

# Learning Objectives

## The Road Map for Safety Training

By Jeff Dalto

ASSE and ANSI recently updated ANSI/ASSE Z490.1, Criteria for Accepted Practices in Safety, Health and Environmental Training, and this is the first in a series of articles that will analyze key parts of that standard. The series is similar to basic safety training that explains fundamental concepts to use as building blocks for improved safety training. The focus of this article is learning objectives.

### Objectives: Follow the Yellow Brick Road

Learning objectives are a road map for all parts of training. Once they are in place, you can follow them where you want to go. To start, imagine that the safety training program at your organization is incomplete. It is your responsibility to create new training, and you decide to start with hazardous energy control (lockout/tagout).

But what comes next? Do you schedule a face-to-face training session and start talking? Do you print out OSHA's 1910.147 and read it to everyone? Neither of these tactics is the path to success.

Instead, one of the first things to do is to create a set of learning objectives. Learning objectives are the actions or behaviors trainees should be able to perform once the training is complete. For the lockout/tagout example, that means to correctly perform all the tasks and responsibilities associated with the organization's hazardous energy control program (and the role each worker plays within that program).

### The Ins & Outs (of Training)

Learning objectives are critical for a few reasons. A proper set of learning objectives will determine what to include. If the objectives outline what the employees should be capable of doing after the training is complete, then all you have to do is include training content to help employees learn to satisfy those objectives. Easy enough, right? This is important because many times trainers do not incorporate critical information in the training.

Just as important, the learning objectives tell trainers what not to include; specifically, this is anything that does not help employees satisfy the objectives. This is important for two reasons: 1) trainers often include additional nonessential information in training; and 2) including additional information diminishes learning results. That is because our brains can actively process only a few pieces of information at once. When additional, unnecessary information is included, it distracts the employee and overwhelms his/her brain's processing capacity.

### A Heads-Up to Employees

Another benefit of learning objectives is that they can be communicated to employees to let them know what the training is about. This can

improve the training's effectiveness in two ways. First, employees will be more motivated to learn if the objectives are relevant to employees' jobs and it is clear to employees how learning the material will help keep them safe on the job (and, motivation is key to learning). Second, it allows the employees to periodically self-assess during training to check whether they are learning what they are supposed to learn. This process of thinking about your own thinking is known as *metacognition* and is associated with improved learning results.

Controversy surrounds the issue of how to present learning objectives to employees before training. Some use a bulleted list, others argue for presenting the objectives in the form of an engaging story. This issue is beyond the scope of this article, but worthy of additional investigation.

### Testing, One, Two . . . Testing

Learning objectives also help serve as a guide for posttraining assessment. Objectives help determine what type of assessment to use (e.g., oral evaluation, written test, practical skill demonstration) and what should be included in that assessment.

The golden rule here is simple: Assess all the learning objectives completely and assess nothing other than learning objectives.

### Evaluate Training

Finally, learning objectives are beneficial because they help the trainer evaluate the training's effectiveness. Here's how:

- Learner surveys: If using posttraining surveys, include questions that ask trainees whether they have learned to perform the objectives.
- Assessments: Select a method to evaluate the training.
  - On-the-job observations: After training, get out in the field and see whether employees are doing what they are supposed to be doing. If they are not, find out why because the problem may not be the training.
  - Key business metrics: Before and after training, check the OSH metrics (e.g., lagging and leading indicators) and even larger business metrics (e.g., revenue, costs, profit, production, downtime, absenteeism, morale) to assess whether the training is effective.

### Conclusion

The focus of this article is learning objectives and their benefits, but how does a trainer create them? ANSI/ASSE Z490.1-2016 is a great place to learn more. Check out Section 4.3, Learning Objectives, to begin, and the sections on course design, evaluation and course completion. Also, Annex A includes many helpful references and Annex B.8 includes yet more information.

Learning objectives are a road map for all parts of training. Once they are in place, you can follow them where you want to go.



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ing type more effective than another. Examples include amount of time available from employees' work schedule, work location, ability to read, computer access and the language that is most comfortable.

Third, think about feedback and practice. The standard notes that "the delivery method(s) shall ensure adequate feedback mechanisms for training questions and concerns to ensure comprehension of content." This requires selecting a training delivery method that will allow for giving feedback to employees who want to ask questions, or to practice and master skills with observation and guidance.

In some cases, a written document or a presentation along with a note to "see if there are questions" is enough. In other cases, instructor-led training may be needed so that employees can ask questions and perform hands-on skills while being guided by the instructor. And, in other cases, online learning that includes questions with feedback for correct and incorrect answers, or interactive skill-building simulations that display the consequences of the employee's actions may be most appropriate.

#### Helpful Resources: Blend It for Safety

For more help creating the best blended learning safety training, refer to ANSI/ASSE Z490.1, Section 4.4 and Annex B. In addition, download the free Blended Learner's Beginner's Guide at the Convergence Training blog (<http://bit.ly/2kCA1wJ>). Finally, read Clark's, *Evidence-Based Training Methods: A Guide for Training Professionals*.

#### References

ANSI/ASSE. (2016). Criteria for accepted practices in safety, health and environmental training (ANSI/ASSE Z490.1). Park Ridge, IL: ASSE.

Clark, R.C. (2010). *Evidence-based training methods: A guide for training professionals*. Alexandria, VA: American Society for Training and Development.

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## ANSI/ASSE Z244.1 - 2016 THE CONTROL OF HAZARDOUS ENERGY LOCKOUT, TAGOUT AND ALTERNATIVE METHODS

Standard for requirements and best practices for the control of hazardous energy.



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# Developing Learner-Centric Safety Training

By Jeff Dalto

Learner-centric training prioritizes the learning needs of the learners.

ASSE and ANSI recently updated ANSI/ASSE Z490.1, Criteria for Accepted Practices in Safety, Health and Environmental Training. This article is the third in a series that examines the standard more closely, and it focuses on some aspects of safety training development.

In the first two columns in this series, I discussed learning objectives (*PS* January 2017, p. 25) and training delivery methods (*PS* March 2017, p. 28-29). This article focuses specifically on the concept on developing learner-centric training, and provides a few ideas on why and when it is important.

Section 4 of the Z490.1 standard discusses safety training development. It addresses issues such as the importance of performing a training needs assessment; creating learning objectives and content that supports those objectives; and considering the training delivery method, training content, instructional materials for employees, a trainer's guide, training event location, training schedule, trainer qualifications and plans for continuous improvement of the training. It is worth reviewing this part of the standard.

## Learner-Centric Training

Learner-centric training prioritizes the learning needs of the learners. Some may think this is obvious and that it happens in all training programs, yet people often develop training programs without considering the learners. Plus, the training might be developed with little thought given to how people learn, which frequently leads to safety training that is a passive, nonproductive

learning experience (e.g., sage-on-the-stage safety training).

## Training Needs Assessment

It is important to conduct a training needs assessment (training needs analysis) before developing safety training. A training needs assessment has three phases:

1) Identify the problem the training is intended to solve (the world suffers from many solutions where there is no problem or that do not properly address the problem).

2) Determine that safety training is the best solution (sometimes it is not—for example, maybe placing a guard on a machine is a better solution).

3) Consider the learners when seeking information to help create a more effective learning experience (e.g., schedules, learning preferences, languages, current knowledge and skills, jobs and tasks they perform, how they will use the new knowledge and skills on the job). This third part of the training needs assessment is most directly related to developing learner-centric training.

## Adult Learning Principles

At different points, the Z490.1 standard addresses important techniques that help people learn, including adult learning principles. Trainers should create training that keeps adult learning principles in mind. Different sources will provide slightly different lists of adult learning principles. It is worth becoming familiar with a few sets. For example, the adult learning principles in Z490.1 are:



- Treat trainees with respect.
- Recognize and respond to individual learning styles.
- Exercise professional judgment when managing difficult situations or participants.
  - Show flexibility in tone and pace of subject delivery to meet trainees' needs.
  - Coach and counsel trainees.
  - Value trainees' different experience levels.
  - Encourage active participation.

A slightly different list, based on the list developed by famous learning theorist Malcolm Knowles, states that adult learners:

- are self-directed;
- bring a lifetime of knowledge and experience to training;
- are goal-oriented;
- want training to be relevant and task-oriented;
- learn when they are motivated to learn;
- like to feel and be respected.

For a more detailed look at adult learning principles, with examples of how to use them in safety training, visit <https://bit.ly/AdultLearningPrinciplesforSafety>.

#### How People Learn

Beyond using adult learning principles, to create effective safety training, trainers must understand how people learn. Here is what cognitive psychology research and learning experts say about the human learning process:

- At any moment, a person is flooded with stimulus in his/her sensory memory.
  - People focus on some of those stimuli and filter the rest of them out.
  - People process the stimuli that get attention in their working memory.
    - The working memory can hold only a few bits of information (four or five) and can retain that information for only a short time (often as few as 10 to 15 seconds).
    - If a person does not actively process new information, or move it to the long-term memory, it is essentially lost within 20 seconds.
      - Some information from working memory is transferred to long-term memory.
      - Some information stored in long-term memory is later retrieved and used at appropriate moments on the job.

#### Conclusion

It is important to deliver training that nurtures the development of knowledge and skills at each step in this process. The field of instructional design has many tips for doing this and it is worth further consideration.

One resource along these lines is *Design for How People Learn* by Julie Dirksen. This book is authoritative, relatively short and written in a fun, conversational manner that is easy to understand.

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# Effective Safety Training

## How to Deliver the Goods

By Jeff Dalto

Consider the estimate that 80% of new knowledge is lost 1 day after training.

In 2016, ASSE and ANSI updated the national voluntary consensus standard on OSH training. This article is the fourth in a series that examines ANSI/ASSE Z490.1, Criteria for Accepted Practices in Safety, Health and Environmental Training. This article focuses on training delivery.

Section 5 of Z490.1 focuses on delivery during instructor-led safety training, but much of what the standard covers about instructor-led training is true for other types of training as well, including online training (although a subcommittee is drafting ANSI/ASSE Z490.2 to specifically address virtual safety training).

### Safety Trainers

According to the standard, the trainer should have some measure of subject-matter expertise as well as an expertise in training delivery. Regarding training delivery, the standard mentions (in section 5) the importance of adult learning principles. (For a slightly different list of adult learning principles with examples of how to apply them during safety training visit <http://bit.ly/AdultLearningPrinciplesforSafety>.)

Section 5 also notes the importance of appropriate, active communication with trainees and their need to receive feedback. Avoid one-sided lectures (“sage on the stage”), build in opportunities for and encourage active discussion, be welcoming and answer questions, and help trainees gauge their own understanding (an important learning technique known as *metacognition*) and leave the session with proper understanding. Note that feedback includes answering questions as well as explaining whether

the worker is performing a task or procedure in the proper, safe manner and helping the trainee learn to perform the task in a safe manner.

### Safety Training Environment

According to Z490.1, training environment considerations include safety, climate, noise, lighting and ergonomics. Section 5 is a great resource for additional details, as is Association for Talent Development ([www.td.org](http://www.td.org)).

### Forgetting Curve, Spaced Practice & Testing Effect

Three key concepts related to any training are: 1) the forgetting curve, 2) spaced practice and

3) the testing effect. The standard does not directly address any of these concepts, but all are fundamentally important for effective training delivery and are supported by extensive research.

The basic idea of the forgetting curve is that no matter how effective training is at helping people acquire knowledge or develop skills during the actual session, most of those advances will be lost quickly unless the learner is exposed to the information again. For perspective, consider the estimate that 80% of new knowledge is lost 1 day after training. If a training session aims to raise safety awareness of an issue, even if the training is excellent and each trainee passes the posttraining test, many trainees will likely forget most of what they learned in a matter of a few days.

Startling, yes, but not hopeless thanks to the power of spaced practice. When trainees are reintroduced to the training topic after time has passed, it will reduce, stop or even reverse the forgetting curve. To maximize this effect, consider delivering pretraining, perhaps in written, online or video formats, before the primary training session. Then, deliver training after the primary session, allowing some time between. The reason for this is that if a trainee forgets more and then must work harder to remember/relearn the materials during the posttraining refresher session, the ultimate long-term learning is greater as a result of that additional effort. Search “desirable difficulties” to learn the benefits of making trainees struggle a bit, and search “microlearning” to learn about an effective way to deliver posttraining.

The concept of desirable difficulties leads to the third important concept, the testing effect. While reintroducing a trainee to a concept has some benefit, the real gains come if the trainee must practice or work to recall the information. That is where the value of testing comes in.

The act of testing an employee at some point after the primary training, either through a knowledge or skills test, increases learning. Thus, testing becomes a learning aid and not just a means of assessment. This effect becomes more powerful if enough time has passed since the previous training that the employee has had a chance to forget much of the material. That forgetting process means the trainee will struggle to recall the information and that struggle ultimately reinforces neural connections (and makes new ones) that will lead to greater long-term learning.

To learn more about these concepts, check out Will Thalheimer’s Spacing Learning Over Time (<http://bit.ly/2oWuap5>); *Make It Stick* by Peter Brown, Henry Roediger and Mark McDaniel (<http://amzn.to/2oTksTF>); and an article on the forgetting curve and spaced practice (<http://bit.ly/2ph6ApA>).

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# Evaluating Safety Training

## How to Know How You Are Doing

By Jeff Dalto

In 2016, ASSE and ANSI updated the national Voluntary consensus standard on OSH training. This article is the fifth in a series introducing parts of ANSI/ASSE Z490.1, Criteria for Accepted Practices in Safety, Health and Environmental Training and providing tips for implementing it. This article examines how to evaluate safety training, which is the focus of Section 6 of Z490.1.

### What Does It Mean to Evaluate OSH Training?

To quickly address one possible misconception, evaluation is not the same as assessment. Assessment refers to testing the employee/learner who has completed the training. Assessment is only one part of evaluation. The focus of the evaluation effort is the training itself, not the employees who completed it. The trainer is essentially asking, "Was the training any good and did it work?"

### What Z490.1 Says

Section 6.1 of ANSI/ASSE Z490.1 establishes some basic guidelines, then Section 6.2 introduces the standard four-level training evaluation method widely known as the Kirkpatrick model (see *PS*, August 2017, pp. 20-21). In short, that four-level training evaluation model involves these steps:

- 1) Gather each learner's reaction, often through an evaluation form or survey.
- 2) Assess each employee's ability to satisfy the learning objectives of the training through a hands-on exercise, skill demonstration, role-play, written test or some other form of assessment.
- 3) Observe employee performance on the job after the training to determine whether the worker is implementing the training on the job.
- 4) Use the information from the evaluation process to continuously improve the training.

### The Four Levels of Training Evaluation

Level 1 evaluation aims to gather each employee's reaction to the safety training. While some trainers achieve this through discussion, many do so with a survey or evaluation sheet.

However, studies have found that these evaluation sheets are often written in a way that reduces the value of the information they provide when completed. In particular, it is best to avoid questions that ask employees whether they "liked" the training or trainer; questions and answer options that do not provide

specific, well-defined and actionable information; and numerical, Likert-scale answer options.

A great resource for writing effective evaluation forms is Will Thalheimer's *Performance-Focused Smile Sheets: A Radical Rethinking of a Dangerous Art Form* (<http://bit.ly/SmileSheet>).

Level 2 evaluation aims to assess whether an employee can satisfy the learning objectives of the training. So, a trainer will want to create an assessment that is a legitimate test of the learning objective, such as skill demonstration, role-play, written or online test, or even online training that incorporates scenario-based learning or virtual reality.

No matter the form, the primary goal is to create an assessment that requires employees to perform an action similar to those they would perform on the job. For additional tips on creating effective assessments/tests, visit <http://bit.ly/SafetyTrainingTests>.

Level 3 evaluation occurs when workers are back on the job. The goal is to verify whether workers are implementing the desired safe actions. If so, great. If not, do not rush to judgment. It may not be the employee's fault and it may not be that the safety training was ineffective.

Other factors may prevent a worker from putting training into action. In these situations, the best approach is to talk with the worker in a friendly manner and identify why s/he is not incorporating the training on the job. Many contributors to the *Safety Differently* blog have thoughts on this topic. Find their perspectives at <http://bit.ly/SafetyDifferently>.

Certainly, if a Level 3 evaluation reveals a problem with safety training, a trainer must take steps to revise the content.

Finally, a Level 4 evaluation assesses whether a key safety and/or business metric changed in a desired, positive direction from before the training to after the training. To capture this measurement, a trainer must 1) identify metrics to measure and observe before the training was implemented, and 2) continue monitoring and observing them over time.

### Alternative Methods of Training Evaluation

When trainers discuss training evaluation, it usually involves the four-level Kirkpatrick model. However, other options are available. For example, there is the updated New World Kirkpatrick Model. Read more about it at <http://bit.ly/NewKirk>. Other approaches include the Brinkerhoff Success Case Method (<http://bit.ly/BrinkSCM>) and models by Kaufman and Anderson (<http://bit.ly/4TrainEvals>).

### The Point of Evaluation: Continuous Improvement

The goal of all training evaluation is to make sure training is working and to improve it over time. That will be the focus of the next article in this series.

The focus of the evaluation effort is the training itself. The trainer is asking, "Was the training any good and did it work?"



### Training Evaluation Resources

#### Evaluation Forms

- <http://bit.ly/SmileSheet>

#### Assessments/Tests

- <http://bit.ly/SafetyTrainingTests>

#### Skill Transfer

- <http://bit.ly/SafetyDifferently>

#### Evaluation Models

- <http://bit.ly/NewKirk>
- <http://bit.ly/BrinkSCM>
- <http://bit.ly/4TrainEvals>

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# Continuous Improvement of Safety Training

By Jeff Dalto

In 2016, ASSE and ANSI updated the national voluntary consensus on OSH training, Z490.1. This article is the sixth in a series reviewing parts of that standard and providing tips for implementing it. This article examines the continuous improvement of safety training.

There is a good chance you are familiar with the concept of continuous improvement already from different parts of your work, so it should seem only natural to apply continuous improvement to safety training as well.

### What the Standard Says

Section 6.3 of Z490.1 addresses continuous improvement, mentioning that trainers should use information from training evaluations (see "Evaluating Safety Training: How to Know How You Are Doing," *PS*, September 2017, p. 28) and from incident investigations, observations, audits and inspections to direct the continuous improvement efforts. Let's review several ways to do that.

### The Four Levels of Training Evaluation

Reviewing post-training learner surveys is a good starting point. Remember that these surveys glean more useful information if, instead of assessing whether people liked the training, they focus on whether people feel they can work safely.

Tests and other assessments that learners complete just after the training yield helpful information. Remember the purpose of these tests is not only to assess learner knowledge and skills, but also to signal the instructor if training was deficient. If people consistently fail the assessment or one item in the assessment, this may indicate a problem with the training, not just with the learners.

While doing well on a test immediately after training is nice, it does not ensure that the learners will apply the knowledge and skills on the job. For example, one easy explanation is the so-called forgetting curve, in which much of what people learn in training is essentially lost in a short period. To combat this, reinforce the training with a series of refresher trainings (sometimes called spaced practice).

Finally, monitor key business goals or key performance indicators that the safety training was intended to support. Examples for safety training include measures such as incident rates. However, remember that even a low incident rate does not indicate that training is effective. On the flip-side, incidents and other undesirable safety metrics may not be because the safety training needs improvement, but that possibility should be considered.

### Safety & Health Management Systems

As noted, the Z490.1 standard also suggests looking at "incident investigations, observations, audits and inspections" when aiming to improve safety training.

Doing so will have a positive effect on safety training, and calling those tools out reinforces the

benefits of a robust, integrated safety and health management system so that safety efforts such as incident investigations and safety training are not simply isolated silos at work. The more the left hand works together with the right hand on safety issues, the better.

As readers may know, the ANSI/ASSE Z10 standard covers safety and health management systems. In addition, ISO 45001 ([http://bit.ly/ISO\\_45001](http://bit.ly/ISO_45001)) is on its way soon. This guide (<http://bit.ly/HSMSsystems>) may also help readers implement a safety and health management system in their workplace.

### Other Times to Improve Safety Training

OSH professionals should always look for opportunities to improve safety training. Here are a few ideas to get you thinking.

#### Something New

Are you making a new product? Have you developed a new process? Are you using a new material? What about a new machine or new equipment? Has your organization acquired new workers through a merger or acquisition? These are reasons to consider revising safety training.

#### Something Has Changed

Is the company using material X instead of material Y to make widgets? Was the production line moved to a new area or a new facility? This is an invitation to return to the training and modify it accordingly.

#### You Have Learned Something

The fact that you are an ASSE member, reading *Professional Safety* and reading this article suggests that you are a lifelong learner involved in your own continuous improvement. Be sure to funnel individual continuous improvement into the continuous improvement of safety training as well.

For example, perhaps you just learned about a workplace hazard that you did not know about before. Or maybe you have been introduced to a new perspective on safety that opened your mind to something you had not considered before. Perhaps you learned something about training and how people learn; no one knows everything there is to know about training, and researchers are actively learning more about it everyday.

Whatever the motivation, be sure to churn your own learning and self-improvement back into the safety training continuous improvement effort.

### Coming Next

The next article in this series will examine technology and safety training. Among other things, it will be an opportunity to discuss more about the upcoming ANSI/ASSE Z490.2 standard on virtual safety training.

Be sure to funnel individual continuous improvement into the continuous improvement of safety training as well.



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