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OCCUPATIONAL SAFETY AND HEALTH EDUCATION AND TRAINING FOR UNDERSERVED POPULATIONS

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Abstract

This article presents an analysis of the essential elements of effective occupational safety and health education and training programs targeting under-served communities. While not an exhaustive review of the literature on occupational safety and health training, the paper provides a guide for practitioners and researchers to the key factors they should consider in the design and implementation of training programs for underserved communities. It also addresses issues of evaluation of such programs, with specific emphasis on considerations for programs involving low-literacy and limited-English-speaking workers.

Keywords

occupational safety; health education; training programs; underserved communities

This article will present an analysis of the essential elements of effective occupational safety and health education and training programs targeting under-served communities. We do not propose to present an exhaustive review of the literature on occupational safety and health training. Rather, we intend to provide a guide for practitioners and researchers to the key factors they should consider in the design and implementation of training programs for underserved communities. We also address issues of evaluation of such programs, with specific emphasis on considerations for programs involving low-literacy and limited-English-speaking workers. Readers interested in more detail about issues of training design and evaluation are encouraged to explore the references provided.

While training is a critical tool in reducing occupational health disparities, we must recognize that its effectiveness may be limited if offered in isolation from other interventions. Training workers to use appropriate personal protective equipment, for example, is of limited value if they lack sufficient power in their relationship to their employer to demand such equipment. The reader is encouraged to refer to a set of papers that resulted from a national conference on occupational health disparities (available at http://www.aoecdata.org/conferences/healthdisparities/whitepapers.html) that address these broader socioeconomic and structural factors that affect workers' safety and health conditions and their ability to affect changes in these conditions.

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DEFINITIONS AND CONCEPTS

In the National Institute for Occupational Safety and Health's (NIOSH's) comprehensive 2010 publication *A Systematic Review of the Effectiveness of Training and Education for the Protection of Workers* [1], the authors define training as "planned efforts to facilitate the learning of specific OHS [occupational safety and health] competencies." In this article, we define training more broadly. Beyond simple attempts to transmit knowledge, our definition encompasses a range of efforts designed to engage trainees with the goal of affecting motivation, attitudes, and behavior for the purpose of improving workers' health and safety on the job.

DESIGNING A TRAINING PROGRAM

In designing an occupational safety and health training program, practitioners can choose from a variety of approaches. In this section we will examine the factors that should be considered in developing and designing a training program.

What is the Primary Purpose of the Program?

In designing a given training or educational program, it is important to identify first its primary purpose [2]. This will affect the choice of methods, as well as appropriate evaluation approaches and metrics. The primary focus of the program may be on:

- knowledge transfer/skills development (e.g., a program designed to teach workers about the chemical hazards present in their workplace and the warning signs and labels associated with each);
- attitudinal change (e.g., a program geared towards increasing workers' degree of concern about safety and health hazards in the workplace or enhancing the extent to which they believe that it is possible to reduce their exposure to such hazards by taking certain actions); or
- social action or "empowerment" (e.g., a program designed to encourage workers to talk with each other about job hazards and to take collective action to solve problems).

In practice, most good training programs involve a combination of the above.

What is the Context for the Training Program?

The changing nature of work in the United States and globally in recent years has had an effect on OSH training programs. Until fairly recently, most OSH training in the United States fell into one of two categories: 1) training organized by employers and carried out at the worksite; or 2) training directed towards specific groups of unionized workers, and organized and carried out by union trainers or "COSH" groups (Committees/Coalitions on Occupational Safety and Health). In the past 20 years or so, many community-based organizations have initiated worker safety and health training programs that target groups of non-union workers [3]. These programs sometimes target a specific employment sector, such as home care or domestic workers, but often are directed towards individuals whose common denominator is not an employer or membership in a specific union but

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identification with a given ethnic or language community or with a neighborhood or geographic area. This trend has coincided with a shift in the patterns of employment in the United States, as stable, long-term employment and union membership have steadily declined and a greater proportion of workers has become "contingent"—that is, in temporary, contractual, or part-time employment relationships [4, 5]. At the same time, the proportion of immigrants and individuals with limited English in the workforce has increased. Recent immigrants and English-language learners often identify more strongly with community-based organizations that communicate in the same language and reflect their cultural practices, and that they see as representing their community more than an employer or union representatives can.

Health and safety training programs need to adapt to the very different work contexts of these groups of workers. Unionized workers with stable employment feel more secure in their jobs, have more opportunity for input into decisions affecting their working conditions, have the contractual right to bargain over such conditions, and are more likely to have the benefit of paid time for safety and health training [5]. Temporary and contractual workers have high levels of job insecurity and have little influence on decision-making affecting their working conditions. On the most extreme end of this spectrum are undocumented immigrant workers who are fearful not only of speaking up for their safety and health rights but of the specter of deportation if they come into conflict with their employer.

Training programs directed towards these more vulnerable groups must recognize the many barriers that trainees face in putting into action lessons learned from a training program.

What is the Best Approach for the Program?

OSH education and training programs may use any of a variety of overall approaches to reach their target audiences. In this section, we will examine four general approaches to reaching underserved populations of workers: public health/social marketing campaigns; train-the-trainer programs; lay health advisor programs; and direct worker training. The choice of approach is often based on practical factors such as availability of funding and access to the target populations. But in designing a program, it is useful to consider the full range of possible approaches.

Public Health Campaigns/Social Marketing Programs—In addition to direct training of workers through the workplace and community, some governmental and nongovernmental agencies have sought to reach workers and their families through broader public health messages. Agencies have developed and implemented creative social marketing campaigns addressing issues such as lead-based paint exposures to residential painters [6], farmworker safety [7–9], and heat illness among farmworkers, for example [10]. Other agencies have collaborated with groups in the private sector to introduce OSH themes into existing popular media. In one program, for example, a government agency collaborated with a team of OSH experts and the creative team of a popular Spanish language *telenovela*, or soap opera, to introduce construction safety messages designed to reach Latino construction workers and their families [11].

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In the context of contemporary U.S. society, in which many of the workers who are exposed to the most significant occupational health and safety hazards do not have access to OSH training in their workplaces, these creative efforts to reach workers with OSH messages through the community and a variety of media have become increasingly important.

Train-the-Trainer Programs—Another innovation in OSH training over the past 35 years has been the development of programs designed to train trusted individuals in a community or workplace, who then receive ongoing support to provide training and education to their peers. These programs are based on the understanding that people are most receptive to messages from people who they perceive to be like themselves. Several national unions have developed very successful, long-term programs that have provided training to hundreds of "worker-trainers," who have, in turn, trained thousands of their fellow employees [12–14]. These programs have documented the effectiveness of peer educators as writers of curricula, leaders of train-the-trainer programs, and evaluators [12, 15–17]. Documented training impacts have included participants having confidence and a willingness to make workplace health and safety improvements following the training, use of training materials as resources, and increased communication between workers and managers.

It is important to note that conducting a high-quality train-the-trainer program is not easy. To become successful trainers, trainees must receive intensive follow-up, coaching, and resources.

Lay Health Advisor Programs—In a variation of the train-the trainer model, many community-based programs have built on the lay health advisor model that has proven highly successful in public health practice. Lay health advisor (or lay health promoter) programs have established a strong track record in the public health field, particularly among the Latino immigrant community [18–19]. These programs have been used successfully in OSH programs for construction workers, farmworkers, immigrant day laborers, and poultry processing workers [20–27].

An example of such a program targeting poultry workers provides an interesting case study of the value of community health promoters in occupational safety and health education (see box, next page).

Direct Worker Training—The vast majority of OSH training and education programs involve training workers directly, whether in the workplace, union hall, or community. Such training may range from brief interactions with workers on the street to highly structured, long-term training programs. In the following section, we will review factors that should be considered in the design of direct worker training programs.

Training Methods

Over the past 30 years, the field of OSH training has developed a wide range of creative, engaging training methods. Many of these are guided by the principles of Popular Education, an approach that emphasizes active roles of training participants in analyzing problems and developing practical solutions. This approach has its roots in the pedagogical

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philosophy of Paulo Freire, which developed out of his experience with community literacy programs in Brazil. Freire's approach begins with the needs of the participants and through a problem-posing process uncovers the assumptions and root-cause social conditions within which learning will take place [29–32]. Popular Education often focuses attention on the power dynamics that affect participants' abilities to effect change in their lives and seeks to develop participants' critical thinking skills and confidence as actors in improving their conditions [2]. In place of the traditional instructor-to-student learning model, Popular Education emphasizes the importance of student-to-student and student-to-instructor learning [33].

Justice and Health for Poultry Workers

JUSTA (Justice and Health for Poultry Workers) was a partnership between the Wake Forest School of Medicine and a community-based organization, designed to develop ways to promote health and safety among Latino immigrant workers at several poultry processing plants in North Carolina. The partnership identified cumulative trauma disorders (CTDs) as a major health concern for the workers. These disorders were debilitating, impairing their ability to work and to carry out normal family and social activities outside of work. Many workers did not connect their repetitive work tasks and CTDs, often blaming their disabling pain and weakness on arthritis and contact with water in the workplace. Many also doubted that they, as immigrants, many of whom were undocumented, were eligible for workers' compensation for injuries and illnesses due to their jobs. Considering these conditions and the project's lack of access to the work sites, the partnership identified a lay health promoter approach as a viable educational strategy for reaching workers individually or in small groups in the community.

The partnership developed a medically accurate and culturally tailored lesson to teach workers to identify, treat, and prevent CTDs and to teach them about workers' rights to a safe workplace. The lesson centered on "Maria's Story," a realistic story about a fictitious woman in the community. Low-literacy materials in Spanish and English were developed, including a flip chart, lesson plan, and script for the *promotoras*, and a take-home brochure for the worker. Current and former poultry workers were identified and trained as *promotoras*. Over 28 months, five *promotoras* delivered the lesson to 731 workers. Both ethnographic data [28] and a more formal pre-post evaluation in a small sample of workers [22] demonstrated improvements in knowledge and self-efficacy, and appropriate behavior changes. Based on this success, five other lessons were developed and disseminated into the community using *promotoras*.

Occupational health training by unions and community organizations has adapted these Popular Education methods in an effort to make small group learning participatory within specific employment and enforcement contexts. Examples include the Oil, Chemical and Atomic Workers Union's development of a small group activity method to conduct hazardous materials training; the Service Employees International Union's training of home care workers in preventing transmission of blood-borne pathogens; and participatory training of day laborers in Los Angeles [14, 34–36].

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These Popular Education methods for OSH training have been demonstrated to be not only more engaging, but also more effective. A comprehensive review found that more engaging training methods, such as simulations and hands-on exercises, were more effective, in terms of knowledge acquisition and reduction of negative outcomes, than less engaging methods, such as lectures [37, 38].

We present below a brief overview of some of the more participatory methods that have been used successfully by OSH trainers. A review of the literature on evaluation and effectiveness of these approaches is described in the section on evaluation at the end of this paper.

Small Group Activity Method—Small group discussions and group problem-solving form the core of a concept of training based on the Small Group Activity Method, which is based on the premise that adults learn best in situations that maximize active participation [27]. Proponents argue that "lecture-style teaching methods used in most programs actually hurt the learning process, promote passivity on the part of workers, de-value our knowledge and skills, and make us feel inadequate" [14]. This argument is supported by the aforementioned review of the literature by Burke et al. [37].

Risk Mapping—Risk Mapping is an effective tool for OSH trainers to engage participants in an active process of hazard identification that is centered on what the trainees themselves view as significant hazards [39–43]. Trainees are divided into small groups and asked to create a schematic drawing of their workplace. Armed with various colored markers, participants note the specific hazards they identify in each area, associated with each process, machine, and so forth. Different colors are used for chemical, physical, ergonomic, safety, and stress hazards.

Body Mapping—Like risk mapping, body mapping allows participants to identify work-related health symptoms through a process of graphic representation [40, 44]. Trainees are divided into small groups and given an outline of the human body, on which they place dots indicating where they experience pain in their bodies. The purpose of the activity is to enable participants to see common patterns of health symptoms that may be work-related.

Story-Telling Using Graphic Materials—Telling a story using graphic materials is an effective method for communicating information to low-literacy or limited-English trainees and engaging them in discussions [2, 45]. Materials that rely primarily on illustrations, with only limited text in simple language, have been used effectively to train workers in a variety of settings. Such materials, when done best, are not simplistic, but rich in content, presenting a recognizable human drama that provides an interesting context in which to convey an OSH-related message.

Simulations—Hands-on exercises and simulations are a very effective method of engaging participants actively in a training program and requiring them to apply knowledge gained in real-life situations. This method can be used to practice relatively simple tasks, such as fit-testing a respirator, or for more complex operations, such as putting into practice an emergency response plan for a hazardous chemical release. Burke argues that these

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methods are particularly effective in reinforcing training messages because they require trainees to reflect on lessons learned, "leading to the development of strategies for handling unforeseen events…" [37].

Role Plays—Role plays can be used to present a problem to a group of trainees and to engage them in an active way in a process of reflection and development of possible solutions to the problem (46, 47). In a typical role play, trainers might seek volunteers from among the trainees to read a simple script that presents a situation in which a worker faces a serious safety hazard at work, but fears losing her job if she raises her concerns to her employer. The trainer would then turn to the full group and ask them to voice their opinions on how the worker should respond in this situation.

Computer-based Instruction—Computer-based instruction, which has been widely used in OSH training, can range from entirely passive programs that simply put lectures into a computer presentation format to highly engaging, interactive programs requiring trainees to reflect on messages and to apply new information to solve problems [48, 49]. Effective computer-based instruction should provide feedback to trainees in order to enable them to evaluate their progress and learn from mistakes.

Quizzes and Games—Quizzes, games, and similar activities can be an effective and entertaining way to transmit and reinforce information [50, 51]. Rather than simply reading a list of rights that employees enjoy under the Occupational Safety and Health Act, for example, a trainer might present this in the form of a quiz, asking trainees to identify which statements are true and which false. Each quiz question can be followed by more detailed explanation by the trainer, and the group may be invited to discuss issues or questions that arise. Games can be used as a means to reinforce training messages, in lieu of a verbal or written review of material covered in the training.

Arts-based Approaches—"Photovoice," theater, video, and other arts-based approaches can engage trainees in creative processes to identify problems and reflect on solutions in ways that often feel more "real" to participants than traditional training. One method, called Forum Theater, involves presentation of a simple theater piece presenting a problem relevant to training participants. Trainees are invited to step into the performance as actors at any point, in order to present their ideas and influence the course of the dialogue. This method has been used successfully by OSH trainers to challenge trainees to reflect on how they would respond to a workplace health and safety problem and to address barriers to solutions [52]. "Photovoice" is another creative approach that has been used as a method of participatory hazard identification. In one case, workers were equipped with cameras and asked to photograph hazardous situations on their jobs. The photos were then used as the basis for group discussion and reflection on solutions to these safety and health hazards [53].

Storytelling—Storytelling is yet another creative method of training that can be a powerful learning tool. Many workers in highly hazardous trades learn job- and safety-related skills and information more from their peers than from professional trainers. A study of the use of storytelling as a training technique among mineworkers argues that one of the most compelling methods of getting young miners' attention is to have experienced miners tell

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them stories of workplace disasters that led to deaths and injuries of friends and co-workers [54].

Training Content

While training programs designed to reach underserved workers may include a wide range of safety and health topics, we suggest a few basic principles regarding training content:

- All training programs for underserved workers should include information about workers' rights under the Occupational Safety and Health Act (OSHAct) and pertinent state laws, where to get help in addressing workplace safety and health problems, and resources for more information.
- Training should encourage workers to take collective, rather than individual, action to address safety and health problems in order to reduce the likelihood that vulnerable workers will be exposed to retaliation.
- Training that provides leadership skills for organizing and taking action is likely to be more effective in achieving positive changes in workplace health and safety conditions than training that simply transmits knowledge or teaches skills. Such training is more likely to address the very real and powerful structural barriers to improving workplace safety and health conditions among underserved workers.
- Training programs should recognize that ideal solutions to OSH problems are not feasible for many underserved workers and so should seek to pose problems and provide a forum for collective analysis of these problems. In situations in which aggressive action by workers may result in retaliation by employers, trainers may want to encourage trainees to consider short-term steps towards improving safety and health conditions.

Social and Cultural Factors

In planning training programs for underserved populations of workers, including immigrants with limited English ability, it is important to take into account the social and cultural factors, such as literacy, language, and the cultural appropriateness of materials, that can influence the effectiveness of training among the target population.

Literacy Issues—Many low-wage workers, whether native- or foreign-born, have limited formal education. The largest group of foreign-born workers in the United States, those of Mexican origin, have an average of only about eight years of formal schooling. Foreign-born workers from developing countries may have limited literacy in their native language, as well as in English. Thus, it is essential when providing training to workers in these communities that trainers not rely too heavily on written materials, especially text-dense materials. Written materials should use relatively few words, clear pictures, bulleted key points, and ample white space. Some other strategies suggested by experts in the field of literacy issues in training [51] include these:

- Conduct a needs assessment beforehand to understand the literacy level of trainees.

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- Don't call on people to read or ask them to interpret charts or graphs—read materials out loud yourself or ask for volunteers.
- Use participatory activities such as mapping, games, quizzes, etc., rather than having trainees read materials.
- Field-test all materials with the intended audience to ensure that they are appropriate.
- Respect the wealth of skills and experiences that trainees with limited literacy bring to the issues. It is critical that trainers remember that limited formal schooling results in some specific weaknesses in formal learning environments, but this does not prevent workers with limited literacy from being valuable sources of knowledge and wisdom about how to confront health and safety challenges in the workplace.

Cultural Appropriateness of Materials and Training Activities—A recently completed review of literature addressing the cultural appropriateness of OSH materials noted that a range of factors must be considered when examining cultural appropriateness [55]. These include "how to reach target audiences, developing a document, translation issues, how graphics or images are presented, format, and factors related to readability such as sentence structure, vocabulary, reading level, and the content itself."

The OSH training literature provides specific suggestions for ensuring that materials and training are culturally appropriate, including these:

- Involve members of the intended audience in the design and development of the materials. If this is not possible, the material should at least be focus-group–tested with the target audience.
- Use graphics that are meaningful and relevant to the target audience. If cartoon characters or photos are used, they should depict members of the target audience.
- For written materials, consider using formats that are familiar to the target audience. For example, one study found that Hispanic women preferred to receive health communications in the form of a *fotonovela*, in which a story unfolds through photos with captions in a dramatic fashion [56].
- In designing training activities, consider the cultural context of participants. For example, if you plan on using a quiz game activity, research whether there is a game show that is popular in the target audience's culture (rather than assuming that they will relate to "Jeopardy," for example).
- Understand cultural values and beliefs that may affect behavior. Many cultures do not share Western biomedical ideas about illness causation. Many Latin Americans believe, for example, that showering after working under the hot sun or washing hands after pesticide exposure may cause rheumatism [57].
- When possible, use peer trainers or lay health promoters to reach members of their own cultural groups. A large body of lay health promoter research supports the idea

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that people are most receptive to receiving information from individuals of their own cultural group [18, 21, 23–25, 27, 58].

- Take into consideration differing cultural attitudes towards learning and adapt your training accordingly. In many cultures, for example, the "student" or training participant is expected to sit quietly, passively receiving information from the "expert" teacher. It is considered inappropriate to express opinions or question anything presented by the instructor. Activities may need to be adapted to encourage participation, for example, by breaking into very small groups so that individuals feel comfortable expressing opinions.
- Gender dynamics may impede the participation of female trainees (in any culture!). Effort should be taken to ensure that women have ample opportunity to participate —dividing small groups by gender, for example.
- Respect different cultural styles of communication in training. In some cultures, telling detailed personal stories is very important in establishing trust—more important than "sticking to the agenda." Trainers must seek to find a balance between keeping a training session on track and gaining the respect and trust of trainees by providing adequate time for the sharing of personal stories.
- While it is important to recognize general differences between cultures, we have to be careful not to stereotype or assume that all individuals from a given ethnic or national group share the same beliefs, character traits, or educational backgrounds.

Documentation Status—Trainers must be very sensitive to the particular conditions that undocumented workers face. While OSH trainers may want to encourage workers to stand up for their safety and health rights, many undocumented workers may justifiably view this as an unrealistic, potentially threatening option. Similarly, trainers need to be careful not to guarantee workers that the protections promised by the Occupational Safety and Health Act will shield them from retaliation in the real world.

Challenges of Training Programs for Underserved Communities—Designing and implementing an effective training program for underserved communities—whether they be foreign-born or low-wage native-born workers—inevitably involves a number of special challenges. These include:

- *Language issues for limited/non-English-speaking workers.* In situations in which trainers and trainees do not share a common language, it is necessary to employ interpreters. Interpreters are often informally drawn from among the trainee population or the broader community. These bilingual intermediaries may have the best intentions but often have limited abilities in the face of the complex challenges of interpretation. When financially feasible, it is far better to hire a professional interpreter.
- *Structural barriers, including power relations in the workplace*. If the goal of a particular training program is to raise workers' awareness of job hazards and motivate them to take action to reduce hazards, groups of trainees who have limited power to effect change in the workplace may find the training irrelevant, even

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discouraging. "What good is this information," they may ask, "if we can't do anything about it? " There is no simple answer to this question, but trainers can address this problem by acknowledging the barriers that trainees face in the workplace and structuring training activities in such a way that trainees must consider various options for taking action to protect their safety and health, including simply walking away from a job.

- *Competing priorities*. In most cases, job safety and health will be on the lower end of low-wage workers' priority lists, taking a backseat to putting food on the table and meeting family obligations. It may be difficult to get workers to commit to attending training sessions unless they anticipate some immediate benefit. This problem can be addressed by combining OSH training with the provision of other services valued by the community—conducting training in conjunction with informational sessions on issues that workers may see as higher priorities, such as recapturing unpaid wages; or integrating OSH training into English as a Second Language classes.
- *Time constraints*. Similarly, low-wage and mobile workers often work long hours, multiple jobs, and changing shifts, making it difficult to engage them in ongoing training programs. Such workers often do not know in advance when they will be working, and so cannot commit to attending training. Trainers must recognize that these challenges are unavoidable and remain flexible, understanding that it may be impossible to stick to an ideal training plan.

The obstacles described above challenge us, as trainers of underserved workers, to think about how we can do a better job of "selling" job safety and health training in such a way that it becomes more appealing. The key may be to ensure that the training feels relevant to members of these communities by framing it more broadly in the context of issues of dignity and respect in the workplace. Promoting safer and healthier working conditions as an issue of justice in the workplace is an approach that has the potential to broaden the appeal of OSH training programs among underserved communities.

EVALUATION OF TRAINING AND EDUCATION PROGRAMS

Federal agencies and private foundations that fund OSH training are increasingly emphasizing the importance of solid evaluation data demonstrating that such training meets its goals. In the absence of such evidence, funding for OSH training is likely to be reduced. While evaluation of training has always been important in refining individual training programs, the increased emphasis on evaluation data makes high-quality evaluation critical to our ability to continue to provide OSH training to vulnerable workers.

This section on evaluation discusses general types of methods for evaluation and issues to consider when adapting them for different audiences. Those readers interested in a deeper understanding of training evaluation are encouraged to explore the references provided, including the Occupational Safety and Health Administration's (OSHA's) 2010 report on best practices publications [59] and the National Institute of Environmental Health Sciences' (NIEHS's) 1997 resource guide [60].

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There are many methods for evaluating training, but in essence, evaluation involves an attempt to document conditions (knowledge, attitudes, beliefs, working conditions, and behaviors) before the training was implemented and any changes that occurred as a result of the training. While the general evaluation model is fairly straightforward, training takes place in the real world and over time, which can sometimes complicate this seemingly simple model. Factors external to the training (e.g., changes in company policy, high-profile accidents at the work-site) can impact the knowledge, attitudes, beliefs, practices, and working conditions of workers and managers. If one of these events happens during the training period, any impact the event has on the workers or managers would probably register in the evaluation of the training but could be incorrectly attributed to the training. It is therefore essential to the evaluation process that real-world factors be identified and accounted for before, during, and after the training and evaluation. This can be accomplished with simple techniques such as monitoring company safety logs or asking study participants if any potentially significant events (e.g., accidents at work, OSHA fines, etc.) have occurred.

While the basic method of comparing conditions before and after training is a fairly standard evaluation model, there are a number of methods that can be used to document and measure the impact of a training program. The two general categories of methods for evaluating training are quantitative and qualitative. Quantitative methods can generally be understood as considering anything that can be counted. Common examples of quantitative data collection include multiple-choice tests or opinion surveys, counts of specific actions (e.g., number of safety complaints filed by workers in a given period of time), traffic to a website or toll-free number, and so forth. These data are analyzed using statistical methods. Qualitative methods can generally be understood as relying on descriptive in-depth information. Qualitative methods allow participants to explain their situation in their own words, which is particularly useful in identifying underlying perspectives, assumptions, and reactions that can be helpful in bridging the cultural gap between trainers and participants of diverse backgrounds [28]. Common examples of qualitative data include open-ended individual interviews, focus groups, and debriefing sessions. These two categories of methods are complementary, and evaluation often uses both to get a comprehensive understanding of the impact of a training (see NIEHS's 1997 resource guide [60] for a more detailed treatment of qualitative and quantitative methods).

Selecting Appropriate Evaluation Methods

Some key factors that influence the choice of evaluation methods include the primary purpose of a given training program, the target audience, and the training context.

The primary purpose or objective of the program should have been identified during the development process and will affect the choice of evaluation methods and metrics. Some key objectives include knowledge transfer, attitudinal change, and empowerment.

Knowledge Transfer—The standard evaluation approach for this type of training is a pre-test/post-test model that frequently employs a written test administered before and after the training. Some considerations to take into account when applying this model to underserved

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populations include literacy levels, correct translation, and ensuring that the evaluation questions mean the same thing to the participants as they do to the trainers. Alternative methods, such as interviewer-administered questions, may work better with low-literacy populations. Some examples of alternative methods include:

- working in teams to answer a set of questions;
- playing games to review course content;
- using visuals as "testing" tools;
- multiple choice questions with pictures; and
- oral checklists/hands-on demonstrations.

Attitudinal Change—Attitudinal or motivational change focuses on messages and content aimed at increasing workers' degree of concern about safety and health hazards in the workplace or enhancing the extent to which they believe that it is possible to reduce their exposure to such hazards by taking certain actions. Collecting data about participants' attitudes towards safety at work via surveys (quantitative) or group discussion (qualitative) before and after the training is a common method for evaluating these elements of training. Another common evaluation metric is measures of concrete actions in which the training is intended to motivate people to engage (e.g., using available safety equipment).

Social Action or "Empowerment"—The goal of this type of training is to provide workers with the opportunity to identify barriers to working safely and develop strategies for overcoming these barriers. Both quantitative measures (counting actions such as filing an OSHA complaint) and qualitative measures (e.g., describing changes in relationships with supervisors) can be used. Qualitative methods are often more helpful in evaluating this type of training since the range of possible impacts and outcomes is often much broader than can be reflected in a multiple-choice survey. This is particularly important with underserved populations, as different groups often face different barriers (e.g., immigration status) or develop different strategies for addressing common barriers. Allowing for more open-ended discussion on how the training affected the individual allows the trainers to better understand these differences. There is literature on program evaluation of peer-led empowerment occupational health programs [61–63].

Overcoming Challenges to Evaluating Health and Safety Training and Education

Evaluating any health and safety training presents challenges, and most of these are amplified when dealing with underserved populations.

Perceived Lack of Internal Capacity—Organizations that provide training often feel that they lack both the internal expertise to measure training effectiveness adequately and sufficient funds to hire an outside expert. But effective evaluation need not be overly costly or complex. There are many different evaluation strategies that can be used, some more formal and academic than others. Several resources provide an extensive yet accessible guide to evaluations [51, 60, 64]. When evaluations are conducted internally it is especially important to guard against biasing the process or interpretation of the results. In other words,

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it is important to recognize that those conducting the evaluation are intimately familiar with the training, have their own opinions of it, and have a vested interest in the outcome of the evaluation. In addition, participants often form a relationship with the trainer and may not be as critical of the training for fear of hurting the trainer's feelings or making him or her look bad. While there is not a foolproof way of completely eliminating bias, simple procedures, such as having someone other than the trainer conduct the evaluation and analyze the results, can help reduce the potential impact of bias on the evaluation process.

Inadequate Funding—Funding agencies are requiring more rigorous training evaluation; however, limited resources often leave organizations having to choose between competing priorities such as expanding the reach of the training or conducting a robust evaluation. Ideally, evaluations would be able to track the impact of a program over time. For example, it would be advantageous to observe the types of actions (e.g., refusal to do dangerous tasks, talking to a supervisor, calling OSHA) that a group of workers took when faced with dangerous situations at work before and after participating in training. Likewise, it would be valuable to have workers provide feedback on how a training has impacted the way they work over a period of time (three, six, nine, or 12 months).

Often this ideal situation is not possible due to a lack of resources or access. But this does not mean that adequate evaluation is impossible. For example, while an evaluator might not be allowed to enter a workplace and observe workers confronting a supervisor about a hazard, she may be able meet with them outside work and have them report the number of times they have taken such actions since receiving the training. While this may not be the gold standard for evaluation research, it is certainly better than nothing. The important thing is to not let the perfect become the enemy of the "good enough." This is especially true with underserved populations, many of whom work in jobs on the weak end of the continuum of job security and control over decision-making that was described above.

Difficulty Accessing Workers—Follow-up interviews, questionnaires, and focus groups can be useful in assessing, several months after a training, if and how workers are using the information that was provided. Assuming funding is available for this task, it is much easier to accomplish with a stable group who, for example, work in the same place day after day, or have access to the Internet for online surveys. This process is much more challenging when working with a transient population, which is often the reality when working with underserved populations. It is sometimes only possible to bring together for post-training evaluation a small sample of the workers who have been trained. One strategy for addressing this is to conduct focus groups. It is best to meet in a location that is easily accessible for the participants; if this is not possible, a stipend may be offered to encourage participation.

CONCLUSION

The growing diversity of the workforce and the changing context of employment in the United States present significant challenges for developing and implementing occupational safety and health training. New approaches to content development, format, and implementation need to be developed, as traditional training methods are often not effective with workers from underserved communities or do not account for changes in employment

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patterns and the way work is organized today (e.g., the increasing reliance on temporary workers). This article provides a broad introduction to the multiple issues and challenges that safety and health professionals face when designing training for underserved workers who often have precarious jobs in dangerous industries. It documents innovative approaches and best practices that have developed over the past couple of decades and that undergird contemporary practice of training development, implementation, and evaluation. While there is a rich variety of examples, one common theme that emerges from the studies is the need to involve the target audience from the beginning and tailor the training to its reality. Given the multiple needs, goals, and intentions of occupational health training, it is clear that the studies presented here represent a significant foundation that practitioners and researchers can test, challenge, and build upon. There are many gaps in knowledge and practice which present opportunities for further progress.

Contrasts and seeming contradictions emerge when we consider how one training application, such as the use of computer-based technology, may both enhance and detract from occupational health learning and practice. Further training and evaluation should go beyond focusing on knowledge transfer to explore the social support workers need to implement workplace health and safety practices that will ultimately address the inequities of workplace injury, illness, and death that many vulnerable workers experience. For example it is commonly held that OSH trainings should inform workers of their rights in the workplace. However, knowledge of one's rights is just one step toward being able to ensure that those rights are being respected. Fear of being fired, language barriers between workers and supervisors, and other such barriers may prevent workers from acting to address safety concerns at work even if they are aware of their rights. Finding ways to address these barriers, so that workers are able to implement what they learn, is essential if trainings hope to have an impact on workplace practices or health and safety outcomes.

OSH training for underserved workers faces a variety of challenges, but creative trainers have developed a range of strategies and methods for overcoming these challenges. With careful consideration of the particular context and needs of trainees, OSH trainers can carry out successful training programs even in the most challenging circumstances, documenting whose goals were achieved, how this came about, and what effects a program had on the occupational health status of workers in precarious employment.

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NOTES

1. Institute for Work & Health and National Institute for Occupational Safety and Health. DHHS [NIOSH] Publication No. 2010-127. 2010. A Systematic Review of the Effectiveness of Training & Education for the Protection of Workers.
2. Wallerstein N, Weinger M. Introduction: Health and Safety Education for Worker Empowerment. American Journal of Industrial Medicine. 1992; 22(5):619–635.10.1002/ajim.4700220502 [PubMed: 1442793]

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

3. Fine, Janice. Worker Centers: Organizing Communities at the Edge of the Dream. Ithaca, N.Y: ILR Press; 2006.
4. Kwon, H.; Pontusson, J. Yale University. Globalization, Union Decline and the Politics of Social Spending Growth in OECD Countries, 1962–2000. Nov. 2006
5. Landsbergis PA, Grzywacz JG, LaMontagne AD. Work Organization, Job Insecurity, and Occupational Health Disparities. American Journal of Industrial Medicine. 2012 Epub ahead of print. 10.1002/ajim.22126
6. California Department of Public Health. [accessed August 15, 2012] Lead's Revenge/La Venganza del Plomo. 2010. http://www.cdph.ca.gov/programs/olppp/Pages/LeadsRevenge.aspx
7. Flocks J, et al. Implementing a Community-Based Social Marketing Project to Improve Agricultural Work Health. Environmental Health Perspectives. 2001; 109(Suppl 3):461–468. http://dx.doi.org/10.1289/ehp.01109s3461. [PubMed: 11427397]
8. Monaghan PF, et al. Using Community-Based Prevention Marketing to Improve Farm Worker Safety. Social Marketing Quarterly. 2008; XXIV(4):71–88.10.1080/15245000802477607
9. Monaghan PF, et al. Adoption of Safety Eyewear among Citrus Harvesters in Rural Florida. Journal of Immigrant Minority Health. 2012; 14:460–466.10.1007/s10903-011-9484-3 [PubMed: 21643727]
10. California Department of Industrial Relations, Heat Illness Outreach and Education Campaign. [accessed August 15, 2012] 2010. http://www.99calor.org/english.html
11. The Center for Construction Research and Training, Telemundo, LLC, Hollywood, Health and Society program at the University of Southern California. [accessed August 15, 2012] Public Service Announcement. 2008. [Video]http://www.cpwr.com/service-mts.html
12. Fernandez JA, Daltuva JA, Robbins TG. Industrial Emergency Response Training: An Assessment of Long-Term Impact of a Union-based Program. American Journal of Industrial Medicine. 2000; 38(5):598–605.10.1002/1097-0274(200011)38:5<598::AID-AJIM12>3.0.CO;2-1 [PubMed: 11025501]
13. Merril M. Sharing Power: OCAW Worker-Trainers and the Small-Group Activity Method. New Solutions: A Journal of Environmental and Occupational Health Policy. 1995; 5(2):39–50.10.2190/NS5.2.h
14. Slatin C. Health and Safety Organizing: OCAW's Worker-to-Worker Health and Safety Training Program. New Solutions: A Journal of Environmental and Occupational Health Policy. 2001; 11(4):349–374.10.2190/JVMP-T8PJ-8MEV-GM5L
15. Becker P, Morawetz J. Impacts of Health and Safety Education: Comparison of Worker Activities before and after Training. American Journal of Industrial Medicine. 2004; 46(1):63–70.10.1002/ajim.20034 [PubMed: 15202126]
16. Daltuva JA, et al. Worker-Trainers as Evaluators: A Case Study of Union-Based Health and Safety Education Program. Health Promotion Practice. 2004; 5(2):191–198.10.1177/1524839903257368 [PubMed: 15090173]
17. Weidner LB, et al. Worker Health and Safety Training: Assessing the Impact among Responders. American Journal of Industrial Medicine. 1998; 33(3):241–246.10.1002/(SICI)1097-0274(199803)33:3<241::AID-AJIM5>3.0.CO;2-Z [PubMed: 9481422]
18. Rhodes SD. Lay Health Advisor Interventions among Hispanics/Latinos: A Qualitative Systematic Review. American Journal of Preventive Medicine. 2007; 33(5):418–427.10.1016/j.amepre.2007.07.023 [PubMed: 17950408]
19. McQuiston C, Flaskerud JH. 'If They Don't Ask about Condoms, I Just Tell Them': A Descriptive Case Study of Latino Lay Health Advisers' Helping Activities. Health Education & Behavior. 2003; 30(1):79–96.10.1177/1090198102239260 [PubMed: 12564669]
20. Arcury TA, et al. Reducing Farmworker Residential Pesticide Exposure: Evaluation of a Lay Health Advisor Intervention. Health Promotion Practice. 2009; 10(3):447–455.10.1177/1524839907301409 [PubMed: 18287581]
21. Forst L, et al. Effectiveness of Community Health Workers for Promoting Use of Safety Eyewear by Latino Farm Workers. American Journal of Industrial Medicine. 2004; 46(6):607–613.10.1002/ajim.20103 [PubMed: 15551366]

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

22. Forst L, et al. More than Training: Community-Based Participatory Research to Reduce Injuries among Hispanic Construction Workers. American Journal of Industrial Medicine. 2013; 56(8): 827–837.10.1002/ajim.22187 [PubMed: 23533016]
23. Grzywacz JG, et al. Using Lay Health Promoters in Occupational Health: Outcome Evaluation in a Sample of Latino Poultry Processing Workers. New Solutions: A Journal of Environmental and Occupational Health Policy. 2009; 19(4):449–466.10.2190/NS.19.4.e
24. Luque JS, et al. Implementation Evaluation of a Culturally Competent Eye Injury Prevention Program for Citrus Workers in a Florida Migrant Community. Progress in Community Health Partnerships. 2007; 1(4):359–369.10.1353/cpr.2007.0040 [PubMed: 20208215]
25. Liebman AK, et al. A Pilot Program Using Promotoras de Salud to Educate Farm-worker Families about the Risks from Pesticide Exposure. Journal of Agromedicine. 2007; 12(2):33–43.10.1300/J096v12n02_04 [PubMed: 18086652]
26. Ochsner M, et al. Beyond the Classroom—A Case Study of Immigrant Liaisons in Residential Construction. New Solutions: A Journal of Environmental and Occupational Health Policy. 2012; 22(3):365–386.10.2190/NS.22.3.h
27. Williams Q, et al. The Impact of a Peer-Led Participatory Health and Safety Training Program for Latino Day Laborers in Construction. Journal of Safety Research. 2010; 41(3):253–261.10.1016/j.jsr.2010.02.009 [PubMed: 20630277]
28. Marin A, et al. Ethnographic Evaluation of a Lay Health Promoter Program to Reduce Occupational Injuries among Latino Poultry Processing Workers. Public Health Reports. 2009; 124(Suppl 1):36–43. [PubMed: 19618805]
29. Arnold, R., et al. Educating for a Change. McHenry, IL: Center for Applied Linguistics and Delta Systems; 1991.
30. Roberts Auerbach, E. Making Meaning, Making Change. McHenry, IL: Center for Applied Linguistics and Delta Systems; 1992.
31. Freire, P. Pedagogy of the Oppressed. New York: Continuum; 1970. 30th Anniversary Edition. London: Bloomsbury Publishing; 2000.
32. Sullivan J, Siqueira CE. Popular Arts and Education in Community-Based Participatory Research (CBPR): On the Subtle Craft of Developing and Enhancing Channels for Clear Conversations among CBPR Partners. New Solutions: A Journal of Environmental and Occupational Health Policy. 2009; 19(4):399–406.10.2190/NS.19.4.b
33. Luskin J, et al. Teaching Health and Safety: Problems and Possibilities for Learner-Centered Training. American Journal of Industrial Medicine. 1992; 22(5):665–676.10.1002/ajim.4700220505 [PubMed: 1442796]
34. Amuwo S, et al. Implementation and Evaluation of Interventions for Home Care Aides on Blood and Body Fluid Exposure in Large Group Settings. New Solutions: A Journal of Environmental and Occupational Health Policy. 2011; 21(2):235–250.10.2190/NS.21.2.g
35. Delp, L.; Outman-Kramer, M.; Schurman, S.; Wong, K. Teaching for Change: Popular Education and the Labor Movement. Los Angeles: UCLA Center for Labor Research and Education; 2002.
36. Zanoni J. Confronting Inequity: Participatory Education Impacting Health at Work. Journal Of Critical Thought and Praxis. 2013; 2(1):18–39. http://lib.dr.iastate.edu/jctp/vol2/iss1/4.
37. Burke MJ, et al. Relative Effectiveness of Worker Safety and Health Training Methods. American Journal of Public Health. 2006; 96(2):315–324.10.2105/AJPH.2004.059840 [PubMed: 16380566]
38. Burke MJ. The Dread Factor: How Hazards and Safety Training Influence Learning and Performance. Journal of Applied Psychology. 2011; 96(1):46–70.10.1037/a0021838 [PubMed: 21244129]
39. Keith M, et al. Identifying and Prioritizing Gaming Workers' Health and Safety Concerns Using Mapping for Data Collection. American Journal of Industrial Medicine. 2001; 39(1):42–51.10.1002/1097-0274(200101)39:1<42::AID-AJIM4>3.0.CO [PubMed: 11148014]
40. Keith M, Brophy JT. Participatory Mapping of Occupational Hazards and Disease among Asbestos-Exposed Workers from a Foundry and Insulation Complex in Canada. International Journal of Occupational and Environmental Health. 2004; 10(2):144–153. [PubMed: 15281372]
41. Lee PT, Krause N. The Impact of a Worker Health Study on Working Conditions. Journal of Public Health Policy. 2002; 23(3):268–285. [PubMed: 12325285]

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

42. Minkler M, et al. Using Community-Based Participatory Research to Design and Initiate a Study on Immigrant Worker Health and Safety in San Francisco's Chinatown Restaurants. American Journal of Industrial Medicine. 2010; 53(4):361–371.10.1002/ajim.20791 [PubMed: 20066672]
43. Mujica J. Coloring the Hazards: Risk Maps Research and Education to Fight Health Hazards. American Journal of Industrial Medicine. 1992; 22(5):767–770.10.1002/ajim.4700220514 [PubMed: 1442805]
44. Wigmore D. 'We Can't Give Up. It's Too Important.' Health and Safety Stories from Canadian and U.S. Schools. New Solutions: A Journal of Environmental and Occupational Health Policy. 2010; 20(1):81–93.10.2190/NS.20.1.f
45. Brunette, ML.; Evia, C.; Lawson, D. University of Massachusetts Lowell School of Health Environment. Enabling Bilingual Workplace Communication with Comics and Motion Comics to Promote Decent and Safe Work. Poster; May 2011;
46. Weinger M, Lyons M. Problem-Solving in the Fields: An Action-Oriented Approach to Farmworker Education about Pesticides. American Journal of Industrial Medicine. 1992; 22(5): 677–690.10.1002/ajim.4700220506 [PubMed: 1442797]
47. Wallerstein N. Health and Safety Education for Workers with Low-Literacy or Limited-English Skills. American Journal of Industrial Medicine. 1992; 22(5):751–765. doi:0.1002/ajim. 4700220513. [PubMed: 1442804]
48. Anger WK, et al. Computer-Based Training for Immigrant Latinos with Limited Formal Education. Hispanic Journal of Behavior Sciences. 2004; 26(3):373–389.10.1177/0739986304267735
49. West C, et al. Computer-Based Simulation in Blended Learning Curriculum for Hazardous Waste Site Worker Health and Safety Training. International Journal of Information and Communication Technology Education. 2009; 5(1):62–73. [PubMed: 19430576]
50. International Labor Organization. Barefoot Research: A Workers' Manual for Organizing on Work Security. Mar. 2002
51. Szudy E, Gonzalez Arroyo M. Labor Occupational Health Program, University of California at Berkeley. The Right to Understand: Linking Literacy to Health and Safety Training. Manual. 1994 (ERIC Number: ED367884).
52. Delp L, et al. Teaching for Change: Popular Education and the Labor Movement. Labor Studies Journal. 2004; 28(4):90–92.10.1353/lab.2003.0067
53. Flum MR, et al. Photovoice in the Workplace: A Participatory Method to Give Voice to Workers to Identify Health and Safety Hazards and Promote Workplace Change: A Study of University Custodians. American Journal of Industrial Medicine. 2010; 53(11):1150–1158.10.1002/ajim. 20873 [PubMed: 20632314]
54. Cullen, E.; Fein, A. National Institute for Occupational Safety and Health. DHHS [NIOSH] Pub. No. 2005-152. Aug. 2007 Tell Me a Story: Why Stories are Essential to Effective Safety Training.
55. Afanuh, S. master's thesis. Excelsior College; 2009. Immigrant Workers and Literacy: Implications for Workplace Safety and Productivity.
56. Massett HA. Appropriateness of Hispanic Print Materials: A Content Analysis. Health Education Research. 1996; 11(2):231–242. [PubMed: 10163408]
57. Quandt SA, et al. Farmworker and Farmer Perceptions of Farmworker Agricultural Chemical Exposure in North Carolina. Human Organization. 1998; 57(3):359–368.10.1093/her/11.2.231
58. Arcury TA, Estrada JM, Quandt SA. Overcoming Language and Literacy Barriers in Safety and Health Training of Agricultural Workers. Journal of Agro-medicine. 2010; 15(3):236–248.10.1080/1059924X.2010.486958
59. United States Department of Labor—Occupational Safety and Health Administration. [accessed August 15, 2012] Best Practices for Development, Delivery, & Evaluation of Susan Harwood Training Grants. Sep. 2010 http://www.osha.gov/dte/sharwood/best-practices-booklet.pdf
60. The George Meany Center for Labor Studies, The National Institute of Environmental Health Sciences Worker Training Program and its Awardees, and NIEHS's National Clearinghouse for Worker Safety and Health Training. [accessed December 6, 2013] Resource Guide for Evaluating Worker Training: A Focus on Safety and Health. 1997. http://tools.niehs.nih.gov/wetp/public/hasl_get_blob.cfm?ID=9234

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

61. McQuiston TH. Empowerment Evaluation of Worker Safety and Health Education Programs. American Journal of Industrial Medicine. 2000; 38(5):584–597.10.1002/1097-0274(200011)38:5<584::AID-AJIM11>3.0.CO;2-H [PubMed: 11025500]
62. Brown MP, Nguyen-Scott N. Evaluating a Training-for-Action Job Health and Safety Program. American Journal of Industrial Medicine. 1992; 22(5):739–749.10.1002/ajim.4700220512 [PubMed: 1442803]
63. Lippin T, et al. Empowerment-Based Health and Safety Training: Evidence of Workplace Change from Four Industrial Sectors. American Journal of Industrial Medicine. 2000; 38(6):697–706.10.1002/1097-0274(200012)38:6<697::AID-AJIM9>3.0.CO;2-T [PubMed: 11071691]
64. Zimmerman, K.; Hurtig, SE. Center for Research on Women and Gender, University of Illinois at Chicago. [accessed on August 15, 2012] Tools of the Trade: A CWIT Guide to Participatory Evaluation. 2008. http://www.uic.edu/depts/crwg/cwitguide.shtml

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