insist on one speaker at a time
- Flexible seating with rewards for self initiative
- Buy a sound level meter app so the class understands the concept of soft, medium and loud sounds
- Monitor the classroom

Classroom acoustics - Classroom management

- Create a better signal to noise ratio through technology
- HAT: DM and FM

roger

Classroom acoustics – technology benefit



PHONAK life is on

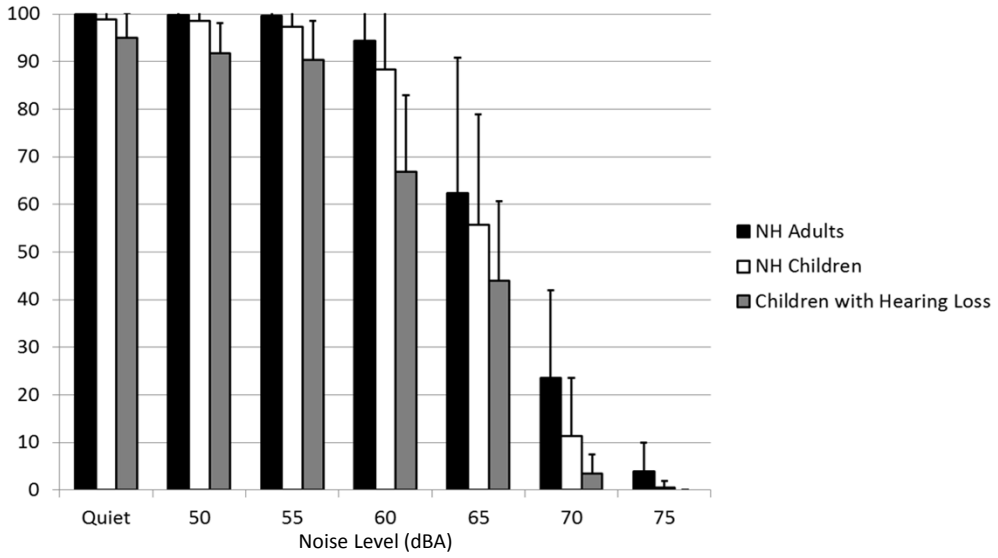
PHONAK life is on

Classroom distribution systems

- **ASA Panel on Public Policy, 2013 (CADs)**
- Emphasizing sound distribution rather than amplification
- Understanding that CADS cannot substitute for poor acoustics
- Providing training in the use of CADS to classroom teachers
- Conducting validation procedures to document that the system is providing an appropriate speech-to-noise ratio

PHONAK life is on

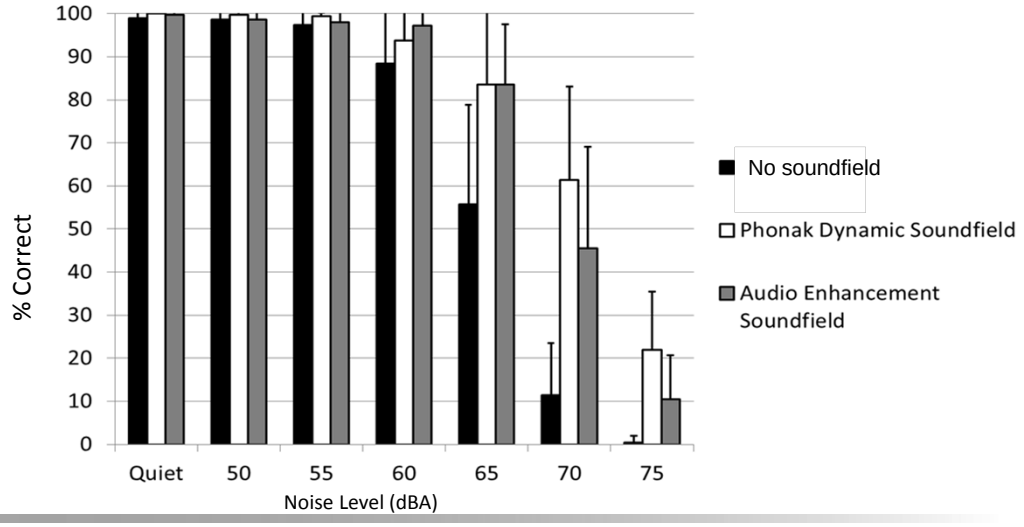
Results: speech recognition without soundfield or Dynamic FM



PHONAK life is on

PHONAK life is on

Normal hearing children with soundfield



PHONAK life is on

Classroom distribution systems

- Roger DigiMaster 5000 and 7000 speakers

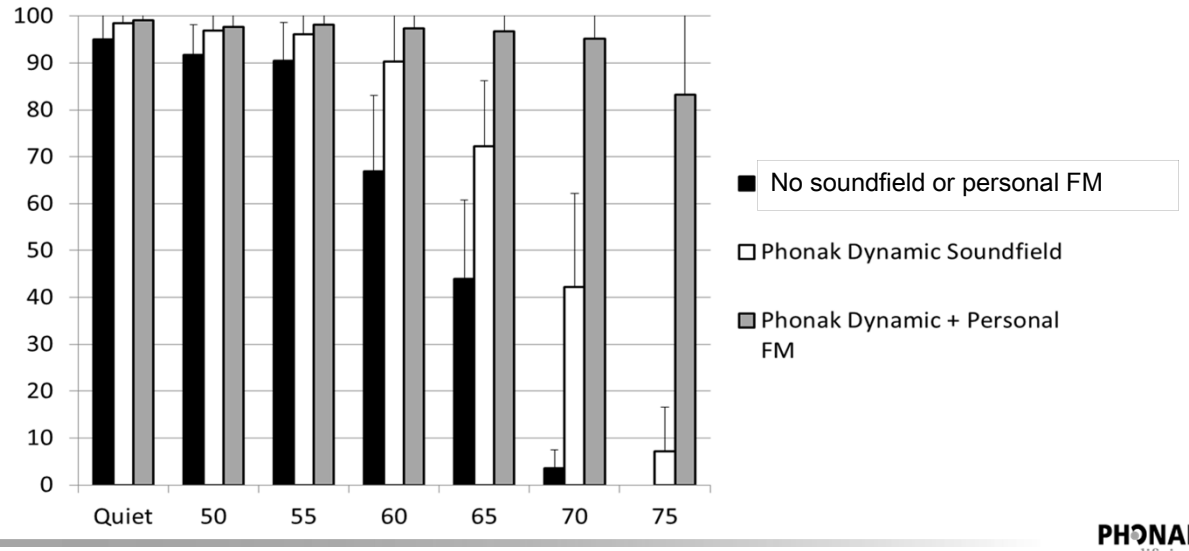
- 12-loudspeaker array
- Adaptive behavior
- Floor stand or wall mounted
- Audio input- connect to smart board

- Microphones:
  - Roger inspiro (Roger/FM/SoundField)
  - Roger inspiro SoundField only

PHONAK life is on

PHONAK life is on

Soundfield <--> Soundfield + Dynamic FM Receiver



35 2/22/2016

PHONAK life is on

Personal devices

- Compatible with:
  - hearing instruments
  - cochlear implants
  - Bahas
- Via:
  - Design-integrated receivers
  - Universal ear level or inductive neck-loop receivers
  - Streamer receivers

36 2/22/2016

PHONAK life is on

PHONAK life is on

Classroom Distribution Systems with Personal DM/FM

- Roger and FM receivers

PHONAK life is on

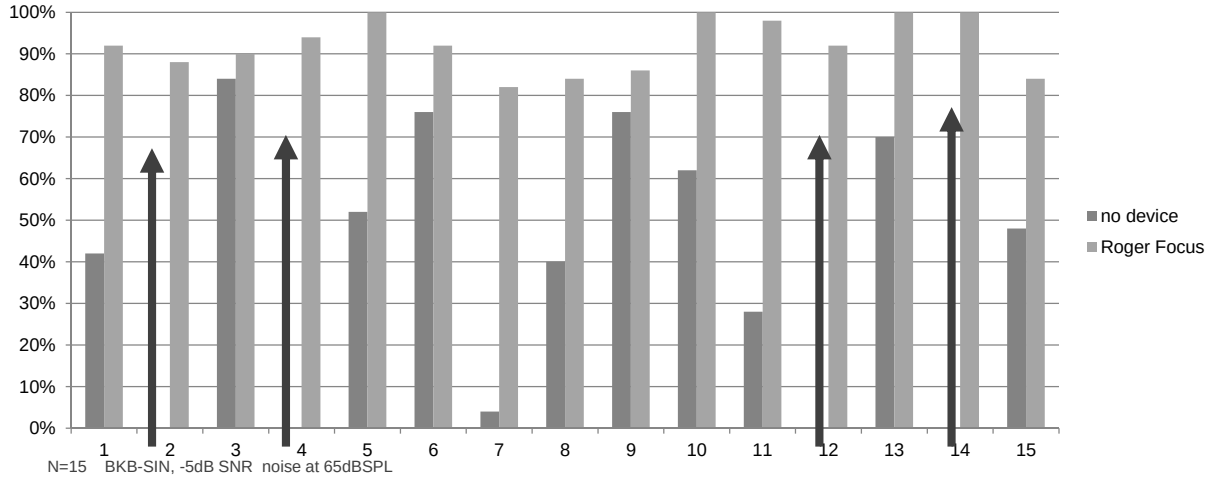
Personal devices for children with normal hearing

PHONAK life is on

PHONAK life is on

Maximum Performance: Roger Focus Evidence

Speech-in-noise testing revealed an average improvement of 53% with Roger Focus compared to no device



N=15 BKB-SIN, -5dB SNR noise at 65dBSPL

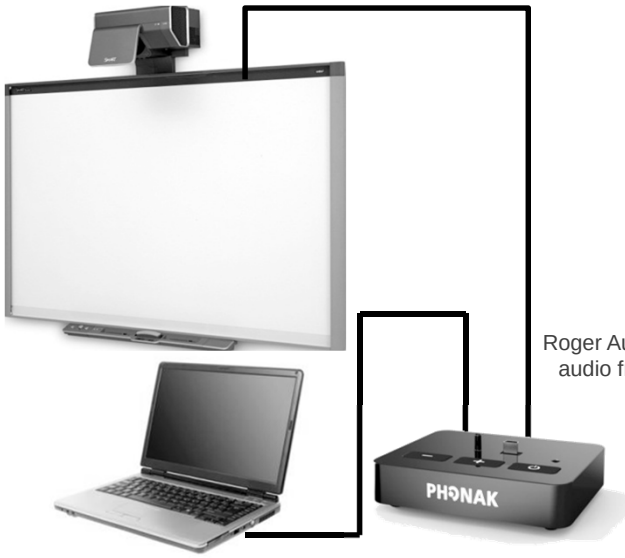
Note: with the exception of subjects 3 and 9 all individual scores showed significant improvement

Subjects 2, 4, 12, and 14 scored 0% without any device and almost 100% with Roger Focus.

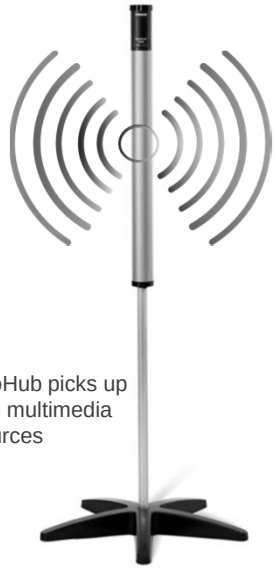
HAT – additional considerations

- **Roger DynaMic**
  - Handy pass-around microphone
  - Works as a secondary microphone alongside Roger inspiro in a MultiTalker Network
  - Allows the comments of students and secondary teachers to be heard by everyone
  - Roger DynaMic is capable of transmitting speech simultaneously to Roger, FM and soundfield listeners

HAT – additional considerations



Roger AudioHub picks up audio from multimedia sources



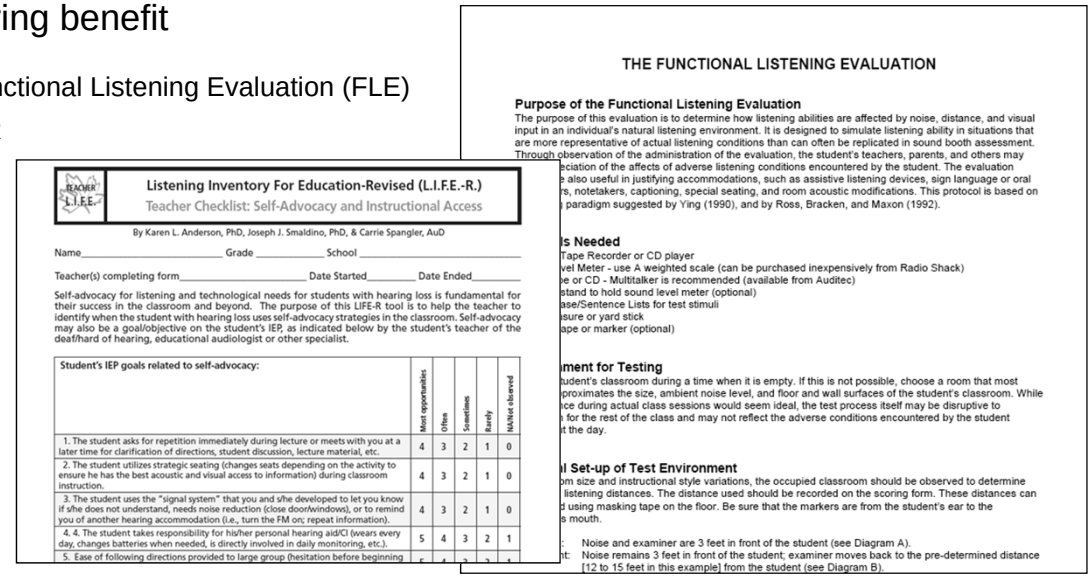
Roger inspiro delivers the speech from the teacher

PHONAK life is on

PHONAK life is on

Measuring benefit

- The Functional Listening Evaluation (FLE)
- LIFE –R



THE FUNCTIONAL LISTENING EVALUATION

Purpose of the Functional Listening Evaluation
The purpose of this evaluation is to determine how listening abilities are affected by noise, distance, and visual input in an individual's natural listening environment. It is designed to simulate listening ability in situations that are more representative of actual listening conditions than can often be replicated in sound booth assessment. Through observation of the administration of the evaluation, the student's teachers, parents, and others may
ciation of the affects of adverse listening conditions encountered by the student. The evaluation
also useful in justifying accommodations, such as assistive listening devices, sign language or oral
rs, notetakers, captioning, special seating, and room acoustic modifications. This protocol is based on
paradigm suggested by Ying (1990), and by Ross, Bracken, and Maxon (1992).

s Needed
Tape Recorder or CD player
vel Meter - use A weighted scale (can be purchased inexpensively from Radio Shack)
e or CD - Multitalker is recommended (available from Auditec)
stand to hold sound level meter (optional)
ase/Sentence Lists for test stimuli
sure or yard stick
ape or marker (optional)

ment for Testing
udent's classroom during a time when it is empty. If this is not possible, choose a room that most
proximates the size, ambient noise level, and floor and wall surfaces of the student's classroom. While
ce during actual class sessions would seem ideal, the test process itself may be disruptive to
for the rest of the class and may not reflect the adverse conditions encountered by the student
t the day.

l Set-up of Test Environment
om size and instructional style variations, the occupied classroom should be observed to determine
listening distances. The distance used should be recorded on the scoring form. These distances can
d using masking tape on the floor. Be sure that the markers are from the student's ear to the
s mouth.

: Noise and examiner are 3 feet in front of the student (see Diagram A).
t: Noise remains 3 feet in front of the student; examiner moves back to the pre-determined distance [12 to 15 feet in this example] from the student (see Diagram B).

Listening Inventory For Education-Revised (L.I.F.E.-R.)
Teacher Checklist: Self-Advocacy and Instructional Access

By Karen L. Anderson, PhD, Joseph J. Smaldino, PhD, & Carrie Spangler, AuD

Name_____ Grade _____ School _____

Teacher(s) completing form_____ Date Started_____ Date Ended_____

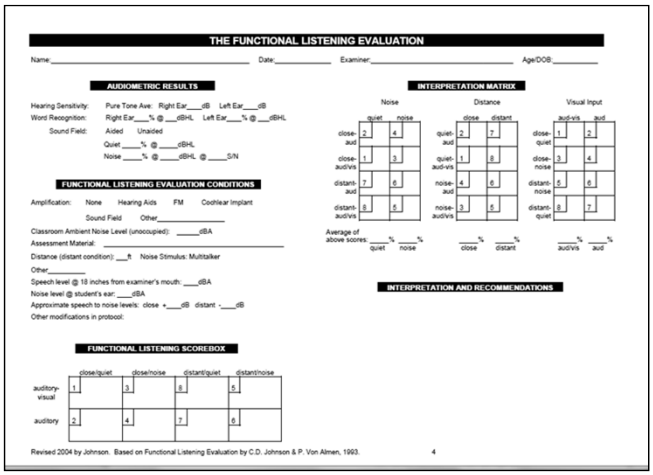
Self-advocacy for listening and technological needs for students with hearing loss is fundamental for their success in the classroom and beyond. The purpose of this LIFE-R tool is to help the teacher to identify when the student with hearing loss uses self-advocacy strategies in the classroom. Self-advocacy may also be a goal/objective on the student's IEP, as indicated below by the student's teacher of the deaf/hard of hearing, educational audiologist or other specialist.

Student's IEP goals related to self-advocacy:	Most opportunities	Often	Sometimes	Rarely	NA/Not observed
1. The student asks for repetition immediately during lecture or meets with you at a later time for clarification of directions, student discussion, lecture material, etc.	4	3	2	1	0
2. The student utilizes strategic seating (changes seats depending on the activity to ensure he has the best acoustic and visual access to information) during classroom instruction.	4	3	2	1	0
3. The student uses the "signal system" that you and s/he developed to let you know if s/he does not understand, needs noise reduction (close door/windows), or to remind you of another hearing accommodation (i.e., turn the FM on; repeat information).	4	3	2	1	0
4. 4. The student takes responsibility for his/her personal hearing aid/CI (wears every day, changes batteries when needed, is directly involved in daily monitoring, etc.).	5	4	3	2	1
5. Ease of following directions provided to large group (hesitation before beginning	5	4	3	2	1

PHONAK life is on

Functional Listening Evaluation (FLE)

- Pros:
  - Addresses room acoustics
  - Addresses child performance in various situations.
- Cons:
  - Although very easy to perform, it can be daunting to first time users and those who are not familiar with it



THE FUNCTIONAL LISTENING EVALUATION

Name:_____ Date:_____ Examiner:_____ Age/DOB:_____

AUDIOMETRIC RESULTS

Hearing Sensitivity: Pure Tone Ave: Right Ear___dB Left Ear___dB
Word Recognition: Right Ear___% @ ___dBHL Left Ear___% @ ___dBHL
Sound Field: Aided Unaided
Quiet ____% @ ____dBHL
Noise ____% @ ____dBHL @ ____S/N

FUNCTIONAL LISTENING EVALUATION CONDITIONS

Amplification: None Hearing Aids FM Cochlear Implant
Sound Field Other_____
Classroom Ambient Noise Level (unoccupied): _____dBA
Assessment Material: _____
Distance (distant condition): ___ft Noise Stimulus: Multitalker
Other_____
Speech level @ 18 inches from examiner's mouth: ____dBA
Noise level @ student's ear: ____dBA
Approximate speech to noise levels: close +____dB distant -____dB
Other modifications in protocol:

FUNCTIONAL LISTENING SCOREBOX

	close/quiet	close/noise	distant/quiet	distant/noise
auditory-visual	1	3	6	5
auditory	2	4	7	6

INTERPRETATION MATRIX

Noise	quiet	noise
close-aud	2	4
close-aud/vis	1	3
distant-aud	7	6
distant-aud/vis	8	5

Distance	close	distant
quiet-aud	2	7
quiet-aud-vis	1	8
noise-aud	4	6
noise-aud/vis	3	5

Visual Input	aud-vis	aud
close-quiet	1	2
close-noise	3	4
distant-noise	5	6
distant-quiet	8	7

Average of above scores: ____% ____% (quiet / noise) ____% ____% (close / distant) ____% ____% (aud/vis / aud)

INTERPRETATION AND RECOMMENDATIONS

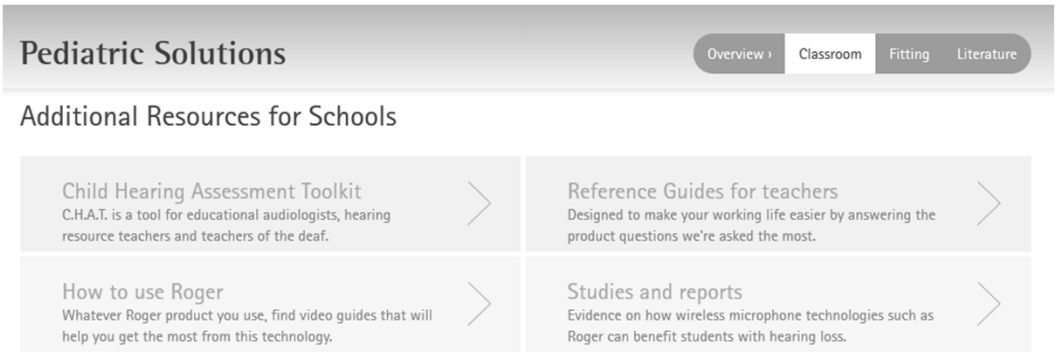
Revised 2004 by Johnson. Based on Functional Listening Evaluation by C.D. Johnson & P. Von Almen, 1993. 4

PHONAK life is on

PHONAK life is on

FLE continued

- The Functional Listening Evaluation can be found on www.phonakpro.com in our CHAT assessment tool.



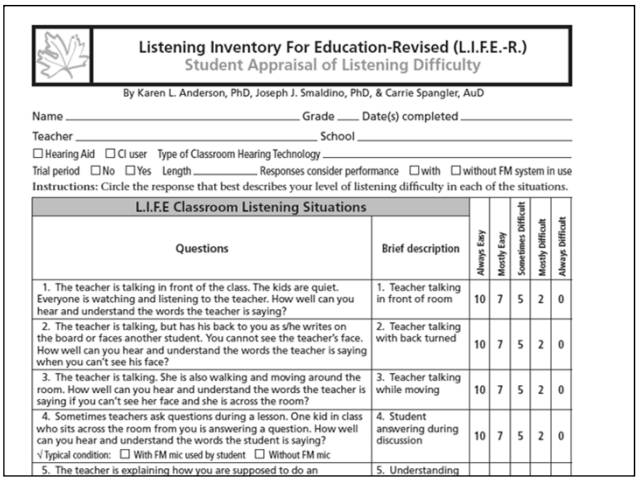
- Successforkidswithhearingloss.com

PHONAK life is on

Listening Inventory for Education Revised (LIFE-R)

- Pros
  - Easy to understand and administer
  - Many categories in the revised version
  - No measurement of acoustics
- Cons
  - Time and attention in filling out
  - No measurement of acoustics

- Available at **Successforkids.com**



Listening Inventory For Education-Revised (L.I.F.E.-R.)
Student Appraisal of Listening Difficulty

By Karen L. Anderson, PhD, Joseph J. Smaldino, PhD, & Carrie Spangler, AuD

Name _____ Grade ____ Date(s) completed _____
Teacher _____ School _____
☐ Hearing Aid ☐ CI user Type of Classroom Hearing Technology _____
Trial period ☐ No ☐ Yes Length _____ Responses consider performance ☐ with ☐ without FM system in use
Instructions: Circle the response that best describes your level of listening difficulty in each of the situations.

L.I.F.E Classroom Listening Situations						
Questions	Brief description	Always Easy	Mostly Easy	Sometimes Difficult	Mostly Difficult	Always Difficult
1. The teacher is talking in front of the class. The kids are quiet. Everyone is watching and listening to the teacher. How well can you hear and understand the words the teacher is saying?	1. Teacher talking in front of room	10	7	5	2	0
2. The teacher is talking, but has his back to you as s/he writes on the board or faces another student. You cannot see the teacher's face. How well can you hear and understand the words the teacher is saying when you can't see his face?	2. Teacher talking with back turned	10	7	5	2	0
3. The teacher is talking. She is also walking and moving around the room. How well can you hear and understand the words the teacher is saying if you can't see her face and she is across the room?	3. Teacher talking while moving	10	7	5	2	0
4. Sometimes teachers ask questions during a lesson. One kid in class who sits across the room from you is answering a question. How well can you hear and understand the words the student is saying? √ Typical condition: ☐ With FM mic used by student ☐ Without FM mic	4. Student answering during discussion	10	7	5	2	0
5. The teacher is explaining how you are supposed to do an	5. Understanding					

PHONAK life is on

PHONAK life is on

Summary

- Who is at risk?
  - **All students not just those with Hearing impairment need positive SNR**
- What can we do about it?
  - **Modify the room acoustics and use Hearing Assistive Technology**
- How do I know my interventions are helping?
  - **Measure Benefit!**

PHONAK life is on

Thank you

PHONAK life is on

PHONAK life is on