Creating a hearing conservation presentation for Alberta's grade three students

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Grade Three Hearing Module

ABSTRACT

The resources currently available to grade three teachers for the *Hearing and Sound* science unit focus on the properties of sound, but do not strongly support learning objectives related to hearing, its role in communication and protection against its damage. Given that about 5% of Canadian students have hearing loss and that about half of Canadians ages 3-79 will use earbuds or headphones at high volume, risking noise-induced hearing loss (Statistics Canada, 2015), a resource to help students understand hearing and hearing protection appeared imperative. Studies indicate that it is urgent to share this information. In 1996, 1% of the US school-age population was found to have some degree of hearing loss (Blair, Hardegree, & Benson, 1996). By 2001 approximately 12% of US children between the ages of 6 and 19 reported symptoms of hearing loss (Naskar et al., 2001). A project was undertaken to provide grade three teachers with one such resource and to provide opportunities for collaboration between speech-language pathology (SLP) students and teachers. The Department of Communication Sciences and Disorders (CSD) at the University of Alberta has adopted a curriculum wherein students practice and demonstrate acquired competencies, including collaboration with other professionals (Department of CSD, internal communication, 2016). To this end, an interactive classroom presentation was created in collaboration with Edmonton teachers that enriches their resource base and allows SLP students to demonstrate competencies as content experts, communicators, collaborators, advocates, and professionals.

INTRODUCTION

Literature and Resource Review

Alberta's curriculum on *Hearing and Sound* is unique in Canada. When searching curricula from all ten provinces and the Northwest Territories, we found that most students across Canada learn about sound in grade four, unlike Alberta, whose students learn about sound in grade three. Table 1 indicates in what grade the *Hearing and Sound* unit is presented in provinces across Canada and provides basic details about each curriculum.

Table 1

Hearing and Sound Units in Curricula Across Canada

Province	Grade	Curriculum highlights
Alberta	3	Discusses sound source and qualities of sound (i.e., vibration, pitch, how it travels), how the ear perceives sound, and hearing conservation
British Columbia	4	Outlines physical properties of sound such as vibrations and frequency
Manitoba	4	Discusses hearing protection
Northwest Territories	4	Outlines the physical properties of sound and how the ear hears
Ontario	4	Discusses the advantages and disadvantages of technology on hearing as well as the properties of sound
Prince Edward Island, Nova Scotia, New Brunswick, Newfoundland & Labrador	4	Describes the physical properties of sound, how the ear hears; identifies objects that make loud noises; describes noise pollution in decibels and how to reduce its impact
Quebec	1-6	Describes how matter has properties that can be sensed (such as sound)
Saskatchewan	4	Outlines the impact of hearing loss on individuals, the positives and negatives of technology's effect on hearing, and how to protect your hearing

Note: Data taken from Alberta Education (1996), British Columbia Ministry of Education (2005), Manitoba Education and Training (1999), Northwest Territories Education, Culture and Employment (2004), Ontario Ministry of Education (2007), Nova Scotia Education (2006), Quebec Ministry of Education, Recreation, and Sports (2001), and Saskatchewan Ministry of Education (2011).

In Alberta, the curriculum is organized according to numbered Specific Learner Expectations (SLEs) (Alberta Education, 1996, p. B15). Grade three students learn the properties of sound in various environments; it is produced by vibrations, variations of which affect a sound's volume and quality (SLE #1, 2, 4, 7). Grade three students also learn that exposure to loud sounds over time can damage their hearing and affect a person's ability to communicate (SLE #3, 11, & 13). Students are provided with opportunities to build devices that both produce sound (e.g., a guitar) and dampen sound (e.g., soundproofing a box) (SLE #5, 6, & 12). Lastly, human ear anatomy and hearing is taught and compared to the range of hearing in animals (SLE #8 & 9). Only a few other provinces include education on hearing loss and hearing protection in their curriculum (i.e., Ontario, Manitoba, and Saskatchewan). Notably, only Alberta and Saskatchewan's curricula mention the impact of hearing on communication.

Speech-language pathology (SLP) students have knowledge in not only human-ear anatomy but also sound volume and quality, noise-induced hearing loss as well as other types of hearing loss, technology available to aid individuals with hearing loss, and how a hearing loss affects a person's ability to communicate. This knowledge covers seven of the thirteen SLEs mentioned above (i.e., SLE #1, 2, 3, 4, 8, 11 & 13) described by Alberta Education (1996). There is a natural overlap between the grade three curriculum on hearing and sound and the knowledge that SLP students gain through their studies.

Second-year students in the University of Alberta's Communication Sciences and Disorders (CSD) Department deliver, without cost to the school or district, a *Sound Sense* program designed by the Hearing Foundation of Canada to grade six students. Coincidentally *Sound Sense* content meets SLE #2, 8, 11, and 13 of the grade three curriculum (Alberta

Education, 1996, p. B15). Throughout the years of presenting the program there have been a number of grade three teachers that have approached *Sound Sense* presenters to inquire about the program for their classrooms, however, its language and concepts are too advanced for grade three students. These inquiries served as the motivation for the current project to search for resources available to grade three teachers, to see if a comparable program or resource could be suggested to them.

Upon beginning the search for available resources, the only official curriculum support for both the Edmonton Public School Board (EPSB) and the Edmonton Catholic School District (ECSD) was a grade three science activities book published in 1996 by the Edmonton Public School Board. Although that book mostly focuses on physical properties of sound and hearing, twelve of the 105 pages of activities explore hearing loss, empathy, and hearing conservation (Edmonton Public School Board, 1996). Beyond that official resource, teachers often rely on searching the internet or hearing by word of mouth about resources that may be available to them to support the hearing and sound curriculum. Teachers may also reach out to local educational audiologists or teachers of the Deaf and Hard of Hearing for additional resources and/or guidance.

A search of the University of Alberta Education Library resource guide revealed 123 books about the physical properties of sound, and thirty-six books about sound-making experiments. To access that resource go to http://guides.library.ualberta.ca/teaching-science/grade-3. Based on a review of the titles, online summaries, and content lists of those books, the majority were written about the properties of sound, sound production, and exploring sounds in the natural environment. Ten were found to include information on

hearing loss, hearing preservation, and the impact hearing has on daily living. Consistent with our aforementioned findings, there are many resources available to teachers about sound, sound production and exploring sound, with only a few available resources containing information on hearing loss or hearing preservation.

In our search for resources we discovered four community programs that offer interactive presentations on hearing and sound to grade three students in the Edmonton area: the *Alberta Science Network* (http://www.albertasciencenetwork.ca/index.html), the *Telus World of Science* (http://telusworldofscienceedmonton.ca/educators/school-programs), *Teacher's Pet* (http://www.tpet.ca/fieldtrips/hearing/), and *Let's Talk Science* (http://outreach.letstalkscience.ca/ualberta.html). The *Alberta Science Network* and *Let's Talk Science* are both not-for-profit community organizations that arrange for volunteers from different science fields to go into classrooms and give presentations. *Let's Talk Science* volunteers are post-secondary students completing science degrees at the University of Alberta. The program includes a manual to guide the delivery of the presentation, but it is not focused on meeting curricular goals. Rather, the intent is to encourage hands-on learning and scientific curiosity (Natasha Donaghue, personal communication, October 13, 2016). *Alberta Science Network* volunteers are scientists who perform research or work in the community. The program includes a presentation script that briefly discusses sound properties, the mechanism of hearing, and a kit of resources to build instruments and explore sound production. Both programs are valuable teacher resources, as they cover the sound property portion of the curriculum, however, they do not offer coverage of the portion of the curriculum regarding hearing, hearing preservation, and the impact of hearing loss on communication.

Teacher's Pet is a company that offers a classroom-based presentation for the Hearing and Sound unit. It includes an exploration of the topics of hearing loss and hearing conservation in addition to the properties of sound and creating instruments. It costs a minimum of $172 to bring this presentation to a school, with extra fees charged for groups over thirty. This presentation is closely aligned with the Alberta curriculum and provides an overview of the Hearing and Sound unit's main components. The *Telus World of Science* offers both a demo (*Sounds of Science*, forty-five minutes) and a program (*Make a Sound*, sixty minutes) hosted in their building for up to thirty-six students at a time that explore the physical properties of sound. There is a per-student cost of about ten dollars, plus the cost of transportation. Both programs effectively incorporate aspects of the Hearing and Sound curriculum, however, their price tag may prevent some teachers from accessing these resources.

To round out our search for available resources, we spoke with curriculum consultants from two major education districts, EPSB and ECSD. They were able to point us to online resources which, generally speaking, did not include information on hearing conservation but focused on physical properties of sound, ear anatomy, and music. The consultants noted that teachers typically have to find or create their own materials for this unit. The Annotated Bibliography of Grade-Three Hearing Resources Related to the Alberta Curriculum (Appendix A) contains both the resources made known to us by curriculum consultants and any other resources we located in our search for supports for teachers.

As can be seen, although Alberta teachers have access to some quality resources about sound properties and its production, there are significantly fewer resources supporting learner

expectations related to hearing loss prevention and the effects of hearing loss on a person's communication (SLE #3, 11, & 13) (Alberta Education, 1996, p. B15). This impacts student learning in two key ways. First, teachers are less supported when teaching these important sections of the curriculum and as a result, students may not fully come to realize the impact hearing has on their communication. This age range is particularly receptive to practicing healthy listening behaviour, so it is vital that this message is explicitly communicated. Griest, Folmer, and Martin (2007) found that although both younger and older students gained knowledge from a thirty-five minute hearing conservation presentation, the younger students' (grade four) long-term attitudes and intended behaviours (e.g., "If I go to a loud concert, I will wear hearing protection") towards hearing conservation were more likely to be impacted than the grade seven students' attitudes. Second, many teachers are not familiar with hearing protection and hearing loss prevention and so they may unintentionally limit students' knowledge. During our consultation meetings with teachers, they revealed that teachers enjoy having educated professionals (e.g., an educational audiologist or an SLP) come into the classroom to teach on a topic that they themselves are not an expert in (Tammy Fulton, personal communication, October 4, 2016).

SLPs and SLP students are especially suited to address these less-than-ideal impacts on students' learning and to help bridge these gaps. Not only are they knowledgeable about hearing loss, hearing conservation, and the impact of hearing on communication, they are taught how to convey information in programs and presentations in multiple ways that keep student interest and facilitate all students' learning, which aligns with the philosophy of Universal Design for Learning (UDL). This program for grade three students was built on a

foundation of a UDL paradigm, teaching concepts to students using diverse modalities and activities. While it was originally based in engineering, UDL seeks to create one structure that supports multiple needs, such as building ramped curbs at intersections instead of right-angled curbs so that everyone can use the ramp equally well (Katz, 2012, p. 13). In a teaching context, UDL involves presenting material through multiple modalities (e.g., visual, auditory, using body movement, constructing models, student-led discussions, etc.) with multiple ways of assessing student learning (Katz, 2012, p. 78-79, 84, 86-87, 145-149). UDL is the pedagogical philosophy underpinning Alberta Education's *Guide to Education: ECS to Grade 12 2016-2017*, which is based on the most recent Ministerial Orders regarding teacher-quality standards and student learning (Alberta Education, 2016). "[C]reating multiple paths to learning for individuals and groups of students, including students with special learning needs" (Government of Alberta, 1997, p. 2) is currently considered best practice for classroom teachers as it gives students the opportunity to learn in the way they learn best and to the best of their abilities.

Staskowski, Hardin, Klein, and Wozniak (2012) outline the principles of UDL and the integral role SLPs can play in developing UDL lessons alongside classroom teachers. SLPs understand how to use technology to make learning more effective, incorporating particular learning needs into a broader program, making core vocabulary and concepts more salient by adjusting the language that is used, scaffolding concept learning by explicit, step-by-step instruction, and measuring student learning based on progress towards mastery. All of these skills are directly related to UDL instruction and help support teachers as they teach these important curricular topics.

All together, these findings support the current project's aim to create a resource to support the Specific Learner Expectations related to hearing loss, hearing protection, and the role of hearing in communication for grade three students in the Edmonton area.

METHOD

The first step in creating the current project involved communicating with an EPSB curriculum consultant who confirmed that a program about hearing loss and its associated communication difficulties would be a welcome addition to the resources that are currently available.

With this confirmation, we next met with an Educational Audiologist, Dr. Krista Yuskow, who shared with us a presentation she created on hearing loss prevention and hearing amplification education. Dr. Yuskow typically delivers the presentation to grade three classes in Edmonton that have a student who is deaf or hard-of-hearing. However, she has not been able to give the presentation of late because of time constraints and was excited by the possibility of this presentation being taken up by the University of Alberta with the current project. She gave us permission to make use of her presentation when designing our own resource. With the presentation given to us by Dr. Yuskow as a guide, a basic presentation was outlined. It included: an introduction to the field of Audiology, basic ear anatomy, preventing hearing loss, demystifying hearing loss, hearing tests, and a learning-review-and-consolidation activity.

Next we met with two teachers from EPSB and one curriculum consultant from ECSD in the Spring of 2016 to collaborate on the program design and content. The teachers and curriculum consultant provided feedback on the proposed outline and gave input on the content of the presentation, techniques to engage students, and logistics of presenting.

Together with the grade three teachers, we created a curriculum-based program that supplements the resources available to teachers and is presented in a research-supported and accessible way for grade three students. A significant part of this collaborative process included incorporating UDL principles throughout the presentation that specifically apply to an educational classroom. The collaborating teachers recommended adding partner discussions, open-ended questions, and consolidation activities that use multiple expressions (e.g., "Write or draw three things you learned today and one thing you are still wondering about"). The teachers also suggested ideas on how to maintain student interest (e.g., vary information giving with asking open-ended questions) and ways of structuring the presentation so it flowed in the most logical manner for grade three students (e.g., focus on typical hearing information, then information on being hard of hearing, then information on deafness).

The presentation is titled *Everybody Hears* to emphasize that, though people hear in various ways, we can all communicate with each other. In the fall of 2016, the two collaborating teachers helped us finalize *Everybody Hears*. It is now a one-and-a-half to two-hour PowerPoint presentation (see Appendix B) with an accompanying presentation information section for SLP students (see Appendix C), a presenter script (see Appendix D), and a list of resources for teachers (see Appendix E). The teacher resource list was created to be given to teachers prior to delivery of the presentation in order to supplement the teachers' current resource base, helping them to expand on the presentation if desired. Due to its length and the complexity of the content, *Everybody Hears* has been designed to be delivered by two SLP students and includes videos, small-group and class discussions, hands-on manipulation of models (e.g., of the ossicles), and full-body movement activities (e.g., acting out the vibration of

the eardrum). The presentation is intended to elicit critical thinking about hearing loss and hearing conservation, and encourage students to apply this information to their everyday lives.

At the fall 2016 meeting, the teachers also contributed to the presenter script and advised on the formatting for the list of teacher resources. In order to solidify content included in the presentation and logistics of presentation delivery, one collaborating teacher offered her classroom for an inaugural run of the presentation. The presentation was arranged and took place in late fall of 2016 with both collaborating teachers, the four SLP students (project creators, two of which presented), and the supervising professor present. Though no formal data were taken from this presentation, it was observed that overall the children appeared to be engaged in the planned activities and enjoyed how the information was presented. Both teachers commented on the presentation's success (e.g., the critical thinking the students displayed and the students' enthusiasm for the activities) and how the students remained interested throughout the hour-and-a-half long presentation. Minor changes were subsequently made to the script and PowerPoint presentation in order to facilitate further evaluation of the effectiveness of the presentation.

DISCUSSION

Future Directions

In order for this presentation to move ahead there will be some costs associated with start-up. A number of materials were borrowed from the CSD Department (i.e., ossicle models, sound-level meter, and a portable audiometer). A sound-level meter costs approximately $80 to $100 and a portable audiometer costs approximately $1600. Additionally, the portion of the presentation using the audiometer could be replaced with a lower-cost alternative, such as

watching a video of a hearing screening or having the students raise their hands to show that they have heard a tone played over classroom speakers. In order to obtain ossicle models, one possible idea is to collaborate with engineering students at the University of Alberta to create models of the ossicles using a 3D printer, as this could keep the cost to a minimum. The hearing aids used during the presentation were donated to Dr. Melanie Campbell and will thus be available for use for all future presentations; if the need for hearing aids was perceived to be greater than what is available, future presenters could look into acquiring "dummy" hearing aids used for display by hearing-aid companies. Consumable materials such as blank paper and wax paper would cost approximately $10 (blank paper at $8 for 500 sheets and wax paper at $2 a roll, both of which would last for several presentations). Ideally, students would also get to take home disposable ear plugs, since the importance of using them is discussed in the presentation. Future SLP students taking up this project could look into seeking sponsorship for the current program to cover the upfront costs (i.e., portable audiometer, sound-level meter, and ossicle models) and the costs associated with the consumable materials (i.e., blank paper, wax paper, and ear plugs). To begin with, this presentation would require one set of materials; however, future students should consider investing in multiple sets so as to allow for more than one presentation to be delivered at a time.

Everybody Hears was designed to uniquely supplement the resources currently available to grade three teachers and provide SLP students with opportunities to collaborate with teachers. As such, it needs to be tested in multiple classrooms across Edmonton in order to ascertain which parts of the presentation are most successful and which areas/activities need to be adapted. It will be important to receive feedback from teachers on presentation length,

student engagement, and perceived value for the teacher. Data collection of what the students learn from the presentation will also be a necessary next step in refining this module. Currently, first-year SLP students are preparing to take over the development of the current project. It is hoped that in the next few years *Everybody Hears* can be developed into a module that SLP students can take into grade three classrooms as one component of the competency-based graduate education for the CSD Department, allowing SLP students to display their expert knowledge, collaborate with teachers, hone their presentation and communication skills, and advocate for those with hearing loss and for hearing conservation.

CONCLUSION

Reviewed resources that support the grade three Hearing and Sound unit in Alberta focus primarily on the properties of sound and the anatomy and mechanics of human hearing. A resource focusing on hearing loss, hearing preservation, and the impact of hearing on communication is sorely needed, as these three curriculum topics have relatively few prepared materials available for teachers to use. We have created a one-and-a-half to two-hour presentation that meets these curricular goals in an effort to bridge this gap in teacher resources. In addition, this presentation helps further student learning in the CSD Department at the University of Alberta by creating collaborative opportunities between SLP students and teachers, which sets the stage for future collaborative work between these professionals.

The presentation *Everybody Hears* needs to be tested in classrooms across Edmonton and fine-tuned as necessary to ensure its workability in multiple classroom settings. Data could be taken both on information retained by the students and by the change in behaviours noted by self-report or teacher report. It is hoped that *Everybody Hears* will one day be offered as a

regular presentation teachers can request from the University of Alberta's CSD Department for their classrooms.

ACKNOWLEDGMENTS

We would like to thank Dr. Krista Yuskow for inspiration for the content of the presentation. We are also thankful and grateful to grade-3 teachers Tammy Fulton and Christine Miller, and curriculum consultant Marlene MacDonald, for their verification of the need for this presentation, collaboration on its development, and advice on its implementation in grade-3 classrooms. Thank you also to Dr. Bill Hodgetts, Audiologist, for measuring the minimum and maximum volume of earbuds when listening to music on an iPhone 7. This allowed our presentation to contain a very relevant and real-world example of hearing safety. Lastly, thank you to Dr. Melanie Campbell, whose unending support, encouragement, and passion for the field of hearing conservation and hearing loss provided the main driving force behind this project.

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Appendix A

Annotated Bibliography of Grade-Three Hearing Resources Related to the Alberta Curriculum

Alberta Science Network. (n.d.). Retrieved July 07, 2016, from http://www.albertasciencenetwork.ca/index.html

This organization offers a presentation on the physical properties of sound when volunteer presenters are available. Twelve kits of materials are also available for teachers to use in their classrooms.

American Speech-Language Hearing association. (n.d.). *Hearing conservation for children.* Retrieved July 07, 2016, from http://www.asha.org/aud/HearingConservationChildren/

This page provides a number of links to programs and campaigns on hearing conservation as well as some fact sheets. It is aimed at an American audience.

British Broadcasting Corporation. (n.d.). *Nervous System - Hearing.* Retrieved July 18, 2016, from http://www.bbc.co.uk/science/humanbody/body/factfiles/hearing/hearing_animation.shtml

A page on hearing which includes an animation of the workings of the ear, following the sound from the outside of the ear to the temporal lobe of the brain.

British Broadcasting Corporation. (n.d.). *Changing Sounds*. Retrieved July 7, 2016, from http://www.bbc.co.uk/schools/scienceclips/ages/9_10/changing_sounds.shtml

Properties of sound are demonstrated by plucking a virtual guitar and altering string length.

Canadian Academy of Audiology. (n.d.). *Hearing loss in adults and children.* Retrieved July 07, 2016, from https://canadianaudiology.ca/for-the-public/hearing-loss-in-adults-and-children/#how-do-you-test-hearing-in-young-children

Provides facts on hearing loss in adults and children, aimed at an adult reader. Therefore, it would require adaptation for use with Grade-3 students.

Center for Disease Control and Prevention. (2015). *Promoting hearing health in schools.* Retrieved June 30, 2016, from http://www.cdc.gov/healthyschools/noise/promoting.htm

This website describes how schools can promote hearing health and links to other possible resources. It is designed as a resource more directed at administrators and policy-makers and does not address how to teach these concepts to children in the classroom, although it mentions that it is important to teach children these concepts and directly mentions SLPs as professionals who can aid in hearing loss prevention education.

Chudler, E. H. (n.d.). *Neuroscience for kids - hearing experiments*. Retrieved July 18, 2016, from University of Washington, https://faculty.washington.edu/chudler/chhearing.html

A list of activities with some specified grade ranges that explore the topics of sound

and hearing such as properties of different sounds, sound localization, and modelling the eardrum.

Dangerous Decibels. (2016). Retrieved November 24, 2016 from http://dangerousdecibels.org/

This site contains information about hearing conversation and is designed for children. This website has been included in the *Everybody Hears* presentation.

Grade 4 Science. (n.d.). Retrieved July 07, 2016, from http://hrsbstaff.ednet.ns.ca/webct/science/4science/sound.htm

This site contains content relevant to properties of sound such as wavelength, loudness, and pitch. It contains a basic chart of loudness of different sounds and a brief animation of different parts of the ear that may be helpful. This site contains links that are published by the Department of Education and Early Childhood Development in Newfoundland and Labrador.

Hands-On Activities: Sound Sandwich Noisemaker. (n.d.). Retrieved July 18, 2016, from http://www.exploratorium.edu/afterschool/activities/index.php?activity=137

A link to an activity for exploring vibration and pitch via a homemade kazoo-like instrument made using everyday materials from around the house. Not directly related to the content of “Everybody Hears” but possibly a resource for teachers.

Hear Alberta. (2014). *Hearing loss prevention.* Retrieved July 07, 2016, from http://hearalberta.ca/programs-and-services/hearing-loss-prevention/

A website advertising a hearing-loss-prevention presentation put on for Grade 3 students in Alberta. Although a contact is available to request the program, the page has not been updated since 2014 so it is unclear if this program is still being offered.

How the Ear Works. (n.d.). Retrieved July 07, 2016, from http://www.childrensuniversity.manchester.ac.uk/interactives/science/brainandsenses/ear/

Provides an animated overview of the ear and its function as well as a quiz at the end of the overview.

Internet4Classrooms. (2000). *Sound.* Retrieved July 18, 2016, from http://www.internet4classrooms.com/science_elem_sound.htm

A list of collected links that lead to activities for exploring sound mostly through music/musical instruments. Although it does not relate directly to the "Everybody Hears" presentation, it could be a valuable resource for teachers.

Kids love 2Learn.ca. (n.d.). *Science-Gr.3 online interactives.* Retrieved July 18, 2016, from, http://www.2learn.ca/kids/listSciG3.aspx?Type=44

Provides a variety of interactive links that can be used to explore the anatomy of hearing and physical properties of sound.

Let's Talk Science. (n.d.). Retrieved July 07, 2016, from http://www.letstalkscience.ca/programs-resources/programs/outreach.html and http://outreach.letstalkscience.ca/ualberta.html

Free science-based presentations given by undergraduate students at the University of Alberta, based in Edmonton. The presentations are brought into classrooms and are designed to increase students' curiosity and love of discovery.

PBS Kids. (n.d.). *Stereo Hanger.* Retrieved July 18, 2016, from http://www.tc.pbskids.org/zoom/printables/activities/pdfs/stereohanger.pdf

An activity for exploring the ability of sound to travel through different media and the difference that makes. Not directly related to the content of "Everybody Hears" but a possible resource for teachers.

StudyJams. (n.d.). *The senses: hearing.* Retrieved July 07, 2016, from http://studyjams.scholastic.com/studyjams/jams/science/human-body/hearing.htm

An animated video which describes the anatomy and function of the ear as well as mentions hearing conservation. This video moves quite quickly, so it may be difficult for Grade 3 students to follow if this is their first exposure to the information.

Teacher's Pet. (n.d.). Retrieved July 18, 2016, from http://www.tpet.ca/fieldtrips/hearing/

An Edmonton-based in-school-field-trip company that brings a two-hour learning

session to the classroom. Topics include: sound properties, effects of noise exposure and aging on hearing, and ways to protect your hearing. There is a cost for this interactive presentation and additional travel costs if the school is outside the Edmonton area.

Telus World of Science. (n.d.). Retrieved July 18, 2016, from http://telusworldofscienceedmonton.ca/grade-3-science-programs#overlay-context=node/149

A 60-minute demonstration which includes experiments about the properties of sound. Located at the *Telus World of Science* in Edmonton.

The Hearing Foundation of Canada. (n.d.). *Sound sense: hearing health for elementary students.* Retrieved July 07, 2016, from http://www.hearingfoundation.ca/sound-sense/

The *Sound Sense* program is currently a part of the CSD master's program curriculum in the second year. Students are instructed to book a presentation with a school and deliver it to its grade-6 classes. They are provided with a kit by the university (funded by the Hearing Foundation of Canada) that contains presentation materials and some take-home items such as earplugs.

University of Alberta Libraries. (2015, July 13). *Subject guides: Teaching science: Grade 3.* Retrieved July 18, 2016, from, http://guides.library.ualberta.ca/teaching-science/grade-3

The University of Alberta library system provides canned searches of books and other materials that are relevant to curriculum topics. Under the grade three Hearing and Sound unit, they list books that support the curriculum in a variety of ways, including experiments about sound production, properties of sound, sounds in the environment, noise pollution, hearing preservation, and picture books describing sounds in the environment.

Wonderville. (n.d.). *How we hear.* Retrieved July 07, 2016, from https://wonderville.org/app/asset/how-we-hear

Could be a valuable resource for teachers in grade three classrooms. Requires a free membership in order to view content.

WorkSafeBC, & Workers' Compensation Board of British Columbia. (2006). *Sound advice : A guide to hearing loss prevention programs* (2006th ed.). Vancouver, BC: WorkSafeBC. Retrieved from http://www.worksafebc.com/publications/health_and_safety/by_topic/assets/pdf/sound_advice.pdf

This electronic document contains information on safe noise levels, the importance of hearing tests to detect hearing loss, and a list of resources available from WorkSafe BC. Though intended for work sites, it may be helpful to give teachers a real-world context for this unit of study.

Appendix B

Everybody Hears PowerPoint Slides

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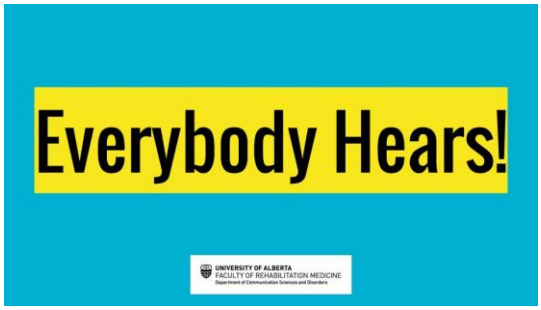

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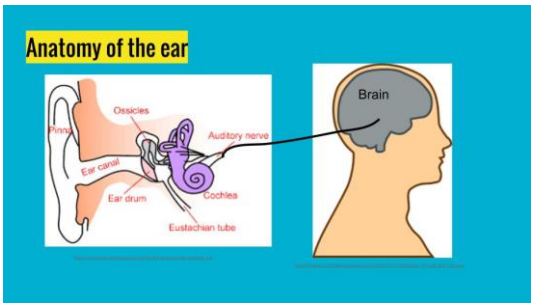

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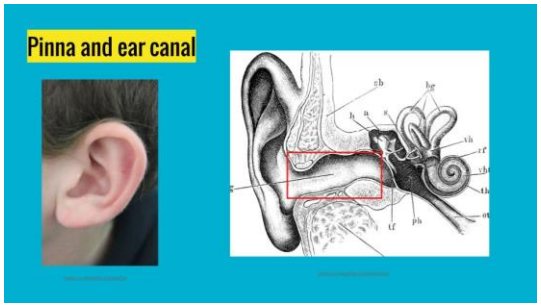

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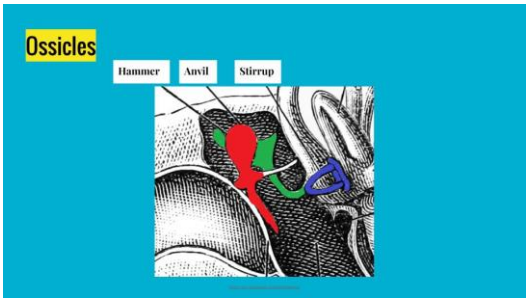

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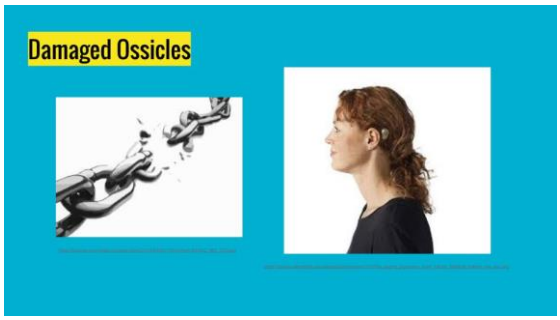

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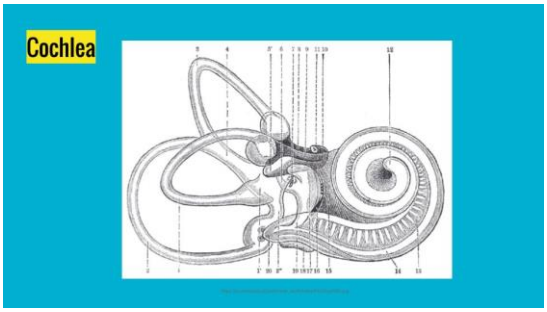

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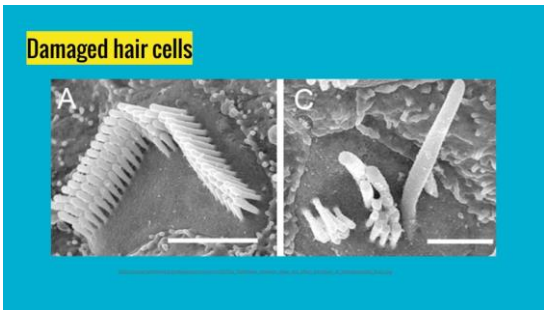

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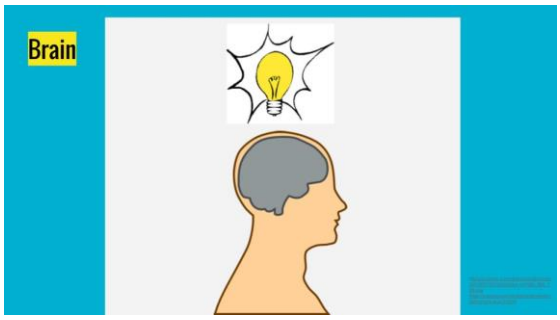

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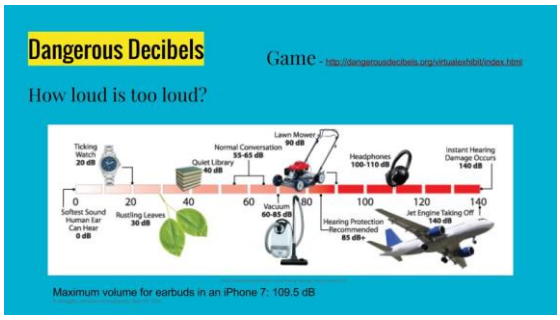

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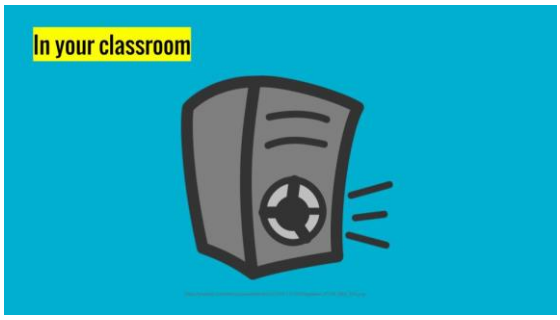

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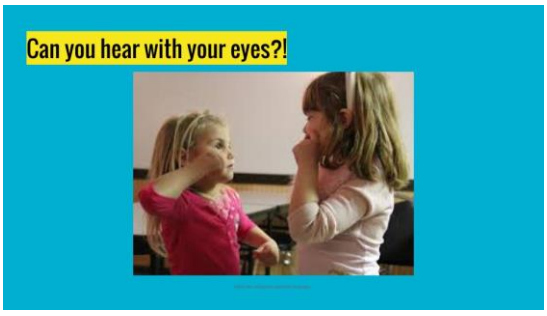

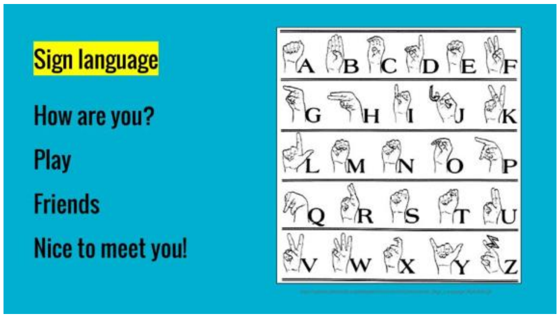

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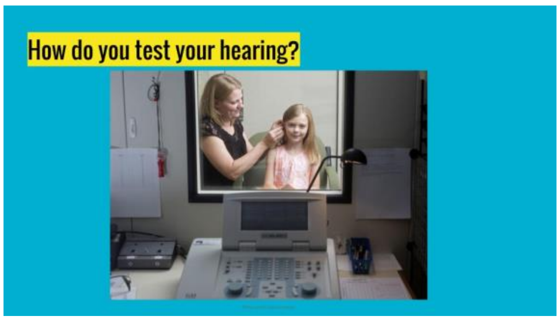

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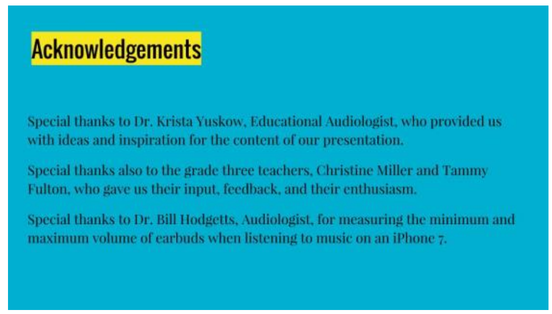

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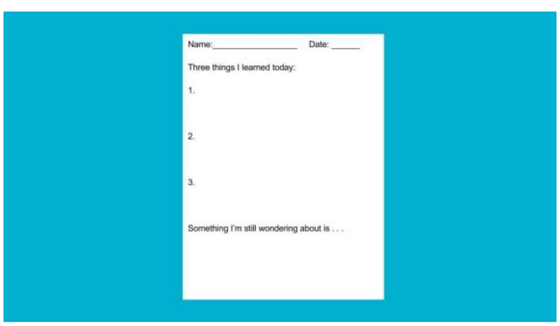

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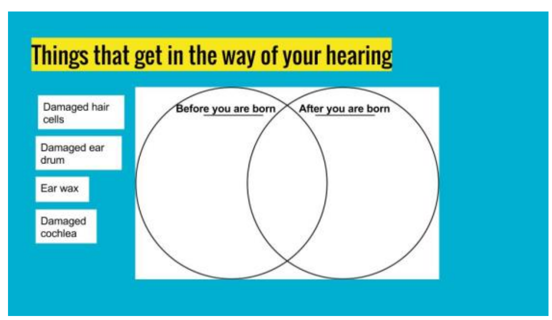

Appendix C

Presentation Information for SLP Student

When to Contact Teachers:

- The sooner the better (August/September). They are planning field trips at this time. Advertise when you contact them that models (of the ear, ossicles, hearing aids, etc.) will be brought in and that this is a free presentation which is aligned to the curriculum. You can also mention that a speech-language pathologist (SLP) "expert" is coming in to share their expert knowledge.

Review of Objectives:

- To make Grade 3 students aware of how damage to the ear affects lifelong hearing.
- Teaching students how to identify noises that are dangerously loud and how to protect their hearing.
- Increase student awareness of hearing amplification options for people who are deaf or hard of hearing.
- Foster inclusive attitudes towards students with hearing impairments.
- Create an environment that supports collaboration between teachers and SLPs.

Key Messages:

- Your hearing is precious and you can protect it.
- If your hearing is damaged, sometimes a device can help you hear.
- We can include everyone by being friendly and using sign language if needed.
- SLPs help people who have trouble communicating, including people who have trouble hearing.

Specific Learner Expectations Covered in Presentation:

From Hearing and Sound unit of Science:

- 3. Recognize that there are ways of measuring the loudness of sounds and that loud sounds pose a danger to the ear
- 8. Describe how the human ear senses vibrations
- 11. Describe changes in hearing that result from continued exposure to loud noise from the natural process of aging
- 13. Explain the role that sound plays in communication

From Wellness Choices unit of Health and Life Skills:

- W-3.2 Improve and practice positive health habits

Room & Session Setup:

- Give teacher the:
    - Teacher evaluation form to fill out while you are presenting - it is part of your mark so it needs to be filled in.
- Ensure PowerPoint presentation is available and viewable on the classroom system.

- Ensure videos will play on the classroom system (needs internet connection; check the volume; when playing videos, make sure they are full-screen).
- Ask teacher if they have a Classroom Audio Distribution (CAD) system; if he/she does, you can use it while presenting or for an example in the presentation.
- Ensure there is a whiteboard/flip chart and appropriate markers.
- Ensure you have your supplies ready: (may include) enough wax paper squares (approximately 10 cm x 12 cm), audiometer, model(s) of ossicles, a dime, hearing aids, sound-level meter, enough review sheets for all children in class, a chair, and place to set the audiometer that is near an electrical outlet.
- Ask teacher how they get students' attention to reorient and focus on the presentation after discussion periods (e.g., "Discussion over in 3, 2, 1"). Use these strategies during your presentation.

Presentation Overview:

- Set up presentation and room (5-10 minutes)
- Presentation (maximum of 2 hours - potentially including one recess depending on school schedule and when you present)
    1. Introduction (5 minutes)
    2. Basic Anatomy of the Ear (20 minutes)
    3. Preventing Hearing Loss (30 minutes)
    4. Demystifying Hearing Loss (30 minutes)
    5. Getting Your Hearing Checked (~5 minutes)
    6. What Did You Learn (~5-20 minutes)

Tips for Presenting:

- Keep the presentation moving.
    - Some kids will talk as long as you let them; *ask specific questions* so they have an easier time answering and are less likely to get off-topic.
    - Vary what the kids are doing every 5-10 minutes. If they've been sitting, get them to stand. If they've been writing, ask them to answer a question by talking to their neighbours.
- Some kids need extra support when a classroom routine changes. Ask the teacher in advance what the best way is to help EVERY child attend to the presentation.
- Real-life demonstrations are powerful learning tools for this age group. Anything gross or unusual, or maybe even making up a story about "someone you know" with a hearing loss, helps to solidify student learning.
- Avoid saying "you guys" (and all other mentions of boys/girls). Instead say "students" or "grade 3s".
- When one presenter is handing out models or wax paper squares, the other presenter should not be talking at the same time. The children's focus will be on the person handing things out, NOT on the person talking.
- Ask teacher in email correspondence to have name tags for the children so you can call them by name (on their body not on their desks, as it is hard to see).

- Go through the script a few times before presenting so you feel comfortable with each section. Highlight or bold the sections that you will be doing and choose what activity you will do at the end.
- Be comfortable explaining how to sign and demonstrating: “how are you”, “friends”, “play”, and “nice to meet you.” American Sign Language (ASL) videos can be found on YouTube.
    - How are you? - https://www.youtube.com/watch?v=3x9pPcMbDBY
    - Friends - https://www.youtube.com/watch?v=hrH2ZfCyJDo
    - Play - https://www.youtube.com/watch?v=qo1AvsD1ZH0
    - Nice to meet you - https://www.youtube.com/watch?v=S40fTlJY0PQ

Appendix D

Presenter Script

Total Time = 1.5 - 2 hours *P = Presenter* *S = Students*

1. **Introduction: 5 minutes**

Slide 1: Everybody Hears

P: *[Insert greeting and name(s)].* Today we're here to get you thinking about your ears, how you hear, and what happens when you can't hear. We call our talk "Everybody Hears" because at the end of this talk, we want you all to know that everybody hears, but they might "hear" in different ways.

P: Some people hear with their ears, some people hear with help from something that's called a hearing aid. Let's say it together: hearing aid. Some people hear with help from a cochlear implant. Let's say it together: cochlear implant. And some people don't hear through their ears at all, but they "hear" through watching other people talk with their hands. This is called sign language. Let's say it together: sign language.

Slide 2: What is a speech-language pathologist? [What is an audiologist?]

P: We are speech-language pathology [and audiology] students. Those are some long words. Let's say them together: audiology; speech-language pathology. *[Point to these words on slide to help students]* Speech-language pathologists are called SLPs for short. [Audiologists don't have a short name!] Now I want you to turn to your neighbour and talk about what you think a speech-language pathologist [or an audiologist] is. You have one minute: go! *[P walk around and listen to groups; help facilitate discussion if needed].*

P: I heard you say *[insert ideas that P heard from kids when walking around; elaborate if need be].* An SLP helps people communicate. We can help kids and adults, people who can hear and people who can't. [An audiologist tests hearing, helps people take care of their hearing, and selects and prepares hearing aids for people who need them.] [Audiologists and SLPs work together as a team, just like we are doing today.]

Slide 3: What does it mean to communicate?

P: So what does it mean to communicate? Communication is when you get (or transmit or send) a message from your head to someone else's in a way they can understand. SLPs can work on communication by helping people to talk, read, or write. SLPs [and audiologists] can [work together to] help people who have trouble hearing.

2. **Basic Anatomy of the Ear: 20 minutes**

Slide 4: Anatomy of the ear

P: First we are going to talk about the ear. Your ears are made up of many parts that help you hear. Each part is like a player on a team. Here are the team members *[P will point to each one on the slide]*: pinna, ear canal, eardrum, ossicles, cochlea, auditory nerve and brain - all of these parts work together to help you hear!

Slide 5: Pinna and ear canal

P: The pinna catches the sound and then shoots the sound wave down the ear canal. *[Have Ss stand and pretend to have a baseball mitt that catches the sound and then "throw" it like a baseball down the canal, then Ss sit down].*

Slide 6: Too much ear wax

P: What happens if something blocks your ear canal? Can the sound waves travel to the ear drum? Use a thumbs-up *[demonstrate]* if you think yes, and a thumbs-down if you think no *[demonstrate]*. You're right, the sound waves won't be able to travel to the ear if there is something in the way.

P: One thing that can block your ear canal is ear wax. Your ears are made so that the ear wax slowly moves out of your ear, bringing dirt and germs with it. If you use Q-Tips, there is a danger that you can push the wax and dirt backwards and then that stuff gets stuck in your ear. If you go too far in with a QTip, you can a put a hole in your eardrum. That makes it hard to hear properly too! Instead, let your ear wax move out of your ear on its own. Or, you can go to your doctor or audiologist and they can clean out your ears.

Slide 7: Eardrum

[One P to get the wax paper squares ready]

P: Ok, so after the pinna catches the sound and shoots it down the ear canal, you have the eardrum. Your eardrum vibrates to the rhythm of the sound waves *[Provide action - then have kids stand, put hands in front of them and shake them back and forth rapidly, like pushing and pulling.]*

P: Now we are going to do a quick experiment.

[One P distribute wax paper squares. Have kids hold wax paper up to their mouths and hum/vibrate the paper using their lips.]

P: Does it make a noise? *[Have kids put the middle of the wax paper square on their finger and then pull/push down the edges with the other hand, so it is like a cone of wax paper around*

their finger. Hold on to the wax paper and take finger out from underneath. Rip off the top part of the cone to make a hole in the middle of the paper square. Open the wax paper and instruct to hold the hole to their mouth and hum again. Allow students enough time to experiment with this. Don't rush!]

P: Does the sound change? An eardrum with a hole in it can't vibrate very well, just like the wax paper when it has a hole in it, and sound doesn't travel very well to the ossicles (those are the bones in your ear).

P: Sudden loud noises like gunshots, fireworks, or popping balloons can put a hole in your eardrum *[P point to picture of hole in eardrum]*. Broken eardrums sometimes heal and your hearing comes back; other times they do not heal and it is hard to hear for the rest of your life. Make sure you protect your ears with ear plugs when you're around possible loud noises.

P: *[Insert other presenter's name]* is going to collect your wax paper now. *[One P collects the wax papers and discards them, or have the children get up and put the wax paper into the garbage]*

Slide 8: Ossicles

P: There are 3 bones in your ear. They are connected to your ear drum. The sound moves from the air into the bones and then through the bones to the cochlea. How big do you think these bones are? *[Have students raise their hands if they have a guess. Choose 2 or 3 students and ask them.]*

P: They are the smallest bones in your body, and all 3 of them would fit on a dime. *[Hold up a dime for them and then pass around model(s). Allow them time to look at the models and ask questions. Remember, do not continue with the presentation until models are collected. In case a student asks: hammer 7.69 mm, anvil 6.47 mm, stirrup 3.22 mm.]*

P: When the eardrum vibrates, it makes the 3 bones in your ear vibrate. *[Have kids stand up, make groups of 3 to represent each bone, connect hands in a line and have one person start shaking their hands and the next person can't shake their hand until the person before; or do an octopus-like motion with arms.]*
P: The vibration travels from the hammer to the anvil to the stirrup.

Slide 9: Damaged ossicles

P: Uh oh! The ossicle chain is broken! *[Have kids release hands and try to have the vibration move down the chain]* How will the sound get to your cochlea without the ossicles sending the

vibrations along?

P: There is another way you can hear sounds. Put your fingers in your ear and say “mmm”.

P: Do you hear your voice inside your head? That’s because the sound travels through a bone behind your ear. *[Have kids feel behind their ears for the mastoid process.]* Some hearing aids send vibrations through this bone behind your ear right into the cochlea. Phew! For a minute I thought that it was game over for this ear! *[Have kids sit down]*

Slide 10: Cochlea

P: This is what a cochlea looks like. It’s about the size of a pea and is shaped like a snail. Inside the coiled part are tiny hair cells that change the vibrations from the ossicles into messages to your brain! When these hair cells dance or move they send signals to the brain. *[Have kids stand up and jump up and down in one spot to model the electrical signals. Ss sit down.]*

Slide 11: A healthy dancing hair cell

P: Here is what one hair cell looks like. Here is what happens when the hair cell gets vibrations from the ossicles *[P play video].*

Slide 12: Damaged hair cells

P: We can take pictures of these tiny hair cells using powerful microscopes. Picture A has healthy hair cells - they’re standing upright. Look at picture C. These hair cells have been damaged by noises that are too loud and are lying down. If they are lying down do you think they can send signals to the brain? *[Ss can give thumbs up for yes, thumbs down for no]*

Slide 13: Brain

P: Zoom! The auditory nerve is like a highway. The signals from the dancing hair cells speed along until they reach the brain. *[Have kids put their fingers just behind the top of their pinnae]* That’s the part of your brain that tells you what you’ve heard.

P: Ok, let’s do a quick review of all the parts of the ear with their movements. *[Have Ss stand and do movements with P]* First, we have the pinna that catches the sound and shoots it down the ear canal, which vibrates the eardrum, and then the ossicles which makes the hairs in the cochlea dance/jump which send messages to the brain!

3. Preventing Hearing Loss: 30 minutes

P: Now that we know all about the ear we are going to talk about hearing loss.

Slide 14: Causes of hearing loss

P: Everyone's body is unique. Some people are born with blonde hair, some with brown. Some people are born with hearing, and some are born with hearing loss. Sometimes we are born with good hearing but something happens that damages our hearing like loud noises, ear infections, broken ossicles or damaged ear drums.

P: We are going to talk about hearing loss caused by loud noises.

Slide 15: Dangerous Decibels

P: When we measure liquid, we measure them in liters, milliliters, or cups. When we measure distance, we measure in centimeters, meters, or kilometers. We measure liquids with a measuring cup and distance with a ruler. I want you to turn to your neighbour and talk about what units we measure sound with and what we use to measure sound. Ok go!

P: So, how do you think we measure sound and what unit do we use? *[Or say "I heard some of you talk about…].* The unit we use to measure sound is decibels and there are many different tools that we use to measure it. A bit later I will show you one.

P: But first this is a chart that shows sounds from some of the quietest to some of the loudest sounds. *[Show decibel chart - point out the different sounds and the decibels typically related to those sounds. Point out at least one at low volume and one at high volume. If available, you can write on the SmartBoard using SmartBoard pens.]*

P: Sound becomes dangerous to our ears around 80 decibels. When it is that loud, your hair cells fall over and can't move. If you have only heard that loud sound for a short time, sometimes your hair cells will get back up and can move again, but other times they don't.

P: Now that you know that decibels measure sound, we are going to play a game to see if you know what sounds may or may not be safe. *[Game link is on PowerPoint. Play "How loud is too loud". Tell Ss that you will choose them one at a time to go up to the board. They will pick a tile and the class will decide whether that sound is safe, thumbs up, or not safe, thumbs down. Remind students that 80 dB is when sounds start to become dangerous. You should have enough time to go through all 18 of the tiles.]*

Slide 16: Loud noises and places

P: So, how loud do sounds have to be to be dangerous? *[Recall, 80 dB]*. Now we are going to do an experiment. <u>When I count to three</u>, we are going to see how loud you can be and how quiet you can be. Remember how I said there are different tools that we can use to measure sound?

Well, one of them is called a sound-level meter.

[Take out sound-level meter - explain what it is - get the kids to all clap and measure sound - have a child look at the screen to see the number; do again for absolute silence and then lastly when everyone is being loud (banging, talking). Use the phrase "be loud" so the kids don't scream. Mark the levels on the whiteboard.]

P: Now I want you to turn to your neighbour and brainstorm 3 places - not things, places - that you go that might have loud noises. You have one minute: go! *[Ask for 3 ideas from kids and write out answers on the whiteboard.*
Examples may include...

- *Movies*
- *Concerts*
- *Sporting events*
- *Car races*

If a child answers "listening to headphones too loud" comment that earbuds aren't a place but they can still damage one's hearing and give the data below:

- *earbuds go up to 110 dB, range from 45.5 dB to 109.5 dB, with the middle notch being 85-88 dB.*

P: So, now we know which sounds are safe, which are dangerous, and that even your class can be loud enough to cause hearing loss sometimes!

Slide 17: How can we protect our hearing?

P: So, how can we protect our hearing when we are in these loud places? *[P take some suggestions from the class. If not already suggested from the class, share the following and do the actions.]*

- Moving away *[Have Ss stand up and walk on the spot]*
- Wear ear plugs *[Have Ss plug ears with fingers, pretend to put in earplug]*
- Turn down the music *[Have Ss pretend to click down the sound]*

[Have Ss read the three options along with you. Go through the sequence of actions two or three times, depending on student engagement.]

4. Demystifying Hearing Loss: 30 minutes

Slide 18: What is it like to have a hearing loss?

P: Next, we're going to watch a short video about what it would sound like if you had a hearing loss. When you're watching the video, think about what it would be like to try and talk to your

friend or your mom if that's all you could hear. The video starts out showing what it sounds like for someone with normal hearing. Then, what it sounds like for someone with a mild, or small, hearing loss, and lastly what someone with a severe hearing loss hears. *[Write normal, mild, and severe on the whiteboard and point them out during the video]*
[Be prepared to improvise if the video doesn't work. For example - you could talk and slowly get quieter or could talk with your hand over mouth to muffle your voice.]

P: What do you think they were talking about at the end of the video? Who won the game? *[Ss will probably not know. Make the point that when someone has a hearing loss, it is difficult to understand what other people are saying and they miss out on important information.]*

Slide 19: Do you know someone with a hearing loss?
P: Raise your hand if you know someone with a hearing loss. *[If they all mention grandparents remind them that kids their own age can sometimes have hearing loss]*

P: I want you to talk to your neighbour about what you think it would be like to have a hearing loss or to be completely deaf. Think about what would happen if your mom was calling you from downstairs, or your teacher was telling you to do something. When you're talking with your neighbour, you could even try plugging your ears with your fingers to see what it would be like. You have two minutes! *[P will walk around listening for things to share with the whole class. If the classroom has noise cancelling headphones, you could try to have a conversation while wearing them.]*

Slide 20: Technology that helps people hear
[One P get hearing aids ready to pass out]
P: People that have hearing loss can use special technology to help them hear better. So, what does this technology look like? Here are some hearing aids for you to look at. *[One P hands out different kinds of hearing aids to each student. Once hearing aids are handed out P reminds the students to be gentle with the hearing aids. Allow the Ss time to look at the different hearing aids and ask questions (5 minutes max); then collect hearing aids].*

[P points to pictures on PowerPoint slide]
P: This one is a hearing aid. It makes sounds louder to help your ossicles or hair cells send messages to your brain. This one is a BAHA - a bone anchored hearing aid. It sends vibrations directly to your cochlea when the ossicle chain is broken. This one is a cochlear implant. Remember the snail-shaped cochlea? A cochlear implant has a wire in the cochlea that sends signals directly to your brain to help you hear.

Slide 21: About cochlear implants

P: Now we are going to watch a video about two boys who have one of the special hearing technologies that we talked about just now. Pay attention to see what kind they use. It's either a hearing aid, a cochlear implant, or a BAHA *[P write these options on the whiteboard]*. These boys are deaf. That means that they have a severe hearing loss. *[P will play video]*

P: What do these boys use to help them hear? *[Cochlear implant].* Are there any questions? *[Take 3 or so, depending on how much time you have. Be prepared for lots of questions after the video (e.g., "I have a magnet in my brain?"). Use the signal "This is the last question": if necessary.]*

Slide 22: Things you can do

P: Now, when I say "go", I want you to choose a partner, stand back to back, and try to talk to each other in a normal voice - don't get louder. You can tell the person about your favourite thing to do. Once you've finished telling them your favourite thing to do, I want you to turn to face your partner and have the exact same conversation. We'll talk about it afterwards. Go! *[P will give Ss 1 minute to talk, getting them to switch at 30 seconds, then ask them to sit down]*

P: What are three things that you noticed about talking to someone with your back turned to him or her? *[P will take 3 S's answers; P will affirm and then expand on this topic with the following...*

- *You found it really difficult to talk to someone like that.*
- *You couldn't hear the person when they were facing away from you, but you found it easier to hear when you were facing them.*

P: What would have helped you hear and talk with the person? You can look at the slide for some hints. *[Have the children raise their hands - take 3-5 answers]* It's important to make sure the person you're talking to can see your face. It is important that they can watch your mouth and can see how you're feeling based on your facial expression. It is also important for you to speak clearly. This can help people hear you better, whether they have a hearing loss or not. When you were talking with your partner and turned to face them, you were using all of these things!

Slide 23: In your classroom

P: Another thing that helps people with hearing loss AND everyone in the classroom hear well is using a microphone. Thumbs up if you have you ever noticed one of your teachers wearing a microphone before. *[Hold up a CADS battery pack & microphone if available]* It helps all of you to hear better. When you hear better, it's easier for you to learn. It's very important that your

teacher wears the microphone. Can you help him/her to remember to put it on? You can also help your teacher by telling them if it's too loud.

Slide 24: Can you hear with your eyes?!

P: You probably know the 5 senses: touch, taste, hear, see, and smell *[P point to your respective body part as you're saying them]*. People who can't see use touch to help them see. They feel things to get an idea of what they look like.

P: People who can't <u>hear</u> can use the sense of sight to help them understand and talk with each other by using sign language. Does anyone know some sign language? *[If Ss know any signs, affirm what they show you and tell them you're going to learn more!]*

Slide 25: Sign language

P: We're going to teach you some signs that you can use when you're talking to a friend with hearing loss who knows sign language. The first one is "how are you?" *[P will demonstrate].* The next one is "play" *[P will demonstrate].* The next one is "friends". *[P will demonstrate]* The last one is "nice to meet you". *[P will demonstrate]* Now let's put them all together. Ready? *[P will lead practicing the signs all together as a class.]*

Slide 26: Singing in Sign Language

P: Here is an example of how you can use sign language. These kids are using sign language to sing. See if you can find any of the signs that we taught you. *["Friend" is the only one used. There is a sign similar to "play" and the lyrics include the word "play", but they do not actually sign it.]*

5. <u>Getting Your Hearing Tested: 5 minutes</u>

Slide 27: How do you test your hearing?

P**:** So, now we know what is involved in hearing (how we hear) and what can cause a hearing loss, but how do we know if we have a hearing loss?

P: There are lots of people who can test your hearing using a short test, including doctors, nurses, and SLPs (that's us!). But there is one kind of person who can do a full hearing test. Does anybody know who can do that? *[P take one or two guesses from Ss]*

P: That person is an audiologist. Let's say that together: audiologist *[Say it slowly].* When an audiologist tests your hearing, you sit inside a special room called a sound booth. You wear headphones and listen to beeps and you press a button when you hear the beeps. If you ever think you might have hearing loss, you need to ask your family to take you to an audiologist.

Doctors and SLPs can do a short test of your hearing, which is what we are going to do now for one or two of you to show you what it might be like to get your hearing tested [*If kids ask, ENTs, hearing aid dealers, audiology assistants, and nurses can also do hearing screening]*.

[P will proceed to do a partial hearing screening on a student. Ask the teacher to choose a student to demonstrate. REMEMBER TO TURN THE AUDIOMETER OFF AND ON AGAIN BEFORE DOING THE TEST. Have student sit on chair at front of class. Instruct the whole class to raise their hands when they hear the beep. Turn audiometer to max dB and hold headphones facing students. Press the button. Turn example S so their back is to the class and put headphones on. TURN DOWN AUDIOMETER TO 30 dB. Instruct S to raise a hand when he/she hears the beep; tell the class you will raise your hand so they know when the beeps happen and they can tell if the S is hearing them too. Do 1000 Hz and 4000 Hz if time permits.]

Slide 28: Acknowledgements

P: Thank you for listening so well today!

Slide 29: References

[Skip through this slide quickly to go to next section]

6. **<u>What Did You Learn: 5 - 20 minutes</u>**

Slide 30: What did you learn today?

P: Now that you've learned all about hearing, hearing loss, and hearing aids, you're going to show me what you learned today!

[Choose a suggested activity from the list below that you feel comfortable doing; see Slide 31 or 32 in presentation for examples]

- *Ask the students: Imagine you just got home from school today and you had to tell your mom/dad/sister/brother what you learned in school. What would you tell them about what we just talked about today?*
- *Split the class into small groups. Give each group a noisy situation/scenario. Have each group act out what they could do or say in that situation that would help them protect their hearing.*
- *Hand out pieces of paper and write/draw what they learned. They could write keywords that they remember or write 3 things that they learned and one question they have. Slide 31 is an example of a sheet that you could print out and give to the students.*
    - ***Have the teacher photocopy them so they can have a copy and P can take a copy as data.***
- *Ask them to do a Venn diagram activity (might have to explain what a Venn diagram is).*

Have two hula hoops or make two circles out of string or draw on board. Have students brainstorm concepts such as hearing vs. deaf/hard of hearing, or dangerous vs. non-dangerous sounds, or "things that get in the way of your hearing". Write down concepts on pieces of paper and place in appropriate circles - don't forget the overlap part - Slide 32 is an example.

- *Re-enact the way sound is transmitted in the ear or how to talk to someone with hearing loss.*

[Once activity is finished, wrap up by saying thank you again, then gather everything and leave. Don't forget teacher evaluation form, any data collection and all materials.]

Appendix E

Teacher Resources for the *Everybody Hears* presentation

Other Presentations:

Alberta Science Network

http://www.albertasciencenetwork.ca

- This organization offers a presentation on the physical properties of sound when volunteer presenters are available. Kits of materials are also available for teachers to use in their classrooms.

Hearing loss prevention

http://hearalberta.ca/programs-and-services/hearing-loss-prevention/

- A website advertising a hearing loss prevention presentation put on for Grade 3 students in Alberta.

Let's Talk Science

http://outreach.letstalkscience.ca/ualberta.html

- A program that brings post-secondary students to classrooms free of charge to get them excited about Science, Technology, Engineering, and Math fields. They have a resource for their presenters to create a sound and hearing presentation.

Science of Sound and Hearing:

Nervous System - Hearing

http://www.bbc.co.uk/science/humanbody/body/factfiles/hearing/hearing_animation.shtml

- A page on hearing which includes an animation of the working ear, following the sound from the outside of the ear to the temporal lobe of the brain.

Changing Sounds

http://www.bbc.co.uk/schools/scienceclips/ages/9_10/changing_sounds.shtml

- Properties of sound are demonstrated by plucking a virtual guitar and altering string length.

Neuroscience for kids - hearing experiments

https://faculty.washington.edu/chudler/chhearing.html

- A list of activities with some specified grade ranges that explore the topics of sound and hearing such as properties of different sounds, sound localization, and modelling the eardrum.

Grade 4 Science

http://hrsbstaff.ednet.ns.ca/webct/science/4science/sound.htm

- This site contains content relevant to properties of sound such as wavelength, loudness, and pitch. It contains a basic chart of loudness of different sounds and a brief animation of different parts of the ear.

How the Ear Works
http://www.childrensuniversity.manchester.ac.uk/interactives/science/brainandsenses/ear/

- Provides an animated overview of the ear and its function as well as a quiz at the end of the overview.

Sound
http://www.internet4classrooms.com/science_elem_sound.htm

- A list of collected links that lead to activities for exploring sound mostly through music/musical instruments.

Science-Gr.3 online interactives
http://www.2learn.ca/kids/listSciG3.aspx?Type=44

- Provides a variety of interactive links that can be used to explore the anatomy of hearing and physical properties of sound.

Stereo Hanger
http://www-tc.pbskids.org/zoom/printables/activities/pdfs/stereohanger.pdf

- An activity for exploring the ability of sound to travel through different media and the difference that makes.

The Senses: Hearing
http://studyjams.scholastic.com/studyjams/jams/science/human-body/hearing.htm

- An animated video which describes the anatomy and function of the ear as well as mentioning hearing conservation. This video moves quite quickly, so it may be difficult for grade-3 students to follow if this is their first exposure to the information.

Hearing Loss and Conservation

American Speech-Language Hearing Association
http://www.asha.org/aud/HearingConservationChildren/

- This page provides a number of links to programs and campaigns on hearing conservation as well as some fact sheets.

Hearing loss in adults and children
https://canadianaudiology.ca/for-the-public/hearing-loss-in-adults-and-children/#how-do-you-test-hearing-in-young-children

- Provides facts on hearing loss in adults and children; aimed at an adult reader so should be adapted for use with grade-3 students.

Dangerous Decibels
http://dangerousdecibels.org/virtualexhibit/index.html

- Provides interactive games about hearing and sound; focusses on which decibel levels are too loud and can cause hearing damage.