



# **Safety and Health Training in Construction in Kentucky**

**Julie Tackett  
Paul M. Goodrum, PE, PhD  
William F. Maloney, PhD  
University of Kentucky  
Lexington, Kentucky  
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The Center to Protect Workers' Rights  
Suite 1000 8484 Georgia Ave. Silver Spring, MD 20910  
301-578-8500 Fax: 301-578-8572 [www.cpwr.com](http://www.cpwr.com) [www.elcosh.org](http://www.elcosh.org)

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Compared to many other industries, construction workers have experienced a high rate of deaths and injuries. U.S. Bureau of Labor Statistics (BLS) data show that, in 2003, construction workers were 7% of the U.S. workforce, but suffered 21% of the nation's 5,575 reported work-related deaths. That same year, nonfatal rates of injury and illness involving days away from construction work were 259.4 per 10,000 full-time equivalents (FTEs),<sup>1</sup> higher than for agriculture, mining, and manufacturing (BLS 2003). Although there is general agreement that worker safety and health training can help prevent injuries and deaths, data are lacking on the nature, extent, and effectiveness of such training. Also, there is a lack of consensus about how to define and measure training effectiveness. The purpose of this pilot study was to provide insight into these issues. For this study the authors conducted the following activities:

1. Reviewed construction safety and health training materials, courses, and programs and developed a database of the sources believed to be most relevant and useful to construction workers.
2. Conducted focus group sessions with highway and general construction workers in Kentucky to learn more about their safety and health training.
3. Created a questionnaire to be completed by a national sample of construction workers and their immediate supervisors, to be conducted as a follow-up to this pilot study. The questionnaire is designed to measure the types and effectiveness of safety and health training received by construction workers.

## **Background**

There are many safety and health training programs available to construction industry workers, but there has been little investigation into the effectiveness of such programs. Still, the limited evidence suggests that there are benefits from implementing such training. One study, conducted to assess the effect of first aid training,

workers' compensation insurance rates, and is based on both the frequency and severity of accidents experienced over a three-year period.

Hinze and Wilson (2000) found that the respondents, who were in management positions, felt training was key to improvements in safety performance. They also found that some of the firms had adopted formal training programs, such as Wheels of Learning, OSHA 10-hour, and the DuPont STOP program. Hinze and Wilson noted significant improvements in many firms' safety training efforts since the 1993 study, including the following: implementation of construction site safety training on all projects, hiring a full-time corporate training director, formalized supervisor training, increased evaluation of workers' skills and knowledge upon hiring, and computerized tracking of worker training.

The American Association of State Highway and Transportation Officials (AASHTO) conducted two pilot studies that addressed the effectiveness of interactive compact-disc (CD) based learning. In tests administered after taking the CD-based course, trainees showed an average 25% improvement over pre-test results. The authors concluded that CD-ROM technology is an effective training tool and will play a greater role in future training of transportation workers (Paniati and Wilson 1995).

Formal education and training programs, which include apprenticeships, certification programs, continuing education courses, and "train-the-trainer" programs, have been measured and reported in the Current Population Survey (CPWR 2002). Informal training, which consists mainly of mentoring by co-workers and supervisors, is more difficult to measure and evaluate, but it is recognized as a useful training method. For instance, research has shown that a substantial amount of work planning occurs within occupational communities in the construction trades (Stinchcombe 1959). Also, organizational research in other non-construction industries has long recognized the importance of "communities of practice" within an organization. Such occupational communities produce and sustain work practices, standards for acceptable and unacceptable behavior, benchmarks for work quality, and information-sharing among workers (Stinchcombe 1959).

## **Research Methods**

### **Development of database of construction safety and health training programs**

The authors conducted a literature search to identify safety and health training programs, materials, and courses available to the construction industry. In addition to reviewing training references from professional and trade journals, the authors reviewed online websites and external databases, including Compendex/Engineering Village, American Society of Civil Engineers (ASCE), ScienceDirect, Electronic Library of Construction Safety and Health (eLCOSH), American Society of Safety Engineers (ASSE), SciFinder, Nation Center WorkZone Safety, and MedLine. Many other websites, such as the sites for the National Institute for Occupational Safety and Health (NIOSH), the U.S.

Occupational Safety and Health Administration (OSHA), and The Center to Protect Workers' Rights (CPWR) were also searched.

The following key words were used to search the databases: accident prevention, construction, construction worker health, safety and health training, highway, human factors, operations, and safety education. The search results were used to create a database (in Microsoft Access) of safety and health training programs believed to be most relevant and useful to construction workers. The database is described further in the Results section (*see* page 5).

### Focus groups

The research team organized and conducted eight focus group sessions with construction workers in central and northern Kentucky, from August 2004 through January 2005. The workers were employed on both highway and general construction projects. Four sessions had union participants and four had non-union participants; there were 66 participants in all, of whom 38 were highway construction workers (*see* tables 1 and 2).

#### 1. Focus group locations and union status of participants

Group	Location	Union	Non-union
A	Mt. Sterling, KY		*
B	Louisville, KY	*	
C	Louisville, KY	*	
D	Lexington, KY	*	
E	Frankfort, KY	*	
F	Dry Ridge, KY		*
G	Lexington, KY		*
H	Frankfort, KY		*

#### 2. Focus group labels and number of participants

Group	Number of participants
A	13
B	18
C	9
D	5
E	5
F	5
G	6
H	5
Total	66

The researchers recruited participating contractors through contacts at the local Associated General Contractors chapter, the local Associated Builders and Contractors chapter, and the Kentucky Association of Highway Contractors. Contacts with contractors were made by telephone and e-mail, with follow-up letters. The team met also with officers of local trade unions to recruit focus group participants from their memberships. Since this was a pilot study, the authors did not collect detailed





## **Questionnaire**

The first phase of the research project involved the two projects described above. Using the information from the focus group sessions, the research team created a questionnaire designed to be completed by a national sample of construction trade workers and their immediate supervisors. The objective of the questionnaire is to further identify types of training received by construction workers as well as gaps in training that need to be addressed. A copy of the questionnaire may be obtained by contacting the main author at [pgoodrum@engr.uky.edu](mailto:pgoodrum@engr.uky.edu).

## **Results**

### **Database of training programs**

The final database contains 123 entries and identifies 78 organizations that provide safety and health training for the construction industry. The database

focus group participants identified important issues pertaining to safety and health training, in response to both planned questions and open discussion. The main topics to emerge during the sessions were as follows: types of formal training, formal vs. informal training, training effectiveness, job hazards, barriers to training, and safety policies, procedures, and culture.

The focus groups reported receiving a variety of formal safety and health training (table 3). All of the focus group participants reported receiving some type of safety orientation for new employees. All participants said they were offered CPR/first aid training, and half the groups (4 of 8) were provided training on fall protection and the use of harnesses. Participants from only two groups mentioned that they had job- and hazard-specific informal training programs.

### 3. Formal safety and health training reported by worker focus groups

**Figure 3. Formal Safety Training Reported by Worker Focus Groups**

workers most during the first six months on the job. Informal training topics mentioned by the participants include traffic signaling, temporary barricades, and the use of safety nets. By contrast, formal training programs (such as “canned” videotape programs) fail to address the “real-life” hazards, according to the focus groups. For instance, an iron worker noted that formal training rarely covers the very common fall hazard associated with walking across wet reinforcement steel; the worker learned about this hazard from his co-workers.

*Training effectiveness.* The focus group participants rated training effectiveness based on its relevance to their work. Generic toolbox safety talks, for instance, were rated as not very effective, whereas toolbox talks with job-specific content, such as those focusing on the use of harnesses and tie-offs for fall protection, were considered more beneficial. Informal training on equipment operation often was rated as very beneficial. The participants emphasized that practical, hands-on knowledge and a focus on job-specific skill sets were critical to the effectiveness of the training. The consensus was that training is more effective when delivered by someone who knows the subject, has experience in the job, and is familiar with the job-specific risks. Several participants in at least two focus groups mentioned that the training videos they viewed did not realistically depict their jobs or the hazards they face. In this regard, ladder safety training was singled out as ineffective.

Participants in three focus groups mentioned that they had received effective training for handling chem Tw2-eGp(Iovng ceasdparit, snd a]TJ18.687580 TD0.0011 Tc0.1643 Tw[(asing o)7.75a)-0.5

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The job hazards mentioned by the 38 highway construction worker participants include moving vehicles, traffic, pedestrians, moving equipment, and materials handling. Working with poorly trained subcontractors was also mentioned as a hazard. In one focus group, many of those interviewed said that the majority of the work zone accidents did not result from a lack of training but from workers' inattention to their surroundings.

*Barriers to training.* Focus group participants said that attending training programs was difficult because of travel time, scheduling problems, and costs of the programs. Many focus group participants who have to pay for their own training indicated that they did not believe the benefits of training outweighed the cost. Two focus groups said they were reluctant to register for classes that require them to travel to a location that is not near the jobsite. The problem is compounded by the fact that their jobsites often change, making it difficult to schedule training in advance.

*Safety policies, procedures, and culture.* All focus groups said that their employers require them to wear personal protective equipment (PPE) and clothing, mainly hard hats, steel-toe safety shoes, safety glasses, and reflective vests. One group of highway construction workers reported they are required to use safety manuals and have regularly scheduled safety committee meetings to promote safe job performance.

One non-union contractor reportedly provided in-house safety orientation videos in English and Spanish. This company conducts both daily safety inspections and job-specific inspections of activities such as excavation, trenching, shoring, scaffolds, equipment operation (including the use of safety belts), and barricades. The company also provides toolbox talks that are job-specific and uses MSDS sheets for training on hazardous chemical use.

One focus group described what seems to be a successful balance of formal and informal training, driven by the company's commitment to safety. The company uses a process of identifying newer workers by colored stickers on their hardhats during the first 18 months of their employment, so their co-workers can a

already licensed and certified. Journeymen in particular “think the training is a joke,” said one participant.

Nonetheless, there is pressure to ensure that workers receive proper safety training and certification. For road work, contractors are requiring certification for workers to be qualified to bid for the job. The directors mentioned the 7-hour International Municipal Signal Association (IMSA) training program in Kentucky provided by the state, which covers basic work zone traffic control, such as work area flagging.

*Mentoring and on-the-job training.* The training directors said that apprentices needed more on-the-job training and mentoring by journeymen. Younger workers have reported that they learned much from their senior colleagues, but, according to one training director, journeymen do not realize they have an obligation to instruct the inexperienced workers on the safety aspects of the job. Furthermore, sometimes the journeymen expect too much of the inexperienced workers, assuming the apprentices are trained in certain functions when in fact they are not.

*Relevance of training.* The training directors reported that some training programs are using innovative learning technologies, such as computer-based learning and simulations to improve learner retention and provide “real-world” experience. The Operating engineers’ union director noted specific success with their heavy equipment simulator in this regard.

## **Conclusions and Recommendations**

In the course of developing the database of training programs, the authors found an abundance of safety and health training programs and formats available to construction industry employers and contractors. However, the focus group participants were sometimes critical of formal programs, claiming that such programs fail to address the “real-life” hazards faced by construction workers. The challenge for employers may be to find customized training relevant to their individual worksites and site-specific hazards.

Training program scheduling and costs are a concern for union and non-union workers alike. This issue may warrant attention from supervisors and employers, who could make jobsite training more accessible and affordable in order to motivate more workers to participate.

*Project limitation.* Although the authors sought to learn more about the specific training needs of Hispanic construction workers, they were unable to recruit Hispanic workers for the focus group sessions, mainly because most Hispanic workers are employed in the residential building sector rather than in highway construction in Kentucky and thus were not part of the target group. Since this was a pilot study and not intended as a representative sampling of the population, the authors did not collect detailed demographic data on age or ethnicity from the participants.

The authors’ recommendations for future research and training efforts are as follows:

- Employers and training directors should consider implementing formalized mentoring programs designed to take advantage of the knowledge and skills gained through the work experience of the journeymen.
- Training providers should expand the availability of “train-the-trainer” programs.
- Future research should study the effectiveness of training programs, both formal and informal, in preventing injuries to construction workers and improving safety at the worksite.

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