Instructional Objectives

Improving the success of safety training

By Nancy Lenthe Dowling and Stephanie H. McKinnon

MANY SAFETY, HEALTH AND ENVIRONMENTAL (SH&E) professionals are required to provide training to employees, yet few have received formal instruction on how to do so. Therefore, many SH&E professionals need to set a goal to improve their skills as trainers.

A key component of training is defining what to evaluate and how to do so. Determining the "whats" and "hows" of evaluation is not as easy as it sounds. "All training professionals agree: evaluation should be done. That is as far as the agreement goes. When we try to define 'evaluation' or determine how to do it, opinions and recommendations vary tremendously" (Kirkpatrick "Preface"). The recently adopted Z490.1-2001, Accepted Practices in Safety Health and Environmental Training, calls for evaluating at least the following three elements: training program management, training process and training results (Table 1). Table 2 shows how OSHA defines core criteria for training in Appendix E of its HazWOPER Standard (29 CFR 1910.120). Table 3 shows the range of variables that experts from the academic and professional field of human resources development—a primary repository of evaluation theory, tools and templates—recommend (Dowling).

While these three sets of variables may appear unrelated, they share several key points. ANSI lists "learning objectives" as important. "Course materials" is listed in OSHA's elements, and the agency refers to "training requirements" in its quality control criteria (5). Dowling emphasizes "instructional objectives" (85-95). Further investigation of these three sources suggests that the different authors define "learning" and "instructional" objectives synonymously.

Learning/instructional objectives define the expectations for the learner/trainee. They also tell the trainer what content to include in the training. The content suggests the most-appropriate supporting methods and media. Finally, learning/instructional objectives tell both the trainer and the trainee what will be evaluated. Mager states:

An objective is a statement describing an instructional outcome, rather than an instructional process or procedure. It describes results, rather than the means of achieving those results. . . . Objectives, then, are useful in providing a sound basis 1) for the selection or designing of instructional content and procedures; 2) for evaluating or assessing the success of the instruction; and 3) for organizing the student's own efforts and activities for the accomplishment of the important instructional intents. In short, if you know where you are going, you have a better chance of getting there (1975, 6-7).

Given that learning/instructional objectives provide the architecture for any training program's content and evaluation focus, this article focuses on writing and evaluating objectives.

Components of Objectives

Useful objectives must conform to rigorous standards. According to Mager, objectives must be written to answer these questions:

•What should the trainee be able to do?

•Under what conditions should the trainee be able to do it?

•How well must it be done? (21)

According to ANSI Z490.1, objectives shall state:

•target audience;

•desired knowledge, skill or ability to be learned by the trainee;

•conditions under which the knowledge, skill or ability is to be demonstrated;

•criteria for determining that the learning objective has been achieved (11).

Dowling states that objectives must meet these criteria:

Nancy Lenthe Dowling, Ph.D., is a management consultant based in Columbus, OH. She holds a B.A. from Hood College, an M.A. from Middlebury College and a Ph.D. from Ohio State University. Her areas of expertise include training and development, organizational performance analysis and performance management systems.

Stephanie H. McKinnon, CSP, is a project manager/consultant with Emilcott/DGA Inc., where she provides SH&E consulting and training services. She holds a B.S. in Safety from Slippery Rock University and an M.S. in Safety from Indiana University of Pennsylvania. McKinnon is a professional member and President-Elect of ASSE's Central Ohio Chapter.

•Conditions of performance are specified.
•Performers are identified.
•The objective contains an action verb.
•One tangible result (outcome) per objective is specified.
•Standard of acceptable performance is specified (86).

The agreement in these three lists is obvious. Therefore, to maximize performance, SH&E professionals should learn to write objectives that conform to these rigors.

Description & Template for Objectives

Let's take a closer look at Dowling's elements for sound objectives.

1) **Conditions of performance are specified.** The trainee is told what will/will not be available to him/her in order to perform the required task. Example: "Without looking at this list of the five required elements of performance and instructional objectives, you will write each element in the same order and with the same words the author used."

2) **Performers are identified.** "You" often refers to the performers. Example: "Without looking at the list of the five required elements of performance and instructional objectives, you will write each element in the same order and with the same words the author used."

3) **The objective contains one action verb.** Example: "Without looking at the list of the five required elements of performance and instructional objectives, you will write each element in the same order and with the same words the author used."

4) **One tangible result per objective is specified.** Example: "Without looking at the list of the five required elements of performance and instructional objectives, you will write each element in the same order and with the same words the author used." The performance result: a written list of the five elements.

5) **The standard of acceptable performance is specified.** Example: "Without looking at the list of the five required elements of performance and instructional objectives, you will write each element in the same order and with the same words the author used" (87-88). Table 4 presents a template/job guide that SH&E professionals can use when writing objectives (Dowling 91).

Levels of Objectives

Not only must objectives conform to the rigors noted, objectives can also be written and evaluated at different levels. Kirkpatrick recommends that training be evaluated at one or more of the following four levels: reaction, learning, behavior, results. The following seven levels can also be applied.

1) Learning during the instruction. For example: From memory, trainee will identify the steps to perform a respirator user seal check listing each step in the same order as listed in course materials on page xx. *In this case, the instructor would ask for feedback during the class.*

2) Retention of learned information following instruction. For example: Three months after the class, without reviewing any materials, trainee will identify the steps to perform a respirator user seal check listing each step in the same order as listed in the course materials on page xx. *To evaluate this objective, the instructor or a supervisor must be present in the workplace after instruction in order to evaluate retention.*

3) Behavior during the instruction. For example: From memory, trainee will demonstrate user seal checks separately for each seal check (positive and negative) using the methods listed in the course materials on page xx. *The instructor will evaluate each participant as the skill is being demonstrated and provide immediate feedback.*

4) Retention of learned information following the instruction. For example: Three months after training, without reviewing course materials, trainee will demonstrate user seal checks separately for each seal check (positive and negative) using the methods listed in the course materials on page xx. *Like level two, this can use the same objective as in class. However, the skill is observed by the instructor (or his/her delegate) "in the field" when the trainee is actually performing the task as a part of work requirements.*

5) Performance during the instruction. For example: From memory, participants will demonstrate all steps of performing respirator user seal checks using the same steps in the same order as listed in the course materials on page xx. *At this level, skills can be combined for one complete task.*

6) Performance following the instruction. For example: Three months after the class, without reviewing course materials, participants will demonstrate all steps of a respirator user seal checks (positive and negative) using the same steps in the same order as listed in the course materials on page xx. *Again, the instructor or a supervisor would observe a trainee in the field actually performing the task as s/he prepares to work to see whether the training material and skills are being used properly.*

7) Organizational performance following training. These objectives may be similar to employee performance directives for the company safety program—focused on larger issues such as reducing the company's incident rate. A trainer can safely write objectives at this level only if the trainer:

•also has management control over all variables that impact safety performance and contribute to incidence reduction;

•uses statistical measurement skills to control for the nontraining variables that impact performance (Dowling).

Instructor Control of Outcome

Many trainers believe that if a trainee doesn't "get it" it is the trainee's fault. Often, the opposite is true. If a trainer designs a program appropriate to trainees' learning readiness, most of the trainees will "get it." Therefore, a trainer must ensure that the content is neither too basic nor too advanced. Otherwise, training may need to be adjusted during delivery—and such on-the-spot designing is rarely as effective as a well-planned design developed before delivery. The better prepared safety trainers are, the better they can control desired training outcomes.

Consider objectives at level one (learning during instruction) and level three (behavior during instruction). Both look for feedback while training is in progress. Level one can be accomplished by asking trainees questions. The trainer must try to question each trainee and must be alert for feedback from all. The level three objective asks participants to demonstrate a skill or complete an exercise during the instruction. If the demonstration involves a hands-on skill, the

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Table 3

HRD Variables to Be Evaluated

Element	Variables
Training program	a) content b) design
Trainees	a) interest b) behavior c) learning d) performance
Instructor	a) content knowledge b) delivery skills
Other stakeholders	a) interest b) assessment c) perception of trainee changes
Organization	a) performance

Source: Dowling

Table 4

Objective Writing Template

Condition of Performance	Performer(s)	Action Verb	Outcome	Standard of Acceptable Performance (time, cost, quantity, quality)
1.				
2.				
3.				
N.				

Source: Dowling (91)

Table 5

Evaluation Options

When testing for knowledge/thinking skills, use:	When testing for behaviors/skills (not psychomotor), use:	When testing for psychomotor skills/ behaviors, use:	When testing for motivation/ attitude, use:	When testing for performance, use:
•Write-in-the-answer questionnaires	•Observation of work behaviors	•Observation of work behaviors	•Interviews	•Objective reviews of performance results
•True-false questionnaires	•Interviews with stakeholders/customers		•Attitude assessments	
•Matching questionnaires	•Surveys of stakeholders/customers			
•Verbal questions and answers	•Collection of critical incidents (work examples)			
•Case analyses				

trainer must observe the entire group at one time in order to identify trainees who need additional coaching and feedback. After all the students have completed the skill demonstration, the trainer may provide some additional comments to the entire group. With objectives at the first and second levels, controlling group size is one way for the instructor to ensure that trainees receive the necessary amount of practice and feedback.

The primary difference between level three and level five (performance during instruction) objectives is that level three refers to single behaviors while level five refers to a group of skills needed to perform one complete task. In the examples, level one and three objectives focused on the skill of performing separate user seal checks. Level five combined the skills into a complete task.

As noted, objectives at levels two (retention of learned information following instruction), four and six (performance following instruction) require the trainer to evaluate trainees actually using the skills learned in order to determine whether the objective has been met. In the example (performing a respirator seal check), skill mastery is the desired outcome. That skill must be performed correctly time after time; anything less is unacceptable because the trainee will enter a work environment that requires respiratory protection. If performance falls below expectations, the trainer must identify the cause—the training program or something else—and correct it.

Putting This All to Use

This process was applied in preparing an annual OSHA eight-hour HazWOPER refresher course in 2002. (One of the authors presents this program multiple times each year and the material is prepared each year as new material.) First, the training agenda was established based on guidelines in Appendix E of OSHA's HazWOPER Standard. Next, instructional objectives were prepared for each agenda topic using the process described in this article. For example, "Without using course materials, participants will recall, when asked on the final quiz, hazard communication as the most-frequently cited OSHA standard for fiscal year 2000."

By using the condition of performance, outcome and standard of acceptable performance, the criteria for performance—without using course materials—is established as is the evaluation method—a quiz

question. In this example, the instructional method is instructor lecture with PowerPoint slides.

Additional benefits were realized by using this approach. Preparing the information in this way has improved efficiency in instructor preparation (multiple instructors are used) because it helps them recognize what information to emphasize and ensures that information is presented consistently—even when scheduling different instructors. In addition, expectations of course participants are clear, which helps the instructors in preparation and delivery.

Conclusion

What about evaluations? The trainer should use learning/instructional objectives to determine what, when and how to evaluate. Examples provided in this article require that trainees answer questions during instruction; practice skills in a controlled instructional setting; and apply skills in the actual work environment. Other options are also available based on the training setting (Table 5). Well-defined learning/instructional objectives coupled with sound evaluation techniques promote effective training and effective safety performance. ∎

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