Approaches to Evaluating Faculty Outreach, Part III:

Demonstration Project—Evaluation of Teacher Professional Development Workshops on Sound and Hearing Health

Sandra Laursen, Ethnography & Evaluation Research

1 Introduction

We first provide an overview of the broader evaluation study of faculty outreach at CU Boulder, of which this project was a component. We then detail the specific outreach project studied here, the Sound and Hearing Health workshop for K-12 educators.

1.1 Overview of the Evaluation Study

In 2011 the University of Colorado Boulder Office of University Outreach (OUO) asked our research unit to explore the evaluation needs, opportunities, and interests of faculty who have been awarded Faculty Outreach awards. These small grants support faculty to carry their research and creative work and teaching expertise to varied public audiences in the community and statewide. Some projects develop into considerable and lasting efforts that benefit faculty in several ways, providing high visibility to CU programs, yielding scholarly products, enhancing the experiences of CU students, and attracting external funding. Yet much less is known about the impact of this work on external audiences themselves and thus the value of this outreach investment in the community and state. The OUO also seeks to encourage faculty to think in an evidence-based way to optimize the value of their outreach work to external audiences in balance with their own needs, capacities and values.

To study these issues, we developed a two-pronged approach:

1) A qualitative study based on interviews with a sample of faculty grantees, to explore their interest in evaluation, and the needs and opportunities offered by their projects
2) Three "demonstration projects" evaluating Faculty Outreach projects, to provide practical examples and bring evaluation-related concerns, challenges, and possibilities to the fore.

For the demonstration projects, we selected multi-year projects that were well established and offered evidence of prior success, and whose leaders were willing to work with us. The demonstration projects vary across disciplines, outreach audiences and outreach methods yet offer examples of major outreach approaches such as youth experiences, public performances, and K-12 teacher professional development. Here we report on one such demonstration project.

We refer readers to Part I of the report for more details on the overall study, and to Part II for another example of a demonstration project.

1.2 Overview of the Sound and Hearing Health Workshop Outreach Project

Associate Professor Kathryn Arehart of Speech, Language and Hearing Sciences (SLHS) has led a workshop for teachers about hearing loss prevention nearly annually since 2005. Targeted to music, health and science teachers, the one-day workshop addresses the basic science of sound and hearing, how sound can cause hearing loss, and how noise-induced hearing loss can be prevented. The workshop accommodates 20-25 teachers per year, paying for a substitute teacher

and supplying each with a kit (valued at ~$100) of hands-on materials for demonstrating concepts and measuring sound levels. In past years, the workshop has also involved music educators and fostered connections between SLHS and music education faculty.

The workshop is adapted in part from a successful NIH-sponsored program, *Dangerous Decibels*; it is 2.5 days long while this one is a single day. The *Dangerous Decibels* developers have conducted substantial evaluation to design and refine the program, and to gather evidence about its effectiveness in educating teachers and their students about sound-induced hearing loss (Griest, Folmer & Martin, 2007). The CU workshop draws on this prior body of work, using some of its methods and materials, but the effectiveness of the *Dangerous Decibels* materials applied in this shorter format has not been established.

1.3 Evaluation Questions

The SHH teacher workshop is intended to equip teachers with the knowledge they need to teach students to take care of their hearing. Like other teacher professional development (TPD), this is a high-leverage strategy: reaching 20 teachers has the potential to reach hundreds of children year after year. Thus there are many possible outcomes of interest: what teachers learn; how this knowledge affects their beliefs and attitudes, and their behaviors as teachers; whether and how they implement any of this new learning in lessons in their own classrooms, and with what effectiveness; what their students learn from such lessons; and whether this results in the desired behavioral changes to protect young people's hearing health. Yet these outcomes are complex and sequential: the student outcomes are far downstream of the actual intervention with teachers. Moreover, health behaviors are inherently complex and challenging to change. Thus measuring the outcomes of this or any TPD intervention is inherently difficult, and the opportunity to think about these challenges with a faculty outreach team is one reason we chose this project as an evaluation demo project.

To think about this problem, we used the model of Guskey (2000), which identifies five levels of information about the impact of professional development, ordered from simplest to most complex. Gathering evaluative information at the higher levels requires more time and effort.

Level 1, Participants' Reactions, addresses participant satisfaction with the content and logistics of the workshop: did the teacher participants have a positive experience?

Level 2, Participants' Learning, aims to determine whether or not teachers acquired the intended knowledge, skills and beliefs.

Level 3, Organization Support and Change, focuses on the organizational variables, such as administrative support and resources, that may hinder or prevent teachers' success in implementing workshop material.

Level 4, Participants' Use of New Knowledge and Skills, addresses how effectively participating teachers were able to implement new knowledge and skills into the classroom, and identifies any challenges or barriers to implementation.

> Level 5, Student Learning Outcomes, aims to assess the impact of teachers' new knowledge and skills, as implemented in the classroom, on students' performance, achievement, or well-being.

Guskey's levels are also hierarchical, in that failure of the TPD intervention at one level can prevent success at the next level. So, for example, while evaluating teacher satisfaction from a TPD workshop (Level 1) is not considered good evidence of its overall impact, a workshop that fails to provide a positive and productive experience to teachers will certainly have no impact on teachers' learning and implementation later on. Information about Level 1 is thus important in assessing what higher-level outcomes are possible or likely.

We spent a good deal of time discussing possible methods to evaluate the workshop at each level and the tradeoffs among them As a science-trained faculty member, Arehart was concerned that our methods be scientifically valid; the small sample size and lack of a comparison group also constrained our choices. The modest scope of the outreach project was paramount: both the effort required of the outreach team and the input requested of teachers needed to match the scope of the project and the magnitude of what was being provided to teachers. Ultimately, we settled upon the following evaluation questions, mapped to Guskey's levels:

1. How satisfied were teachers with the workshop experience, and what advice did they give for improving it? (Level 1)
2. What changes can be measured in participating teachers'
    a. Attitudes and beliefs about hearing loss and prevention? (Level 2)
    b. Knowledge about hearing, noise-induced hearing loss, and hearing loss prevention? (Level 2)
3. To what extent do teachers implement the workshop material, in what settings and with what intent? (Levels 3 and 4)
4. What can be learned about the facilitators and barriers for teachers in implementing this material in the classrooms? (Levels 3 and 4)

These questions define a thorough evaluation at Guskey's Levels 1 and 2, and an exploratory evaluation at Levels 3 and 4. Examining Level 5 was deemed to be beyond the scope of this project. Prior work has documented positive Level 5 impacts on 4th and 7th grade students based on lessons delivered by their own teachers after participating in a *Dangerous Decibels* workshop (Griest, Folmer & Martin, 2007). Again, the current workshop is shorter and does not follow the *Dangerous Decibels* format fully.

We expected all levels to offer both formative information about improving future renditions of the workshop and summative information about its impact. However, given that the workshop was already well developed and had been run previously several times, the formative evaluation was less focused on refining the workshop itself, and more focused on the follow-up and implementation activities that the outreach team recently added.

A second layer of evaluation questions grows out of the broader effort to examine the needs, interests and opportunities for more robust evaluation of Faculty Outreach projects.

5. What methods may be used to probe these questions, and what considerations enter into selection of methods for a particular study?
6. How do the selected methods work in practice to gather information, with what results, what investment of resources and what potential for sustained independent use in the dance program?
7. What can be learned from this pilot project that is useful to the OUO and to faculty in setting expectations and implementing evaluation appropriate for funded Faculty Outreach projects?

These latter questions were developed in collaboration with the outreach project leaders and OUO staff, and with awareness of recent scholarly work on university outreach and engagement (e.g., Fitzgerald, Burack & Seifer, 2010).

2 Selection of Study Methods

In this section we identify how the evaluation questions and data collection approaches emerged. Detail about the process is offered to guide future projects in assessing whether or not similar methods would work for them. The appendices include our study instruments, as examples for others who may wish to adapt similar approaches for evaluating their own outreach work.

The study design emerged from initial conversations with hearing scientist Arehart. She worked with us throughout the year to develop the study approach, design study instruments, and interpret results, and consulted with the *Dangerous Decibels* developers to obtain their instruments and advice. SLHS graduate student Carly Lang took the lead in designing the pre/post workshop assessments and postdoctoral scientist Cory Portnuff assisted Lang in planning the follow-up survey and carrying out follow-up work with teachers. Our final design drew upon E&ER's prior work on science TPD evaluation and on the *Dangerous Decibels* evaluation items, and included four components (see Lang, 2012, for details).

1) *Pre-workshop content survey.* Given at the start of the workshop, this addressed teachers' baseline knowledge of the material, as well as their initial attitudes and beliefs about noise and hearing conservation. Demographic information was also documented. Multiple-choice and true/false content questions were adapted from questionnaires developed for Dangerous Decibels program to address key content presented in the SHH workshop (see Appendix A).
2) *Post-workshop survey.* Administered immediately after the workshop, this addressed teacher reactions (Level 1), knowledge and beliefs (Level 2) for comparison with the pre-workshop baseline, self-reported gains in knowledge and the ability to apply it (Levels 2-3), and intent to implement (Levels 3-4). Items included numerical ratings and write-in items. Content questions from the baseline evaluation were altered slightly to prevent memorization while preserving score matching capabilities (Appendix B).

   In addition, participants were informed that they would be contacted at a later date about their follow-up needs. The "menu" of follow-up options included a follow-up meeting with

workshop personnel for additional teaching support, a sound level survey of their classrooms, curriculum development, and dosimeter rental. Teachers indicated which options, if any, they were interested in receiving so that follow-up arrangements could be organized.

3) *Follow-up facilitation.* In April, teachers were contacted regarding their selections for follow-up and additional support. Some opted not to receive additional services and did not participate in this area of evaluation. Others requested a meeting or phone conference with workshop personnel to review content and equipment use, and to address any barriers to implementation that were encountered. While this facilitation was primarily to support teacher implementation, field notes on teacher feedback and concerns were also collected.

4) *Follow-up survey*. At the end of the semester, about 6 weeks after the workshop, participants were asked by e-mail to complete a follow-up survey on their classroom implementation of workshop material. A primary goal of the workshop was to reduce the number of barriers to implementation, and this survey was designed to help determine how well this goal was achieved, what barriers remain, and participant ideas or suggestions for how this can be addressed in future workshops. All participants were asked to complete this survey, regardless of whether they received additional support.

3 Results: Pre/Post-Workshop Assessment and Survey

The 2012 Sound and Hearing Health (SHH) workshop was held on Friday, March 16, 2012, on the CU Boulder campus, and led by Dr. Kathryn Arehart and Dr. Cory Portnuff. In all, 31 participants registered (with 13 wait-listed); 29 attended, and 25 completed both pre- and post-workshop surveys (86% response rate). Here we summarize Lang's (2012) detailed quantitative analysis that focuses on pre/post measures of learning, belief change, and satisfaction. In addition, we summarize write-in comments from the immediate post-workshop survey that give feedback on the workshop and detail teachers' plans to use the material in their own classrooms (25 responses).

3.1 Characteristics of respondents

Of 25 respondents, 45% taught grades 9-12, 17% taught grades 6-8, and 38% taught in grades K-5. Teacher subject areas varied: 44% reported their primary subject as science, 32% taught music, and 8% taught health (16% did not specify). The mixture of both grade levels and subject areas is interesting, as most TPD workshops are discipline and/or grade-band specific.

Lang (2012) details teachers' reports on the topical areas covered in the workshop that teachers had previously taught (e.g. auditory anatomy, physics of sound). Significantly, few participants had addressed hearing loss or conservation topics previously, and fully 24% had taught none of the topics listed.

Participants indicated their primary reasons for attending the workshop. Three motivations were prominent among the group, with 68% of respondents indicating each (respondents could indicate multiple reasons):

- the subject of the workshop was relevant to the courses they taught
- they wanted to learn about sound and hearing health

- they wanted to acquire new classroom activities.

3.2 Pre/post knowledge assessment

Content questions were scored by assigning a numerical value to indicate a correct (+1) or incorrect (-1) response. Table 1 summarizes the results of the content test.

Overall, the results of the content test suggest that teachers did learn new knowledge from the workshop. However, their high pre-test scores suggest that many items were relatively easy and may be considered common knowledge, at least among this well-educated population. Despite the fact that teachers scored well on some pre-test items, they may remain useful to invoke this prior knowledge at the start of the workshop so that teachers keep it in mind as they learn and discuss. The decline in scores for one sub-item of Question 1 indicates that there was some confusion about the role of the eardrum in the auditory system. The presenters knew where this misconception had likely arisen and will address it in future versions of the workshop.

Table 1: Item Scores for Pre/Post Content Test

Question	Mean % correct on pre-test	Mean % correct on post-test	% of scores changing from pre- to post-test	Notes
1, anatomy of auditory system (6 items listed)	75%	81%	17% improved 72% no change	Net improvement on 2 items; no change on 3 items; decline on 1 item (eardrum)
Same item, Oct'12	48%	76%	63% improved 31% no change	Item was reworked slightly; it is now more sensitive to change
2, sources of hazardous noise (8 items listed)	97%	99%	2% improved 99% no change	High initial knowledge, item does not discriminate; may be useful to invoke prior knowledge
Same item, Oct'12	95%	100%	13% improved 88% no change	Used to invoke prior knowledge
3, sound chars. that cause hearing damage	32%	100%	68% improved 32% no change	Evidence of strong learning on this item
Same item, Oct'12	71%	85%	50% improved 31% no change	Strong learning continues though initial score is higher
4, children's susceptibility to hearing damage	100%	100%	100% no change	Item does not discriminate but useful to invoke prior knowledge – item omitted 10/12
5, methods to conserve hearing	87%	99%	13% improved 86% no change	Some evidence of learning despite high initial scores
Same item, Oct'12	83%	98%	81% improved 19% no change	

3.3 Pre/post survey of attitudes and beliefs

Pre/post items on attitudes and beliefs were administered as statements with which respondents could agree or disagree (scale 1, strongly disagree, to 5, strongly agree). The ratings are summarized in Table 2. Ratings on the same measures administered in the BSI-cosponsored workshop in October 2012 are also shown.

Table 2: Item Ratings for Pre/Post Attitude Assessment (5-point scale)

Question	Mean rating, pre-survey	Mean rating, post-survey	Notes
1, own susceptibility to hearing loss	4.92	5.00	High initial awareness of susceptibility; changes little
Same item, Oct'12	4.52	5.00	
2, own effort to protect hearing	3.10	4.76	Much stronger behavioral intent to protect hearing
Same item, Oct'12	N/A	4.65	
3, it is easy to protect hearing	4.08	4.64	Growth in belief that hearing can be protected easily
Same item, Oct'12	3.86	4.80	
4, intent to seek ways to protect hearing	3.56	4.72	Stronger behavioral intent to protect hearing
Same item, Oct'12	3.67	4.65	

While the knowledge-related items showed relatively modest shifts (due to high scores on the pre-test), the attitudinal items show sizable shifts in respondents' beliefs about the importance of protecting hearing. Respondents indicated stronger behavioral intent to protect their hearing in the future.[1] They also agreed more strongly that it is easy to protect one's hearing, suggesting a lowering of one common barrier to hearing protection. To assess the statistical significance of these pre/post changes, two-tailed, paired samples T-tests were conducted between the pre- and post-survey items. Significant, positive changes were noted on items 2, 3 and 4 ($p < .05$). The responses from October 2012 show generally similar patterns, but were not subjected to t-tests.

One explanation for these strong shifts is that teachers learned new information that made them recognize the importance of protecting their own hearing while also realizing that it was not difficult to do so (e.g., "walking away" from a loud sound is one protective strategy). This suggests the workshop material carries some emotional weight; the potential for hearing loss may seem less remote and perhaps a bit scary, but also more easily prevented than they had previously known. However, it is also possible that the shifts in these indicators reflect compliance with socially desired behavior (protecting one's hearing) that was communicated in the workshop. Social desirability is a known factor in influencing the accuracy of self-report.

[1] Results from *Dangerous Decibels* indicate that behavioral intent may be stable for weeks to months, but do not indicate if the intent is reflected in actual hearing protection behaviors.

We looked to the write-in comments for illumination on this point, but the open-ended questions focused on teachers' classroom application of the material rather than on their personal take-aways. To explore this aspect in the future, it would be interesting to add a write-in question asking teachers to reflect on the personal impact of the information they learned, particularly in cases like this where change in a teacher's personal behavior is also a potential outcome of the TPD.

3.4 Post-survey on satisfaction and general impact

Several survey items examined teachers' sense of their preparation to teach the workshop material, as shown in Table 3. The three items on comfort, knowledge, and preparation to teach the material used a scale from 1 (strongly disagree) to 5 (strongly agree) and the overall rating scale ran from 1 (poor) to 5 (excellent). Table 3 also includes ratings on the same items on the follow-up survey six weeks later, showing that teacher ratings of the workshop remain largely stable. Ratings from the same items for the October 2012 workshop are also shown.

Table 3: Item Ratings of Overall Learning and Satisfaction (5-point scale)

Question	Mean, pre-survey	Mean, post-survey	Mean, follow-up survey	Notes
comfort in teaching workshop material	2.50	4.40	4.43	Substantial growth in confidence to teach material
Same item, Oct'12	2.90	4.60	—	
increased knowledge in subject area	—	4.88	4.71	Stronger content knowledge
Same item, Oct'12	—	4.95	—	
preparedness to use hands-on materials	—	4.60	4.43	General confidence in using the equipment & materials
Same item, Oct'12	—	4.65	—	
overall rating of workshop compared with other TPD	—	4.83	—	Workshop is highly rated

Overall, the ratings show that participants felt they had increased their knowledge, felt generally prepared to use the hands-on materials, and overall felt more comfortable teaching the workshop material at the end of the workshop than they did at the beginning. Again, the ratings are quite similar for the March and October workshops.

Open-ended comments further elucidate these ratings. Participants' write-in comments about the strengths of the workshop praised the content knowledge and clarity of speakers Arehart and Portnuff, the hands-on activities, and the practical applications and importance of the information. Participants appreciated the way the workshop integrated physics, biology, health and music. This is particularly interesting given the diversity of grade levels and disciplinary

backgrounds of the participants: there is little evidence of any frustration about unmet needs, despite the fact that evaluators often encounter this in workshops for "mixed" audiences. This may be due to a general lack of familiarity with this topic among any of the participants, as the pre-survey item indicated.

Another open-ended question asked what aspects of the workshop could be improved. The most frequent suggestion was to include more hands-on activities and to intersperse them with lecture segments to reduce sitting time. Teachers would have liked more time to try out the activities and ask questions. They wanted to be able to take notes on the handouts during the lectures. One person suggested giving people time to think individually before a group brainstorm.

Similar themes appeared in write-in responses to the prompt, "I wish there had been more information on...." Teachers wanted more hands-on activities and more time to do them. One wanted time to think about how to incorporate into his/her own curriculum, echoing other comments on the value of small group discussion and "talking shop" with fellow educators. A few mentioned specific questions about hearing loss, musicians' hearing health, tinnitus, hearing measurement, and hearing protection; the lack of recurring themes here suggests that these are individual questions rather than perceived gaps in the presentation. The similar prompt, "I wish there had been less information on...," elicited mainly responses indicating that the information was well presented and useful—"keep it all"—and few suggestions of what to leave out.

Seven people wrote in additional comments. Six of these were praise for the quality of the workshop and value of the time spent. One person perceived a lack of "compassion" in discussing studies that exposed animals to high sound levels. Animal studies are a potentially sensitive topic where teachers may not share researchers' knowledge or perspective on the use of animal studies, and here researchers may need to offer some additional framing or commentary.

Overall, the write-in comments were positive about the workshop and offered some helpful advice, much of which could be readily addressed. These comments were used as input for adaptation of the workshop by Arehart and the BSI in planning the October 2012 workshop.

3.5 Implementation plans

Teachers were asked about their plans to teach this material in the remainder of the school year (end of March-May 2012):

14 planned to teach it before the end of the school year (some qualified this, if time permits)

4 explicitly stated that they could not teach it until next year

7 did not specify a time of use

Clearly, many teachers' use of the material would be delayed until the following (2012-13) school year. Indeed, teachers were also asked about the likelihood that they would incorporate workshop material into the upcoming (2012-2013) school year. Three quarters indicated that they would be "very likely" to do so, and most of the rest reported that they were "likely" to do so. This delay in uptake of the material is confirmed in the follow-up survey (Section 4).

Teachers reported a wide range of course topics and grade levels for their planned use, from 3rd grade to high school, and including physics, biology, health, vocational education, and special education. Popular workshop elements to include in their own lessons were YouTube videos used in the workshop, the tuning fork demo, and the pipe cleaner model. The sound meters were mentioned by some respondents, but less frequently. It is possible that teachers were not yet entirely comfortable with using the meters, or have not fully understood their potential for supporting student exploration and investigation with the use of authentic equipment.

4 Follow-up Facilitation

Here we summarize the follow-up activities offered to support teachers, based on a report by Portnuff (2012). Several types of follow-up activities were offered including:

- Sound Level Meter Use. Classroom support for instruction in how to measure sound, and on-site support for taking measurements.
- Curriculum Support. In-class support for incorporating hearing education into curriculum, and incorporating hearing loss prevention in science and health curricula.
- Curriculum Consultation. Consultation by e-mail or phone to support for incorporating hearing protection as a part of curriculum.
- Dosimeter Use. Classroom instruction in using a sound dosimeter, interpreting dosimeter measurements, and use of a dosimeter borrowed from CU.
- Sound Survey. Classroom support for creating sound surveys and sound level maps (provided by CU audiologists)
- Hearing Protection Devices. In-class or consulting support for using earplugs, musicians' earplugs and assistance in obtaining custom musicians' earplugs.

Teachers completed a form during the workshop to detail the follow-up activities of interest to them, and those interested were contacted by e-mail to schedule follow-up times.

In 2012, several participants requested consulting support by e-mail, asking that in-classroom support be provided in the fall semester. The low level of requests for follow-up activities this time was likely due to the late timing in the school year (early April). In past years, 2-3 teachers have requested and received classroom visits, most often seeking assistance in working with sound level meters and dosimeters. In-class visits lasted about one hour, and typically included taking some measurements in the classroom while the teacher taught. A follow-up report was provided to each teacher after the visit, summarizing what had been discussed.

Follow-up activities must be led by a knowledgeable person. Past follow-up has been conducted by one of the workshop leaders, a licensed audiologist familiar with sound measurement in the classroom. AuD students with appropriate training—particularly if they had participated in the workshop and familiar with teachers' interests and concerns—could easily provide this type of follow-up in the classroom or by e-mail consultation.

This experience illustrates a common difficulty with TPD workshops. Research indicates that follow-up support is important to overcome barriers to implementation, yet it is challenging to

offer support that meets teachers' needs. In this case, follow-up support was completely individualized, but to actually benefit teachers, it must be extended through a full academic year after the workshop. This can be difficult for faculty to plan for and support on a one-year grant cycle, as well as discouraging when teachers do not seem receptive to the support offered.

5 Results: Follow-up Study

Fifteen responses were received to a follow-up survey given in June 2012 about teachers' actual use of the material in class (52% response rate). While the response rate is acceptable for an online survey, the sample is small.

5.1 Characteristics of respondents

Of teachers responding to the follow-up survey, six cited their main subject as science, three as music, and one as health (4 marked 'other subjects' and listed math, audio production, and special education). Six teachers taught grades K-5 and seven taught high school; no middle school teachers responded. Overall, given the smaller samples, these distributions are similar to that in the pre-survey. Because implementers are more likely to report their activities on a follow-up survey than non-implementers, it is likely that the follow-up survey captured most or all of the post-workshop implementation that occurred.

5.2 Implementation of workshop material

Six of 15 respondents reported using the workshop material during spring term 2012. This is about half the number who said they intended to do so at the end of the workshop, and 40% of all respondents. While this is not a high rate of uptake overall, it is not disappointing given the short time between the workshop and the end of the school year.

Topics that teachers incorporated included anatomy of the hearing system and the physics of sound; one created a new educational unit, while the others incorporated information into existing units. Write-in comments emphasized teachers' needs for more time to plan and to fit new material into their lesson plans. Two teachers expected to need administrative approval to incorporate the workshop material

As shown in Table 3, follow-up ratings remained high for teachers' sense of mastery of the material and comfort in teaching it, with means near 4.5 on a 5-point scale (where 4 = agree and 5 = strongly agree). Ratings on the item 'I feel that the follow-up measures were helpful in providing additional understanding of the workshop material' were positive but somewhat lower, with a mean of 3.79 on the same 5-point scale. This reflects that not all teachers could make use of the follow-up options on the time frame of the follow-up survey.

Thirteen of 14 respondents indicated they intended to use the workshop material in the 2012-13 school year. Most planned to incorporate new material into existing units. Again, write-in comments emphasized teachers' need for time to think, plan and collaborate with other teachers. Some hoped that they would have continued support from the workshop leaders to implement the material in the fall.

In written comments, teachers offered further suggestions about the workshop itself. They again emphasized the value of hands-on activities to use with students and practical knowledge about

hearing loss, measurement and protection. Two asked for time during the workshop to think about how to teach this material in their own settings. Others requested digital copies of the slides, not just a print copy. One person suggested that school nurses would be a good audience for this material with the potential to reach many young people. One teacher suggested that the presenters should make it clear that the kit became the property of the teacher who had been trained and did not have to be left behind if s/he changed schools. Again, several commenters repeated their praise for the workshop and expressed their thanks.

Overall, participant responses indicate that the workshop was well received, interesting and useful to participants. Several of the suggestions are easily implemented refinements; some were implemented already in a second edition of the workshop presented in collaboration with the Biological Sciences Initiative. The BSI's professional developers have particular expertise in designing and implementing hands-on activities. Moving the workshop to October is likely to improve the rate of classroom implementation in the near term, though this is not a general solution (not all TPD can be offered in the fall). Teachers from the March workshop would value ongoing support for their implementation if that can be provided.

6 Lessons Learned

Here we summarize three kinds of learning that emerged from this study:

- Findings about the Sound and Hearing Health outreach project itself (6.1-6.2)
- Specific insights into the kinds of evaluation approaches that appealed to project leaders and that worked in practice (and that did not), and thoughts on how these approaches will continue to inform this project and/or serve as useful models to others (6.3)
- General insights that may inform other outreach projects and strategies of the Office of University Outreach (6.4-6.5)

6.1 Findings about the SHH outreach project

Overall, the results at Levels 1 (teacher satisfaction) and 2 (teacher learning) are quite positive, indicating that the SHH workshop is well planned and executed and well received by teachers. This is particularly noteworthy given the mixed teacher audience by subject and grade level, as it can be difficult to meet the needs of all teachers in a diverse group. Moreover, the findings were useful as formative feedback. For example, teachers' advice to offer more hands-on activities was explicitly incorporated into the October 2012 offering through the BSI, through the addition of several new hands-on activities and building in time for teachers to carry them out. While teachers did not receive additional time for their own planning, they did receive a binder and CD of all the handouts and materials, which may reduce the work required for each to implement in their own classrooms.

At Levels 3 (organizational barriers) and 4 (classroom implementation), the results reveal some challenges that are typical of one-day TPD activities. The extent of implementation has been modest so far, with an understandable delay in uptake for teachers from the March 2012 workshop to the following academic year. In and of itself this is not a problem, but it does

suggest some potential challenges for classroom implementation, as teachers must retain their interest, learning and ideas for implementation over several months before they can apply it.

It is difficult to discern the extent to which organizational and structural barriers impede teachers from implementing, but some barriers can be identified from the data. The most commonly mentioned barrier was time—both personal time to plan and think, and classroom time in which to insert a new lesson or unit. A small number of comments mentioned the need to coordinate with other teachers or supervisors to incorporate the material. Presumably because the teachers received a kit of *Dangerous Decibels* items, equipment or materials were not commonly identified as barriers, though some teachers requested copies of handouts and slides that they could adapt, and some indicated that they would like reinforcement of content ideas and equipment use.

Interestingly, in comparison to other TPD workshops we have evaluated, there were relatively few mentions of the state standards, neither positive or negative (e.g. the workshop material supported the teaching of particular standards, or did not fit the state standards). This is perhaps due to the variety of disciplines represented: compared to science teachers, educators from disciplines such as health and music may exhibit less concern about strict adherence to the standards because their field is not tested in high-stakes state assessments. It may also reflect the sizable fraction of elementary teachers attending, who as generalists in their teaching may take a more integrative view of the standards than do many high school science teachers, for example.

While not every teacher can be expected to use the material, there may be ways to assist teachers in implementing:

- provide workshop time for personal and collaborative planning, so that teachers leave with a draft plan for their future use of the content
- extend follow-up e-mail or personal support into the following school year
- offer a "refresher" option for teachers who want to attend future offerings of the workshop or a follow-up session
- align workshop material explicitly with state standards for relevant grades and subjects, and clearly communicate that alignment to teachers.

Each of these generates some additional work for the workshop leaders and offers its own logistical challenges, but they also give the workshop greater potential to have lasting impact on classroom practice.

6.2 Cross-campus collaboration

In addition to this study design, our conversations facilitated a connection with the Biological Sciences Initiative (BSI), a science education outreach program at CU. Arehart collaborated with the BSI to revise and offer this workshop as part of the BSI's regular TPD series. This is a fruitful relationship that lowers logistical barriers for Arehart (advertising, registration, materials preparation, classroom, food) while providing an experienced workshop leader to the BSI's list of faculty collaborators. Noted Arehart,

> Having the support was wonderful, and we were able to provide more hands-on activities for teachers during the day. [The BSI] had demos set up for each work station, and this hands-on experimentation for teachers made for a wonderful collaboration. Having those resources *and* the teacher kits (which they would not be able to fund) was truly a win/win situation, from my perspective.

Arehart also reported that she had found it useful to work with the BSI staff to set and make explicit clear learning goals for the workshop. This is a useful step toward standards alignment, as noted above, and a pedagogical strategy that she had applied to her college-level teaching.

The BSI facilitators likewise reported the workshop as going very well, and remarked upon Arehart and Portnuff's "passion for sharing their expertise and healthy hearing knowledge with teachers - with the intent of bringing about behavioral changes in students." They had developed several new activities and teachers experienced them first-hand during the workshop. In their written comments, ten of 17 teachers mentioned the value of materials including hands-on activities, handouts, binders, CDs and the Dangerous Decibels kits as the most effective aspect of the workshop. Two requested still more hands-on work.

The BSI's mailing list reaches a different subset of teachers in the local area, including teachers who have come to trust the quality of their offerings. The workshop quickly filled and developed a wait list. Arehart has sufficient funding for one more set of kits; both parties intend to collaboratively offer the workshop next year. It is unclear at this time how much follow-up support can be offered to teachers, but Portnuff indicated he was planning to follow up with the March participants who had asked for teaching assistance in the fall term.

6.3 Evaluation capacity-building for the SHH outreach project

The positive results offer validation of Arehart's personal sense that the workshop is effective at Level 1. While many experienced professional developers develop good self-assessment skills over time, we do not take the accuracy of these skills as a given; it is useful for leaders to calibrate their observations against feedback from participants. Effectiveness at Levels 2-5 is much more difficult to establish by observation, as often leaders receive at best anecdotal feedback from a very limited number of participants.

Evaluation at Level 2 is often omitted, because professional developers often hesitate to directly measure teacher learning (Guskey). Here we selected previously developed and tested items to develop an assessment of changes in teacher learning and beliefs (Griest, Folmer & Martin, 2007). Lang analyzed the results and offered revised versions of the pre/post instruments (see Appendices D and E of Lang, 2012). We ran the assessment again during the October 2012 workshop. We now have an instrument that is simple to analyze and can be used again for any future SHH workshop.

The results of the project appear in no way to be sensitive to particular circumstances of this offering and audience; the leaders are experienced and the workshop materials are fairly well honed at this point. Therefore this study should serve as evidence for the workshop outcomes for some time: it need not be repeated annually. We would suggest that the instruments developed

here continue to be used for routine monitoring. The outreach team is most interested in formative feedback and does not anticipate a need for summative evidence about outcomes.

6.4 Implications for OUO practice

This was an instructive project for learning about the opportunities and challenges of evaluating a teacher workshop. The "one-shot" TPD workshop is a typical model of outreach at CU and elsewhere, and thus two lessons learned in this project are relevant to the evaluation of other TPD projects. First, the idea of a modular "plug-in" or "tool kit" approach to evaluation was appealing to this team. Indeed we started with some useful pieces, including an existing TPD satisfaction survey that E&ER had previously used, and the pre/post assessment items developed for the *Dangerous Decibels* program. Nonetheless, substantial conversation and effort were required to identify and select appropriate components and adapt them to this workshop. This helps to confirm our prior opinion that a tool kit approach to outreach evaluation will not meet the needs. Second, the approach used here is nonetheless applicable to other projects. The survey instruments could be adapted to other TPD efforts. In particular, we hope that Guskey's five-level approach will assist others in their thinking about an approach to TPD evaluation that addresses teacher satisfaction, learning, use, barriers, and/or student outcomes.

Like the other outreach evaluation demo projects, this project required substantial effort. Team members contributed several forms of in-kind support in addition to the evaluator's input. While this is "the reality of doing outreach," as one team member put it, the feasibility of this effort was a constant consideration, an added expectation on an already full plate. For any outreach team, the worthiness of an evaluation effort depends on the value to them of the resulting information. In this case, the results were not of intrinsic interest to the outreach team; they did not (for instance) seek to build their own evaluation capacity nor have current plans to use the data to pursue additional funding. They wished to assist the OUO and viewed the evaluation work as primarily a service activity. This contrasts with other types of projects where evidence-gathering is integral to the conduct of the outreach or a means of furthering faculty scholarly commitments.

The service perspective on evaluation is also consistent with a view of university outreach as about giving knowledge to external constituencies who can make use of it. In this perspective, the knowledge-giving itself is the university's role. Benefits to the external community are desired, but it is the responsibility of the receivers to apply the knowledge fruitfully. We identified this 'Type 1' perspective in an analysis of interview data with faculty outreach teams (Laursen & Archie, 2012). As one speaker put it, "I do this because it's fun to interact with teachers"—this kind of work is where faculty can "let our hair down." This comment emphasizes the personal value of making connections with community members.

In this perspective, the outreach activity itself is the commitment. And under this framing, the purpose of evaluation is primarily to verify the quality of what is being delivered, rather than to examine what has been received or whether it meets a community need in an effective manner. For faculty who are experienced teachers, the quality of what is delivered may be in little doubt; therefore evaluation may readily seen as an added burden without a compensating reward. There may be other positive spin-offs from these interactions—such as relationships that foster more positive town-gown relationships, that are less tangible and less easily measured, and that are

general to all types of outreach rather than directly related to the nature of the outreach activity. Nor have we documented in this demo project the internal benefits to students and faculty, which also play into the overall calculus of the impact of university outreach.

This perspective may also be more typical in projects led by faculty in tenurable positions who do outreach along with their teaching, research and service duties, than in those involving non-tenure-track faculty or staff who work in outreach as their professional role. OUO supports many outreach projects where similar considerations would apply. In these cases, any increase in expectations for evaluation will mean providing both financial support for the extra work and expertise to design and carry it out. While—as in this and other examples—students and other colleagues may be willingly enlisted to help with the time commitments, they are unlikely to bring the necessary expertise.

6.5 University support for teacher professional development

Unlike some types of outreach, there is a large body of evidence about the design and effectiveness of teacher professional development. Rigorous studies that trace the impact of TPD through all of Guskey's levels to documenting effects on student learning are challenging to carry out and thus still not common. But a growing body of literature (Desimone, et al., 2002; Garet, et al., 2001; Porter, et al., 2003; Banilower, et al., 2006; Supovitz & Turner, 2000; Penuel, et al., 2007; Yoon, et al., 2007) highlights three core features that have been shown to yield lasting impact on teacher practice and student performance:

- content knowledge is emphasized and linked with pedagogical content knowledge, the knowledge of how to teach particular ideas with attention to student developmental readiness and students' possible misconceptions;
- teachers are actively engaged, using learner-centered instructional approaches like those their students should experience;
- the program is coherent: it supports "sustained professional communication" ((Porter et al. 2003), links to school and teacher goals, and aligns with state and district standards and assessments.

To achieve these core features, substantial teacher involvement is required, beyond what the single-shot, one-day workshop can deliver. For example, Banilower and colleagues (2006) show that changes to elementary teachers' science teaching practice began only after 30 hours of contact time, and continued to rise up to 80 hours, while changes to the investigative culture of science classrooms began at 40 hours and were still rising at 160 hours of TPD. The impact of smaller doses on teachers' classroom practice was not detectable.

The coherence of TPD offered in small doses is also at issue. Bobrowsky, Marx and Fishman (2001) point out that most TPD engages only self-selected, voluntary participants, who are known to be more motivated, innovative and open to change. They describe the "scattered, decontextualized events" offered to teachers for professional learning as yielding "a hodgepodge of knowledge about teaching and learning that does not lead to a coherent vision or knowledge base to guide practice" (p. 2). Other authors likewise describe the single-shot workshop as offering TPD that is "intellectually superficial, ….fragmented and noncumulative" (Ball &

Cohen, 1999, pp. 3-4, cited in Yoon et al., 2007). Lacking a coherent infrastructure for professional development, it becomes a "patchwork of opportunities—formal and informal, mandatory and voluntary, serendipitous and planned" (Wilson & Berne, 1999, p. 174, cited in Yoon, et al., 2007).

Given these critiques and the research evidence about effective TPD, it is worthwhile to consider what OUO might do to encourage, support and sustain the creation of coherent, multi-day TPD experiences that have potential to genuinely improve K-12 education. This is a hard problem that will almost certainly require carefully built and meaningful partnerships between the university and local school districts. The collaboration between the SHH workshop and the BSI hints at one step in this direction: workshops involving individual faculty from across campus, but coordinated through experienced providers who lead ongoing TPD efforts, are more likely to be able to develop sustainable TPD models. Ideally, these will offer teachers the intensity and coherence called for by the research evidence yet provide "click-in" opportunities for university faculty to share their disciplinary expertise and passion while lowering some of the barriers to their participation. The School of Education, the iSTEM project, and other professional outreach units around campus are other potential partners.

This consideration goes well beyond the present study, but it is worth raising as relevant to OUO's longer-term goal to support outreach work that is based on good evidence about its impact. It may be more strategic to consider how to move TPD practice, campus-wide and over time, toward research-supported models, than to invest in evaluating models that are not well supported by the existing evidence base.

7 Acknowledgments

Kathy Arehart, Carly Lang and Cory Portnuff contributed significantly to the design and execution of this evaluation. Rebecca Crane assisted in early design stages of the project. Tammy Maldonado and Kristin Swihart shared their comments and insights.

8 References Cited

Ball, D. L., & Cohen, D. K. (1999). Developing practices, developing practitioners: Toward a practice-based theory of professional development. In G. Sykes & L. Darling-Hammonds (Eds.), *Teaching as the learning profession: Handbook of policy and practice* (pp. 30-32). San Francisco, CA: Jossey-Bass.

Banilower, E. R., Boyd, S. E., Pasley, J. D., & Weiss, I. R. (2006, December). *Lessons from a Decade of Mathematics and Science Reform: A Capstone Report for the Local Systemic Change through Teacher Enhancement Initiative*. [Report to the NSF] Chapel Hill, NC: Horizon Research, Inc. Retrieved 11/8/2012 from http://www.pdmathsci.net/reports/capstone.pdf

Bobrowsky, W., Marx, R., Fishman, B. (2001). The empirical base for professional development in science education: Moving beyond volunteers. Paper presented at NARST, St. Louis, MO.

Desimone, L. M., Porter, A. C., Garet, M. S., Yoon, K. S., & Birman, B. F. (2002). Effects of professional development on teachers' instruction: Results from a three-year longitudinal study. *Educational Evaluation and Policy Analysis*, 24(2), 81–112.

Fitzgerald, H. E., Burack, C., & Seifer, S. D. (eds.) (2010). *Handbook of Engaged Scholarship: Contemporary Landscapes, Future Directions* (vols. 1 & 2). East Lansing: Michigan State University Press.

Garet, M., Porter, A., Desimone, L., Birman, B., & Yoon, K. (2001). What makes professional development effective? Results from a national sample of teachers. *American Educational Research Journal, 38*, 915-945.

Griest, S., Folmer, R. L., & Martin, W. H. (2007). Effectiveness of "Dangerous Decibels," a school-based hearing loss prevention program. *American Journal of Audiology, 16,* S165-S181.

Guskey, T. R. (2000). *Evaluating Professional Development*. Thousand Oaks, CA: Corwin Press.

Lang, C. (2012). An assessment of outcome measures for the Sound and Hearing Health workshop. Capstone project, Department of Speech, Language & Hearing Sciences, University of Colorado Boulder.

Laursen, S., & Archie, T. (2012). *Approaches to Evaluating the Outcomes of Faculty Outreach, Part I: Needs, Opportunities and Challenges*. [Report to the Office of University Outreach] Boulder, CO: Ethnography & Evaluation Research, University of Colorado Boulder.

Penuel, W. R., Fishman, B. J., Yamaguchi, R., & Gallagher, L. P. (2007). What makes professional development effective? Strategies to foster curriculum implementation. *American Educational Research Journal, 4*4, 921-958.

Porter, A. C., Garet, M. S., Desimone, L., Birman, B. F. (2003). Providing effective professional development: Lessons from the Eisenhower Program. *Science Educator* **12**(1), 23-40.

Portnuff, C. (2012). Sound, Hearing, and Hearing Health teacher workshop: Follow-up summary.

Supovitz, J. A., & Turner, H. M. (2000). The effects of professional development on science teaching practices and classroom culture. *Journal of Research in Science Teaching*, 37(9), 963-980.

Wilson, S. M. & Berne, J. (1999). Teacher learning and the acquisition of professional knowledge: An examination of research on contemporary professional development. *Review of Research in Education, 24*, 173-209.

Yoon, K. S., Duncan, T., Lee, S., W.-Y., Scarloss, B., & Shapley, K. (2007). *Reviewing the evidence on how teacher professional development affects student achievement* (Issues & Answers Report, REL 2007-No. 033). Washington, DC: U.S. Department of Education, Institute of Educational Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Southwest. Retrieved 11/8/2012 from http://ies.ed.gov/ncee/edlabs/regions/southwest/pdf/REL_2007033.pdf

9 List of Appendices

Appendix A: SHH Pre-workshop Survey

Sound and Hearing Health Workshop: Pre-Workshop Survey

This survey is intended to assess your current knowledge, personal attitudes and beliefs regarding noise and hearing conservation. The information gathered will help us to understand how well the workshop met teachers' needs and how to make improvements for future workshops. Your answers will remain completely anonymous and confidential.

I. Please check the box next to the response that best answers the question. Some questions may have more than one answer.

1. Which of the following structures may be damaged when a person is exposed to high-level sounds? Check all that apply.

☐ The middle ear bones ☐ The auditory cortex ☐ The eardrum
☐ The auditory nerve ☐ The hair cells ☐ None of the above

2. Which of the following sounds may damage your hearing? Check all that apply.

☐ Lawnmowers ☐ Personal MP3 players ☐ Power tools
☐ Concerts ☐ Firearms ☐ All of the above
☐ Fireworks ☐ Musical instruments ☐ None of the above

3. What factors play a role in determining whether or not a sound will cause damage to your hearing? Check all that apply.

☐ Duration of the sound ☐ The frequency of the sound ☐ Your age
☐ The decibel level of the sound ☐ The size of your ear canals ☐ None of the above

4. School-age children are at risk of developing hearing loss caused by exposure to loud sounds.

☐ True ☐ False ☐ Not sure

5. Which of the following are effective ways to protect your hearing from excessively loud sounds? Check all that apply.

☐ Put your fingers in your ears ☐ Walk away ☐ Wear earplugs
☐ Exposure to loud sound does not cause hearing loss ☐ It is impossible to prevent noise-induced hearing loss ☐ Turn down the volume
☐ Take aspirin after exposure

II. Using the scale below, express your level of agreement or disagreement with the following statements.

N/A	1	2	3	4	5
Not applicable	Strongly disagree	Disagree	Neutral	Agree	Strongly agree

Statement	**Agreement rating**
6. I believe that exposure to excessively loud sounds may damage my hearing.	N/A 1 2 3 4 5

Appendix A: SHH Pre-workshop Survey

7. I make an effort to use hearing protection when I am in noisy environments.	N/A 1 2 3 4 5
8. I believe that protecting my hearing from excessively loud sound can be easily achieved.	N/A 1 2 3 4 5
9. I seek out ways to protect my hearing when participating in loud environments and activities.	N/A 1 2 3 4 5
10. I feel well prepared to develop and teach a lesson or series of lessons on hearing loss prevention to my students.	N/A 1 2 3 4 5

In the past, which of the following topics have been included in your classroom curriculum? (Check all that apply)

- ☐ Anatomy of the auditory system
- ☐ Physiology of the auditory system
- ☐ Physiology of hearing loss
- ☐ Physics of sound
- ☐ Effects of noise exposure on hearing and the auditory system
- ☐ Hearing conservation
- ☐ None of the above

Aside from convenience and scheduling, what factor most influenced your choice to attend this workshop? (Check all that apply)

- ☐ The subject is relevant to my courses
- ☐ The presenter has a good reputation
- ☐ I wanted to learn about this topic
- ☐ I wanted to get new activities for my classroom
- ☐ I needed a continuing education credit
- ☐ Other (please specify):

The following identifiers will be used to match your pre-workshop answers with your post-workshop answers for comparison. You will not be identified as an individual.

What is the main subject area you currently teach?

☐ Science ☐ Music ☐ Health ☐ Other:

What grade levels do you currently teach?

☐ Elementary school (K-5) ☐ Middle school (6-8) ☐ High school (9-12)

What was the make and model of your first car?

Appendix B: SHH Post-workshop Survey

Sound and Hearing Health: Post-Workshop Evaluation

This survey is intended to assess your current knowledge, personal attitudes and beliefs regarding noise and hearing conservation, and your intent to use the information from this workshop in your classroom curriculum. The information gathered will help us to understand how well the workshop met teachers' needs and how to make improvements for future workshops. Your answers will remain completely anonymous and confidential.

I. Please check the box next to the response that best answers the question.

1. Which of the following sounds may damage your hearing? Check all that apply.

☐ Musical instruments ☐ Concerts ☐ Fireworks
☐ Personal MP3 players ☐ Lawnmowers ☐ None of the above
☐ Power tools ☐ Firearms ☐ All of the above

2. Which of the following are effective ways to protect your hearing from excessively loud sounds? Check all that apply.

☐ Put your fingers in your ears ☐ Wear earplugs ☐ Walk away
☐ Turn down the volume ☐ It is impossible to prevent ☐ Exposure to loud sound does
☐ Take aspirin after exposure noise-induced hearing loss not cause hearing loss

3. Permanent hearing loss caused by exposure to loud sounds can occur in childhood.

☐ True ☐ False ☐ Not sure

4. The duration and decibel level of a sound determine how much damage it can cause to your hearing.

☐ True ☐ False ☐ Not sure

5. Which of the following structures may be damaged when a person is exposed to high-level sounds? Check all that apply.

☐ The auditory cortex ☐ The auditory nerve ☐ The hair cells
☐ The eardrum ☐ The middle ear bones ☐ None of the above

II. Using the scale below, express your level of agreement or disagreement with the following statements.

N/A	1	2	3	4	5
Not applicable	Strongly disagree	Disagree	Neutral	Agree	Strongly agree

Statement	**Agreement rating**
6. I believe that protecting my hearing from excessively loud sound can be easily achieved.	N/A 1 2 3 4 5
7. I believe that exposure to excessively loud sounds may damage my hearing.	N/A 1 2 3 4 5
8. In the future, I am likely to seek out ways to protect my hearing when participating in loud environments and activities.	N/A 1 2 3 4 5

9. In the future, I will make an effort to use hearing protection when I am in noisy environments.	N/A 1 2 3 4 5

III. Please circle the response that best matches your level of agreement or disagreement with the following statements about the workshop.

N/A	1	2	3	4	5
Not applicable	Strongly disagree	Disagree	Neutral	Agree	Strongly agree

Statement	**Agreement rating**
1. The workshop improved my knowledge and understanding of the topic.	N/A 1 2 3 4 5
2. I feel well prepared to develop and teach a lesson or series of lessons on hearing loss prevention to my students.	N/A 1 2 3 4 5
3. I feel prepared to use the equipment and hands-on materials when teaching this topic.	N/A 1 2 3 4 5

IV. Please tell us about your initial plans to implement ideas from this workshop.

4. How likely is it you will adapt and deliver a lesson on this topic during the current school year? (Circle the box that best matches your response.)

Very unlikely	Unlikely	Neutral	Likely	Very likely

When do you intend to present this material to your students? Please be as specific as possible.

How will you incorporate this material into your curriculum? Which unit will it be included in, and what aspects of the workshop will you include? Please be as specific as possible.

5. How likely is it you will adapt and deliver a lesson on this topic in the next school year (2012-13)? (Circle the box that best matches your response.)

Very unlikely	Unlikely	Neutral	Likely	Very likely

When do you intend to present this material to your students? Please be as specific as possible.

How will you incorporate this material into your curriculum? Which unit will it be included in, and what aspects of the workshop will you include? Please be as specific as possible.

Appendix B: SHH Post-workshop Survey

V. Please evaluate the overall quality of the workshop and provide suggestions for improvement. We welcome your opinions and feedback!

Compared to other workshops I have attended, I believe the quality of this workshop was:

Poor	Below average	Fair or average	Good	Excellent

Which aspects of this workshop were the most effective?

Which aspects of the workshop could be improved?

I wish there had been more information on:

I wish there had been less information on:

Please list any additional comments you have regarding this workshop on the back of this page.

The following identifiers will be used to match your pre-workshop answers with your post-workshop answers for comparison. You will not be identified as an individual.

What is the main subject area you currently teach?

☐ Science ☐ Music ☐ Health ☐ Other:

What grade levels do you currently teach?

☐ Elementary school (K-5) ☐ Middle school (6-8) ☐ High school (9-12)

What was the make and model of your first car?

Appendix C: SHH Follow-up Survey

Sound and Hearing Health Workshop: Follow-Up Survey

This survey is intended to assess your individual experiences in implementing material from the Sound and Hearing Health Workshop into your classroom curriculum. The information gathered will help us to understand how well the workshop met teachers' needs and how to make improvements for future workshops. Your answers will remain completely anonymous and confidential.

Did you incorporate information from the sound and hearing health workshop into your classroom curriculum during the Spring 2012 semester?

☐ Yes ☐ No

What material did you cover?

☐ Auditory system anatomy
☐ Auditory system physiology
☐ Physiology of hearing loss
☐ Ear plug use
☐ Other (please describe):
☐ Physics of sound
☐ Effects of sound exposure on hearing and the auditory system
☐ Hearing loss prevention
☐ Sound levels of everyday sounds

Did you incorporate the workshop material into an existing unit within your curriculum?

☐ Yes ☐ No ☐ Not applicable

If so, which unit?

Please circle the response that best matches your level of agreement or disagreement with the following statements about the workshop.

N/A	1	2	3	4	5
Not applicable	Strongly disagree	Disagree	Neutral	Agree	Strongly agree

Statement	**Agreement rating**
1. The workshop improved my knowledge and understanding of the topic.	N/A 1 2 3 4 5
2. I feel well prepared to develop and teach a lesson or series of lessons on this topic for my students.	N/A 1 2 3 4 5
3. I feel prepared to use the equipment and hands-on materials when teaching this topic.	N/A 1 2 3 4 5
4. I feel that the follow-up measures were helpful in providing additional understanding of the workshop material.	N/A 1 2 3 4 5
5. I feel that the workshop met my expectations.	N/A 1 2 3 4 5
6. I would be interested in participating in similar workshops in the future.	N/A 1 2 3 4 5

Appendix C: SHH Follow-up Survey

What factors facilitated or encouraged your ability to incorporate information from the workshop into your curriculum (e.g., material already included in my curriculum; extra space in my syllabus or class schedule; support of other teachers in my department; etc.)?

What factors do you feel impeded your ability to incorporate workshop material into your curriculum (e.g., my syllabus and class schedule are too full; the material is not directly relevant to my class or subject area; I do not feel confident enough in the material to teach it effectively; I plan to teach it in the future; etc.).?

What do you think could be done to reduce or eliminate some of the factors hindering your ability to implement the material from the workshop into your curriculum?

Please provide any advice you may have regarding how the workshop can be improved for the future to help facilitate student and teacher learning. Thank you for your participation!

Appendix C: SHH Follow-up Survey

Are you planning to incorporate workshop material into your curriculum during the 2012-13 school year?

☐ Yes ☐ No

What material are you planning to cover?

☐ Auditory system anatomy
☐ Auditory system physiology
☐ Physiology of hearing loss
☐ Physics of sound
☐ Effects of noise exposure on hearing and the auditory system
☐ Hearing conservation
☐ All of the above
☐ None of the above

Will you incorporate the workshop material into an existing unit within your curriculum?

☐ Yes ☐ No

If so, which unit?

The following identifiers will be used to match your pre-workshop answers with your post-workshop answers for comparison. You will not be identified as an individual.

What is the main subject area you currently teach?

☐ Science ☐ Music ☐ Health ☐ Other:

What grade levels do you currently teach?

☐ Elementary school (K-5) ☐ Middle school (6-8) ☐ High school (9-12)

What was the make and model of your first car?