

SAFETY TRAINING That Works

By GEORGE ROBOTHAM

Workers without occupational safety and health (OHS) training would appear at high risk for workplace injury and illness. Where training is given, the adequacy of the procedures becomes the issue (Cohen and Colligan 22).

When it comes to OSH, the difference between effective and ineffective training may be death, injury, pain, suffering and lost profits (Whiles 10). The method of delivery and course content must be tailored to meet trainee needs as well as financial constraints. In addition, clear written training objectives help keep the training on track and point out areas that need improvement (Rogers 20).

The first step in developing a training program is to find out what training is needed (Rogers 20).

1) **Conduct a task analysis.** List all occupations within the workplace and reduce each to the tasks performed.

2) **Identify critical tasks.** These are tasks that have produced—or have the potential to produce—substantial personal or property damage.

3) **Review accident records** to gain insight into training required.

4) **Survey and interview employees** to identify what training they think would help them perform their work more safely and efficiently.

The difference between effective and ineffective training may be death, injury, pain and lost profits.

5) **Review legislation** to gain insight into training needs. For example, in Australia, valuable information about training needs analysis can be obtained from the Australian Institute of Training and Development. Similar organizations exist throughout the world.

An instructional plan that outlines what, how and by whom information is to be conveyed is important, as is the process of evaluating training. The key is to determine whether the trainee can perform the new skills on the job.

IS TRAINING EFFECTIVE?

To determine whether or not training is effective, one must answer three questions (Cheeseman 56).

• **Did trainees learn the course content?** Before any training session is complete, the instructors must determine whether participants have successfully met the training objectives. Pre- and post-

course tests are appropriate. If skills training is being conducted, written tests should be supplemented by performance demonstrations.

• **Do they apply training on the job?** Transferring learning from the classroom to the workplace is the goal of any training session. Job observation and job performance surveys can be appropriate here.

• **Does the training make a difference?** If the right training has been delivered effectively to those who need it, consistent application should result in better job performance. Performance data can be obtained from document searches, surveys, interviews and direct observation.

Two factors separate ineffective from effective training: 1) lack of training objectives; and 2) failure to evaluate training (Montante 32-33). Effective training can be achieved by following six steps (Bird and Germain 260).

- 1) Pinpoint training needs.
- 2) Set training objectives.
- 3) Decide how to best meet the specific objectives.
- 4) Secure/develop the program.
- 5) Conduct the training.
- 6) Evaluate the training.

Prior to providing training, one should conduct a detailed training needs analysis. Too often, needs analysis is not performed before the program is developed, which makes it more difficult to assess its true value and overall impact.

Being an Effective Trainer

What makes a trainer effective? One can cite many qualities, but the following guidelines are a good starting point.

- Keep up to date.
- Pursue relevant qualifications.
- Follow the session plan.
- Review session plans.
- Review training aids.
- Make testing appropriate.
- Document everything.
- Keep accurate records.
- Avoid dismissing class early.
- Maintain training focus.

As noted, training evaluation is another key factor. Evaluation can be performed at any of three stages: input, output and outcome. Input (costs of or time used to develop training) can be compared to planning a budget. Output can be assessed in terms of the number of people trained during a given period, cumulative training costs and/or percentage trained versus a performance standard. Outcome can be determined by measuring and evaluating the following criteria (Montante 34):

- Reaction**—surveys or interviews to gauge the emotional response of participants to training.
- Knowledge**—usually involves before and after tests of knowledge gained or understanding achieved with respect to training objectives.
- Behavior**—may involve proficiency tests, direct observation or self reports of skill performance.
- Results**—determined by direct calculation of losses, claims on rates and/or change in waste, productivity, quality and cost performance.

ELEMENTS OF AN EFFECTIVE TRAINING PROGRAM

Different reviews of the general literature emphasize the importance of certain elements to an effective training program (Goldstein and Buxtan; Campbell).

- 1) Perform a needs assessment.
- 2) Establish training objectives.
- 3) Specify training content and media.
- 4) Account for individual differences.
- 5) Specify learning conditions.
- 6) Evaluate training.

TRAINING EVALUATION

According to Kirkpatrick, training evaluations can take on four forms, which are reviewed as a series of steps or levels: Reaction; knowledge gained or skills acquired; behavior change; results.

Reaction

To assess reaction to a training session, participants are typically asked to complete a course review form at the conclusion of each session of the course. Typical questions may include:

- What was the most useful session of the course?
- What was the least useful session of the course?
- Was the venue appropriate?
- How could the course be improved?

These questions seek out reaction to the course, but do not measure learning or effectiveness. Some experienced trainers somewhat cynically refer to these course review forms as “happiness sheets.”

Knowledge Gained or Skills Acquired

With this method of evaluation, questions are asked to test the transfer of knowledge to the course participant. For example, questions may include:

- 1) Describe the four methods of X.
- 2) Explain how to Z.
- 3) Provide the formula for W.

Alternately, skills may be tested by asking questions such as:

- 1) Demonstrate how to tie a bowline.
- 2) Demonstrate how to change the grinding wheel on an angle grinder.

Behavior Change

Measuring behavior change is important, but can prove difficult. Asking the course participant how his/her behavior has changed after s/he has had sufficient time to put the new principles/skills into practice is one approach. Interviewing supervisors and peers about any change in the participant's behavior since the training can also be worthwhile.

Results

Measuring training results in economic terms is a challenge. However, managers typically seek some return on investment for training. One effective approach is to establish control groups composed of those who have not been trained, then compare their performance to that of experimental groups that include individuals who have completed training.

Common industry practice is to measure the reaction. However, this can have little relationship to the degree of actual learning. The effect of training can be greatly affected by other workplace factors—in both the training and post-training environment.

OSHA's training guidelines are designed to help employers provide safety and health information to workers (Cohen and Colligan 10-11). These guidelines are intended to enhance or supplement other employer training activities. The seven guidelines are:

- 1) Determine the need for training.
- 2) Identify training needs.
- 3) Identify goals and objectives.
- 4) Develop learning objectives.
- 5) Conduct training.
- 6) Evaluate program effectiveness.
- 7) Improve the program.

It should be noted that successful training outcome is greatly influenced by management's support of safety training, especially in its transfer to the job site (Cohen and Colligan 40). Policies that encourage opportunities to apply knowledge gained from training, or reinforce learned behaviors or other means produce optimum results.

ADULT LEARNING PRINCIPLES & PROCESS

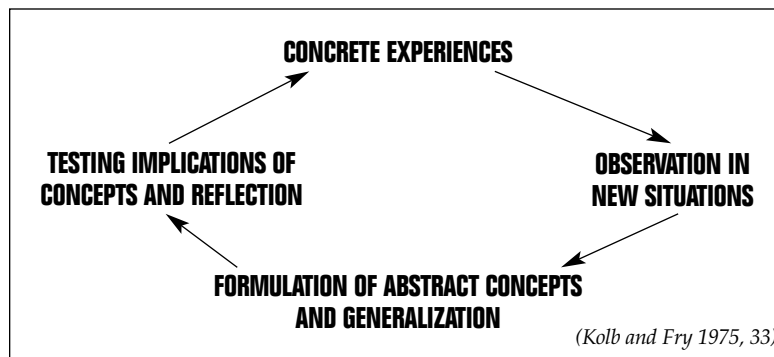
Following is a summary of the author's efforts to facilitate OSH learning among adults in the workplace. The teaching of adults (andragogy) is significantly different from the teaching of children and other young people (pedagogy). Adults bring considerable life experience to the training room and will likely question information that does not match their life experience. This introduces considerable challenges—but can also be a source of considerable satisfaction—to the facilitator.

ANDRAGOGY

Critical reflection is an important element in andragogy. This occurs most naturally when course content invites involvement, when students are encouraged to respond to material by drawing in a disciplined way from their life experiences. Creative reflection and criticism depend on students seeing themselves as central to their own learning, a feat accomplished not by a teacher saying something is “student-centered,” but through the experience of being at the center.

Reflection helps move learners to greater complexity and sophistication in

FIGURE 1 Experiential Learning Model



their understanding of any material presented. As a concept, andragogy is an important element for adult learning in general, but particularly for safety learning, where lives can be saved with appropriate transfer of skills, knowledge and abilities. (Those interested in exploring the andragogy concept should refer to Knowles; Savicevic; Griffin; Jarvis; Tennant.)

Following is a selection of theoretical concepts relevant to facilitation of adult learning.

WHAT THE ADULT LEARNING THEORY MEANS TO THE LEARNING FACILITATOR

Minimize Lecture-Style Presentations

There is room for the content expert to explain the theory, but this should be minimized. For learning to have meaning, activities should be organized to allow participants to discover concepts for themselves—not always an easy task. Discussions, case studies, practical exercises and role playing are preferred. Although they require more time, these are usually more-effective learning methods than lecture. Activities must reflect real life situations, and a content expert must be on hand should participants require his/her input.

Some theoretical input is given, and the opportunity for critical reflection—via an activity or discussion—is important.

Assessment is regarded as an opportunity to revise concepts as well as evaluation. The focus must be on the learner, not the facilitator.

For each session, learning objectives must be stated and a participative process used to achieve those objectives. Furthermore, learning must relate to learners' prior experience and knowledge.

Avoid giving the impression that the instructor is the all-knowing "expert." Rather, s/he is an organizer and facilitator of a participative, supportive learning environment. Too often, training activities are devised by trainers or managers who are removed from the workplace environment. The content represents what the trainer or manager thinks is required and, consequently, often misses the mark.

Therefore, an effort must be made to consult with employees on their perceived training needs. The skills, knowledge and attitudes (or abilities) to perform tasks must be examined to gain insight into deficiencies. In cases where

gaps between current and desired competencies are revealed, training will explain "what's in it for me," and elicit participants' expectations of training during the initial stages.

Learning must be appropriate for what is necessary for people to perform their jobs. In addition, allow for frequent breaks and do not overload participants with theory.

Interactive Learning Strategies

Interactive (rather than passive) learning strategies are preferred for adults. It has been suggested that for effective learning and behavior change.

Talk only	2% possibility of behavior change
Talk and model	10% possibility of behavior change
Talk, model and practice	20% possibility of behavior change
Talk, model, practice and onsite coaching	80% possibility of behavior change

As this chart shows, "saying" and "doing" are certainly important for retention and later application. Compared with other methods, interactive strategies provide advantages to both student and teacher: they suit most learning styles; most students enjoy learning or consolidating knowledge by taking part in such activities; and students enjoy the variety.

Smith & Delahaye Learning Principles

Smith and Delahaye refer to certain learning principles:

•**Whole or part learning.** Divide the learning into manageable segments and work from the known to the unknown.

•**Spaced learning.** Learning that is spaced at reasonable levels is usually more effective than massed or crammed learning for long-term retention.

•**Active learning.** If trainees are actively involved in the learning process (rather than listening passively), they will learn more effectively and become self-motivated. Active learning is often described as "learning by doing."

•**Feedback.** Give trainees feedback on progress early and regularly. Obtain feedback on your progress as a trainer.

•**Overlearning.** Stated simply, overlearning means learning until one has perfect recall—and then learning it some more. In other words, forgetting is significantly reduced by frequently attempting to recall learned material.

•**Reinforcement.** Learning that is rewarded is more likely to be retained.

•**Primacy and recency.** Given any sequence of facts, trainees will tend to remember what they hear first and last. What they hear in between is often forgotten. Therefore, emphasize and reinforce facts that are in between.

•**Meaningful material.** When presented with new information, people unconsciously ask two questions:

- 1) Is the information valid when I compare it with my past experiences?
- 2) Will this information be useful to me in the immediate future?

The implication of these questions is that one must move from the known to the unknown, and ensure information is readily useable by participants.

•**Multiple-sense learning.** Always use sight and hearing, but do not neglect the other senses.

•**Transfer of learning.** The amount of learning that trainees transfer from training room to workplace depends primarily on two variables:

1) The similarity between what is learned in the training program (including how it was presented) and what occurs in the workplace.

2) How easily trainees can integrate skills/knowledge gained from the training program into the work environment (Smith and Delahaye).

These two variables demonstrate the importance of referring to the workplace when looking for ideas on how to present information/skills, and when designing training activities and tests.

Retention & Transfer of Learning

For learning to occur successfully, the adult learner must:

- be motivated to learn;
- establish an attentional set;
- be in a state of developmental readiness to learn;
- be in an environment conducive to learning.

FIGURE 2 Experiential Learning Cycle

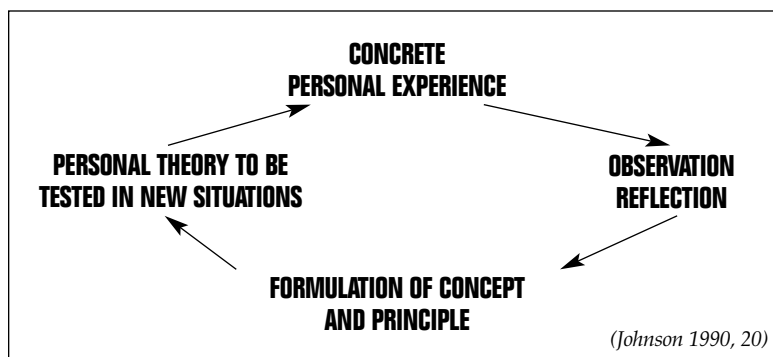


Figure 2 shows the process of experiential learning (Johnson 20). The learner reflects on his/her concrete experiences and examines their meaning in order to formulate a set of concepts or principles.

Adults are best motivated to learn when the material relates or is meaningful to their needs, goals, habits, values and self-concept. The adult's willingness to participate in learning depends on such factors as perception of the value of learning; acceptance of what and how to learn; need for self-esteem or social affiliation with others; and expectations from life.

Teachers of adult learners can facilitate retention and transfer of learning by employing certain activities:

- Encourage the learner to search for relationships between current and past learning.
- Provide reviews in which the learner encounters previously learned material within new activities.
- Provide well-distributed practice in problem-solving.
- Relate learning material to the abilities, needs and interests of the learner.
- Stress generalizations while ensuring that the learner understands the meaning and factual basis for each generalization thought. Schedule frequent tests or create a "set" to remember.
- Arrange for success or anticipation of successful experiences in learning.

Action Learning

A large body of research literature suggests that action learning is particularly appropriate for adults. Action learning is a process underpinned by a belief in individual potential; it is a way of learning from our actions—and what happens to and around us—by taking time to question and reflect on this in order to gain insight and consider how to act in the future (Weinstein 9). There are two other aspects to action learning. Action learning involves a group of people who work together on their "doing" and their "learning"; and it requires regular and rigorous meetings of the group to allow space and time for the process of questioning and reflection.

Learning may be defined as the process of making a new or revised interpretation of the meaning of an experience which guides subsequent understanding, appreciation and action (Mezirow 1). Critical reflection involves a critique of the presuppositions on which people's beliefs are built.

Marsick discusses action learning (23-45) and outlines three key components of

the action/learning facilitation process: action, reflection and the building of one's own theories (32-33). The action component is developed in two ways: through appropriate experience provided by project work, and through an action-oriented approach to the way people learn from experience.

For action learning to be effective, one must foster a climate that allows participants to examine beliefs, practices and norms (Marsick 44). The facilitator must ensure that learners look at problems from many perspectives, challenge one another, ask questions, draw contrasts, probe connections and try out new behaviors.

In its video, "Introduction to Action Learning," the National Staff Development Committee outlines the benefits and process of action learning, and refers to the following equation:

$$L = P + Q \text{ where}$$

L=Learning
P=Programmed knowledge balanced with
Q=Questioning insight

Experiential Learning

Experiential learning has some similarities to action learning, and is also thought to be relevant to adult learners. Boud, et al developed five propositions to help the adult educator develop effective experiential learning (Boud, et al 8-16).

- Experience is the foundation and stimulus for learning.
- Learners actively construct their experience.
- Learning is a holistic experience.
- Learning is socially and culturally constructed.
- Learning is influenced by the socio-emotional context in which it occurs.

Figure 1 shows Kolb and Fry's experiential learning model (33). Experiential learning is based on three assumptions (Johnson 20):

- 1) People learn best when personally involved in the learning experience.
- 2) Knowledge must be discovered if it is to have meaning or change behavior.
- 3) Commitment to learning is highest when people are free to actively pursue their own learning goals within a given framework.

Concrete personal experiences are followed by observation, reflection and examination of one's experiences. This leads to formulation of abstract concepts and generalizations, which leads to hypotheses to be tested in future action.

Learning in the Workplace

Billett argues that informal learning settings—such as workplaces—provide an optimal place for the acquisition of robust and transferable vocational skills (1). Such training can incorporate site-specific examples of safety concerns encountered in the workplace. The process used models the most traditional forms of learning—the notion of an expert/novice relationship (Billett 2). It utilizes activity theory originally proposed by Vygotsky, who claimed that knowledge is socially and culturally constructed. Central to this view is that the relationship between learner and teacher/expert is socially constructed. Consequently, the quality of the relationship will determine what type of knowledge the novice has access to and is allowed to learn (Billett 3).

Billett maintains the authenticity of learning activities is a determining quality of learning experiences (4). His research in the Queensland Coal Mining Industry found that respondent preferred to learn-by-doing (Billett 5). They also believed that the expertise for learning was already on site. "The engagement of learners in authentic activities in natural settings, guided by experts with reference to other learners and by allowing the learner to experience both the process and the product of their activities have the potential to make the workplace a powerful learning experience" (Billett 10).

Billett indicates that skill-development activities and assessment should be conducted only by those who have and are seen to have a strong base of skills in a specific area (a content expert) (Billett 4). In addition, activities should closely reflect those that are part of everyday practice in the workplace (authentic activities). This emphasizes the role of natural settings and authentic activities,

and reflects the research of Glaser; Glaser and Bassok; Collins, et al; Brown, et al; Gott; Raizen).

A learning process that gives responsibility for learning to the learners, engages them in dialogue with more expert workers, asks them to problem-solve real situations and then provide an analysis of their approach is appropriate (Billett 5). Learning tasks must be realistic and challenging, but ultimately achievable. ■

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Knowles's Principles of Adult Education

Malcolm Knowles, widely regarded as the father of adult education, advocated five key principles—what he called the "foundation stones of modern adult learning." Their application can improve the effectiveness of safety training.

PRINCIPLE 1

Training should be active, not passive.

PRINCIPLE 2

The adult learner must relate to training.

PRINCIPLE 3

Training must meet an immediate need of the learner.

PRINCIPLE 4

The adult learner should be involved with setting learning goals.

PRINCIPLE 5

Training should involve workers to the point of using their expertise.

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