Legit innovations for teens

Christine Jones, AuD
Agenda

1. Learnings from schools: evidence of challenge
2. Building features around needs: evidence based design
3. Features that work: evidence of benefit
All students sat facing the teacher and district rules forbid teachers from loitering in downtown ice cream stores, dressing in bright colors, dying their hair, and even traveling beyond city limits without permission from the school board.
Common Core adopted by 45 states

- **Teaching teamwork.** The Common Core State Standards identify collaboration and teamwork as a 21st century skill to be taught. We're moving into a collaborative culture of continuous learning within networked communities. Teachers give it life in the classroom by using team contracts, peer collaboration rubrics, and work ethic rubrics to turn group work into effective teams.
Focus on the teacher
Figure 4. Boxplots depicting the $L_{eq}$ data for each observation site.

Figure 5. Proportion of time spent in each sound environment, as classified by the observer for each site.
Classroom listening study - Feilner, 2015

- 9-15 years old
- Mainstream class environment
- Audio and video recordings throughout the day
- Observed Automatic classification and behavior of HIs
- Student interviews regarding hearing performance throughout the day
Findings

- Far less frontal instruction
- More interaction as students got older
- Multi-media
- Hearing difficulties correlated more with teaching style than acoustics
- Group work in particular reported as unsatisfactory
Acoustics of a child’s school day

- Frontal instruction: 22%
- Working individually: 13%
- Group work: 22%
- Interactive lessons: 12%
- Exciting activities: 22%
- Other: 9%
Real challenges for teens with HL in school

• **CCSS**
  
  *Schools are purposefully moving toward more collaborative styles of learning*

• **Cruckley, Scollie, & Parsa and ...**
  
  *Acoustics are such that basic amplification unlikely to yield adequate hearing performance for most of the day*

• **Feilner**
  
  *Traditional wireless microphones designed to address only 22% of the typical school day*
Given these challenges, what do teens think?
86 teenage students completed survey

Age of respondent

- Normal: 6%
- Profound: 2%
- Moderate: 28%
- UHL: 30%
- Severe: 9%
- Mild: 25%
- HA: 64%
- CI: 5%
- None: 31%

Average Audiometric Thresholds

- Male: 60%
- Female: 40%

Threshold (dB HL) vs Frequency (Hz)

- Frequency (Hz) range: 250 to 8000 Hz
- Threshold range: -10 dB to 100 dB HL
Use profiles

- Yes Yes: 70%
- Yes No: 24%
- No No: 6%

- I don't feel like I need it (5)
- It doesn't sound normal (5)
Reasons for Use

- I choose to use it (5)
- Connecting to video (3)
- Keeps me from getting headaches (5)
Benefit by situation

- Classroom Teacher: 60% Help, 30% Slightly, 10% Not
- Classroom Peers: 50% Help, 40% Slightly, 10% Not
- After School Activities: 40% Help, 30% Slightly, 20% Not
- Listening to Music: 30% Help, 40% Slightly, 30% Not
- Listening to DVD/Media: 20% Help, 30% Slightly, 50% Not
- Outside Activities: 10% Help, 40% Slightly, 50% Not
- Social Time with Friends: 10% Help, 40% Slightly, 50% Not
- Phone: 10% Help, 40% Slightly, 50% Not

Overall, 70% find the benefit helpful in various situations, while 24% find it not very helpful.
Students who ceased using wireless products

- N=22
Reasons for non-use among former users

- I just don’t want it (5)
- I have an interpreter (5)
- Don’t like carrying it around (5)

Survey results:

- Yes Yes: 70%
- Yes No: 24%
- No No: 6%
Findings

Users for teacher access, confidence, SPIN, grades

Strongest benefit by users were 1. teacher 2. peers 3. media

24% of teens became non-users

Users used it because they wanted to

Reasons for non-use 1. look/feel 2. doesn’t help teacher 3. doesn’t help peers
Opportunity for innovation
Fixed versus adaptive directionality

Fixed directional beamformer

UltraZoom
N=15
Age 7-17
Mild to Moderately severe SNHL
Roger DM test scenes

Teacher and Peer talker in noise (65/65)

Peer talker from behind in quiet
The adaptive directional mic significantly improves understanding of peers

Error bars = 1 S.D.

N=15

Wolfe, in prep, 2016
Roger TouchScreen Mic
Small group mode
N=13

Adults

Mild to
Moderately
severe SNHL

Fitted with Sky V
UP devices and
Roger X receivers
Objective: speech perception testing

- Multi-talker babble (noise) was presented at 4 corner speakers, simulating a classroom with multiple working groups such as a team project or lab exercise.
- IEEE sentences (targets) were randomly presented from 0, 90, and 270 degrees simulating a group of 4 near-field students engaged in group work around a table:
  - 20 sentences from each of the three speakers
  - Calibrated to 70 dB
- To avoid floor and ceiling effects, signal to noise ratio was between +/- 6 based on individual performance
- Listener was scored on word correct for IEEE sentences arriving from all angles.
Speech perception results show significant improvement with Roger Touchscreen small group mode

- Significant improvement compared to HA only
- ** Significant improvement compared to HA+Roger Pen

p = <.05
Small group work conditions

Wolfe, in prep, 2016
Roger Touchscreen – small group mode

N=68
In summary

- Classroom listening is becoming increasingly diverse

- Opportunities in classroom hearing performance have been identified by subjective and objective research

- The use of directional microphones in combination with remote microphones improves understanding of near field talkers

- The use of the multi-microphone small group mode in the Roger TouchScreen mic improves understanding of multiple near field talkers in noise
Acknowledgements

- Ann Gear, Julie Sweeny-Grana and ITD @SEDOL
- Jace Wolfe
- Nora Prachar
- Lisa Standaert, Lori Rakita @ PARC