An Evaluation of CPWR's Construction Noise and Hearing Loss Training Program

And lessons learned for construction safety and health training development and implementation

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CPWR
THE CENTER FOR CONSTRUCTION
RESEARCH AND TRAINING

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Key Findings

CPWR's Construction Noise and Hearing Loss Prevention Training Program (Noise Training) was originally developed in 2018 following a multi-union study that explored existing training efforts, knowledge, and solutions related to noise and hearing loss. This follow-up study assessed the program's usability and effectiveness through trainer and trainee evaluations.

Trainer Assessment

- Of the seventy-four trainers who gave CPWR's Noise Training program **an overall rating**, 94.6% rated it good or excellent.
- The *30 Minute Elective Module* was the most widely used (30.1%) by trainers, followed by the *1 Hour Elective Module* (28.9%), and the *In-Class and/or Hands-On Refresher Exercises* (25.3%). This suggests a short but complete training module with presentations and in-class exercises ready for instructor use – rather than exercises alone – may be the most desirable format for trainers.
- The trainers surveyed relied most often on OSHA (93.3%), CPWR (83.9%), and their union's training curriculum (83.9%) for information and materials to support training sessions.
- One factor limiting the uptake of CPWR's Noise Training program was that many trainers already used other training programs or materials. Of the 142 trainers who provided noise-induced hearing loss prevention training, over half (51.4%) said they used a combination of materials from CPWR's Noise Training and other sources, while 40.8% relied solely on materials from other sources. Only 7.7% exclusively used CPWR's Noise Training. When asked why they have not used CPWR's Noise Training, a quarter (25.9%) said they already have a curriculum they are comfortable with, while some were not familiar with the CPWR program.

Trainee Assessment

- In a separate evaluation, 67 trainees **rated the content** of CPWR's Noise Training. Nearly all (98.5%) said the content was good or excellent. Trainees were asked the same 22 questions to assess their understanding of noise and hearing loss in three surveys: before receiving the Noise Training, immediately after the training, and a few weeks post-training. Each trainee received a score based on the number of questions they answered correctly, and an overall average was calculated for each survey. For the baseline survey, the average score among 71 trainees was 59.6%. For the second survey, the average score among 67 trainees was 75.5%, a 26.7% increase. For the third survey, the average score among 47 trainees was 66.6%. Although the average score declined with time following the second survey, it remained 12.2% higher than baseline, indicating trainees retained knowledge from the program.
- Almost all (95.5%) trainees agreed or strongly agreed they had learned something from CPWR's Noise Training they could apply to their job. When trainees were asked to list what they learned that they could apply to their job, almost three-fourths (74.2%) said it taught them how to properly use earplugs and other personal protective equipment.
- Nearly half of trainees (48.9%) said they used hearing protection more often after receiving CPWR's Noise Training.
- A majority of trainees (81.8%), who all received the *1 Hour Elective Module*, found the videos to be the most helpful part of the training, followed by the lectures/presentations (69.7%), demonstrations (60.6%), hands-on activities (59.1%), handouts (45.5%), and group discussions (43.9%).

Background

Safety and health training is an important component of preventing injuries and illnesses among construction workers, but there are many challenges when it comes to effectively facilitating the industry's adoption of a new training program. To learn more about whether training programs are a viable and effective means of dissemination for occupational safety and health research findings, CPWR's Research to Practice (r2p) team set out to conduct an evaluation of their previously developed Construction Noise and Hearing Loss Prevention Training Program (Noise Training).[1]

The r2p program works with researchers, trainers, and practitioners from CPWR, the National Institute for Occupational Safety and Health (NIOSH), the Occupational Safety and Health Administration (OSHA), universities, labor unions, and employers to advance the adoption of safer tools, equipment, training, planning, and work practices. Based on the type of research project providing information and the target audience(s), r2p uses a variety of translation and dissemination strategies to distill key findings and solutions from the research and share them with the construction industry. One common strategy is incorporating findings and solutions into new or existing training programs. However, schedules are already packed during apprenticeship programs and on active jobsites, limiting time for additional training. Because of this constraint, CPWR recognized the need to evaluate this dissemination strategy to help determine when it is most feasible and how it can be done most effectively. The r2p team also wanted to learn how individual characteristics and elements of the Noise Training program contributed to or detracted from instructors' and trainees' success in using it.

The Noise Training was originally developed based on a separate study that surveyed thousands of trainers and workers across multiple unions to better understand existing noise and hearing loss training programs, knowledge, solutions, and experiences.[2,3] The r2p team worked closely with CPWR's Training Department to employ good practices for conducting training when developing the program. This included providing PowerPoint slides with complementary instructor guides, making the modules as engaging as possible with activities and class discussion, and offering flexibility in delivery with a 1-hour version, a 30-minute version, and separate hands-on refresher exercises.

The Noise Training is divided into three parts. The *1 Hour Elective Module* is designed to provide trainers with the information needed to successfully fulfill the OSHA 30-hour training program requirement for training on a health hazard. The *30 Minute Elective Module* can fulfill the OSHA 10-hour training program requirement for a half-hour training module on a health hazard, or it can be used for a portion of the OSHA 30-hour health hazard training requirement. Finally, the *In-Class and/or Hands-On Refresher Exercises* are a series of short (5-10 minute) exercises designed to reinforce and apply lessons learned about noise hazards and hearing loss prevention. It includes materials that can be incorporated into safety and health training modules (e.g., personal protective equipment, power tools) or as part of a hands-on skills training program.

With the feedback and information gathered from trainers and trainees in this study, we plan to improve the Noise Training and apply lessons learned to future training program development.

Methods

This study consisted of two parts: one to obtain data and feedback from safety and health trainers, and the second to obtain data and feedback from construction workers. For recruitment, we relied on an established network of union trainers using CPWR's Trainers and Researchers United Network (TRU-Net) mechanism.[4] The study was approved by CPWR's Institutional Review Board (IRB).

Trainer Assessment

The first part of this study surveyed union trainers about their experiences with and thoughts on how to improve CPWR's Noise Training (see Appendix I). The survey also identified trainers willing to help with the second part of the study, the Trainee Assessment. It included 23 multiple-choice and open-ended questions with skip patterns and was available online in English via Qualtrics. At the end of the survey, a link to a separate survey was provided where trainers could volunteer their contact information if they were willing to help with the next step of the study; otherwise, no personal identifying information was collected. The survey was distributed by email in December 2020 to the Apprenticeship & Training Directors' Committee of North America's Building Trades Unions (NABTU), which consisted of 23 individuals at 16 different union and union-affiliated training funds/organizations. The email included a description of the study and a request for training directors to share the survey link with their union's trainers between January and May 2021. Sample language explaining the survey was also provided to the training directors, who could use it to introduce the survey.

Trainee Assessment

The second part of this study aimed to measure worker experiences with CPWR's Noise Training program, as well as its impact on their knowledge and awareness of noise and hearing loss prevention as it relates to their work. The Kirkpatrick model, a framework for evaluating the effectiveness of training programs, was used as a basis for measurement. NABTU-affiliated trainers were asked to deliver a version of CPWR's Noise Training during an apprenticeship class (e.g., OSHA 10 or OSHA 30) and administer three surveys to their trainees. These surveys were based on level 1 (reaction – how participants responded to the training), level 2 (learning – degree to which participants acquired intended knowledge and skills), and level 3 (behavior – extent to which new knowledge and skills are applied on the job) in the Kirkpatrick model.[5] They included: 1) a baseline survey administered at the start of the class to assess trainees' knowledge of noise hazards and practices to prevent hearing loss (see Appendix II); 2) a survey at the end of the class to assess their reaction to the training program and what they learned (see Appendix III); and 3) a survey a few weeks later with the same group of trainees to capture self-reported use of preventative measures introduced during the training program (i.e., assess influence on practices) (see Appendix IV).

The baseline survey included 27 multiple-choice questions, the second survey included 26 multiple-choice and open-ended questions, and the third survey included 31 multiple-choice questions. All three surveys contained skip patterns. In addition, 22 of the questions appeared in all three surveys to assess how knowledge changed and was retained before and after the training. The surveys were all voluntary and anonymous. Trainers had the option of distributing paper copies of the surveys to their trainees or sharing links with them to the online surveys in Qualtrics. The surveys were only available in English.

Several methods were used to contact trainers regarding participation. First, trainers who expressed willingness to help during the first part of the study were contacted via email in September 2023. To increase participation, CPWR also reached out directly to NABTU training directors in January 2024. Like the first part of the study, the email included a description of the study, a request to share the study details with their training staff, and sample language they could use. Finally, in December 2024, CPWR's Training Department sent an email through its newsletter to over 500 NABTU trainers asking for volunteers.

When a trainer volunteered to participate, r2p staff set up an initial call with them to review details of the project and followed up as needed by email. If a trainer opted to use paper copies of the surveys, they were sent back to CPWR and then entered into Qualtrics manually by r2p staff. Data analysis was performed using SAS 9.4.

Results

Trainer Assessment

Demographics

A total of 183 trainers completed the survey, representing a diverse set of union affiliations. The largest share (48.6%) were members of the International Association of Sheet Metal, Air, Rail and Transportation Workers, followed by the International Union of Bricklayers and Allied Craftworkers (21.3%), the United Union of Roofers, Waterproofers and Allied Workers (18.0%), and the International Association of Heat and Frost Insulators and Allied Workers (10.9%). A smaller proportion of trainers were affiliated with the International Union of Painters and Allied Trades and “other” unions (0.5%, respectively).

Types of Training Provided and Material Sources

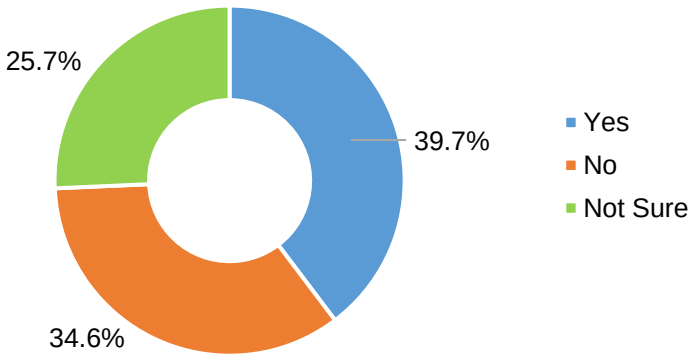
These 183 trainers conducted a variety of training sessions, with the OSHA 30-hour being the most common (83.1%), followed by the OSHA 10-hour (71.0%). Additionally, 69.4% provided in-class craft skills training and 68.3% provided hands-on craft skills training. A smaller subset (9.8%) delivered specialized training topics, such as National Fire Protection Association (NFPA) certification, the OSHA 500 series, train-the-trainer, leadership and mentorship, first aid and CPR, aerial lift and forklift operation, Infection Control Risk Assessment (ICRA), and asbestos removal.

When asked to select all sources used for information and training materials to support these training sessions, 180 trainers responded and reported relying heavily on OSHA (93.3%), followed by CPWR (83.9%) and their union’s training curriculum (83.3%). Other sources included NIOSH (63.3%), manufacturers (52.2%), the NABTU Smart Mark Program (52.2%), internet searches (45.0%), other instructors (42.8%), and CPWR’s Construction Solutions (37.2%). Less frequently used resources included CPWR’s Electronic Library of Construction Occupational Safety & Health (eLCOSH) (11.7%) and professional organizations (8.3%). "Other" sources (6.7%) trainers listed included the New York City Department of Buildings, State Building and Construction Trades Council of California, Sheet Metal Occupational Health Institute Trust, International Finishing Trades Institute, and Mancomm.

Familiarity with CPWR's Noise Training Program

Among 179 trainers who answered this question, 39.7% had heard of CPWR’s Noise Training, 34.6% had not, and 25.7% were not sure (Chart 1). Of the 71 respondents who had heard about CPWR’s Noise Training, 42.3% learned about it directly from CPWR, followed by 25.4% who heard about it from other trainers and 23.9% from their union. In addition, 2.8% of trainers discovered the program through an online search and 5.6% heard about it through "other" sources, such as CPWR’s trainer enhancement sessions or the OSHA 500 series. Familiarity levels among these 71 trainers varied, with 9.9% describing themselves as very familiar with the program, 46.5% as somewhat familiar, and 33.8% as a little familiar. A smaller percentage (9.9%) reported no familiarity with the program.

Chart 1. Have you heard of CPWR's Construction Noise and Hearing Loss Prevention Training Program? (N=179)

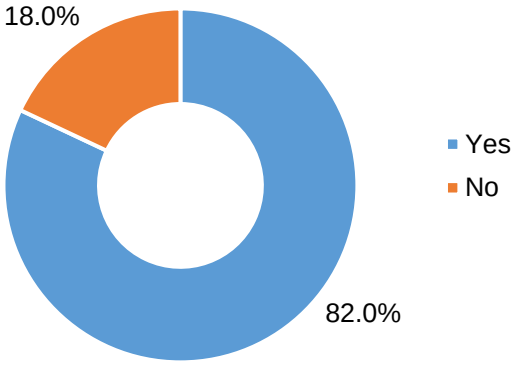


Noise and Hearing Loss Prevention Training (General)

Of 179 trainers, the vast majority (96.6%) responded that hearing loss is an important issue in the construction industry (75.4% strongly agreed and 21.2% agreed). Only 2.2% strongly disagreed, and 1.1% remained neutral. When asked about workers' concerns regarding hearing loss, more than half (54.7%) of respondents said the workers they train are very concerned (10.6% strongly agreed and 44.1% agreed), while 36.9% were neutral, and 8.4% disagreed (1.1% strongly disagreed and 7.3% disagreed). Finally, 66.5% of trainers indicated that hearing loss prevention was a priority for their union (23.5% strongly agreed and 43.0% agreed). However, 28.5% remained neutral and 5.0% disagreed (1.7% strongly disagreed and 3.4% disagreed).

Most of the trainers conducted training on how to prevent noise-induced hearing loss. Of 178 trainers, 82.0% said they conducted training on the topic, while 18.0% did not provide such training (Chart 2). Among the 32 respondents who did not train on the topic, the most common reason was the lack of materials to conduct the training (34.4%). An additional 25.0% stated it was not a priority topic, while 21.9% indicated they did not know enough about the subject to teach it. Other reasons included the topic being delivered by another trainer (9.4%) or lack of time due to an already full curriculum (3.1%). Some trainers selected "other" (6.3%) and mentioned scenarios such as just beginning their role as a training coordinator or only addressing the topic when trainees asked questions.

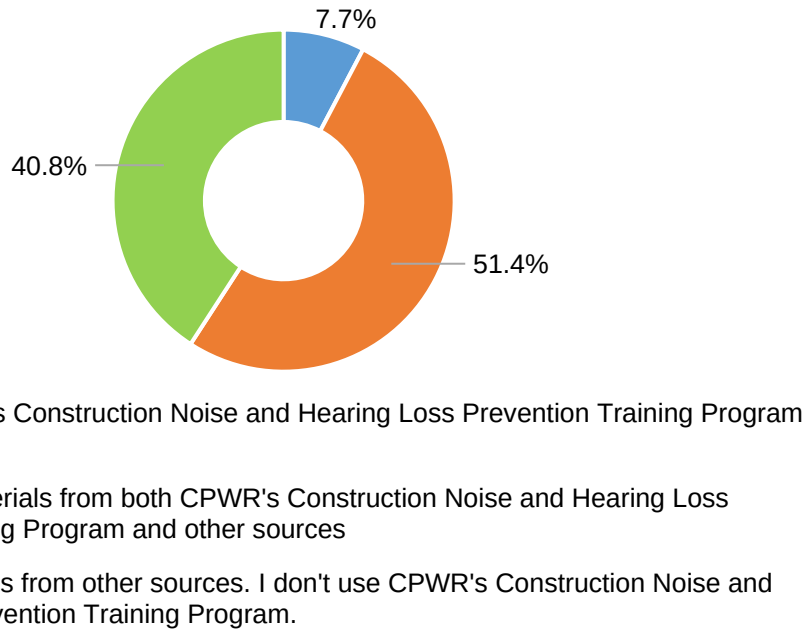
Chart 2. Do you conduct training on how to prevent noise-induced hearing loss? (N=178)



For 142 trainers who provided noise and hearing loss prevention training and answered this question, key topics covered included applicable OSHA standards and permissible exposure limits (91.5%), how to wear hearing protection (84.5%), how to determine when hearing protection is needed (81.0%), how to select appropriate hearing protection (79.6%), and sources of noise (78.2%). Risks and signs of noise-induced hearing loss were covered by 64.1% of trainers, while segments on engineering controls (62.7%), administrative controls (57.0%), and the limitations of hearing protection (52.8%) were also common. Less frequently addressed topics included identifying when hearing protection needs to be replaced (43.7%), basic acoustic theory (43.0%), the benefits of lower-noise equipment (31.0%), identifying low-noise equipment options (22.5%), and “other” topics (1.4%).

These 142 trainers were also asked about the sources of the materials they used to teach this topic. Around half (51.4%) said they used a combination of materials from CPWR’s Noise Training and other sources, while 40.8% relied solely on materials from other sources (Chart 3). Only 7.7% exclusively used CPWR’s Noise Training. When asked why they had not used CPWR’s Noise Training, nearly half (48.3%) of the 58 trainers who only used training materials from other sources stated they were not familiar enough with the program to include it in their training. In addition, 37.9% had never heard of CPWR’s Noise Training before the survey and a quarter (25.9%) said they already had a noise training curriculum they were comfortable using. None of the respondents cited missing content in CPWR’s materials or requirements to use their union’s training program as reasons for not using CPWR’s Noise Training. A small number (6.9%) selected "other," with the majority explaining they intended to explore and integrate CPWR’s materials into their own training curriculums (e.g., OSHA 30-hour).

Chart 3. Which of the following statements most closely describes the materials you use when conducting training on noise and hearing loss prevention (N=142)



Use of CPWR's Noise Training Program

Trainers were asked to identify which components of CPWR’s Noise Training they had used before answering more specific questions about the components selected.

Overview of Module and Instructor Manual Usage

Of 83 trainers who had used all or some of CPWR’s Noise Training materials, the *30 Minute Elective*

Module was the most widely used (30.1%), followed closely by the *1 Hour Elective Module* (28.9%) and the *In-Class and/or Hands-On Refresher Exercises* (25.3%) (see below). Fewer trainers reported using the complementary instructor manuals. The *1 Hour Elective Module Instruction Manual* was used by 15.7% of respondents, 13.3% used the *30 Minute Elective Module Instruction Manual*, and 13.3% used the *In-Class and/or Hands-On Refresher Exercises Instruction Manual*. Around a third (34.9%) of the respondents stated they could not recall which specific module or instructor manual they had used.

In-Class and/or Hands-On Refresher Exercises

The *In-Class and/or Hands-On Refresher Exercises* can be categorized into three groups of presentation modules. Among 23 trainers who used these modules or the associated instructor manual, 91.3% used the *In-Class Refresher Exercises for OSHA 10- & 30-Hour Modules* (Group A) and 60.9% used the *Noise Training Exercises for Use In-Class for Skills Training Programs* (Group B). The *Noise Training Exercises for Use in the Hands-On Portion of Skills Training Programs* (Group C) were used less frequently, by 39.1% of respondents.

Each of the three presentation modules contains a series of short exercises. Trainers were asked whether they used these exercises, described below:

In-Class Refresher Exercises for OSHA 10- & 30-Hour Modules (Group A)

Among 21 trainers who used the *In-Class Refresher Exercises for OSHA 10- & 30-Hour Modules,* the most frequently used exercise was "Exercise A-4: How to Properly Use Ear Plugs" (85.7%) and "Exercise A-5: How Loud is Too Loud?" (85.7%) followed by "Exercise A-1: The Impact of Hearing Loss" (76.2%). In addition, over half used "Exercise A-2: Are You Talking to Me?" (57.1%), "Exercise A-6: Self-Assessment of Hearing" (57.1%), and "Exercise A-3: What Does Hearing Loss Sound Like?" (52.4%),

Noise Training Exercises for Use In-Class for Skills Training Programs (Group B)

Of the 14 trainers who used the *Noise Training Exercises for Use In-Class for Skills Training Programs*, 78.6% used "Exercise B-1 – Cumulative Presentation: Noise and Hearing Loss – The Risk and Prevention" and 71.4% used "Exercise B-2 (D) – Preventing Hearing Loss?" Other exercises they used included "Exercise B-2 (A) – Noise: What are the Risks?" (64.3%), "Exercise B-2 (B) – The Cost of Hearing Loss" (64.3%), and "Exercise B-2 (C) – Noise: How Loud is Too Loud?" (64.3%).

Noise Training Exercises for Use in the Hands-On Portion of Skills Training Programs (Group C)

Among 8 trainers who used the *Noise Training Exercises for Use in the Hands-On Portion of Skills Training Programs*, "Exercise C-1: Identifying Noise Levels of Equipment" (100%) and "Exercise C-3: Choosing the Right Hearing Protection" (87.5%) were the most widely used, followed by "Exercise C-2: Measuring Noise Levels Throughout the Day" (62.5%).

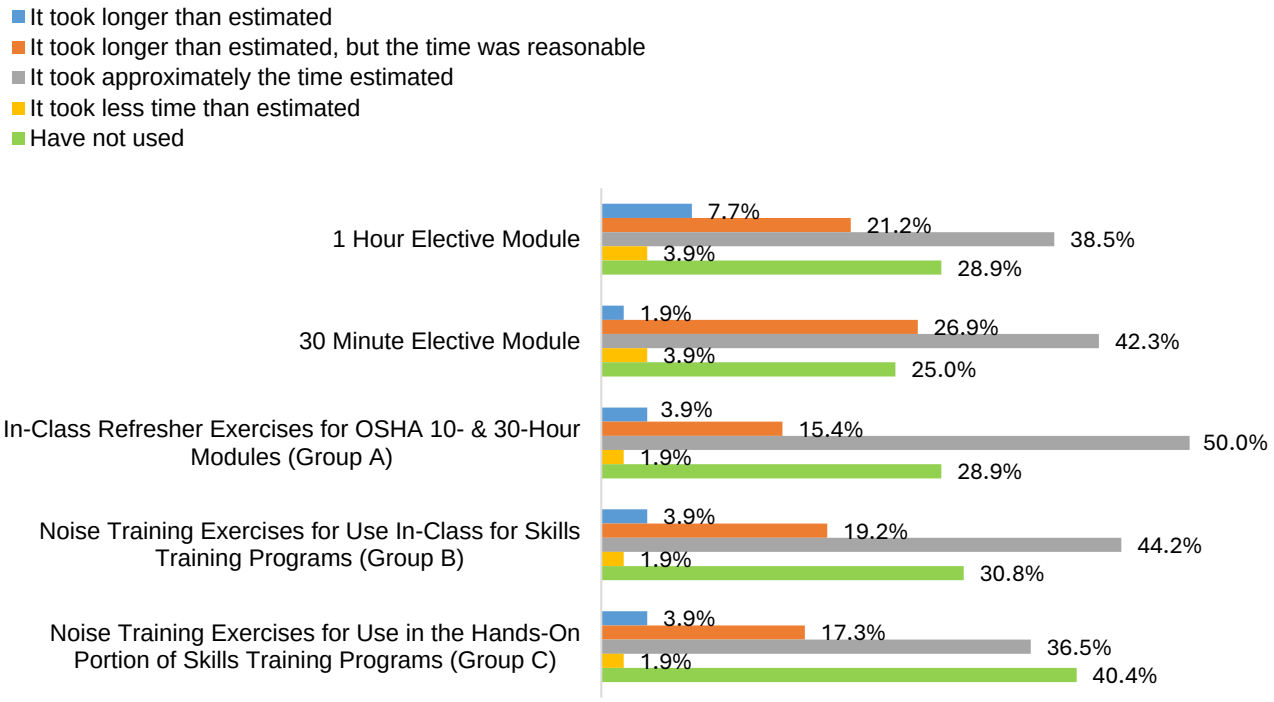
Evaluation of CPWR's Noise Training Program

Accuracy of Estimated Training Time

Fifty-two trainers provided feedback on whether CPWR's estimated training times aligned with actual instruction (Chart 4). For the *1 Hour Elective Module*, 38.5% completed it within the expected time, 21.2% said it took longer than estimated but remained reasonable, and 7.7% found it took longer than estimated. A small percentage of trainers (3.9%) completed it in less time, while 28.9% did not use it. Similarly, the *30 Minute Elective Module* was completed within the expected timeframe by 42.3% of trainers, while 26.9% needed more time but found it reasonable. Additionally, 1.9% said it took longer than estimated, 3.9% said it took less time than estimated, and 25.0% did not use it.

Half (50.0%) of the trainers stated the *In-Class Refresher Exercises for OSHA 10- & 30-Hour Modules* (Group A) took approximately the time estimated, 15.4% said it took longer than estimated but found it reasonable, 3.9% said it took longer than estimated, 1.9% said it took less time than estimated, and 28.9% did not use it. For the *Noise Training Exercises for Use In-Class for Skills Training* (Group B), 44.2% of trainers said it was completed within the estimated timeframe, 19.2% said it took longer than estimated but considered it reasonable, 3.9% required more time, 1.9% said it took less time, and 30.8% did not use it. Finally, for the *Noise Training Exercises for Use in the Hands-On Portion of Skills Training Programs* (Group C), 36.5% of trainers finished within the estimated time, 17.3% said it took longer than estimated but found it reasonable, 3.9% required more time, 1.9% said it took less time, and 40.4% did not use these exercises.

Chart 4. When you used the modules and/or exercises, did you find the amount of time estimated to be accurate? (N=52)



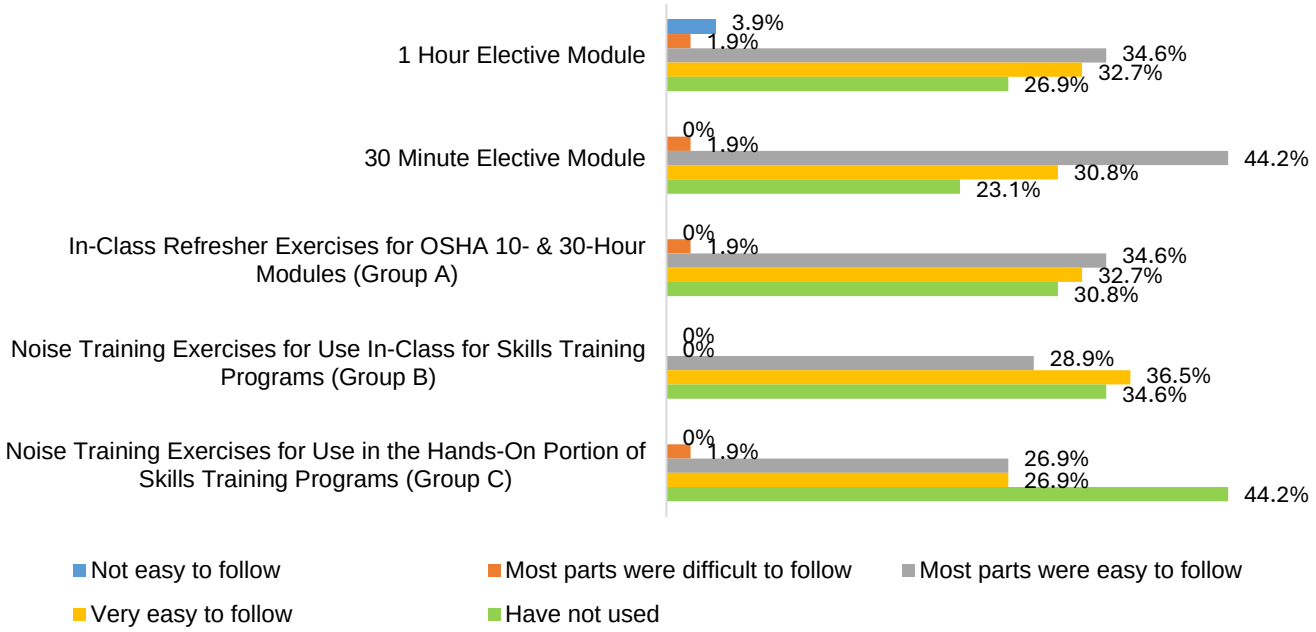
Ease of Use

Among the 52 trainers who provided feedback, most found CPWR's instructor guides and training materials easy to follow (Chart 5). For the *1 Hour Elective Module*, 34.6% said most parts were easy to follow and 32.7% rated it as very easy to follow. One respondent (1.9%) found most parts difficult to follow, and two others (3.9%) found it was not easy to follow. However, more than a quarter (26.9%) of respondents did not use this module. In addition, respondents rated most parts of the *30 Minute Elective Module* easy to follow (44.2%) and 30.8% found it very easy to follow. One (1.9%) said most parts were difficult to follow, and 23.1% did not use this module.

Most parts of the *In-Class Refresher Exercises for OSHA 10- & 30-Hour Modules* (Group A) were rated easy to follow by 34.6% of trainers, and 32.7% found them very easy to follow. Only 1.9% found most parts were difficult to follow, and 30.8% did not use these exercises. *Noise Training Exercises for Use In-Class for Skills Training* (Group B) received similar feedback, with 28.9% of trainers rating most parts

easy to follow, and 36.5% finding them very easy to follow. Additionally, 34.6% of trainers did not use these exercises. Lastly, the *Noise Training Exercises for Use in the Hands-On Portion of Skills Training Programs* (Group C) had slightly lower ratings, with 26.9% of trainers rating most parts easy to follow, 26.9% finding them very easy to follow, and 1.9% considering most parts difficult to follow. A notable 44.2% of respondents indicated they had not used these exercises.

Chart 5. How easy were the instructor guides and training materials to follow? (N=52)



Appropriateness of Information and Engagement

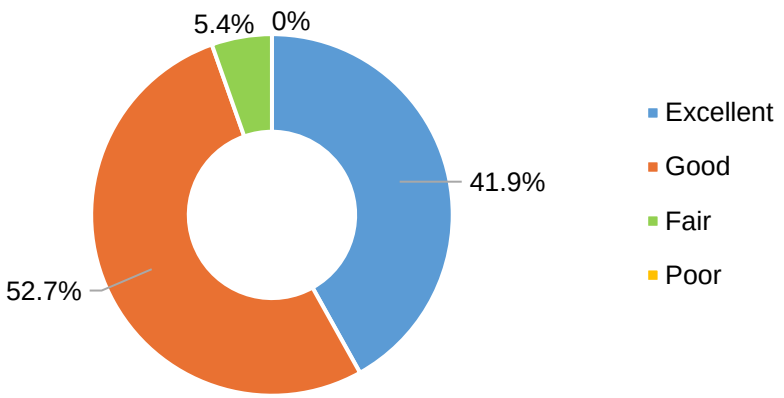
Seventy-four trainers provided feedback on the appropriateness of the information in CPWR's Noise Training for their trainees. The majority (63.5%) rated the information as very appropriate and 31.1% rated it somewhat appropriate. A smaller portion (4.1%) believed the information could be made more appropriate, and 1.4% found it not appropriate at all.

Trainee receptivity to the information in the training program was also assessed. Among the 74 trainers who responded, 45.9% said their trainees were very receptive to the content and 48.6% found them somewhat receptive. Only 5.4% indicated their trainees were not very receptive.

Overall Rating

Seventy-four trainers gave an overall rating of CPWR's Noise Training. More than half (52.7%) rated the program as good, 41.9% considered it excellent, and a small percentage (5.4%) rated it as fair (Chart 6).

Chart 6. How would you rate CPWR's Construction Noise and Hearing Loss Prevention Training Program overall? (N=74)



Recommendations

When asked for recommendations to improve the Noise Training program, several trainers stated no changes were needed. Others suggested the program should be more widely promoted to increase awareness. Additional feedback included addressing broken links in program materials and emphasizing the importance of hearing loss prevention to younger generations. Another trainer shared a successful hands-on exercise from the State Building and Construction Trades Council of California (SBCTC), where trainees write down words spoken over simulated construction background noise to demonstrate the impact of hearing loss. This activity was described as well-received by trainees. This is likely the same exercise as “Exercise A-2: Are you talking to me?” in CPWR’s Noise Training, since many of these materials were adapted from a training program produced by the SBCTC.

Trainee Assessment

Demographics

Three trainers from three different local unions volunteered to deliver a version of CPWR’s Noise Training during an apprenticeship class. Each trainer chose to teach CPWR’s 1-hour module in an OSHA 30-hour class for apprentices. In addition, all the trainers elected to distribute paper copies of the surveys; however, one trainer had their apprentices complete the third survey online.

Seventy-one apprentices completed the baseline survey prior to receiving the CPWR Noise Training. Around two-thirds (66.2%) were first-year apprentices, 31.0% were fourth-year apprentices, and 2.8% were fifth-year apprentices. The majority rated their hearing as either good (69.0%) or excellent (18.3%), while 9.9% said they had a little trouble hearing, 1.4% said they had moderate trouble hearing, and 1.4% said they had a lot of trouble hearing. Most (69.0%) had already received training on how to prevent noise-induced hearing loss (18.3% reported not receiving training and 12.7% were not sure).

Among the 49 apprentices who had already received training on how to prevent noise-induced hearing loss, 44.9% said their union provided the training, 44.9% said both their union and employer provided the training, 6.1% said their employer provided the training, and 4.1% were not sure. In addition, apprentices who received training were asked if they had been given the CPWR Noise Training. Of 45 apprentices, almost half (48.9%) said they had received the CPWR training, 40.0% were not sure, and 11.1% said they did not receive this training.

Of the 71 apprentices, 19.7% reported always wearing hearing protection when working around noise, a quarter (25.4%) said they wear it often, 42.3% reported sometimes wearing it, 9.9% said they rarely wear it, and 2.8% said they never wear it. The nine apprentices who rarely or never wear hearing protection were asked their top reasons for not wearing it. The most common reason, cited by 44.4%, was hearing protection is uncomfortable. Additionally, a third (33.3%) reported several reasons for not wearing hearing protection, including not being sure when to wear it, that no one else wears it, that it is not provided to them or they could not always find it, that it prevented them from hearing things they needed to, or it gets in the way of other safety equipment and clothing.

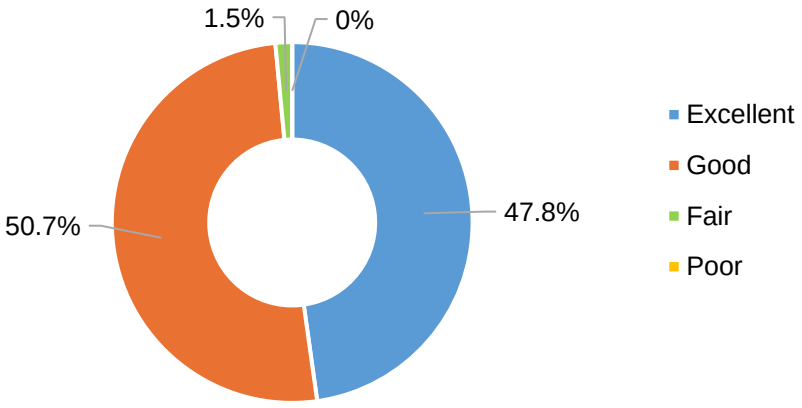
Apprentices saw their employers take a number of actions on jobsites during the last 12 months to protect workers from hearing loss. Among 69 apprentices, the majority (84.1%) said their employer provides earplugs, a third (33.3%) said they use warning signs, and 31.9% said they provide earmuffs. Less common actions that were reported include: providing training on how to prevent hearing damage (23.2%); rotating jobs (14.5%); placing noisy equipment in isolated areas away from workers (13.0%); labeling equipment to indicate noise level (13.0%); placing barriers between noise sources and workers (11.6%); scheduling loud work when the fewest workers are present (10.1%); and using quieter, low-noise equipment (5.8%). An additional 11.6% did not see their employer take any of the actions listed, and 1.5% were not sure.

Among the 71 apprentices, more than half (53.5%) have had their hearing tested since they began working in the construction industry. Asked why their hearing was tested, 38 apprentices said their employer required the test (73.7%) and 5.3% said their doctor recommended the test. Additionally, 21.1% selected “other” and several of these individuals specified the hearing test was a requirement during union orientation. Another individual said the hearing test was for a hearing aid.

Evaluation of CPWR’s Noise Training Program

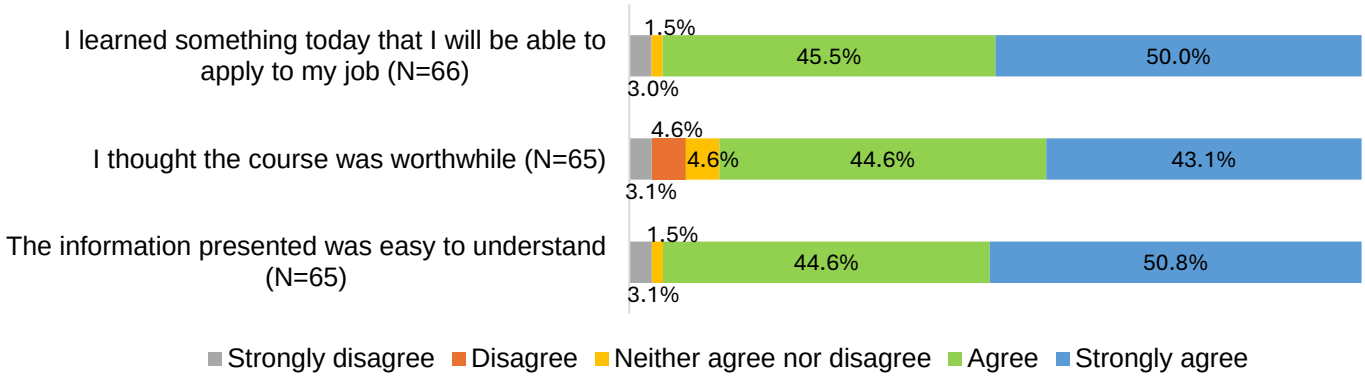
Following the delivery of the CPWR Noise Training, trainers distributed a second survey to their apprentices. Sixty-seven apprentices completed the second survey. Asked to rate the content of the CPWR Noise Training overall, the majority gave it a good (50.7%) or excellent (47.8%) rating, and 1.5% gave it a fair rating (Chart 7).

Chart 7. How would you rate the content of the CPWR Construction Noise and Hearing Loss Prevention training program overall? (N=67)



In addition, out of 66 apprentices, almost all (95.5%) agreed or strongly agreed they had learned something they could apply to their job. Among 65 apprentices, most (87.7%) also agreed or strongly agreed the course was worthwhile, and 95.4% agreed or strongly agreed that the information presented was easy to understand (Chart 8).

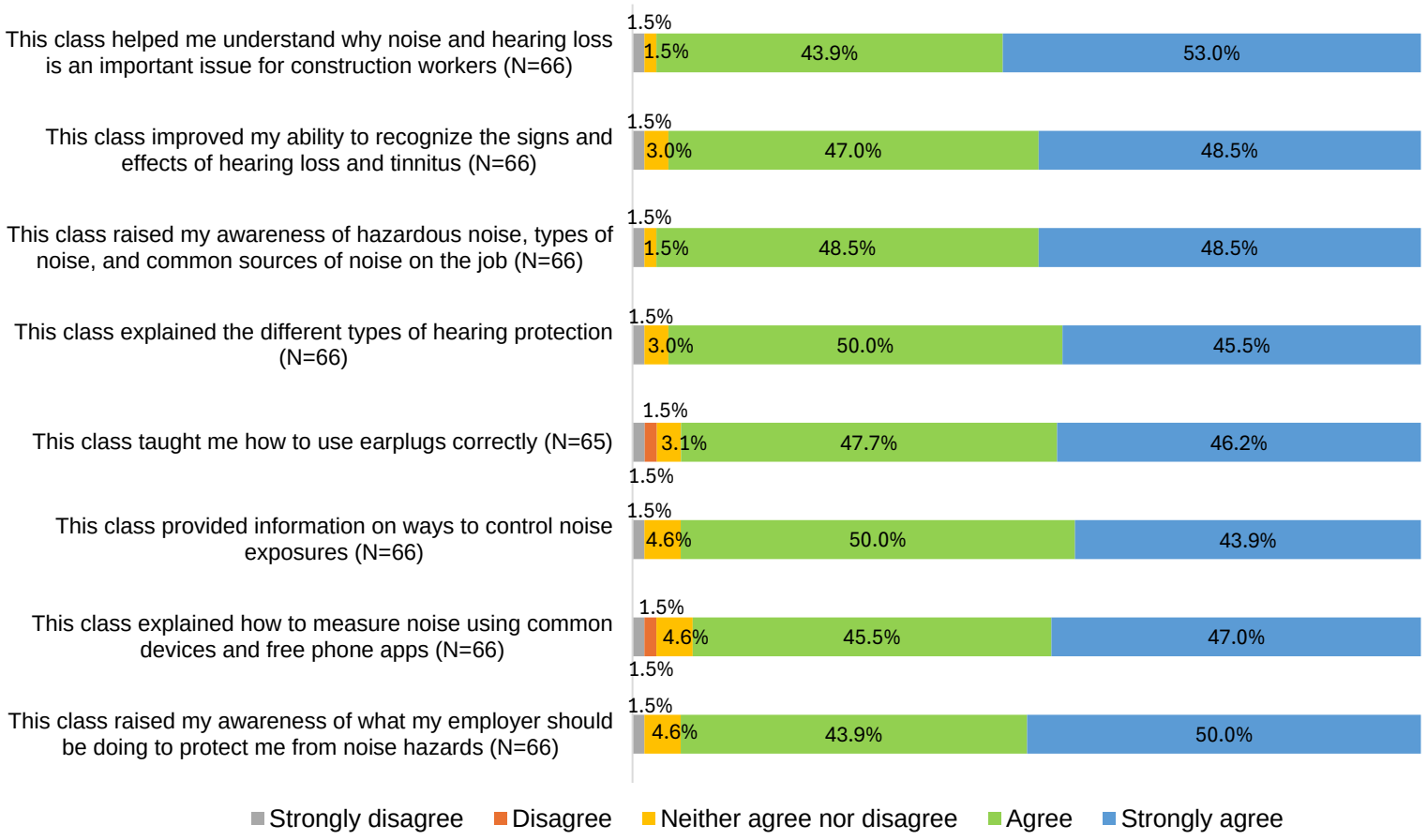
Chart 8. Please indicate how strongly you agree or disagree with the following statements.



Out of 66 apprentices, the majority (81.8%) found the videos the most helpful part of the training, followed by the lectures/presentations (69.7%), demonstrations (60.6%), hands-on activities (59.1%), handouts (45.5%), and group discussions (43.9%). When asked about the best methods for providing them with reminders and new information on noise hazards and ways to prevent hearing loss, 43.9% said they preferred formal training in a classroom setting, followed by toolbox talks (33.3%) and posters around the jobsite (24.2%). Less frequently chosen methods included videos (16.7%), handouts (10.6%), text message (7.6%), email (6.1%), and Facebook (1.5%). Two apprentices (3.0%) selected “other” methods and specified "self-reminders" and an "actual hearing test."

Almost all the apprentices either agreed or strongly agreed with a set of statements asking them about the CPWR Noise Training, including: it helped them understand why noise and hearing loss is an important issue for construction workers (97.0%); it improved their ability to recognize the signs and effects of hearing loss and tinnitus (95.5%); it raised their awareness of hazardous noise, types of noise, and common sources of noise on the job (97.0%); it explained the different types of hearing protection (95.5%); it taught them how to use earplugs correctly (93.9%); it provided information on ways to control noise exposures (93.9%); it explained how to measure noise using common devices and free phone apps (92.4%); and it raised their awareness of what their employer should be doing to protect them from noise hazards (93.9%) (Chart 9).

Chart 9. Please indicate how strongly you agree or disagree with the following statements.



In an open-ended question, apprentices were asked to list three things they learned from the CPWR Noise Training they could apply to their job. Almost three-fourths (74.2%) said it taught them how to properly use earplugs and other personal protective equipment, and a quarter (25.8%) said it taught them to wear hearing protection. Table 1 categorizes the most common responses.

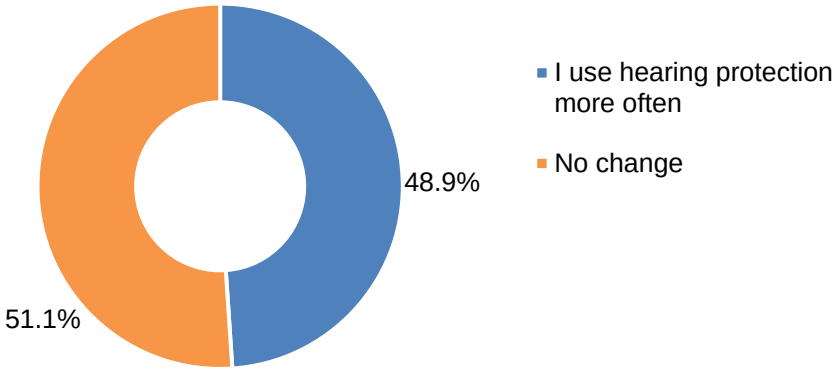
Table 1. List three things you learned from this training program that you will apply to your job (N=62)

	Frequency	Percent	Examples
How to properly use earplugs and other personal protective equipment (PPE)	46	74.2%	"How to correctly put earplugs in"
Wear hearing protection	16	25.8%	"Wear hearing protection around noise hazards"
Noise exposure limits	15	24.2%	"PEL for decibels"
Ways to prevent or control noise exposure (other than hearing protection)	15	24.2%	"Buying quieter equipment in the future"
Causes and effects of hearing loss	14	22.6%	"Hearing damage can result in dementia"
Increased awareness about noise and hearing loss	12	19.4%	"Have more noise awareness at jobsite"
Types of hearing protection	12	19.4%	"Which ear protection is the most effective"
When to wear hearing protection	11	17.7%	"Just how frequent protection should be worn"
Measuring noise with app	10	16.1%	"How to use your phone to measure sound level"
Signs of hearing loss	6	9.7%	"The signs of hearing loss"
Employer requirements	5	8.1%	"Employer must provide hearing PPE at no cost to me"
Hygiene	5	8.1%	"Safely clean ear devices"
Tinnitus	3	4.8%	"Tinnitus is ringing in your ears"
Other	3	4.8%	"How much I can't hear"

Change in Knowledge and Practices Following CPWR's Noise Training Program

Fifty-one apprentices completed the third survey, which was distributed a few weeks after they received the CPWR Noise Training. Among 47 apprentices, nearly half (48.9%) said they used hearing protection more often after receiving CPWR's Noise Training, while 51.1% reported their use did not change (Chart 10).

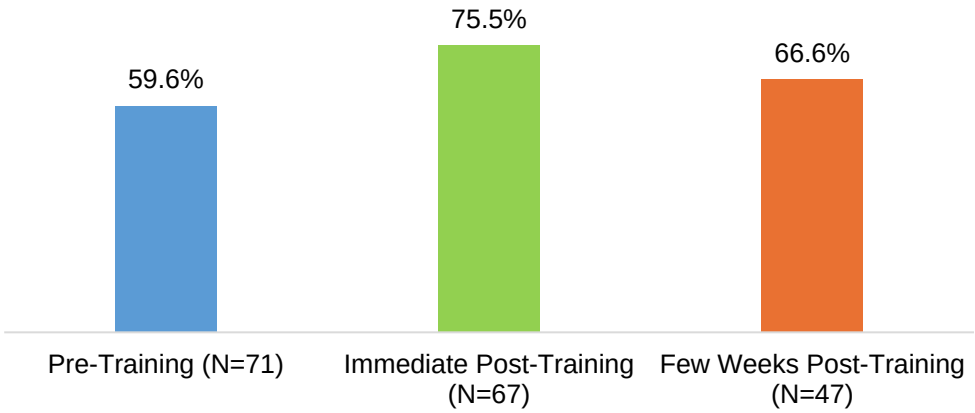
Chart 10. How has your use of hearing protection changed since receiving CPWR's Construction Noise and Hearing Loss Prevention training? (N=47)



Apprentices were asked the same 22 questions in all three surveys to assess their understanding of noise and hearing loss before and after receiving CPWR's Noise Training. Each apprentice received a score based on the number of questions they answered correctly, and an overall average was calculated for each survey (Chart 11). For the baseline survey, the average score among 71 apprentices was 59.6%. For the second survey, which was administered immediately after the training,

the average score among 67 apprentices was 75.5%, a 26.7% increase. For the third survey, administered a few weeks later, the average score among 47 apprentices was 66.6%. Although the average score declined following the second survey, it remains 12.2% higher than baseline, indicating apprentices retained important knowledge from the training program.

Chart 11. Average score among apprentices for the same 22 questions in each survey



Areas with notable increases in comprehension after CPWR's Noise Training include causes and effects of hearing loss, signs of hearing loss, identifying what tinnitus is, OSHA's permissible exposure limit for noise, the forms of hearing protection that offer the most protection, and the correct way to wear earplugs. However, one area that may require more emphasis in future training classes is the hierarchy of controls, in particular Prevention through Design (i.e., designing out or minimizing hazards and risks). Across all three surveys, most apprentices thought personal protective equipment was the best action an employer could take to protect their employees from loud noises, instead of engineering controls such as low-noise equipment.

CPWR's Noise Training also raised awareness of apps available to directly measure noise levels. In the baseline survey, 75.7% (53) of apprentices said they were aware of apps to measure noise levels, while 24.3% (17) were not. In the second survey, 98.5% (66) said they were aware of the apps and 1.5% (1) were not – a 24.5% increase from baseline. However, in the third survey, when apprentices were asked if they had used these apps to check noise levels on the job, only 22.0% (9) said they had, while 78.1% (32) had not.

Ways to Improve CPWR's Noise Training Program

In the third survey, 43 apprentices responded to a question about what topics they needed more information about. Over a third (37.2%) said they needed more information about the signs and effects of hearing loss and tinnitus, how to select and use hearing protection (37.2%), and what their employer is required to do to protect employees from hazardous noise (34.9%). They also wanted more information on how to determine if a noise level is hazardous (32.6%) and why noise and hearing loss is an important issue for construction workers (27.9%). Seven percent said they needed "other" information but did not elaborate.

Apprentices were also invited in an open-ended question to share suggestions for improvement. One individual thought the training program was too long, while another asked for more hands-on demonstrations. Finally, one apprentice suggested using "the phone app from different distances to show the decibel levels."

Discussion

Overall, the evaluation demonstrated CPWR's Noise Training was at least moderately effective in terms of being utilized and educating workers when used. This lends support to the idea that other similar programs can be an effective means for disseminating research-based safety and health information. However, the trainer surveys in particular reiterated two primary dissemination challenges. The first is difficulties in creating awareness. Despite our use of CPWR's existing connections to NABTU's network of trainers, there was still a significant number of trainer respondents who had either not yet heard of the CPWR Noise Training or were not very familiar with it, instead using other noise training materials. The second challenge is the time and resource limitations trainers face in prioritizing training topics and choice of materials. If trainers aren't comfortable with a new topic or if they already have a training program on that topic, they are less likely to take time to learn about and use a new program.

Despite these dissemination challenges, the findings from both the trainer and trainee assessments are encouraging. They suggest safety and health training programs can be an effective means of disseminating research findings and solutions when developed to be responsive to the training needs of the industry and when relatively short and multi-dimensional, including both didactic and interactive training exercises. This was indicated by the majority of trainees who reported finding the videos, lectures/presentations, demonstrations, and hands-on activities to be the most helpful part of the Noise Training, and who said it taught them how to use earplugs correctly.

Limitations of the study include selection bias, a small sample size, and a lack of representation from all unions. For example, individuals participating in the trainee assessment received the Noise Training from one of three trainers. All surveyed trainers and trainees are also affiliated with building trades unions, and as such, they participate in formal apprenticeship training programs. Because of this, they have an existing mechanism to incorporate new training as well as a structured way for CPWR to communicate with them about the availability of new training programs, in contradiction to non-union trainers and trainees.

In addition, we were delayed in administering the trainee assessment due to the impact of COVID-19 on CPWR's r2p program. Because of this delay, many of the trainers who expressed interest in participating in the trainee assessment in early 2021 had retired, taken new positions, or were otherwise unable to commit to participating. Moreover, we experienced an overall reluctance towards research participation among the construction industry for several years following the pandemic. The impact of COVID-19 on supply chains, schedules, staffing shortages, and finances made it more difficult for industry members to devote the extra time and energy needed to support CPWR's safety and health research studies.

Conclusion

This evaluation has demonstrated the viability of using short, research-based safety and health training programs to effectively educate apprentices and other trainees about specific hazards and solutions in classroom settings. We have identified several ways to improve the Noise Training program and inform the development of future training programs.

We will continue to recommend and use training program development as a dissemination tool for research, with the caveat that the training program should address current gaps in training and be developed in a format that fits well with existing training programs and schedules. Consulting with the target audience before and during development of the program is critical to ensuring its feasibility and future use.

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5. Kirkpatrick Partners (2025, June 16). *The Kirkpatrick Model*. https://www.kirkpatrickpartners.com/the-kirkpatrick-model/

Appendix I

Noise Training Program Assessment Survey for Construction Safety & Health Trainers

This survey is being conducted by CPWR – The Center for Construction Research and Training to gather information on trainers' awareness and use of CPWR's Construction Noise and Hearing Loss Prevention Training Program, and to learn about other noise training resources being used.

The survey should take roughly 10 minutes to complete. All responses will be anonymous. Results will only be reported as group data – no names or identifying information will be collected as part of this survey.

1. Please identify the union that you belong to from the list below: (Select one)

- ○ International Association of Bridge, Structural, Ornamental and Reinforcing Iron Workers
- ○ International Association of Heat and Frost Insulators and Allied Workers
- ○ International Association of Sheet Metal, Air, Rail and Transportation Workers
- ○ International Brotherhood of Boilermakers, Iron Ship Builders, Blacksmiths, Forgers and Helpers
- ○ International Brotherhood of Electrical Workers
- ○ International Brotherhood of Teamsters
- ○ International Union of Bricklayers and Allied Craftworkers
- ○ International Union of Elevator Constructors
- ○ International Union of Painters and Allied Trades
- ○ Laborers' International Union of North America
- ○ Operative Plasterers' and Cement Masons' International Association of the United States and Canada
- ○ United Association of Journeymen and Apprentices of the Plumbing and Pipe Fitting Industry of the United States and Canada
- ○ United Brotherhood of Carpenters and Joiners of America
- ○ United Union of Roofers, Waterproofers and Allied Workers
- ○ International Union of Operating Engineers
- ○ Other (please specify):

_____

2. Please select the types of training you conduct (Check all that apply):

- ❑ OSHA 10-hour training
- ❑ OSHA 30-hour training
- ❑ In-class Craft Skills training
- ❑ Hands on Craft Skills training
- ❑ Other (please specify):

_____

3. Which of the following sources do you go to for information and training materials to use in your training programs (Check all that apply):

- ❑ My union's training curriculum
- ❑ Occupational Safety and Health Administration (OSHA)
- ❑ National Institute for Occupational Safety and Health (NIOSH)
- ❑ CPWR – The Center for Construction Research and Training
- ❑ Manufacturers
- ❑ Other Instructors
- ❑ Internet searches
- ❑ eLCOSH
- ❑ Smart Mark Program (www.esmartmark.org)
- ❑ CPWR Construction Solutions
- ❑ Professional organizations (e.g., National Hearing Conservation Association (NHCA), National Safety Council (NSC), American Industrial Hygiene Association (AIHA), Council for Accreditation in Occupational Hearing Conservation (CAOHC))
- ❑ Other (please specify):

_____

4. Please indicate your level of agreement with the following statements: (Select one)

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Hearing Loss is an important topic for the construction industry.					
The workers I train are very concerned about hearing loss.					
Training on preventing hearing loss is a top priority for my union.					

5. Have you heard of CPWR's Construction Noise and Hearing Loss Prevention Training Program? (Select one)

- ○ Yes
- ○ No
- ○ Not Sure

[Skip to Question 8 if you answered "No" OR "Not Sure" to Question 5]

6. How did you hear about CPWR's Construction Noise and Hearing Loss Prevention Training Program? (Select one)

- ○ From my union
- ○ From CPWR
- ○ Other trainers
- ○ Online searches
- ○ Other (please specify):

_____

7. How familiar are you with the Program? (Select one)

- ○ Very familiar
- ○ Somewhat familiar
- ○ A little familiar
- ○ Not familiar at all

8. Do you conduct training on how to prevent noise-induced hearing loss? (Select one)

- ○ Yes
- ○ No

[Skip Question 9 if you answered "Yes" to Question 8]

9. Which of the following statements best describes why you do not train on noise and hearing loss prevention? (Select one)

- ○ This topic is delivered by another trainer
- ○ I don't have time - my curriculum is already full
- ○ It's not a priority topic
- ○ I don't know enough about the topic
- ○ I don't have the materials needed to conduct the training
- ○ Other (please specify):

_____

[If you answered "No" to Question 8, DO NOT continue with the rest of the survey]

10. Which of the following topics do you cover in the hearing loss prevention training that you provide (Check all that apply):

- ❑ Applicable OSHA standards and permissible exposure limit
- ❑ Sources of noise
- ❑ Basic acoustic theory (i.e., the decibel scale and what it means)
- ❑ Risk for, and signs of, noise-induced hearing loss
- ❑ Engineering control measures to reduce noise exposure
- ❑ How to identify low noise equipment options
- ❑ The benefits of using lower noise equipment
- ❑ Administrative control measures to reduce noise exposure
- ❑ How to determine when hearing protection is needed
- ❑ How to select appropriate hearing protection
- ❑ How to wear hearing protection
- ❑ How to identify when hearing protection needs to be replaced
- ❑ The limitations of hearing protection
- ❑ Other (please specify):

_____

11. Which of the following statements most closely describes the materials you use when conducting training on noise and hearing loss prevention: (Select one)

- ○ I only use CPWR's Construction Noise and Hearing Loss Prevention Training Program
- ○ I use training materials from both CPWR's Construction Noise and Hearing Loss Prevention Training Program and other sources
- ○ I only use materials from other sources. I don't use CPWR's Construction Noise and Hearing Loss Prevention Training Program

[Skip Question 12 if you answered "I only use CPWR's Construction Noise and Hearing Loss Preventing Training Program" OR "I use training materials from both CPWR's Construction Noise and Hearing Loss Prevention Training Program and other sources" to Question 11]

12. Why haven't you used CPWR's Construction Noise and Hearing Loss Prevention Training Program? (Check all that apply)

- ❑ Before this survey I had never heard of the Program
- ❑ I'm not familiar enough with the Program
- ❑ I'm required to use my union's training program
- ❑ It doesn't include all the topics I need to cover
- ❑ I already have a noise training curriculum I'm comfortable using
- ❑ Other (please specify):

_____

[If you answered "I only use materials from other sources" to Question 11, DO NOT continue with the rest of the survey]

13. Which of the modules and instructor manuals in CPWR's Construction Noise and Hearing Loss Prevention Training Program have you used? (Check all that apply)

- ❑ 1 Hour Elective Module
- ❑ Instructor Manual for 1 Hour Elective Module
- ❑ 30 Minute Elective Module
- ❑ Instructor Manual for 30 Minute Elective Module
- ❑ In-Class and/or Hands-On Refresher Exercises
- ❑ Instructor Manual for In-Class & Hands-On Refresher Exercises
- ❑ I don't remember

[If you selected "I don't remember" for Question 13, skip to Question 20]

[If you selected "In-Class and/or Hands-On Refresher Exercises" OR "Instructor Manual for In-Class & Hands-On Refresher Exercises" for Question 13, please answer Questions 14 - 17. Otherwise, skip to Question 18]

14. Which of the instructor exercises in CPWR's Construction Noise and Hearing Loss Prevention Training Program have you used? (Check all that apply)

- ❑ In-Class Refresher Exercises for use in OSHA 10- & 30-Hour Modules
- ❑ Noise Training Exercises for use in In-class for Skills Training Programs
- ❑ Noise Training Exercises for use in the Hands-On Portion of Skills Training Programs

[Only answer Question 15 if you selected "In-Class Refresher Exercises for use in OSHA 10- & 30-Hour Modules" for Question 14]

15. Which of the In-Class Refresher Exercises for use in OSHA 10- & 30-Hour Modules have you used? (Check all that apply)

- ❑ Exercise A-1: The Impact of Hearing Loss
- ❑ Exercise A-2: Are you talking to me?
- ❑ Exercise A-3: What does hearing loss sound like?
- ❑ Exercise A-4: How to Properly Use Ear Plugs
- ❑ Exercise A-5: How loud is too loud?
- ❑ Exercise A-6: Self-assessment of Hearing

[Only answer Question 16 if you selected "Noise Training Exercises for use in In-class for Skills Training Programs" for Question 14]

16. Which of the Noise Training Exercises for use in in-class for Skills Training Programs have you used? (Check all that apply)

- ❑ Exercise B-1 – Cumulative Presentation: Noise and Hearing Loss- The risk and prevention
- ❑ Exercise B-2 (A) – Stand Alone Slide: Noise – What are the risks?
- ❑ Exercise B-2 (B) – Stand Alone Slide: The Cost of Hearing Loss
- ❑ Exercise B-2 (C) – Stand Alone Slide: Noise – How Loud is Too Loud?
- ❑ Exercise B-2 (D) – Stand Alone Slide: Preventing Hearing Loss?

[Only answer Question 17 if you selected "Noise Training Exercises for use in the Hands-On Portion of Skills Training Programs" for Question 14]

17. Which of the Noise Training Exercises for use in the hand-on portion of the Skills Training Programs have you used? (Check all that apply)

- ❑ Exercise C-1: Identifying Noise Levels of Equipment (Group Activity)
- ❑ Exercise C-2: Measuring Noise Levels Throughout the Day (Individual Activity)
- ❑ Exercise C-3: Choosing the Right Hearing Protection

18. When you used the modules and/or exercises, did you find the amount of time estimated to be accurate? (Select one)

	It took longer than estimated	It took longer than estimated, but the time was reasonable	It took approximately the time estimated	It took less time than estimated	Have not used
1 Hour Elective Module					
30 Minute Elective Module					
5-10 Minute In-Class Refresher Exercises for use in OSHA 10- & 30-Hour Modules					
5-10 Minute Presentations for Noise Training Exercises for use in-class for Skills Training Programs					
5-10 Minute Noise Training Exercise for use in the hands-on portion of Skills Training Programs					

19. How easy were the instructor guides and training materials to follow? (Select one)

	Not easy to follow	Most parts were difficult to follow	Most parts were easy to follow	Very easy to follow	Have not used
1 Hour Elective Module					
30 Minute Elective Module					
5-10 Minute In-Class Refresher Exercises for use in OSHA 10- & 30-Hour Modules					
5-10 Minute Presentations for Noise Training Exercises for use in-class for Skills Training Programs					
5-10 Minute Noise Training Exercises for use in the hands-on portion of Skills Training Programs					

20. How appropriate was the information in CPWR's Construction Noise and Hearing Loss Prevention Program to your trainees? (Select one)

- ○ Very appropriate
- ○ Somewhat appropriate
- ○ Could be made more appropriate
- ○ Not appropriate at all

21. In general, how receptive were your trainees to the information covered in CPWR's Construction Noise and Hearing Loss Prevention Program? (Select one)

- ○ Very receptive
- ○ Somewhat receptive
- ○ Not very receptive
- ○ Not at all receptive

22. How would you rate CPWR's Construction Noise and Hearing Loss Prevention Training Program overall? (Select one)

- ○ Excellent
- ○ Good
- ○ Fair
- ○ Poor

23. Do you have any recommendations to improve the Program, including any changes to the course content or ways we can improve your ability to deliver the Program?

Thank you for your feedback.

As a next step, CPWR is conducting a study to explore the effectiveness of the Construction Noise and Hearing Loss Prevention Training Program and to further our understanding of how we can use training programs to advance the use of safety and health research findings and safer practices. We would like to conduct three surveys of apprentices who receive the Program. Those surveys will be anonymous and will only be reported as group data. No identifying information will be collected from the apprentices, and no attempt will be made to connect you with your trainees' responses.

Are you willing to help with this study by conducting the training program and administering the in-class surveys? If so, **click here to be taken to a separate form to provide your contact information**. Your information will not be linked to this survey or shared, and we will only use it to provide more information on how to participate in the study.

Appendix II

Baseline Survey – Noise Training Program Evaluation

Introduction

Thank you for participating in this brief survey to help CPWR—The Center for Construction Research and Training assess the effectiveness of the Noise and Hearing Loss Prevention Training Program, which was developed with the help of more than 4,000 union members and trainers. The purpose of this survey is to understand your knowledge and current practices concerning noise and hearing loss. **It is not a test, and you are not being graded.** Your participation in this survey is completely voluntary and your responses will be anonymous. No names or other personal identifiers will be collected, and results will only be analyzed and reported as group data.

This and later surveys will help CPWR learn more about the effectiveness of the training program and ways to improve it. The goal is to provide you and other construction workers with the training and information needed to protect your hearing.

Section 1

1. **Please select the title that most closely reflects your current role: (Select one)**
   - ○ Journeyperson
   - ○ Apprentice
   - ○ Other (please specify):

     _____

[Skip Question 2 if you answered "Journeyperson" OR "Other" to Question 1]

2. **What year of your apprenticeship are you currently in? (Select one)**
   - ○ 1st year
   - ○ 2nd year
   - ○ 3rd year
   - ○ 4th year
   - ○ 5th year
   - ○ Other (please specify):

     _____

[Skip Question 3 if you answered "Apprentice" to Question 1]

3. **How many years have you worked in the construction industry? (Select one)**
   - ○ Less than 1 year
   - ○ 1 – 5 years
   - ○ 6 – 10 years
   - ○ 11 – 15 years
   - ○ 16 or more years

4. **Please choose the BEST description of your hearing: (Select one)**
   - ○ Excellent
   - ○ Good
   - ○ A little trouble hearing
   - ○ Moderate trouble hearing
   - ○ A lot of trouble hearing
   - ○ I am deaf

Section 2

5. **Have you received training on how to prevent noise-induced hearing loss? (Select one)**
   - ○ Yes
   - ○ No
   - ○ Not Sure

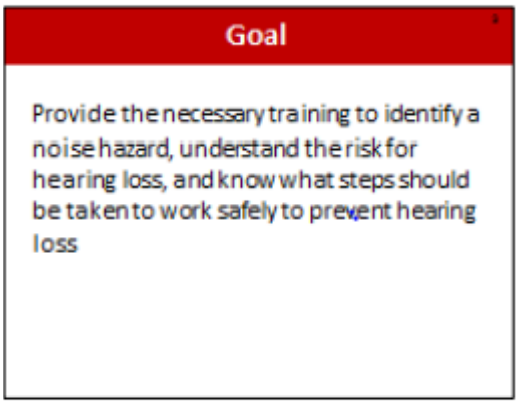
[Skip Question 6 if you answered "No" OR "Not Sure" to Question 5]

6. **Who provided the training on how to prevent noise-induced hearing loss? (Select one)**
   - ○ Union
   - ○ Employer
   - ○ Both (union and employer)
   - ○ Not sure
   - ○ Other (please specify):

     _____

[Skip Question 7 if you answered "No" OR "Not Sure" to Question 5]

7. **Did you receive the CPWR Construction Noise and Hearing Loss Prevention training? (Select one)**
   - ○ Yes
   - ○ No
   - ○ Not Sure



8. **How often do you wear hearing protection when you work around noise? (Select one)**
   - ○ Always
   - ○ Often
   - ○ Sometimes
   - ○ Rarely
   - ○ Never

[Skip Question 9 if you answered "Always", "Often", OR "Sometimes" to Question 8]

9. **If you NEVER or RARELY wear hearing protection when working around noise, what are the top three reasons? (Select three)**
   - ❑ I am not sure when I should wear hearing protection
   - ❑ I can't hear things I need to hear when I wear hearing protection
   - ❑ Hearing protection is not provided
   - ❑ Hearing protection is uncomfortable
   - ❑ No one else wears hearing protection
   - ❑ I can't always find hearing protection
   - ❑ Hearing protection gets in the way of other safety equipment/clothing
   - ❑ I feel isolated when wearing hearing protection
   - ❑ Other (please specify):

     _____

10. **Please select all the actions you have seen your employer do on job sites during the last twelve months to protect workers from hearing loss: (Select all that apply)**
    - ❑ Provide earmuffs
    - ❑ Provide ear plugs
    - ❑ Provide training on how to prevent hearing damage
    - ❑ Place noisy equipment in an isolated area away from workers
    - ❑ Use quieter, low noise equipment
    - ❑ Place barriers between noise sources and workers
    - ❑ Schedule loud work when the fewest workers are present
    - ❑ Rotate jobs
    - ❑ Use warning signs (e.g., hearing protection required)
    - ❑ Labels on equipment indicating the noise level
    - ❑ None of the above
    - ❑ Not sure
    - ❑ Other (please specify):

      _____

11. **Have you had your hearing tested since you began working in the construction industry? (Select one)**
    - ○ Yes
    - ○ No

[Skip Question 12 if you answered "No" to Question 11]

12. Why was your hearing tested? (Select one)

- ○ My employer required the test
- ○ I was having problems hearing
- ○ My doctor recommended the test
- ○ Other (please specify):

_____

Section 3

13. Which statements are true and which are false? (Put "X" in the appropriate column)

	True	False
Hearing loss can be caused by a one-time exposure to a loud sound		
Noise-induced hearing loss is always immediately noticeable		
Hearing loss is a normal part of old age and cannot be prevented		
Hearing loss can be caused by repeated exposure to loud sounds		
Noise-induced hearing loss is not permanent		
Noise is part of the job and nothing can be done about it		
Hearing loss can affect the rest of my health		
Hearing loss can affect young construction workers		
You can damage your hearing from working around construction materials that contain solvents		

14. Which of the following are signs of hearing loss? (Select all that apply)

- ❑ Trouble hearing people talk when there is background noise
- ❑ People sound like they are mumbling
- ❑ Need to ask people to repeat what they are saying
- ❑ Need to turn up the radio or TV a lot – particularly at the end of the day
- ❑ Have difficulty hearing people on the phone
- ❑ Constant or frequent ringing in your ears
- ❑ Hard to distinguish sounds such as "s" or "th"
- ❑ Men's voices are easier to understand than women's

15. Overall, how frequently are construction workers exposed to dangerous noise levels? (Select one)

- ○ 18%
- ○ 33%
- ○ 55%
- ○ 73%
- ○ 94%

16. According to the National Institute for Occupational Safety and Health (NIOSH), the average 25-year-old construction worker has the hearing of a: (Select one)

- ○ 25-year-old
- ○ 35-year-old
- ○ 50-year-old
- ○ 65-year-old

17. What is tinnitus? (Select one)

- ○ A type of hearing protection
- ○ An ear infection
- ○ How sound is measured
- ○ Ringing in your ears
- ○ Total loss of hearing

18. Which of the following are effects of noise exposure and hearing loss? (Select all that apply)

- ❑ Difficulty hearing warning signals on the job
- ❑ Increased risk of falling
- ❑ Nervousness, sleeplessness, and fatigue
- ❑ Loneliness and depression
- ❑ Increase in energy
- ❑ Increase in stress, blood pressure, hypertension, and cardiovascular disease
- ❑ Brain impairment/dementia

19. How do you know if it's too loud at work? (Select all that apply)

- ❑ Shout to be heard an arm's length away (2-3 feet)
- ❑ Turn equipment off to be heard
- ❑ Move to another location to talk and be heard
- ❑ Turn up the car radio at the end of the day
- ❑ Shout to be heard 6 feet away

20. What is the Occupational Safety and Health Administration's (OSHA) Permissible Exposure Limit (PEL) for Noise (measured in decibels for an 8 hour shift)? (Select one)

- ○ 30 decibels
- ○ 60 decibels
- ○ 90 decibels
- ○ 120 decibels

21. Which of the following is a cause of hearing loss? (Select all that apply)

- ❑ Heredity
- ❑ Exposure to loud noise
- ❑ Head injury
- ❑ Headphone use
- ❑ Certain drugs and chemicals
- ❑ Childhood illness
- ❑ Aging

22. Are you aware there are noise apps (a noise meter that can be accessed through a smartphone) to measure noise levels? (Select one)

- ○ Yes
- ○ No

23. Which of the following is the <u>BEST</u> action an employer can take to protect their employees from loud noises? (Select one)

- ○ Use administrative controls (e.g., warning signs, designated areas for noisy tasks)
- ○ Use engineering controls (e.g., low noise equipment, barriers around loud equipment)
- ○ Provide personal protective equipment (PPE) (e.g., earplugs, earmuffs)

24. True or False: The Occupational Safety and Health Administration (OSHA) requires employers to provide hearing protection at no cost to their employees. (Select one)

- ○ True
- ○ False

25. Which two forms of hearing protection offer the <u>MOST</u> protection if used properly? (Select two)

- ❑ Foam plugs/moldable
- ❑ Reusable (pre-formed) plugs
- ❑ Banded/semi-aural
- ❑ Earmuffs
- ❑ Custom

26. Which of the following is <u>NOT</u> one of the top seven factors to consider when selecting hearing protection? (Select one)

- ○ Cost
- ○ Comfort
- ○ Hygiene
- ○ Convenience
- ○ Communication needs
- ○ Your hearing ability
- ○ Noise reduction needed
- ○ Noise level

27. Select the picture that depicts the correct way to wear earplugs. (Circle one)

A. 

B. 

Appendix III

Survey #2 – Noise Training Program Evaluation

Introduction

Thank you for participating in this brief survey to help CPWR—The Center for Construction Research and Training assess the effectiveness of the Noise and Hearing Loss Prevention Training Program you just received. **Please keep in mind that this survey is not a test, and you are not being graded.** Your participation is completely voluntary and your responses will be anonymous. No names or other personal identifiers will be collected, and results will only be analyzed and reported as group data.

Responses to this and a later survey will be used to improve the training program and understand how best to provide you and other construction workers with the training and information needed to protect your hearing.

Section 1

1. **Please select the title that most closely reflects your current role: (Select one)**
   - ○ Journeyperson
   - ○ Apprentice
   - ○ Other (please specify)

     _____

[Skip Question 2 if you answered "Journeyperson" OR "Other" to Question 1]

2. **What year of your apprenticeship are you currently in? (Select one)**
   - ○ 1st year
   - ○ 2nd year
   - ○ 3rd year
   - ○ 4th year
   - ○ 5th year
   - ○ Other (please specify):

     _____

[Skip Question 3 if you answered "Apprentice" to Question 1]

3. **How many years have you worked in the construction industry? (Select one)**
   - ○ Less than 1 year
   - ○ 1 – 5 years
   - ○ 6 – 10 years
   - ○ 11 – 15 years
   - ○ 16 or more years

4. **Please choose the BEST description of your hearing: (Select one)**
   - ○ Excellent
   - ○ Good
   - ○ A little trouble hearing
   - ○ Moderate trouble hearing
   - ○ A lot of trouble hearing
   - ○ I am deaf

Section 2

5. **How would you rate the content of the CPWR Construction Noise and Hearing Loss Prevention training program overall? (Select one)**
   - ○ Excellent
   - ○ Good
   - ○ Fair
   - ○ Poor

6. **Please indicate how strongly you agree or disagree with the following statements: (Put "X" in the appropriate column)**

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
I learned something today that I will be able to apply to my job					
I thought the course was worthwhile					
The information presented was easy to understand					

7. **Which aspects of the training did you find helpful? (Select all that apply)**
   - ❑ Lecture/presentation
   - ❑ Hands-on activities
   - ❑ Group discussions
   - ❑ Demonstrations
   - ❑ Videos
   - ❑ Handouts

8. **What are the BEST ways to provide you with reminders and new information on noise hazards and ways to prevent hearing loss? (Select all that apply)**
   - ❑ Formal training in a classroom setting
   - ❑ Toolbox Talk
   - ❑ Text message
   - ❑ Email
   - ❑ Handouts
   - ❑ Posters around the job site
   - ❑ Videos
   - ❑ X, formerly known as Twitter
   - ❑ Facebook
   - ❑ Instagram
   - ❑ Other (please specify):

     _____

Section 3

9. **Which statements are true and which are false? (Put "X" in the appropriate column)**

	True	False
Hearing loss can be caused by a one-time exposure to a loud sound		
Noise-induced hearing loss is always immediately noticeable		
Hearing loss is a normal part of old age and cannot be prevented		
Hearing loss can be caused by repeated exposure to loud sounds		
Noise-induced hearing loss is not permanent		
Noise is part of the job and nothing can be done about it		
Hearing loss can affect the rest of my health		
Hearing loss can affect young construction workers		
You can damage your hearing from working around construction materials that contain solvents		

10. **Which of the following are signs of hearing loss? (Select all that apply)**
    - ❑ Trouble hearing people talk when there is background noise
    - ❑ People sound like they are mumbling
    - ❑ Need to ask people to repeat what they are saying
    - ❑ Need to turn up the radio or TV a lot – particularly at the end of the day
    - ❑ Have difficulty hearing people on the phone
    - ❑ Constant or frequent ringing in your ears
    - ❑ Hard to distinguish sounds such as "s" or "th"
    - ❑ Men's voices are easier to understand than women's

11. Overall, how frequently are construction workers exposed to dangerous noise levels? (Select one)

- ○ 18%
- ○ 33%
- ○ 55%
- ○ 73%
- ○ 94%

12. According to the National Institute for Occupational Safety and Health (NIOSH), the average 25-year-old construction worker has the hearing of a: (Select one)

- ○ 25-year-old
- ○ 35-year-old
- ○ 50-year-old
- ○ 65-year-old

13. What is tinnitus? (Select one)

- ○ A type of hearing protection
- ○ An ear infection
- ○ How sound is measured
- ○ Ringing in your ears
- ○ Total loss of hearing

14. Which of the following are effects of noise exposure and hearing loss? (Select all that apply)

- ❑ Difficulty hearing warning signals on the job
- ❑ Increased risk of falling
- ❑ Nervousness, sleeplessness, and fatigue
- ❑ Loneliness and depression
- ❑ Increase in energy
- ❑ Increase in stress, blood pressure, hypertension, and cardiovascular disease
- ❑ Brain impairment/dementia

15. How do you know if it's too loud at work? (Select all that apply)

- ❑ Shout to be heard an arm's length away (2-3 feet)
- ❑ Turn equipment off to be heard
- ❑ Move to another location to talk and be heard
- ❑ Turn up the car radio at the end of the day
- ❑ Shout to be heard 6 feet away

16. What is the Occupational Safety and Health Administration's (OSHA) Permissible Exposure Limit (PEL) for Noise (measured in decibels for an 8-hour shift)? (Select one)

- ○ 30 decibels
- ○ 60 decibels
- ○ 90 decibels
- ○ 120 decibels

17. Which of the following is a cause of hearing loss? (Select all that apply)

- ❑ Heredity
- ❑ Exposure to loud noise
- ❑ Head injury
- ❑ Headphone use
- ❑ Certain drugs and chemicals
- ❑ Childhood illness
- ❑ Aging

18. Are you aware there are noise apps (a noise meter that can be accessed through a smartphone) to measure noise levels? (Select one)

- ○ Yes
- ○ No

19. Which of the following is the BEST action an employer can take to protect their employees from loud noises? (Select one)

- ○ Use administrative controls (e.g., warning signs, designated areas for noisy tasks)
- ○ Use engineering controls (e.g., low noise equipment, barriers around loud equipment)
- ○ Provide personal protective equipment (PPE) (e.g., earplugs, earmuffs)

20. True or False: The Occupational Safety and Health Administration (OSHA) requires employers to provide hearing protection at no cost to their employees. (Select one)

- ○ True
- ○ False

21. Which two forms of hearing protection offer the <u>MOST</u> protection if used properly? (Select two)

- ❑ Foam plugs/moldable
- ❑ Reusable (pre-formed) plugs
- ❑ Banded/semi-aural
- ❑ Earmuffs
- ❑ Custom

22. Which of the following is <u>NOT</u> one of the top seven factors to consider when selecting hearing protection? (Select one)

- ○ Cost
- ○ Comfort
- ○ Hygiene
- ○ Convenience
- ○ Communication needs
- ○ Your hearing ability
- ○ Noise reduction needed
- ○ Noise level

23. Select the picture that depicts the correct way to wear earplugs. (Circle one)

A. 

B. 

Section 4

24. Please indicate how strongly you agree or disagree with the following statements: (Put "X" in the appropriate column)

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
This class helped me understand why noise and hearing loss is an important issue for construction workers					
This class improved my ability to recognize the signs and effects of hearing loss and tinnitus					
This class raised my awareness of hazardous noise, types of noise, and common sources of noise on the job					
This class explained the different types of hearing protection					
This class taught me how to use earplugs correctly					
This class provided information on ways to control noise exposures					
This class explained how to measure noise using common devices and free phone apps					
This class raised my awareness of what my employer should be doing to protect me from noise hazards					

25. List three things you learned from this training program that you will apply to your job:

1. _____

2. _____

3. _____

26. Do you have suggestions for how this training program could be improved?

Appendix IV

Survey #3 – Noise Training Program Evaluation

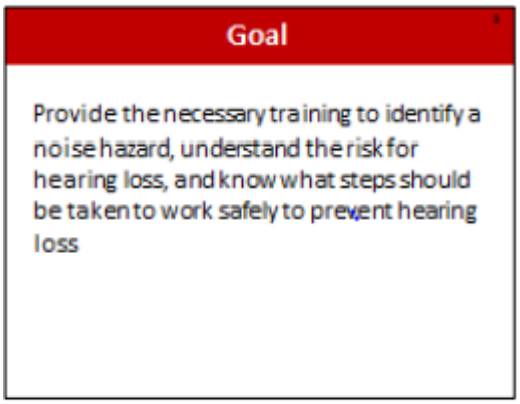
Introduction

Thank you for participating in this brief survey to help CPWR—The Center for Construction Research and Training assess the effectiveness of the Noise and Hearing Loss Prevention Training Program. **Please keep in mind that this survey is not a test, and you are not being graded.** Your participation is completely voluntary and your responses will be anonymous. No names or other personal identifiers will be collected, and results will only be analyzed and reported as group data.

Responses to this and earlier surveys will be used to improve the training program and understand how best to provide you and other construction workers with the training and information needed to protect your hearing.

Section 1

1. **Did you receive the CPWR Construction Noise and Hearing Loss Prevention training? (Select one)**
   - ○ Yes
   - ○ No



2. **Have you received other training on how to prevent noise-induced hearing loss? (Select one)**
   - ○ Yes
   - ○ No

[Skip Question 3 if you answered "No" to Question 2]

3. **Who provided this additional training on how to prevent noise-induced hearing loss? (Select one)**
   - ○ Union
   - ○ Employer
   - ○ Both (union and employer)
   - ○ Not sure
   - ○ Other (please specify):

_____

4. **Please select the title that most closely reflects your current role: (Select one)**
   - ○ Journeyperson
   - ○ Apprentice
   - ○ Other (please specify):

     _____

[Skip Question 5 if you answered "Journeyperson" OR "Other" to Question 4]

5. **What year of your apprenticeship are you currently in? (Select one)**
   - ○ 1st year
   - ○ 2nd year
   - ○ 3rd year
   - ○ 4th year
   - ○ 5th year
   - ○ Other (please specify):

     _____

[Skip Question 6 if you answered "Apprentice" to Question 4]

6. **How many years have you worked in the construction industry? (Select one)**
   - ○ Less than 1 year
   - ○ 1 – 5 years
   - ○ 6 – 10 years
   - ○ 11 – 15 years
   - ○ 16 or more years

7. **Please choose the <u>BEST</u> description of your hearing: (Select one)**
   - ○ Excellent
   - ○ Good
   - ○ A little trouble hearing
   - ○ Moderate trouble hearing
   - ○ A lot of trouble hearing
   - ○ I am deaf

<u>Section 2</u>

8. **How often do you wear hearing protection when you work around noise? (Select one)**
   - ○ Always
   - ○ Often
   - ○ Sometimes
   - ○ Rarely
   - ○ Never

[Skip Question 9 if you answered "Always", "Often", OR "Sometimes" to Question 8]

9. **If you NEVER or RARELY wear hearing protection when working around noise, what are the top three reasons? (Select three)**
   - ❑ I am not sure when I should wear hearing protection
   - ❑ I can't hear things I need to hear when I wear hearing protection
   - ❑ Hearing protection is not provided
   - ❑ Hearing protection is uncomfortable
   - ❑ No one else wears hearing protection
   - ❑ I can't always find hearing protection
   - ❑ Hearing protection gets in the way of other safety equipment/clothing
   - ❑ I feel isolated when wearing hearing protection
   - ❑ Other (please specify):

     _____

10. **Please select all the actions you have seen your employer do on job sites during the last twelve months to protect workers from hearing loss: (Select all that apply)**
    - ❑ Provide earmuffs
    - ❑ Provide ear plugs
    - ❑ Provide training on how to prevent hearing damage
    - ❑ Place noisy equipment in an isolated area away from workers
    - ❑ Use quieter, low noise equipment
    - ❑ Place barriers between noise sources and workers
    - ❑ Schedule loud work when the fewest workers are present
    - ❑ Rotate jobs
    - ❑ Use warning signs (e.g., hearing protection required)
    - ❑ Labels on equipment indicating the noise level
    - ❑ None of the above
    - ❑ Not sure
    - ❑ Other (please specify):

      _____

11. **Have you had your hearing tested since you began working in the construction industry? (Select one)**
    - ○ Yes
    - ○ No

[Skip Question 12 if you answered "No" to Question 11]

12. **Why was your hearing tested? (Select one)**
    - ○ My employer required the test
    - ○ I was having problems hearing
    - ○ My doctor recommended the test
    - ○ Other (please specify):

      _____

[Skip Section 3 (questions 13 through 29) if you HAVE NOT participated in CPWR's Construction Noise and Hearing Loss Prevention training]

Section 3

13. How has your use of hearing protection changed since receiving CPWR's Construction Noise and Hearing Loss Prevention training? (Select one)

- ○ I use hearing protection more often
- ○ No change
- ○ I use hearing protection less often

14. Which statements are true and which are false? (Put "X" in the appropriate column):

	True	False
Hearing loss can be caused by a one-time exposure to a loud sound		
Noise-induced hearing loss is always immediately noticeable		
Hearing loss is a normal part of old age and cannot be prevented		
Hearing loss can be caused by repeated exposure to loud sounds		
Noise-induced hearing loss is not permanent		
Noise is part of the job and nothing can be done about it		
Hearing loss can affect the rest of my health		
Hearing loss can affect young construction workers		
You can damage your hearing from working around construction materials that contain solvents		

15. Which of the following are signs of hearing loss? (Select all that apply)

- ❑ Trouble hearing people talk when there is background noise
- ❑ People sound like they are mumbling
- ❑ Need to ask people to repeat what they are saying
- ❑ Need to turn up the radio or TV a lot – particularly at the end of the day
- ❑ Have difficulty hearing people on the phone
- ❑ Constant or frequent ringing in your ears
- ❑ Hard to distinguish sounds such as "s" or "th"
- ❑ Men's voices are easier to understand than women's

16. Overall, how frequently are construction workers exposed to dangerous noise levels? (Select one)

- ○ 18%
- ○ 33%
- ○ 55%
- ○ 73%
- ○ 94%

17. According to the National Institute for Occupational Safety and Health (NIOSH), the average 25-year-old construction worker has the hearing of a: (Select one)

- ○ 25-year-old
- ○ 35-year-old
- ○ 50-year-old
- ○ 65-year-old

18. What is tinnitus? (Select one)

- ○ A type of hearing protection
- ○ An ear infection
- ○ How sound is measured
- ○ Ringing in your ears
- ○ Total loss of hearing

19. Which of the following are effects of noise exposure and hearing loss? (Select all that apply)

- ❑ Difficulty hearing warning signals on the job
- ❑ Increased risk of falling
- ❑ Nervousness, sleeplessness, and fatigue
- ❑ Loneliness and depression
- ❑ Increase in energy
- ❑ Increase in stress, blood pressure, hypertension, and cardiovascular disease
- ❑ Brain impairment/dementia

20. How do you know if it's too loud at work? (Select all that apply)

- ❑ Shout to be heard an arm's length away (2-3 feet)
- ❑ Turn equipment off to be heard
- ❑ Move to another location to talk and be heard
- ❑ Turn up the car radio at the end of the day
- ❑ Shout to be heard 6 feet away

21. What is the Occupational Safety and Health Administration's (OSHA) Permissible Exposure Limit (PEL) for Noise (measured in decibels for an 8-hour shift)? (Select one)

- ○ 30 decibels
- ○ 60 decibels
- ○ 90 decibels
- ○ 120 decibels

22. Which of the following is a cause of hearing loss? (Select all that apply)

- ❑ Heredity
- ❑ Exposure to loud noise
- ❑ Head injury
- ❑ Headphone use
- ❑ Certain drugs and chemicals
- ❑ Childhood illness
- ❑ Aging

23. Are you aware there are noise apps (a noise meter that can be accessed through a smartphone) to measure noise levels? (Select one)

- ○ Yes
- ○ No

[Skip Question 24 if you answered "No" to Question 23]

24. Have you used a noise app to check the noise level on a job? (Select one)

- ○ Yes
- ○ No

25. Which of the following is the <u>BEST</u> action an employer can take to protect their employees from loud noises? (Select one)

- ○ Use administrative controls (e.g., warning signs, designated areas for noisy tasks)
- ○ Use engineering controls (e.g., low noise equipment, barriers around loud equipment)
- ○ Provide personal protective equipment (PPE) (e.g., earplugs, earmuffs)

26. True or False: The Occupational Safety and Health Administration (OSHA) requires employers to provide hearing protection at no cost to their employees. (Select one)

- ○ True
- ○ False

27. Which two forms of hearing protection offer the <u>MOST</u> protection if used properly? (Select two)

- ❑ Foam plugs/moldable
- ❑ Reusable (pre-formed) plugs
- ❑ Banded/semi-aural
- ❑ Earmuffs
- ❑ Custom

28. Which of the following is <u>NOT</u> one of the top seven factors to consider when selecting hearing protection? (Select one)

- ○ Cost
- ○ Comfort
- ○ Hygiene
- ○ Convenience
- ○ Communication needs
- ○ Your hearing ability
- ○ Noise reduction needed
- ○ Noise level

29. Select the picture that depicts the correct way to wear earplugs. (Circle one)

A. 

B. 

Section 4

30. Which of the following do you need more information about? (Select all that apply)

- ❑ Why noise and hearing loss is an important issue for construction workers
- ❑ The signs and effects of hearing loss and tinnitus
- ❑ How to determine if a noise level is hazardous
- ❑ How to select and use hearing protection
- ❑ What my employer is required to do to protect employees from hazardous noise
- ❑ Other (please specify):

_____

31. What are the BEST ways to provide you with reminders and new information on noise hazards and ways to prevent hearing loss? (Select all that apply)

- ❑ Formal training in a classroom setting
- ❑ Toolbox Talk
- ❑ Text message
- ❑ Email
- ❑ Handouts
- ❑ Posters around the job site
- ❑ Videos
- ❑ X, formerly known as Twitter
- ❑ Facebook
- ❑ Instagram
- ❑ Other (please specify):

_____