

Evaluation of Health Assistants for Training for Work and Safety Program

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ABSTRACT

This paper describes an action research evaluation method developed to assess a worker training program which encourages trainees to use knowledge acquired to correct health and safety problems in their workplaces. The project teaches trainees from the same workplace to identify problem areas collectively using a tool called a Risk Chart and then to prioritize problems to work on with the aid of an Action Plan. Follow-up trainee interviews are conducted to determine what impact the training has on trainees. The methodology is presented and preliminary results are discussed, with particular emphasis on the advantages and limitations of this method. © 1992 Wiley-Liss, Inc.

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1. Introduction

Little published documentation exists regarding the impact of health and safety training programs on worker health, worker exposure to hazards, or worker actions to improve health and safety conditions. With this in mind, the California-Arizona Consortium with a 5-year hazardous waste training grant from the National Institute of Environmental Health Sciences in 1988, designed an evaluation program to assess the impact of its training on trainee actions after they return to the workplace.

A 1984 survey of health professionals, who conducted workplace health and safety education, found that most evaluations undertaken were either in the areas of process, that is, assessing the usefulness of certain teaching methods, or immediate impact, that is testing trainees' knowledge immediately after the educational intervention [Vojtecky and Berkanovic, 1984]. The CAC wanted to study process and immediate impact of their trainings but also wanted to develop a means to study intermediate impact of trainings, or to what extent trainees took actions to improve

The California-Arizona Consortium consists of six training centers in the University of California, one center at both the University of Southern California and Arizona State University and the Los Angeles Committee on Occupational Safety and Health (LACOSH).

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workplace conditions after receiving training. Intermediate impact differs from outcome evaluation in that outcome evaluation looks at long-term impact of training such as trainee mortality and morbidity statistics.

During the first year of the CAC program, a 40-hour training class was designed to comply with Federal Occupational Safety and Health Administration (OSHA) Standard 29 CFR 1910.120 ("HAZWOPER ") to educate hazardous waste site workers about hazards on their jobs and their legal rights in order to take actions to reduce or eliminate those hazards. But how was CAC staff to know if the classes were successful—that workers had taken steps as a result of the trainings to protect themselves and their co-workers? Frequently, instructors who have been in this field for awhile hear from past trainees that they were successful in convincing their supervisors to install appropriate ventilation systems, revamp respiratory protection programs, or buy proper chemical protective clothing. But to get a more complete, systematic assessment of the impact of these trainings, the CAC established and implemented a formal evaluation plan.

As stated earlier, several kinds of evaluation were conducted: process, immediate impact, and intermediate impact. The process evaluation involved a course evaluation questionnaire which all trainees filled out at the end of the training. At that time they had an opportunity to assess whether the topics covered would be helpful in their work, the effectiveness of the teaching methods used, instructors' knowledge and teaching skills, and to make recommendations to improve the course. Demographic data were also obtained (e.g., job titles, main type of work, first language, level of education, union status, etc.). For the immediate impact evaluation, the same multiple choice knowledge test was administered before the training began and at the end of training in order to estimate knowledge gained as a result of the training [Caparez et al., 1990].

Developing the intermediate impact evaluation, which will be discussed in depth in this article, was a challenge for the CAC [Nguyen-Scott and Brown, 1990]. This is a useful action research method which can be duplicated elsewhere when educators want to find out if knowledge acquired in training is used later by trainees to address health and safety problems in the workplace.

2. Methods

Training Philosophy

The CAC training approach is not only to provide workers with information to protect themselves and to work safely, but also to increase workers' awareness of health and safety conditions at their workplaces and to promote worker action to address these problems. CAC training is first and foremost participatory. All training classes incorporate trainees' work experiences and workplace health and safety problems within class exercises and small group activities. In the simulated scenarios used in these exercises, trainees are asked to address the same types of chemicals they work with in their workplaces and to include any other health and safety hazards they may have encountered at work. This same participatory philosophy is carried out in the CAC evaluation process through the use of the Action Research Method in order to evaluate the intermediate impact of our training programs.

Action Research Method

Action research can be defined as a research process whereby both researchers and subjects (in this case workers) work together to identify the research problem. As stated by Mergler [1987], "the problem arises from an interaction between the workers' concern and needs and the researchers' interests, leading to an exchange between the workers' pragmatic, concrete knowledge of work environment and health and the researchers' academic knowledge and experience." Action research is thus participatory in the sense that both researchers and subjects identify the issues that need to be addressed. It is also a co-learning process, "in which researchers involve workers in developing local theory that explains their own situation and such knowledge in turn is used by workers to change the organization" [Israel et al., 1989]. And finally it is an empowering process, in that it increases workers' awareness of their own work problems, their rights to a safe and healthful workplace, and stimulates them to take action within their own organization to address these problems. The Action Research Method adopted by the CAC consists of asking trainees when they come to the training what they perceive as health and safety problems at their workplaces, what actions they plan to take to address these problems when they go back to work, and to what extent the CAC training program helps remedy these problems.

Four key teaching modules were selected for this evaluation: workers' rights and responsibilities, personal protective equipment, decontamination, and emergency response training. These 4 were chosen out of the 20 modules taught in the 5-day course for hazardous waste site workers because: 1) the four modules represent the areas of training that concern CAC trainees most, based on the needs assessment survey conducted weeks prior to each training, and 2) CAC instructors who have worked in the hazardous waste field think these modules convey vital information in the field and cover areas where trainees can make changes in their workplace.

Days 1—4: Risk Charts

Focusing on these four modules, a Risk Chart with different categories of health and

safety conditions and personal protective equipment at hazardous waste sites was developed (see Table I). Categories for the Risk Chart were developed based on the problems identified by trainees and instructors from the CAC training programs and from the International Chemical Workers' Union (ICWU) hazardous waste training program.² At the end of each Of the four modules presented, trainees were asked to indicate on the Risk Chart whether there were problems in their workplaces. For example, after the Personal Protective Equipment (PPE) module, trainees assess, with respect to air purifying respirators (APRs),³ whether:

- I. there is an adequate supply for all workers;
- 2. the APRs are used according to criteria set forth in the training;
- 3. APRs are properly stored, regularly inspected, and well maintained;

2The Risk Chart methodology was first developed and pilot-tested by the International Chemical Workers ' Union (ICWU) hazardous waste training program. We wish to thank Dr. Alfred Marcus, ICWU Evaluator, for sharing this methodology with us. We have revised this methodology and the categories of the Risk Charts to suit the purposes of our training classes.

3This list was generated from the Cal-OSHA Respiratory Protection Standard

TABLE 1. Sample Risk Chart

RISK CHART 1: PPE
Today's Date: _____

—USE A RED DOT STICKER TO INDICATE PROBLEM AREAS
—USE A GREEN DOT STICKER TO INDICATE AREAS THAT ARE ALL RIGHT.

TYPE OF PERSONAL	ADEQUATE SUPPLY	PPE (SCBA, AIR PURIFYING	PROPERLY STORED	DECON-TAMINATED	TRAINED IN	FOR APRs: FIL-TESTED	APRs ONLY	FILL OUT IN THIS COLUMN ANY OTHER
PROTECTIVE EQUIPMENT (PPE)	FOR ALL WORKERS	RESPIRATOR PROTECTIVE CLOTHING)	REGULARLY INSPECTED AND WELL-	OR DISPOSED OF AFTER EACH USE	PROPER USE	ONCE A YEAR ACCORDING TO PROCEDURES	CARTRIDGES CHANGED EVERY	<u>PPE PROBLEMS YOU MAY</u>
		USED ACCORD- ING TO CRITERIA OUTLINED IN TRAINING MANUAL (MODULE 7)	MAINTAINED			OUTLINED IN TRAINING MANUAL p.7C-8 FOR OTHER PPE: FITS ALL WORKERS CORRECTLY	SHIFT	HAVE AT WORK
AIR PURIFYING RESPIRATORS (APRs)								
PROTECTIVE CLOTHING, (COVERALLS AND GLOVES) SCBA's*								

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*Self-contained breathing apparatuses.

- 4. APRs are decontaminated;
- 5. trainees have been trained in the proper use of APRs;
- 6. trainees have been fit tested once a year;

7. APR cartridges are changed after each shift.

An open-ended column has been added for trainees to list other problems related to APRs at work.

At the end of each of the four modules, trainees from the same company or government agency are grouped together in small groups (two to five people) to work on their Risk Charts. Each small group chooses a Contact Person. Trainees come to an agreement on where the problems are; the Contact Person sticks a red dot label on problem areas and a green dot where there is no need for improvement. The Contact Person fills out two copies of the Risk Chart. One copy stays with the training program and the other is kept by the Contact Person.

Day Five: Action Plans

On the fifth day of training each small group selects by consensus the two most serious problem areas as the priorities they want to correct in their workplace and writes these two problems on an Action Plan Worksheet (see Table II). For each problem, trainees specify on the Worksheet: 1) what they need to do to solve the problem, 2) what their employer needs to do to solve the problem, 3) what obstacles they think they might encounter in attempting to solve the problem and, last, 4) what they realistically can accomplish in the next 3 months to remedy the problem.

Next, each group presents to the entire class their two priority problems and their strategies to remedy these problems. An instructor-facilitated class discussion follows. By discussing their problems and strategies with the other trainees and instructors in the class, they learn new strategies for bringing about health and safety changes in the workplace, benefiting from others' experience and support.

As with the Risk Charts, two copies of the Action Plan Worksheets are filled out by the Contact Person within each group. One copy stays with the training program and the Other is taken by the Contact Person. This person will be called for two follow-up interviews/progress reports after completion of the course.

Follow-Up Interviews

Three months and twelve months after the training, the follow-up phone interviews are conducted. The interviewers have copies of every interviewees' Risk Chart and Action Plans. A standard interview protocol is followed. During the interviews questions are asked to determine:

- I. whether trainees have been successful in correcting the priority problems identified on the Action Plans;
2. what obstacles they met while attempting to implement changes; and
3. if they think the training helped them in correcting these problems.

Additional questions are asked about other activities which could have been influenced by the course such as:

TABLE 11. Action man Worksheet

STUDENT ID: _____
Today's Date: _____

Please select TWO (2) RED DOTS that represent PRIORITY HEALTH AND SAFETY PROBLEMS that concern you most in your work area.

RED DOT 1: _____
RED DOT 2: _____

For each of these RED DOT areas, what do YOU need to do to solve the problem?

What does your EMPLOYER need to do to solve the problem?

RED DOT 1 (Problem 1):

<u>What I need to Do:</u> _____ _____ _____	<u>What my employer needs to do:</u> _____ _____ _____
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RED DOT 2 (Problem 2):

<u>What I need to Do:</u> _____ _____ _____	<u>What my employer needs to do:</u> _____ _____ _____
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What obstacles might you encounter in trying to solve RED DOT 1?

What obstacles might you encounter in trying to solve RED DOT 2?

What obstacles might you encounter in trying to solve RED DOT 2?

Of all the things you need to do (listed above) in order to bring change in the RED DOT areas, WHICH TWO (2) can you REALISTICALLY get done in the next three months?

RED DOT 1 ARU: _____ RED DOT 2 AREA: _____

We would like to follow up with our trainees about 3 MONTHS after they finish our course. What would be the BEST way to get in touch with you?

Contact Person's name: _____

Preferred contact time: Daytime: _____

Evening: _____

• By telephone: phone number: _____ (home) _____ (work)

• By mail: address: _____

4. what health and safety reference materials do trainees use at their workplaces? (This is asked to determine if they will mention CAC training manuals, reference materials distributed in class, and/or the Risk Charts);

5. whether they have initiated discussions with their co-workers about information or skills they learned in the courses;

6. whether they have initiated discussions with supervisors, other management representatives, or regulatory agencies about health and safety issues raised in the courses; and

7. whether, at their request, new equipment was purchased by the employer and whether training was given on their new equipment.

The 3-month interview is both a way to find out if trainees have had relatively immediate successes in solving their problems, and is a "motivator" call. The interviewers, UCLA graduate students who have attended the trainings, communicate interest in workers' efforts, and notify instructors if trainees need additional technical information. Instructors then call back trainees with the information requested.

The following results are based on data collected from the 3 month calls which were completed between June 1989 and June 1990 after trainees attended six 40-hour courses for hazardous waste site workers. During this period, 118 workers (representing 58 employers) were trained. Interviews were conducted with 39 Contact Persons representing 39 different employers. Of the 19 trainees (from the remaining companies) who were not interviewed, 4 reported there were no health and safety problems in their workplaces, 5 had not yet worked with hazardous wastes (and, therefore, had not filled out the Risk Charts and Action Plans), 5 had left their employers since the training was conducted, and 5 could not be reached.

3. Results

Analysis of the 39 Risk Charts found that over 50% of trainees reported problems in the following areas:

1. no regular rehearsal Of emergency evacuation procedures (62%);

2. no annual fit-test of APRs according to proper procedures (56%); and

3. no comprehensive employee warning system incorporated into emergency contingency plans (51 %).

Interestingly, the areas in which trainees stated there were problems somewhat overlapped those most cited by Federal OSHA at hazardous waste sites. According to a summary of 1,409 OSHA citations for violations of the HAZWOPER Standard up until March 1990, 713 (51%) were for lack of an emergency response plan, 146 (10%) were for lack of worker training programs, 50 (4%) were for lack of PPE, and 42 were for inadequate decontamination procedures [Hughes, 1990].

The problems which concerned trainees most, and which they identified as priority health and safety problems on their Action Plan Worksheets, were the following:

1. lack of/inadequate supply of APRs, SCBAs (self-contained breathing apparatuses), other PPE and decontamination equipment;

2. no adequate emergency plans; and

3. inaccessibility of information on hazardous chemicals in the workplace.

Comparing the problems identified on the Risk Charts and the Action Plan Worksheets, one can see that lack of emergency response plans and PPE were identified by trainees as the major problem areas and the areas where trainees wanted to make changes.

Actions Taken by Trainees to Address Problems

The follow-up interviews revealed that, after the classes, the majority (56%) of trainees had discussed their priority health and safety concerns with supervisors or other management representatives. Some trainees (12%) took the initiative to develop or improve health and safety plans, some (10%) ordered new PPE, some gave health and safety presentations to co-workers at meetings, some shared class reference materials with co-workers, and, finally, some developed and conducted trainings within their workplaces.

Three months after training, 40% of the trainees interviewed stated that the health and safety problems that concerned them most had been corrected. Following are typical quotes from follow-up interviews on how the training helped trainees address these problems.

With regard to the problem of lack of PPE, trainees stated:

- I. "The course helped us decide what we needed and develop arguments to acquire PPE."
2. ' "The new budget proposal for PPE was based on the course."
3. "The course gave me the opportunity to bring up the idea (to acquire PPE) to my supervisor. ' '

With regard to the absence of emergency plans, trainees stated:

- I. "The course provided "back-up" material that was useful for talking with my immediate supervisor. "

With regard to the accessibility of information on hazardous materials, trainees stated:

1. "The information in the manual helped me organize the hazardous reference materials at my workplace. '

Thirty-two percent said their problems had not been corrected entirely, but that there had been some improvements. Twenty-eight percent reported their problems still had not been corrected.

4. Discussion

Positive Features

The Risk Chart/Action Plan methodology has some very positive features as an evaluation tool. Five positive features will be discussed here.

The steps each trainee goes through, as s/he develops with the small group the workplace Risk Charts and Action Plan Worksheets, provides a structured, focused way to review what was learned, identify problem areas, and arrive at strategies for change. In many teaching situations, these steps in the learning process are not emphasized or are overlooked [Office of Technology Assessment, 1985].

The evaluation is trainee driven in the sense that when trainees choose the "priority problems," stated in their Action Plans, they are choosing also what areas they will be queried about during the follow-up interviews. This is quite different from the more common evaluation approach of evaluators/instructors deciding on the desired behavior change they want to see trainees exhibit and then obtaining selfreports (or observing workers) to see whether they are following safer work practices and wearing PPE as a result of training [Robins et al., 1990; Hopkins et al., 1986].

This approach may contribute to group cohesion among trainees from the same workplace as they analyze problem areas (Risk Charts) and decide together what are the most serious health and safety problems (Action Plans) and what actions to take to remedy these problems.

Through the class discussions trainees from a given workplace learn from each other, and from workers from other workplaces. Instructors are present solely to facilitate these class discussions. Their presence and positive attitude communicate their position that changes can and should take place. Good adult education teaching practice acknowledges that adult learners bring work experiences into the classroom; and effective instructors structure learning so that others can benefit from these experiences.

And, in fact, the follow-up interview serves as a positive reinforcement tool. All trainees were, almost without exception, very receptive to the calls and oftentimes spent as long as 30—45 minutes discussing with the interviewer their progress in improving workplace conditions since the training.

Limitations

During the first year of using this evaluation method, members Of the Consortium identified at least five limitations to this approach. Consequently , some changes in the methodology have been made.

From our observation during the administration of the Action Plans, one limitation was that the Contact Person chosen by trainees to be interviewed later tended to be a supervisor. There was the risk that this person, an on-line supervisor, might give a biased perspective as s/he might minimize the problems or be more likely to say they were resolved than an on-line worker might. The perceptions of the supervisors may vary significantly from those of on-line workers and understandably, both are critical to evaluation. The Action Plan protocol has been changed, as a result. Trainees are still grouped by employer to discuss health and safety problems at their worksites. But now they fill out the Action Plan individually and no Contact Person is chosen. Thus the Action Plans are more likely to reflect trainees' concerns, and not those recorded by their supervisors. After all trainees have filled out their Action Plans

they gather into small groups by workplace and are asked to present to the class their health and safety problems and their strategies for addressing these problems. In this way, although trainees fill out individual Action Plans, we maintain a collective focus and encourage collective action when trainees go back to their workplaces. In our revised methodology, a random sample of 50% of trainees of a given class is phoned for follow-up interviews. This sampling method avoids the bias of including in the survey such a high proportion of supervisors as were interviewed in the past. This approach also results in an increased likelihood of contacting more than one worker from a given workplace. This latter point is a positive feature because the more follow-up calls trainees from the same workplace receive, the more they may be encouraged to take action to improve workplace health and safety conditions.

There are characteristics specific to hazardous waste work that can interfere with this kind of evaluation. These include: some trainees have not yet begun work at a hazardous waste site before they come to training; some workers move from one hazardous waste site to another within a short period of time while working for the same employer, and the rate of job turnover in this line of work is very high [Gochfeld et al., 1990].

Another concern when using this approach is that there are certain limitations inherent in a self-report method. Ex-trainees may respond to evaluators in a way they think the evaluators want to hear, in this case saying they have made great progress in solving their priority problems. To remedy this, another approach would have the evaluators go to the workplace to interview former trainees and their supervisors (who have not received the training) so that self-reports by trainees are not the sole means of determining program impact. We chose not to attempt this because of financial and workplace access limitations.

Also, we would be remiss without this word of caution. In an unorganized workplace (i.e., one without a union), especially, some workers may be reluctant to speak out on workplace conditions for fear of employer reprisal. Instructors must be sensitive to these conditions and address this issue in a direct way during the training. In CAC courses, although only about 30% of trainees were unionized, they did not voice such fears. But they also may have worked for employers who were more aware of the need for, and supportive of, health and safety improvements than the average since they sent their employees to this OSHA-mandated training.

Last, there is some debate within the Consortium whether the Risk Chart is a good tool to use. Some feel it is too limiting for trainees in that the problem areas to consider are preselected by the evaluators. Others argue that the problem areas were based on trainee/instructor input, and that the Risk Charts are used as a specific teaching tool where trainees have a chance to immediately analyze their own health and safety conditions using what they just learned in class.

5. Conclusions and Implications

Based on our findings, the Action Research Methodology represents a very promising way to assess the impact of training on workers' attempts to improve health and safety conditions at the workplace.

This is action-oriented research. The evaluation program is based upon a teaching philosophy which encourages workers to establish goals and initiate action to address their health and safety concerns in the workplace.

This approach is practical and participatory. It is trainee-driven in that it requires trainees to choose actual problems in their workplaces and to use information taught in the course to correct these problems.

The CAC has been fortunate to receive funding so that this intermediate impact evaluation will be conducted from June 1989 to June 1992. At present only the first set of 3-month interviews for classes held from June 1989 to June 1990 have been tabulated. By Fall 1992, 3 years of interviews will be analyzed and then there will be much more information on the effectiveness of this action-based evaluation methodology. Others are encouraged to attempt a similar effort, or an adaptation of this, with their worker education programs. The CAC evaluators are available if people have further questions on philosophy or protocol. It is strongly recommended that, from the beginning, people with health education and evaluation skills be involved in developing and implementing such an evaluation strategy.

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