Remote Microphone Technologies in Pediatric Education: Making Every Voice Count

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Key Takeaways

Key Takeaway	Clinical Implication
Auracast™ is primarily designed for broadcasting in stationary, public spaces	Think modernized loop: houses of worship, theatres, universities, conference rooms, bars/restaurants, and conference centres.
Auracast adoption is slow and usability is not yet streamlined	Auracast may not be relevant for the vast majority of clients for the next few years; continue advocating for installations.
Roger and Auracast differ in delay, ease of use, and compatibility	Roger discovery delay is 0.4 – 1.4 seconds with audio delay below 30ms; Auracast is 6 – 40 seconds and above 30ms.
Roger was built for education	Features such as transmitter-initiated connection, MultiTalker Network, automatic microphone modes, and List Devices address classroom needs.
Roger offers universal compatibility today	The Roger ecosystem is for all hearing devices, while Auracast is limited to Auracast™-enabled hearing instruments.
Not all remote microphones are created equal	Roger significantly outperformed traditional fixed-directional remote microphones in noisy classroom settings.
Consider the performance of the overall system	Care should be taken when recommending an RM solution best suited to the client's listening needs and realistic noise levels.

Course Content

Learner Outcomes

After this course, participants will be able to:

- Describe how Auracast™ differs from the Roger™ wireless protocol
- List ways Roger technology is specifically designed for education
- Explain considerations for choosing remote microphones for an educational setting

The Future of Broadcasting

Bluetooth Taxonomy

- Bluetooth® includes Classic (1:1 streaming, widely supported current standard), LE Audio, and LE Data.
- LE Audio includes Auracast™ Broadcast (1:many streaming) and Unicast (1:1 streaming, future generation of Classic).
- LE Data covers device control via app and Noahlink wireless.
- Non-Bluetooth® protocols still use 2.4 GHz: MFi, ASHA, and AirStream are proprietary standards based on Bluetooth LE, and Roger is a Phonak proprietary protocol.

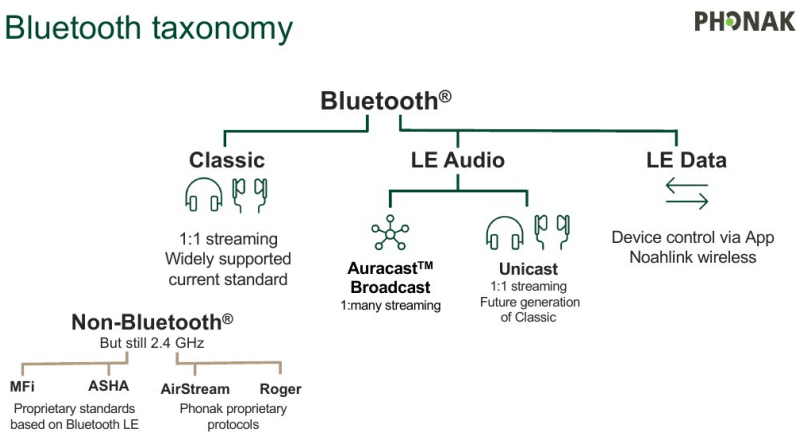


Figure 1. Bluetooth taxonomy showing Classic, LE Audio, LE Data, and non-Bluetooth protocols.

Q1 **Quiz Hint:** Classic and LE Audio appear in the Bluetooth taxonomy as wireless protocols, and Roger is a Phonak proprietary wireless protocol that is non-Bluetooth but still uses 2.4 GHz.

How Does Auracast™ Work?

- Venue sets up a transmitter: a TV, PA system, or audio device starts an Auracast broadcast, like a local radio station in the room.
- Find and select a stream: open a broadcast assistant app and scan a QR code or scan for nearby streams, such as "St. Mary's Church" or "TV1 - English".
- Hearing aids receive audio: they stream the audio directly, with their own volume and program, independent of others.

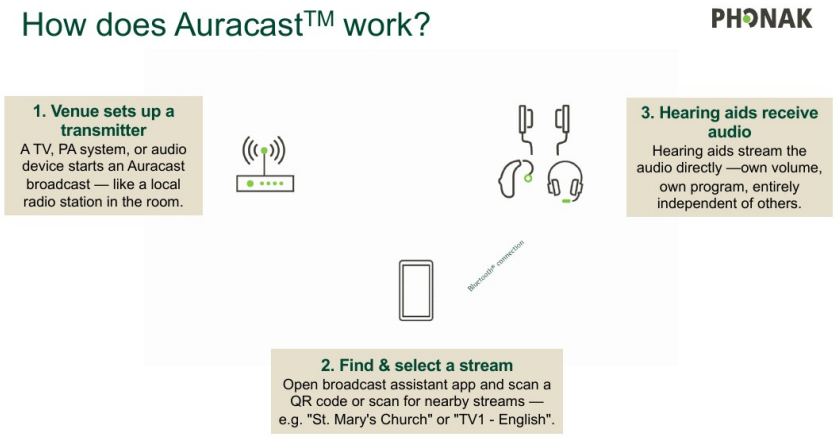


Figure 2. The three steps of how Auracast works.

What Can Auracast™ Do?

- Digital signal
- ‘Good’ latency
- Anonymous join/exit
- Encryption
- Easy installation – retrofitting into buildings
- Manufacturer buy-in – adoption potential

Where Is Auracast™ Used?

It is primarily designed for broadcasting in stationary, public spaces – think modernized loop.

- Houses of worship
- Theatres
- Universities
- Conference Rooms
- Bars/Restaurants

- Conference Centres

Q2 **Quiz Hint:** Auracast is primarily designed for broadcasting in stationary, public spaces, which the course describes as a modernized loop.

Who Is Auracast™ For?

For anybody and everybody.

- People with hearing loss: requires Auracast compatible hearing devices, or a venue-provided receiver neckloop for telecoil.
- People without hearing loss: requires compatible personal wireless earbuds, or venue-provided receiver devices with headphones.

When Is Auracast™ Coming?

Already, but not yet.

- Installations are taking place; 568 sites globally so far (searched on HearFinder, Nov 3, 2026).

Auracast adoption is slow.

- ABI Research estimates 1.5 million sites will be Auracast enabled by 2029.
- It will likely replace loop systems over the next 20-30 years.

Usability isn't streamlined yet.

- Inconsistent sampling rates of transmitters, receiver volume, and broadcast joining method.
- Timeline: 2021 specifications released; 2026 today; 2027 IEC standards released; 2029 1.5 million Auracast enabled sites.

What Do We Need to Do?

- Awareness: Auracast is enabled in most new hearing aids, but may not be relevant for the vast majority of clients for the next few years, until there is greater adoption.
- Advocate: continue advocating for Auracast installations around the world, regardless of whether people will need it today, they will in future.
- Advance: installation is simpler and cheaper than loop systems in most instances, and the general guidance is to encourage dual transmission of both loop and Auracast (+/- Roger) for public venues wherever possible.

Roger Protocol

The wireless protocol for Roger offers easy to use, the RogerDirect™ advantage, and universal compatibility, with a balance of audio delay, discovery delay, audio quality, power consumption, compatibility, and ease of use.

Seamless Usability

Low-latency

- Experience real-time speech thanks to the extremely fast Roger protocol.
- Quick to re-join with a low discovery delay.

Low-hassle

- Stable connections by owning the protocol.
- Transmitter initiated connections – no assistants/apps needed.
- Accelerometer-powered automatic microphone modes.

Similar but Different: Roger and Auracast™

Feature	Roger	Auracast™
Discovery delay	0.4 – 1.4 seconds	6 – 40 seconds
Audio delay	Below 30ms	Above 30ms
Audio quality	Good	Good at 16kHz, very good at 24kHz
Power	Low	Slightly lower
Ease of use	Turn microphone on	Install transmitter, Auracast™ Assistant, Find Network, (Password)
Compatibility	For all hearing devices	Limited to Auracast™-enabled HIs only

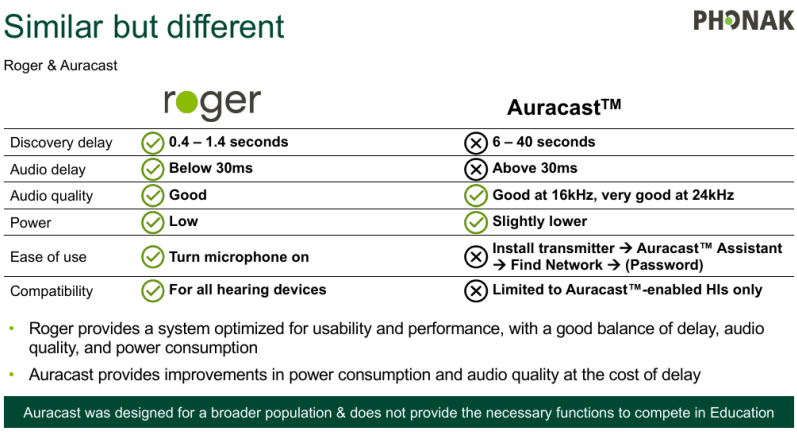


Figure 3. Roger and Auracast compared on delay, audio quality, power, ease of use, and compatibility.

- Roger provides a system optimized for usability and performance, with a good balance of delay, audio quality, and power consumption.
- Auracast provides improvements in power consumption and audio quality at the cost of delay.
- Auracast was designed for a broader population and does not provide the necessary functions to compete in Education.

Considerations for Education

Consideration	Roger Feature
Compatibility: How many children currently have compatible receivers?	Universal Compatibility
Assistant: How many children can use their phones in schools?	Transmitter-initiated Connection
Automatic Join: Can children join hassle-free?	WallPilot, Auto-connection
Volume: How do you know children are getting the correct volume?	Verification Protocol & EasyGain
Co-teaching: How can multiple talkers interact and be heard by the child?	MultiTalker Network
Group work: How do you use the microphone beyond presenter mode?	Automatic Microphone Modes
Check: How do you know your child is tuned into the broadcast?	List Devices

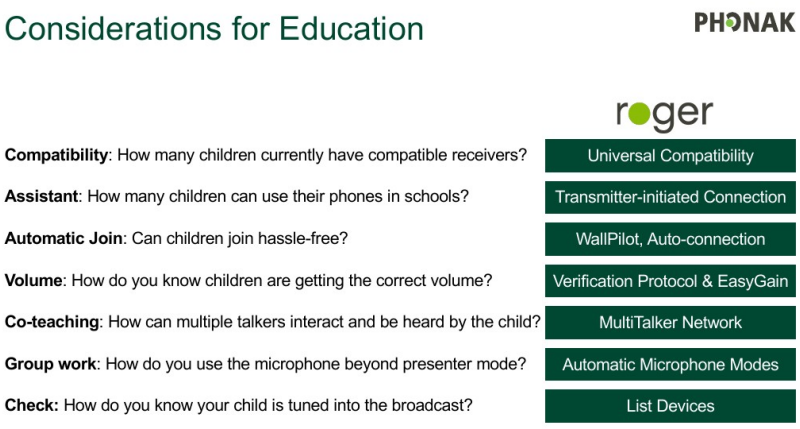


Figure 4. Considerations for education matched to Roger features.

Roger and Auracast™

- Roger and Auracast are both wireless broadcasting protocols (a means to send information). They behave in very similar ways, and can be used in similar applications.
- Auracast has limited availability today, but is slowly gaining traction. We need to be advocating for more public venues to have Auracast compatibility to make it useful.

- Which one is better? It comes down to the overall system, rather than the wireless protocol itself. Auracast implementation in Education requires more innovation on the system.

> Roger was built for Education

Q3 **Quiz Hint:** Roger was built for education: it offers a low-latency protocol, transmitter-initiated connections, MultiTalker Network for co-teaching, and accelerometer-powered automatic microphone modes.

Roger Compatibility

The Roger Ecosystem

Universal compatibility, today. The Roger ecosystem includes RogerDirect, Roger Neckloop, Roger X, Roger Digimaster™, Roger 14, Roger 17, Roger 20, and Roger 21.

The RogerDirect™ Advantage

RogerDirect provides the best latency and audio quality, with additional benefits.

- Design-integrated receivers provide better audio quality, with a compromise on aesthetics.
- NeckLoop provides low-latency signal, with a compromise on convenience and audio quality.
- Using a Roger X with an intermediary device can result in ‘double delay’.

Additional RogerDirect benefits:

- Discrete, hassle-free and without intermediary devices
- Guaranteed end-to-end low-latency signal
- Receiver specific adjustment with EasyGain
- Stereo mode (with a binaural pair of RogerDirect hearing devices)
- Extended range
- Dedicated RogerDirect+Mic program with personalized gain control, adaptive local mics up to Fixed Directional, and dual adaptive gain behavior.

Futureproofing the Classroom

- The Roger advantage: adaptive gain, list devices, various microphone modes, and an ecosystem and combination of products/accessories that Auracast devices cannot support natively yet.
- Backed by clinical evidence: enhances speech recognition over background noise for learning and cognitive development, and reduces vocal strain for teachers, improving their overall well-being.
- Future-ready: retrofitting with an Auracast allows you to benefit from Roger’s adaptive behavior and mixing feature, and future Roger products will be backwards compatible with devices currently sold today.

Q5 **Quiz Hint:** Roger compatibility is described as being for all hearing devices, through an ecosystem of RogerDirect, neckloop, and other receivers, while Auracast is limited to Auracast-enabled hearing instruments.

Roger Evidence

Technical Measures of Performance (Roh et al., 2025)

Compared: Roger TSM (protocol: Roger; receiver: Audeo HIs), Manufacturer A (2.4GHz proprietary; native HAs), Manufacturer B (Auracast 24k; native HAs), and Manufacturer C (Auracast 48k; earbuds) on latency, speech intelligibility, and audio quality.

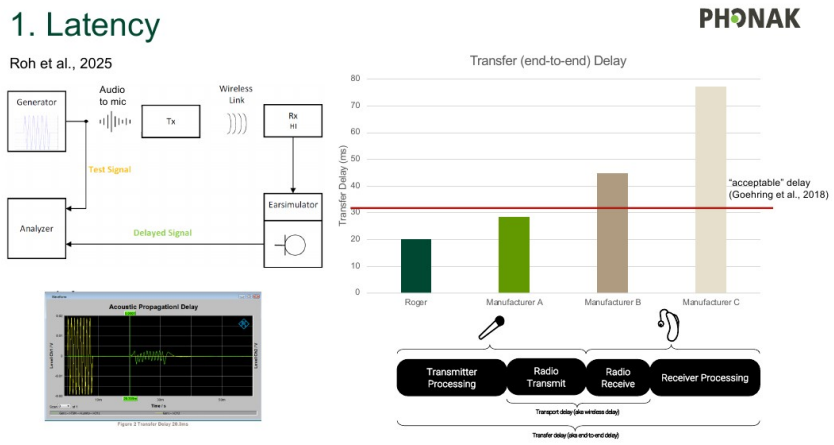


Figure 5. Transfer (end-to-end) delay for Roger and three other manufacturers.

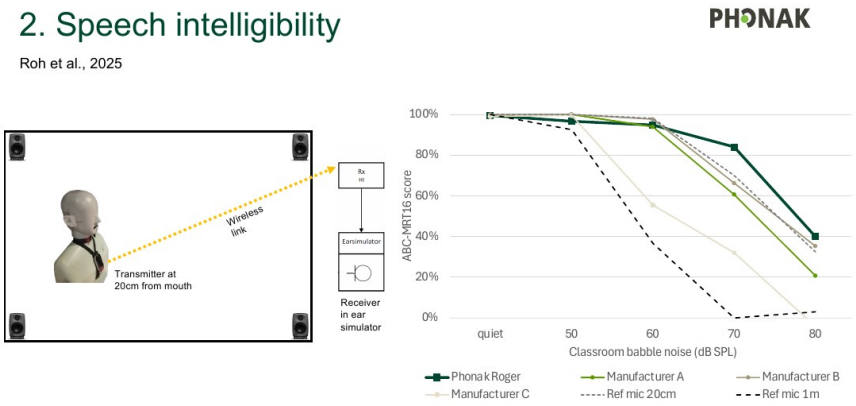


Figure 6. Speech intelligibility scores in classroom babble noise.

- Roger outperforms competitors in delay, predicted speech intelligibility in noise, and estimated sound quality.

Roger vs Fixed Directional RMs (Neumann et al., 2025)

- Assessed speech intelligibility in noise in school-age children with hearing loss in simulated classroom settings using Roger (Dual adaptive) and a fixed directional RM, and evaluated preference.
- Participants: 25 children, 8-12 years old; average PTA 48.6 dB left ear, 50.4 dB right ear (moderate hearing loss); Phonak hearing aids fit to DSL 5.0 targets.

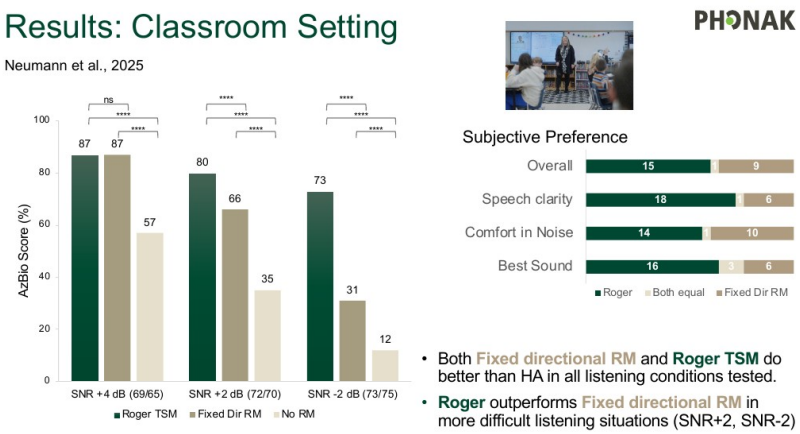


Figure 7. AzBio scores and subjective preference in the classroom setting.

- Both fixed directional RM and Roger TSM do better than HA in all listening conditions tested.
- Roger outperforms fixed directional RM in more difficult listening situations (SNR+2, SNR-2).

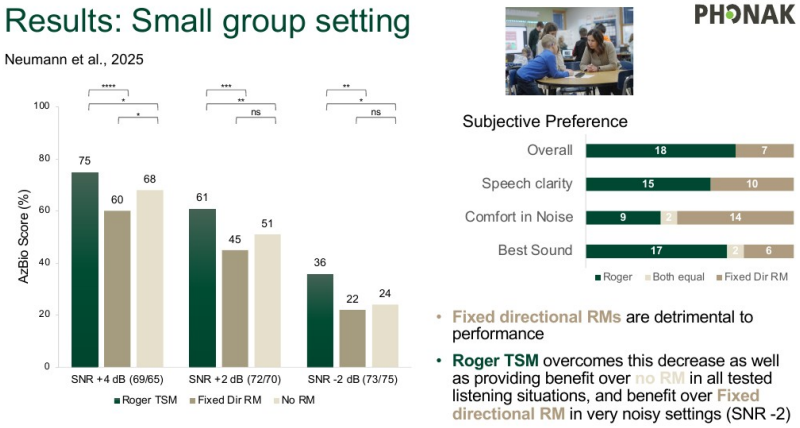


Figure 8. AzBio scores and subjective preference in the small group setting.

- Fixed directional RMs are detrimental to performance.
- Roger TSM overcomes this decrease, provides benefit over no RM in all tested listening situations, and benefit over fixed directional RM in very noisy settings (SNR -2).
- Which device looked nicer? 46% Roger, 37% both the same, 17% fixed directional RM. If they had to choose one device, 68% chose Roger and 32% chose the fixed directional RM.
- Even though the traditional RM had a more appealing design (smaller, lighter), children still chose to use the Roger TSM.

Roger On Competitive Benchmarking (Stewart et al., 2026)

- Participants: 19 adults, 40-85 years old, experienced hearing aid wearers; Phonak hearing aids fit to NAL NL-2 targets.
- Low noise (60 dBA signal, 63 dBA noise, -3 dB SNR): 67% correct with HA alone versus 96% with HA + Roger.
- High noise (60 dBA signal, 70 dBA noise, -10 dB SNR): 14% correct with HA alone versus 86% with HA + Roger.
- Compared with two other remote microphone systems, Phonak Audéo I with Roger On provides significantly better far-field speech intelligibility in noise.

Q4 **Quiz Hint:** In the benchmarking study, Phonak Audéo I with Roger On provided significantly better far-field speech intelligibility in noise than hearing aids alone and than two other remote microphone systems.

Roger On Sphere (Roh et al., 2026)

- Table mode: compared to omni mode (Roger Verification mode) at 0 dB SNR, Roger On 3 gives up to +11.5 dB SNR benefit and Roger On Sphere gives up to +14.2 dB SNR benefit, about 3 dB more than Roger On 3.
- Roger On Sphere can provide equivalent comfort and intelligibility in situations twice as noisy as Roger On 3.
- Presenter mode: Roger On Sphere performs well even at very negative SNRs and is predicted to provide +12.9 dB SNR benefit compared to omnidirectional hearing aids.
- At 0 dB SNR, it is predicted to provide up to 67% better far-field speech in noise performance compared to HA alone.
- Results are based on a 3 dB SNR benefit in typical operating range.

What Do the Studies Tell Us?

- In general, remote microphones are better than no remote microphone, but not all remote microphones are created equal.
- Roger significantly outperformed traditional fixed-directional remote microphones in noisy classroom settings.
- Incorrect use of a fixed directional RM could be harmful regarding speech intelligibility.
- Technical set-ups confirm benefits in delay, predicted speech intelligibility in noise, and estimated sound quality.
- Care should be taken by the clinician when recommending an RM solution that is best suited to their client’s listening needs and realistic noise levels.

Evidence on Holistic Health Pyramid

The course presents evidence for advanced remote microphones across these levels:

- Quality of life
- Social well-being
- Physical well-being
- Cognitive well-being
- Ease of listening
- Speech intelligibility
- Audibility

> **Conclusion**
>
> - Auracast is coming, but implementation in Education is currently limited. Regardless, we need to continue advocating for its installations worldwide.
> - The Roger ecosystem offers the best compatibility today. Auracast will co-exist with Roger in the future.
> - Beyond compatibility, we need to consider performance of the overall system. Roger consistently shows superior performance compared to other products available today.
> - Our children need the best solutions in the future, and in the now.

Interactive Worksheet

Complete each activity as you work through the course. Click any bordered box to type your response. Checkboxes are best completed in desktop Word.

Module 1: The Future of Broadcasting

Key Terms: write each definition in your own words.

Term	My Definition
Auracast™	Click here to enter text.
LE Audio	Click here to enter text.
Roger protocol	Click here to enter text.
Discovery delay	Click here to enter text.

Guided Notes: complete the statements.

Statement	My Answer
Auracast is primarily designed for broadcasting in _____ , public spaces.	Click here to enter text.
The audio delay for Roger is below _____ ms.	Click here to enter text.
ABI Research estimates _____ sites will be Auracast enabled by 2029.	Click here to enter text.

Matching: write the letter of the matching description in the blank next to each term.

Term (letter in box)		Description
Click here to enter text.	1. Classic	A. Device control via app and Noahlink wireless
Click here to enter text.	2. Unicast	B. 1:many streaming
Click here to enter text.	3. LE Data	C. Phonak proprietary protocol
Click here to enter text.	4. Auracast™ Broadcast	D. 1:1 streaming, widely supported current standard
Click here to enter text.	5. Roger	E. 1:1 streaming, future generation of Classic

Sequencing: number the steps of how Auracast works in the order they happen, 1 through 3.

Click here to enter text.	Hearing aids stream the audio directly with their own volume and program.
Click here to enter text.	A venue transmitter such as a TV or PA system starts an Auracast broadcast.
Click here to enter text.	Open a broadcast assistant app and scan a QR code or nearby streams to select a stream.

Pause & Apply: If a family asks whether their child needs Auracast-compatible hearing devices for school, then I will say or do the following, based on what this course covered about Auracast and Roger:

Click here to enter text.

Module 2: Considerations for Education

Window Pane Summary: match each classroom challenge to the Roger feature that addresses it, and note why it matters.

Click here to enter text. **Co-teaching challenge**	Click here to enter text. **Roger feature that addresses it**
Click here to enter text. **Group work challenge**	Click here to enter text. **Roger feature that addresses it**

Quick Check: select True or False.

1. Roger uses transmitter-initiated connections, so no assistants or apps are needed.

☐True ☐False

2. Auracast was designed for a broader population and provides all the functions needed to compete in education.

☐True ☐False

3. Which remote microphone is better depends on the overall system, rather than the wireless protocol itself.

☐True ☐False

Pause & Apply: If a student in my caseload struggles to hear in group work, then I will consider the following remote microphone features and why:

Click here to enter text.

Module 3: Roger Compatibility and Evidence

Quick Check: select the best answer.

1. Compared with a fixed directional remote microphone in noisy classroom settings, Roger:

- ☐ A. Performed significantly worse
- ☐ B. Performed significantly better in more difficult listening situations
- ☐ C. Showed no difference in any condition

2. Using a Roger X with an intermediary device can result in:

- ☐ A. Extended range
- ☐ B. ‘Double delay’
- ☐ C. Stereo mode

Key Evidence: list three findings from the studies presented that you would share with a school team choosing a remote microphone:

Click here to enter text.

Pause & Apply: If a school asks me to recommend a remote microphone, then I will weigh the following listening needs and noise levels:

Click here to enter text.

Clinical Case: Selecting a Remote Microphone for a School-Age Child

An 8-year-old child with moderate hearing loss wears Phonak hearing aids and attends a busy, noisy classroom with small group activities. The school asks which remote microphone to use.

Part 1: What information would you gather first about the classroom and the child's listening needs?

Click here to enter text.

Part 2: Which education considerations (compatibility, assistant, automatic join, volume, co-teaching, group work, check) matter most here, and why?

Click here to enter text.

Part 3: The teacher reports the child struggles most in small group work. How does this change your recommendation?

Click here to enter text.

Part 4: State your final recommendation and how you would verify it is working for the child.

Click here to enter text.

Clinical Reference Tool: Remote Microphone Education Checklist

Consideration	This Student's Need	Plan / Notes
Compatibility	Click here to enter text.	Click here to enter text.
Assistant	Click here to enter text.	Click here to enter text.
Automatic Join	Click here to enter text.	Click here to enter text.
Volume	Click here to enter text.	Click here to enter text.
Co-teaching	Click here to enter text.	Click here to enter text.
Group work	Click here to enter text.	Click here to enter text.

Consideration	This Student's Need	Plan / Notes
Check	Click here to enter text.	Click here to enter text.

This tool is for clinical reference only. Always follow your facility's protocols.

Post-Course Reflection

What was the most significant thing you learned that surprised you or challenged your existing practice?

Click here to enter text.

What knowledge gaps did this course reveal in your own skills or knowledge?

Click here to enter text.

Describe a specific child or school team from your own practice where you would apply something from this course:

Click here to enter text.

Action Plan

Identify at least 2 specific, measurable changes you plan to make to your practice as a direct result of this course. Use the If-Then format where possible: "If I encounter [situation X], then I will [action Y]."

My Action Plan Goal	Target Date	How I Will Measure Success
Click here to enter text.	Click here to enter text.	Click here to enter text.
Click here to enter text.	Click here to enter text.	Click here to enter text.

Notes

Quiz Summary

The following quiz hints appeared throughout the course content. Use this section as a quick study reference.

Q1	**Quiz Hint:** Classic and LE Audio appear in the Bluetooth taxonomy as wireless protocols, and Roger is a Phonak proprietary wireless protocol that is non-Bluetooth but still uses 2.4 GHz.
Q2	**Quiz Hint:** Auracast is primarily designed for broadcasting in stationary, public spaces, which the course describes as a modernized loop.
Q3	**Quiz Hint:** Roger was built for education: it offers a low-latency protocol, transmitter-initiated connections, MultiTalker Network for co-teaching, and accelerometer-powered automatic microphone modes.
Q4	**Quiz Hint:** In the benchmarking study, Phonak Audéo I with Roger On provided significantly better far-field speech intelligibility in noise than hearing aids alone and than two other remote microphone systems.
Q5	**Quiz Hint:** Roger compatibility is described as being for all hearing devices, through an ecosystem of RogerDirect, neckloop, and other receivers, while Auracast is limited to Auracast-enabled hearing instruments.

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Additional Information

Presenter Bio

Min obtained his MAud(Hons) at The University of Auckland, New Zealand. He has held various roles in diagnostic and rehabilitative audiology, tertiary education, professional bodies, and in sales, before joining Sonova in 2022. In his current role, he provides audiological insights for product development and clinical research, as well as guiding commercial marketing for the Roger business unit.

Presenter Disclosure

Financial: Min Roh is an employee of Phonak. Non-financial: Min Roh has no relevant non-financial relationships to disclose.

This learning event focuses on Phonak products and services and will not include info on other products or services.

This course is presented by Phonak.

Additional Information (continued)

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- The course may not cover all possible risk factors, diagnostic methods, or treatment options, and complex cases may require additional considerations.
- Healthcare providers should apply cultural competence and sensitivity to ensure effective and respectful care based on their patients' diverse needs.
- Providers should always evaluate the limitations of diagnostic and screening tools, considering their potential for false results as well as any ethical implications.
- It is the responsibility of course participants to critically evaluate the evidence from multiple sources to guide professional practice.

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