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RESEARCH AND TRAINING

Moving research into practice to improve jobsite safety climate and safety outcomes: The Foundations for Safety Leadership (FSL) training program

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Introduction

Since our founding in 1990, CPWR - The Center for Construction Research and Training has worked to translate research findings into research-based products and tools that the construction industry can use to improve jobsite safety and to reduce the potential for adverse safety and health outcomes. This effort is called "research to practice" (or r2p), which CPWR defines as the "systematic effort to promote the broad-based application of evidence-based interventions to improve health and safety practices in the construction industry." (Baker et al, 2015)

In 2010, CPWR received funding from The National Institute for Safety and Health (NIOSH) to carry out a number of specific r2p initiatives. One initiative was to develop a process by which all CPWR internal and external research teams would be asked to begin planning their r2p activities early in the five-year funding cycle, rather than waiting until the end, when there is little time and money left to do it effectively. To facilitate that change, CPWR created the r2p Roadmap tool (https://www.cpwr.com/research/r2p-tools-roadmaps). This tool asks researchers to consider critical questions about the evidence-based products they will generate from their project, identify stakeholders to involve early on, and think about support they will need to translate their research findings into information that target audiences can use to reduce construction-related occupational injuries and illnesses. In this paper we describe how one research team used the r2p Roadmap to plan their dissemination activities and then provide data to show the success of those efforts.

The FSL research project

As part of CPWR's 2014-2019 5-year cooperative agreement with NIOSH, the authors of this paper carried out a research project to develop, evaluate, and disseminate a training program to introduce construction foremen and other lead workers to critical leadership skills they could use on the jobsite to strengthen safety climate and improve safety and health outcomes. We had two key project goals:

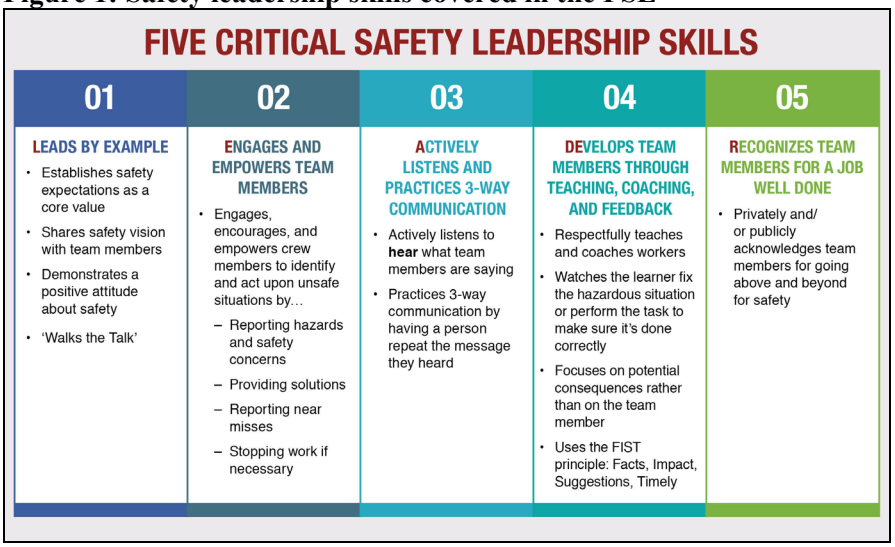
1) OSHA would incorporate the final program into its 30-hour course as an official elective, which reaches over 100,000 workers annually, and
2) Construction companies would incorporate the program into their on-going safety and health training activities.

To help achieve these goals, we engaged stakeholders early in the project, creating a 17-member curriculum development team (CDT) to assist in creating the training program. The CDT included key stakeholders such as OSHA 30-hour trainers, safety and health directors from small and large construction companies, construction workers, a representative from OSHA's Directorate of Training and Education, and the former director of OSHA's Directorate of Construction. We also solicited and received input during the development process from many additional subject matter experts and construction stakeholders.

After a year-and-a-half of collaboration, the 2.5-hour construction-specific safety leadership training program we titled The Foundations for Safety Leadership (FSL) had been pilot tested and finalized. All materials were uploaded to the FSL page on the CPWR website for anyone to download free-of-charge and use to enhance foremen and other frontline lead workers' safety leadership skills (https://www.cpwr.com/foundations-safety-leadership-fsl). Since 2016, many additional FSL-related resources have been created and posted, including toolbox talks, a self-assessment tool, skill sheets, etc. and most of them have been translated into Spanish. Given the focus of this paper, we won't be providing details about the FSL other than in figure below, which shows the 5 critical safety leadership skills

covered. For more detail on how it was developed and its final content, *see* Goldenhar LM, Schwatka N, & Johnson SK, 2019.

Figure 1: Safety leadership skills covered in the FSL

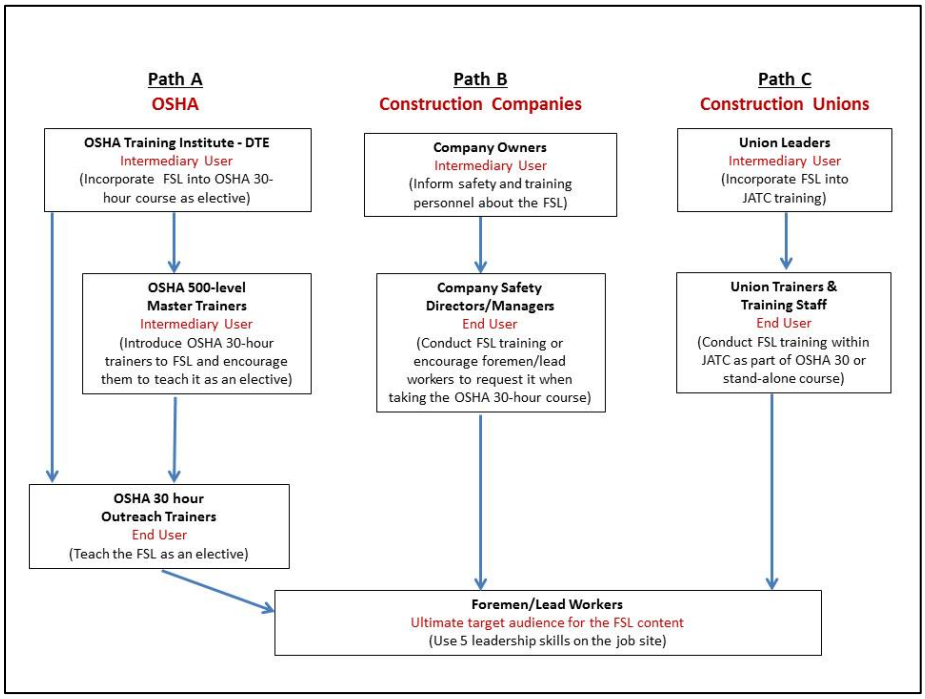


On January 1, 2017, the OSHA Division of Training and Education (DTE) (housed within the OSHA Training Institute), announced to all authorized outreach trainers that the FSL was an official elective in its construction industry 30-hour training course. Prior to OSHA's official roll-out, the research team began conducting a study to evaluate the short-term effectiveness of the FSL training. Results showed that compared to leaders who had not received the training, those who had improved their understanding and practice of the five safety leadership skills covered in the FSL. More detail on the evaluation study can be found in Schwatka N, Goldenhar LM, Johnson SK et al., 2019.

FSL Target Audiences

The Roadmap guides researchers through a number of r2p-related activities. The first one asks researchers to create a list of target audience(s) who could benefit from the project's actual intervention or final research findings. We concluded that for the FSL project there were three types of users or target audiences — intermediary, end, and ultimate-end users — and each had different needs vis-à-vis the final FSL materials (see Figure 2) (Okun AH, Watkins JP, Schulte PA, 2017).

Figure 2: FSL Target Audiences



The ultimate audience or end-users of the FSL are construction foreman and lead workers, who during the training learn leadership skills they can employ on the jobsite. There are also intermediary users, including master trainers and decision-makers such as company owners and union leaders, who need information about the FSL to share with end-users, such as trainers and educators, who would conduct the FSL training.

Dissemination Strategies to Reach Target Audiences

Path A - While all the audiences shown in the diagram above important, the most critical one for attaining one of the project's stated goals — to encourage OSHA to include it as an elective in their 30-hour course — was OSHA-DTE. We therefore began by seeking out and receiving a letter of support for the project idea from OSHA and OSHA-DTE prior to proposing it to NIOSH. To help maintain DTE's support and ensure the final program met its training guidelines, we included one of its staff members on the CDT. Once the primary FSL training materials were finished in spring/summer 2016, we sent them to DTE, along with a letter detailing the process used to produce the FSL, a reminder of their stated support of the project, and a request that they consider incorporating it into the OSHA 30-hour course. It reviewed the materials and on January 1, 2017, DTE approved the FSL as a 2.5-hour elective in their construction 30-hour course.

DTE posted information about the new FSL and provided a link to download all materials from CPWR's webpage on its password-protected instructors-only website. A research team member presented the FSL at DTE's semi-annual meeting, which was attended by their 27 Education Center Directors from around the country, and CPWR and DTE co-presented an FSL webinar in February 2017 that reached a wide audience of trainers, consultants, safety and health professionals. Finally, a CPWR-authorized outreach trainer conducted the full FSL training at a number of annual trainer-enhancement meetings.

Path B and C - After CPWR's FSL webpage was created, we used a range of dissemination strategies to encourage target audience members to visit it and download the materials. In terms of more indirect methods, CPWR posted information about FSL on its website landing page (www.cpwr.com) to inform visitors about the new FSL. The r2p group also conducted social media outreach activities, using Facebook, LinkedIn, and Twitter to send out targeted FSL-related messages and information. The FSL research team members conducted two additional webinars (in addition to the one with DTE) to announce new FSL-related products as they were created (e.g., Spanish translations).

The more direct approaches we employed included presenting information about the FSL or conducting the actual training on more than 50 occasions at professional safety and health conferences or at construction and insurance companies (e.g., American Association of Safety Professionals, Association of Building Contractors, Association of General Contractors, Messer Construction, The Southern Company, Willis Towers Watson Insurance). We also published FSL-related articles in numerous trade and professional association magazines (e.g., EHS Today, The Professional Contractor, and publications from The Association of Union Contractors, National Association of Home Builders, National Roofing Contractors Association, and the Sheet Metal Workers Union International Association). Here is a high-level timeline of key dissemination activities:

Dissemination Activities	
Spring/Summer 2016	Shared final FSL materials with DTE and request they include it in the construction OSHA 30-hour course
Fall 2017	DTE approved FSL as an elective in the construction OSHA 30-hour course
January 1, 2017	DTE announced FSL as an elective, posts link to the CPWR-FSL webpage to access and download
January 1, 2017 - April 2019	Conducted active outreach to inform target audiences about the FSL
Dissemination Evaluation	
January 2017 -December 2018	Collected data on number of FSL trainings conducted a number of students trained at DTE Education Centers
November 2018	Sent on-line survey to authorized OSHA 30-hour trainers
January 2019 - February 2019	Sent follow-up emails to folks with whom we had contact any time between autumn 2016 to December 2019 regarding the FSL
March-April 2019	Tabulated data on number of FSL trainings conducted since December 2016

Dissemination Effectiveness - Strategies and Results

Using a variety of strategies, we followed-up with as many intermediary and end-users as possible from Paths A, B, and C. We would have liked to have categorized them into one of the three paths; however, we did not have each user's affiliation and so we grouped them based on the follow-up strategy employed:

Group 1 - Tailored emails sent to people who:

a. Attended the 2016, 2017, or 2018 CPWR webinars.
b. Downloaded the FSL materials from CPWR webpage, completed a brief survey and provided contact information.
c. Attended an FSL presentation at a construction-related conference.
d. Emailed CPWR directly to learn more about the FSL.
e. Contacts at companies that had participated in the FSL evaluation study.

Group 2 - Trainer on-line survey

a. Authorized outreach trainers/instructors listed on OSHA's website.

Group 3 - Quarterly training reports from OSHA DTE Education (Ed) Centers

a. OSHA Education Centers reporting the number of 30-hour or 500-level trainings conducted since the FSL became an elective January 1, 2017.

Group 4 - Research team trainings

a. Participated in a company or union FSL training session conducted by a research team member, CPWR trainer or an FSL champion

Group 1a-e

We created a database containing the names, affiliation and emails of the individuals in subgroups 1a-e with whom we came into contact over the course of the project. Emails were sent explaining to list members why they were receiving the email (e.g., participated in a webinar, downloaded materials and completed a survey, etc.), a request to review three questions and answer the one that best fit their situation, and a deadline by when to respond. A reminder went out one week after the initial email was sent. See Figure 2 for a sample email, one sent to the 2017 webinar attendees. CPWR's Institutional Review Board reviewed and approved data collection protocol.

Figure 2: Sample email sent to individuals in Group 1

Hello,
A few years ago you attended a CPWR webinar about a new safety leadership training program called The Foundations for Safety Leadership (FSL). I'm checking-in with all webinar attendees to see if they would be willing to review the 3 questions below, decide which one **best** describes their FSL use since attending the webinar, and simply reply to this email with the question/answer that best fits. We're hoping you'll agree to help us and reply by XXXX**.**

1. If you have used or are currently using the FSL training can you tell us…
   a. Approximately how many employees/workers have participated in your FSL training(s) to date?
   b. Can you share some thoughts on your FSL-related experiences?
2. If you have not used the FSL training yet, but plan to do so in the future, can you tell us…
   a. The approximate number of employees/workers you think will participate in the training?
3. If you have not used nor plan to use the FSL training, can you tell us…
   a. Any particular reasons why not?

Table 1 presents results from this dissemination activity. Emails were sent to a total of 659 addresses across all sub-groups, with 564 remaining after the removal of those returned as undeliverable. Of the 564, 107 responded, an overall rate of 19% (ranging between 11% and 43%, depending on the source of the name). Nineteen individuals (19/107=18%) said they had not used the FSL and did not plan to.

Eighty-eight (82%) reported having used the FSL or were planning to in the future. While 107 responses is not a huge amount, the total number of foremen/lead workers they reported having trained — 16,398 — is impressive. A large percentage of this total came from one union trainer, who said that 3,940 foremen/lead workers had been trained by his union trainers.

Table 1: Group 1 reported trainings

Description	#emails (sent - undelivered)	# Responses	Response Rate	# Trained
a. Attended a webinar (2016, 2017, or 2018)	338	36	11%	5,273
b. Visited CPWR-FSL webpage, downloaded materials, completed survey	25	4	16%	600
c. Attended conference where FSL was presented	79	16	20%	5,481
d. Emailed CPWR asking about the FSL	106	46	43%	4,671
e. Companies participating in FSL evaluation study	16	5	31%	273
Total/overall	**564**	**107**	**19%**	**16,398**

Group 2

On November 6, 2018, an email was sent to 3,397 OSHA 30-hour Authorized Outreach Trainers (2,706 OSHA trainers listed on OSHA's website and 691 CPWR-affiliated trainers/instructors). The email asked recipients if they would be willing to complete a short, anonymous survey about their awareness and use of the FSL (see Figure 3).

Figure 3: Sample email sent to trainers

Good morning,

I am writing to invite you to participate in our **survey about the Foundations for Safety Leadership OSHA 30-hour elective**. I obtained your contact information from the OSHA outreach trainers contact information website. You're eligible to be in this study because you are an authorized OSHA trainer. If you decide to participate in this survey, you will be asked a few questions about your awareness and use of the Foundations for Safety Leadership OSHA 30-hour elective. It should take no longer than 5 minutes to complete. If you choose to provide your name and email address at the end of the survey, you will be entered into a drawing to win 1 of 3 $100 Amazon gift cards. The drawing will be held on December 15th, 2018.

This is completely voluntary, and your responses will be kept anonymous. You can choose to complete the survey or not. If you'd like to participate, please click the link below to begin the survey.

Link to survey: https://ucdenver.co1.qualtrics.com/jfe/form/xxxx

Of those emails, 3,359 were successfully delivered (99%), and 604 trainers completed the survey (18% response rate). Of those, 176 said they were aware of the FSL and had taught it at least one time either in a 30-hour course (n=134; 22%) and/or presented it as a stand-alone course (n=42; 7%). The majority

reported having taught it between one and five times, and some said they had taught it 11 or more times (See Tables 2a and 2b, columns A and B).

Once the responses started coming in, we realized we had inadvertently failed to include a question asking respondents to estimate the number students/workers who had participated in the FSL training. However, we were able to use the information they provided to calculate an estimate. First, we took the middle number of the range of times taught shown in column C (e.g., 3 for 1-5) and multiplied it by the number of trainers reporting that range shown in column B (e.g., 3 X 112). Next, to get the average number of students in a typical 30-hour course, we looked at the data from 30-hour trainings CPWR conducted between April 11, 2018 and April 11, 2019. During that time period, CPWR trainers conducted 2,134 OSHA 30-hour classes and the average class size was 16 students, so we entered that number in column E. Finally, to estimate of the number of FSL-trained workers, we multiplied columns D and E (see column F). We estimate that our sample of 134 authorized outreach trainers delivered the FSL to 8,528 workers during an OSHA 30-hour course, and 42 authorized outreach trainers delivered the FSL to 2,720 workers as a stand-alone course.

Table 2a: OSHA 30-hour outreach trainers - FSL taught in OSHA 30-hour training

A	B	C	D	E	F
# of times taught FSL in a 30-hour	**# of trainers**	**Avg # of times taught**	**Estimate # of FSL classes taught (B X C)**	**Avg # students in a class**	**Estimated # of FSL trained individuals (D X E)**
1 to 5	112	3	336	16	5376
6 to 10	15	8	120	16	1920
11+	7	11	77	16	1232
Total	**134**		**533**		**8528**

Table 2b: OSHA 30-hour outreach trainers - FSL taught as stand-alone course

A	B	C	D	E	F
# of times taught FSL in a 30 hour	**# of trainers**	**Avg # of times taught**	**Estimate # of FSL classes taught (B X C)**	**Avg # students in a class**	**Estimated # of FSL trained individuals (D X E)**
1 to 5	35	3	105	16	1680
6 to 10	4	8	32	16	512
11+	3	11	33	16	528
Total	**42**		**170**		**2720**

Group 3

Between January 1, 2017 and December 31, 2018, OSHA DTE sent quarterly emails to the directors of its 27 Ed Centers asking if they would voluntarily provide data on the number of times the FSL was taught as an elective in the 30-hour and the number of students in each of those classes. The directors who chose to participate sent their responses directly to DTE, which then shared the data with us. Sixteen of the 27 Ed Center directors agreed to provide this information to DTE. Even with less-than-complete data, the number of trainings and trainees reported is very impressive (see Table 3). While it is possible that the

11 non-reporting centers did not conduct any FSL trainings, it is more likely that 33,614 is an underestimate of the number of students.

In addition to the 30-hour courses, the National Resource Center (NRC) (a consortium of CPWR's and West Virginia University's Ed Centers) reported the number of times the FSL was presented in the 500-level course, where master trainers provide training to newly authorized outreach trainers or to those needing updated certification. As shown in Table 3, the NRC trainers presented the FSL in 112 500-level courses to 1,674 authorized outreach trainers between January 2017 and December 2018.

Table 3: Group 3 reported trainings

Description	# of Directors reporting	Response rate	# of times taught	# Trained
OSHA Ed Centers located across the US FSL taught as elective in 30-hour	16	59%	2,508	33,614
NRC	2	100%	112	1,674
Total				**35,288**

Group 4

Research team members, CPWR trainers, and FSL champions have conducted over 40 FSL trainings at companies or unions across the country since 2016, reaching just over 700 individuals (See Table 4). Participants included foremen/lead workers, safety and health professionals, trainers, and company owners. The number of students in the classes ranged from 10 to 80, with an average of 45.

Table 4: Group 4 reported trainings

Description	# Trained
Participated in a company/union training	705

Total Estimate from Groups 1-4 - When we add together the numbers of individuals who participated in a FSL training — either through a 30-hour elective, a stand-alone course, or in a 500-level course from late 2016 through mid-year 2019 — the total is **63,369**.

<u>Other Audiences</u>

Construction Management Programs

Although they were not on our initial list of target audiences, we learned that a number of construction management programs (e.g., Keene State, Georgia Tech, School of Building Construction at Roger Williams University, Virginia Tech, and Washington State ERC) incorporated various aspects of the FSL into their curricula. Their stated goal is to give their students tools to use, over and above technical information, when they are working with foremen and lead workers on the jobsite. The FSL apparently came to the attention of these institutions when someone sent the message shown in Figure 4 to colleagues via the Associated Schools of Construction and the Construction Research Congress of the American Society of Civil Engineers list-serves, suggesting they might want to use the FSL in their course(s).

Figure 4: Email sent to construction management list-serves

Dear Colleagues,
I'm writing to let you know about the Foundations for Safety Leadership (FSL) educational materials I'm using in my senior-level Construction Safety and Health class. The FSL is a 2.5 hour module that covers 5 critical safety leadership skills essential for those in construction management roles. These skills should improve jobsite safety climate and reduce adverse safety-related outcome. It's very well-designed and my students and I especially appreciated the real-world scenarios showing different leadership decisions and behaviors. Should be a great addition to your courses – the materials are freely available.

Attached is a flier describing the FSL from CPWR - The Center for Construction Research and Training (www.cpwr.com) and here is the link to their FSL webpage to download all the materials http://www.cpwr.com/foundations-safety-leadership-fsl

We were not able to assess how many followed up on the suggestion; however, one safety manager who works for a large general contracting company told us this after he presented the FSL to construction management students at Keene State College:

> *"While providing examples of prevention through design, I explained that it takes courage to speak up to management when a risky situation is observed even though 'this is the way it has been conducted for years.' By using the five FSL leadership skills, in particular [to] engage and empower team members and developing team members through teaching, coaching, and feedback, young professionals will be able to see benefits of effective safety leadership… I truly believe that Keene State College is not only creating success by providing technical knowledge to students, but also that future safety professionals will see the benefits of the [FSL] program in terms of improving their communication, listening, and leadership skills which they can use to enhance the safety culture of our industry."*

Researchers

We also disseminated information about developing and evaluating the FSL to other academics by publishing articles in the peer-reviewed literature (Goldenhar LM, Schwatka N, Johnson SK, 2019; Schwatka N, Goldenhar LM, Johnson SK, et al., 2019). The goal was to inspire other researchers and practitioners to build on this work by developing additional leadership training products and continuing to investigate the relationship between leadership skills and the jobsite safety climate.

Other Industries

There is an old adage: "imitation is the greatest form of flattery." To date, the FSL has been adapted for the oil and gas industry, energy, and forestry, with plans to do so for the residential construction sector. We also know that there has been interest by people in the agricultural maritime industries, as well as in general industry.

Teaching Material Downloads

We also looked at how often the training materials and additional resources were downloaded from the FSL webpage. As Table 5 shows, the primary FSL teaching materials were downloaded thousands of

times between late 2016 and early 2019. The download numbers for the train-the-trainer and additional resources are as also substantial, particularly since they were developed after the initial roll out and posted over time. For example, the train-the-trainer video was not available until January 2019.

Table 5: FSL downloads

Primary Teaching Materials	
PowerPoint	13,309
Instructor Guide	5,412
Student Guide	4,327
Train the Trainer Resources	
Power point	1,910
Instruction Guide	571
Video of an actual training session	443 views on YouTube
Additional FSL Resources	
Wallet Card	2,211
Hard Hat Sticker	1,872
Outcome Discussion Tables	2,669
Handbook	903
FAQ	1,117
Toolbox Talks	3,975
Create Your Own Scenario	539

Social Media

In addition to OSHA's dissemination channels, direct outreach to trainers, emails, trade publication articles, presentations, and word of mouth, social media was used to raise awareness of the FSL program among potential users. Periodic postings via CPWR's properties between December 2016 and May 2019 generated nearly 65,000 impressions on Twitter and more than 17,000 on Facebook. The data from LinkedIn showing just under 9,000 impressions is actually only from November 2017 to May 2019 because LinkedIn does not archive post information longer than a year, which we did not realize until a year after our initial posts, so our reach on that platform was actually greater (see Table 6).

Table 6: Social media outreach between late 2016 & early 2019

Twitter	64.776
Facebook	17,334
LinkedIn	8,889

Qualitative findings

Finally, in addition to the number of trainings, we also asked respondents for feedback about their experiences with the FSL. We combined all comments into a 30-page document from which we extracted the most illustrative comments from each target group. The result was a 7-page report called "What folks

are saying about the FSL" that we posted on the FSL webpage (https://www.cpwr.com/foundations-safety-leadership-fsl). Given space restrictions, here are a just a few quotes, taking one from each target audience.

> *"It is a great training program. We continue to work to find ways to embed the skills. Our two main ways are: 1. We send out a weekly text to all foreman with a helpful reminder that changes weekly 2. We send out a Tool Box Talk specific to our company that we've written every 2 weeks to engage our team."* ***Executive VP & COO, medium-sized electrical sub-contractor.***
>
> *"The subject of the [FSL] training has come up with many superintendents throughout this season. I have noticed a difference in the way some of them approach problems with their employees such as taking a more diplomatic, professional approach to handling situations rather than yelling. Some attitudes have changed in regards to their responsibilities in the company's safety effort."* ***Safety Director, small paving subcontractor***
>
> *"The leadership training has broadened my way of thinking, and my way of reacting to issues/problems. We have really gotten these guys into shape. I would say a lot of it has come from this program opening your eyes and how to deal with people… they're all buying into it. It took some of them a little bit of bucking but they're buying into it very well."* ***Foreman, small sub-contractor***
>
> *"We've started doing a lot of things differently. A lot of it has to do with the leadership training that we went through. I've started pushing the supervisors to go for a quick five-minute walk[s] through the work area before their hands get there to see if things may have changed and add that to the JSA. I started carrying gloves with me which I didn't do before the training. I have a better understanding of how to relate to the guys instead of saying "you need to do this and that, you need to have this and that on", because I wasn't doing it myself. I was always a firm believer that earplugs hurt my hears and would always wear a bandana and kept it below my ears so no one could tell if I was wearing earplugs or not. I stopped that and now I carry my earplugs and wear them."* ***Superintendent, large general contractor***
>
> *"I've been a safety and health trainer for over 33 years and I really enjoy teaching the FSL. I think the developers put together a well-designed curriculum including a complete power point presentation and an excellent and easy to follow instructor guide. Students I've had in FSL classes have reported enjoying and benefitting from the class and they say they are looking forward to using the skills when they get back to their jobsites."* ***OSHA master trainer***

Conclusion

This article describes how a research team used the CPWR r2p Roadmap team to plan a variety of outreach activities to disseminate a new construction-specific safety leadership training intervention — the Foundations for Safety Leadership (FSL) — to key target audiences. The results indicate that the outreach activities conducted over a two-year period were very successful, with close to 70,000 construction foremen, lead workers and others participating in the FSL training. Even this number is likely an underestimate, since it was not possible to reach all audience members who might have used the module. Success is also reflected by the thousands of FSL training materials downloaded from the

website, the number of impressions and shares on social media, and the number of additional audiences and industry sectors that have used or adapted the FSL for their own purposes.

There are a number of reasons for this success. The FSL was developed using input and feedback from target audiences, subject matter experts, and instructional design professionals (Goldenhar, Schwatka, Johnson, et al, 2019). Also, by utilizing the CPWR r2p roadmap early on in the project and revisiting it as the project progressed, the team was able to identify both intermediary and end-user audiences that were critical for reaching our ultimate end-users: frontline construction leaders. While there are no benchmark data against which to compare the findings reported here, we are confident that our two-year FSL dissemination efforts were successful.

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