EFFECTIVE SAFETY TRAINING
WHO AM I?

Senior Learning & Development Specialist @ Convergence Training

- Instructional Designer
- More than 20 Years in Training
- More than 10 Years in Safety Training
- Regular Articles in ASSE’s Professional Safety Magazine on Safety Training
- Contributor to ASSE/ANSI’s Upcoming Z490.2 Standard on “Virtual Safety Training”

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WHAT TO EXPECT
What Makes Safety Training Effective?
Why Do We Deliver Safety Training?
Workers work with hazardous chemicals
1. Introducing ANSI Z490.1
2. Writing Learning Objectives
3. Selecting Training Delivery Methods
4. Developing Training Materials
5. Evaluating Training Effectiveness
INTRODUCING ANSI Z490.1
What Is ANSI Z490.1?
Criteria for Accepted Practices in Safety, Health, and Environmental Training
What ANSI Z490.1 Covers

Section 1: Scope, Purpose, and Application

Section 2: Definitions

Section 3: Management of a Comprehensive Training Program

Section 4: EHS Training Development

Section 5: EHS Training Delivery

Section 6: EHS Training Evaluation

Section 7: EHS Training Documentation and Recordkeeping

Annexes: (a) References, (b) Training Development Guidelines, (c) EHS Trainer’s Checklist, and (d) Virtual Learning
ANSI Z490.1 Section 4: EHS Training Development

- Training Development
- Training Needs Assessment
- Learning Objectives
- Course Design
- Training Delivery Methods
- Evaluation Strategy
- Criteria for Completion
- Continuous Improvement
Quick Side Note: ANSI Z490.2, “Virtual” Safety Training

ANSI Z490.2—ANOTHER UPDATE ON NATIONAL STANDARD FOR VIRTUAL OCCUPATIONAL SAFETY, HEALTH, AND ENVIRONMENTAL TRAINING

As you may remember, I'm part of a group of people helping to create the upcoming ANSI/ASSE Z490.2 standard on “virtual occupational safety, health, and environmental training” and I've been writing periodic blog articles with updates on the status and little behind-the-scenes views of how a standard is created.

I wrote an earlier article that explains Z490.2 is in creation and that explains some base-level details, such as what is its relation to Z490.1, and a second article as we began working on Z490.2.

In this article, we'll tell you of the most recent developments, which came about as a result of a phone conference the group members had to discuss the new safety training standard.
What Is a Learning Objective?
What you want the employees to be able to do after training
Rough First-Draft Example

“Explain the elements of a GHS-aligned chemical label”

Other Examples:

- “Safely perform a machine changeover”
- “Perform all steps of safely entering a permit-required confined space”
What Are Qualities of a Good Learning Objective?
SMART and ABCD
Qualities of a Good Learning Objective: ABCD & SMART
ABCD: Four Parts of a Learning Objective

- Actors
- Behavior
- Conditions
- Degree
Writing Learning Objectives

Qualities of a Good Learning Objective: ABCD

Sample Problem Example

Employees must correctly identify and explain the elements of a GHS-aligned chemical label on various chemical containers with no failures.
Employees must correctly identify and explain the elements of a GHS-aligned chemical label on various chemical containers with no failures.
Sample Problem Example: Behavior

Employees must correctly identify and explain the elements of a GHS-aligned chemical label on various chemical containers with no failures.
Writing Learning Objectives

Sample Problem Example: **Conditions**

Employees must correctly identify and explain the elements of a GHS-aligned chemical label **on various chemical containers** with no failures.
Employees must correctly identify and explain the elements of a GHS-aligned chemical label on various chemical containers with no failures.
Does this learning objective have all four parts (ABCD)?

When each of five work areas are listed, employee must identify proper PPE for each work area with no errors.
Does this learning objective have all four parts (ABCD)?

Employee must identify emergency exits.
Five Traits of a Learning Objective: **SMART**

- Specific
- Measurable
- Achievable
- Relevant
- Timely
Qualities of a Good Learning Objective: SMART

Sample Problem Example

Employees must correctly identify and explain the elements of a GHS-aligned chemical label on various chemical containers with no failures.
Employees must correctly identify and explain the elements of a GHS-aligned chemical label on various chemical containers with no failures.
Sample Problem Example: **Measurable**

Employees must correctly identify and explain the elements of a GHS-aligned chemical label on various chemical containers with no failures.
Employees must correctly identify and explain the elements of a GHS-aligned chemical label on various chemical containers with no failures.

Sample Problem Example: Achievable
Sample Problem Example: Relevant

Employees must correctly identify and explain the elements of a GHS-aligned chemical label on various chemical containers with no failures.
Employees must correctly identify and explain the elements of a GHS-aligned chemical label on various chemical containers with no failures.
Employee must understand process safety management (PSM) regulation.
Write a learning objective that would make sense for EHS training at your workplace.
SELECTING TRAINING DELIVERY METHODS
Training Delivery Methods

- Instructor-led classroom
- Field-based training
- Mentoring/shadowing/following
- eLearning/online
- Written training materials
- Video
- Etc.
What is the BEST kind of training?
Blended Learning
Blended Learning

“Evidence from hundreds of media comparison studies shows that learning effectiveness does not depend on the delivery medium, but rather reflects the best use of basic instructional methods...

evidence suggest that blended learning environments are more effective than pure classroom or pure digital learning...

The U.S. Department of Education found a significant learning advantage to courses using media blends compared to pure classroom-based or pure online learning.”

--Dr. Ruth Colvin Clark, Evidence-Based Training Methods
“In the first section of the report, five meta-analyses were summarized, comparing eLearning and learning technologies in general to traditional and classroom practice.

Overall, these meta-analyses found that eLearning tends to outperform classroom instruction, and blended learning (using both online learning and classroom instruction) creates the largest benefits.”

--Dr. Will Thalheimer,
*Does eLearning Work? What the Scientific Research Says!*
What Are Some Ways to Select Best Training Delivery Method?
Adequate Feedback for Questions/Concerns

- Less Feedback
- More Feedback
Adequate Feedback

**Less Feedback**

*Example:* Location of Emergency Exits

- Written training materials
- Videos
- Simple linear eLearning
- Webinars
Adequate Feedback

**A Little More Feedback**

*Example:* Use of Machine Guarding & When It’s OK to Remove Guarding

- Classroom/group training
- Field-based assessments
- OJT skill demonstrations
Selection of Training Delivery Methods

- One-on-One/person-to-person
- OJT mentoring/shadowing
- Classroom
- Real-world simulations
- eLearning simulations

A LOT of Feedback

Example: Respiratory Protection Program
Adequate Feedback

You Can Give Feedback in Many Ways

Incorrect.

The potential problems in this picture include loose objects, debris, and fluid on the ground in the crane's area of operation. The color of the lines on the floor is not relevant to crane safety. The roll-up doors being open or closed is also not relevant to crane safety.

OK
Write down examples of training needs at your workplace that require:

1. Almost no feedback
2. A little feedback
3. A lot of individual feedback
DEVELOPING GOOD SAFETY TRAINING
What are good places to get information for training?
From “Reputable Sources”
What are some “reputable sources” for training content?
Reputable Sources for Training Content

PROFESSIONAL SAFETY ORGANIZATIONS
- AIHA
- ASSIST
- National Safety Council

REGULATORY AGENCIES
- OSHA
- MSHA
- CSB

SAFETY & HEALTH JOURNALS

ACCEPTED SCIENCE

SUBJECT MATTER EXPERTS
- Engineers
- Managers
- Workers

MANUFACTURERS & MANUALS
Once you have good information, how can you present it for most effective learning?
Instructional Design
10 Tips from Instructional Designers

- Match Content to Learning Objective
- Use Adult Learning Principles
- Awaken Prior Knowledge
- Watch the Time
- Speak Their Language
- Show and Tell – Use Visuals
- Storytelling
- Have Them Think About Their Learning
- Testing: Practice Tests & Real Tests
- Refresher Training
Employees must correctly **identify and explain the elements of a GHS-aligned chemical label on various chemical containers with no failures.**
Hazard Communication Standard Labels

OSHA has updated the requirements for labeling of hazardous chemicals under its Hazard Communication Standard (HCS). As of June 1, 2015, all labels will be required to have pictograms, a signal word, hazard and precautionary statements, the product identifier, and supplier identification. A sample revised HCS label, identifying the required label elements, is shown on the right. Supplemental information can also be provided on the label as needed.

For more information:
OSHA Safety and Health Administration (800) 321-OSHA (6742) www.osha.gov

SAMPLE LABEL

Product Identifier

Company Name:
Street Address:
City:
Postal Code:
Country:
Emergency Phone Number:

Supplier Identification

Hazard Pictograms

Signal Word
Danger

Highly flammable liquid and vapor. May cause liver and kidney damage.

Precautionary Statements

Keep container tightly closed. Store in a cool, well-ventilated place that is locked.
Keep away from heat/sparks/open flame. No smoking.
Only use non-sparking tools.
Use explosion-proof electrical equipment.
Take precautionary measures against static discharge.
Ground and bond container and receiving equipment.
Do not breathe vapors.
Wear protective gloves.
Do not eat, drink or smoke when using this product.
Wash hands thoroughly after handling.
Dispose of in accordance with local, regional, national, international regulations as specified.

In Case of Fire: use dry chemical (BC) or Carbon Dioxide (CO2) fire extinguisher to extinguish.
First Aid
If exposed call Poison Center.
If on skin (or hair). Take off immediately any contaminated clothing. Rinse skin with water.

Supplemental Information

Directions for Use

Fill weight:________________ Lot Number:________________
Gross weight:________________ Fill Date:________________
Expiration Date:________________
**Adult Learning Principles**

- Self-directed
- Have life experiences
- Goal-oriented
- Task-oriented
- Want to learn within their own schedule
- Learn when motivated
- Want to feel respected
What’s an example of how you can appeal to adult learning principles in your own EHS training at work?

(I’ll go back to previous slide...)
Awaken Prior Knowledge
Awaken Prior Knowledge

What’s an example of “awakening prior knowledge” that could be used before a Haz-Com training session?
4 Watch the Time
What’s the right amount of time for training?
Speak Their Language
“It is imperative to all individuals involved that the equipment be stopped and remain still while the work is being performed.”
“For everyone’s safety, when maintenance is done on the machine, the machine must be stopped and remain still the entire time.”
Watch out for:

- Formal language
- Long, complex sentences
- Specialized terms
- Jargon
- Acronyms
- Abbreviations
- Stereotypes
- Clichés
- Potentially unfamiliar cultural references
Who here is responsible for training a multi-language workforce? Or workers who don’t speak English as a first language?
#### 5. Speak Their Language

- **SEGURIDAD DE MONTACARGAS**
  - Factores de estabilidad
  - Un montacargas estable tiene un centro de gravedad que es bajo y cercano a la mitad del montacargas, bien del centro de la pirámide de estabilidad. Factores que

- **DRAHTSEIL BASICS**
  - Regelübige und Lang Lay
  - Drahtseile sind aufgrund ihrer Komposition aus hoher Stärke und Flexibilität das am häufigsten verwendete Anschlagmittelmaterial. Ohne Drahtseile wäre die Durchführung der meisten Hebezeugarbeiten unmöglich.

- **吊车起重索具安全**
  - 吊装装置的类型
  - 有四种基本类型的结构的：
    - 钢丝绳
    - 链条
    - 钢丝绳
    - 铝合金钢丝绳
Show and Tell – Use Visuals

Language → Images

Developing Training Content
What tools do you use to create visuals at work?
Tools for Visuals

- Flip Charts and White Boards
- Photos
- Videos
- Clip Art
- SmartArt
Show and Tell – Use Visuals

Tools for Visuals
Developing Training Content

Storytelling

What did I learn?
Who’s willing to share a story they tell in their own safety training?
Have Them Think about Their Learning

What did I learn?
How many of you have stopped to ask yourself how much you’ve learned, or what you’ve understood/don’t understand?
Testing
Developing Training Content

Testing

OVERHEAD CRANE BASICS

This image shows the area of operation of an overhead crane. Select all of the potential safety problems. (Select all that apply.)

☐ A. The lines on the floor are the incorrect color
☒ B. There are loose objects and debris in the crane’s area of operation
☒ C. There is fluid on the ground in the crane’s area of operation
☐ D. The roll-up doors should be open for proper ventilation

OVERHEAD CRANE BASICS

Identify the major components of an overhead crane. (Drag the letter from the left to its correct place on the right.)

A. Hook
B. Controller
C. Trolley
D. Jib
What form of testing have you been through in this session?
Refresher Training & Spaced Practice
Refresher Training & Spaced Practice

“Typical” Learning and Forgetting Curves

- Learning Curve
- Forgetting Curve
- Completion of initial training
Refresher Training & Spaced Practice

Comparison: Initial Training with No Spaced Practice vs. with Spaced Practice

- GREATLY improved retention with spaced practice
- Minor and temporary additional difficulties in learning with spaced practice
- Completion of initial training
How often do you lead safety trainings on safety topics X or Y?
Bonus Tip: Research “Desirable Difficulties”

make it stick

The Science of Successful Learning

Peter C. Brown
Henry L. Roediger III
Mark A. McDaniel
TRAINING EVALUATION
How do you know if EHS training was effective?
Four Levels of Evaluation

1. Employee Reaction
2. Measurement of Learning
3. Observed on-the-Job Behaviors after Training
4. Effect on Business Goals
Employee Reaction

**Example:** Surveys delivered to employees immediately after training.
Write a “good” survey question to get employee reaction after training.
Employee Reaction Surveys: Some Tips

- Focus on how well the training prepared worker to apply/use information on job
- Avoid questions about “liking” training
- Provide clear and meaningful answer options to employees
- Create questions and answer options that provide meaningful and actionable information to for evaluation/revision
Employee Reaction Examples: Are These Good or Bad?

How much did you like this training? Rate on a score of 1-5.

True or False: This training prepared me well to work safely in the field.
How prepared are you to apply what you just learned during training?

**My Test Questions:**
- Not at all.
- I have some awareness of the concepts taught, but will need more training to do this on the job.
- I can do this on the job, but will need more training to be fully competent.
- I am fully competent.
Example: Testing immediately after training
What are some ways to “test” employees immediately after training?
What should your test be about?
Focus on Your Objective

Learning Objective  
Training Content  
Test/Test Questions
Employee must correctly identify and explain the elements of a GHS-aligned chemical label on various chemical containers with no failures.

My Test Questions:

- “What type of hazard does this GHS pictogram represent?”
- “What type of information is in the precautionary statement on a GHS label?”
Write a test question (or performance assessment) for your learning objective.
Example: Going out into field, sometime after training has happened, to see if workers are applying training on job
What are some productive ways to interact with employees while observing their on-the-job behaviors after training?
Tips for Observing On-the-Job Behaviors

Recognize

Remind

Investigate
Effect on Business Goals

Did training lead to on-the-job behaviors that had positive effect on business goals?
What are some examples of business goals that safety training might affect?
Reduced Safety Incidents

218 Days since the last lost time accident on this site
What’s the purpose of training evaluation?
WHAT WE LEARNED
1. **ANSI Z490.1**
2. **Writing Learning Objectives**
   - ABCD & SMART
3. **Selecting Training Delivery Methods**
   - Blending & “Adequate Feedback”
4. **Creating Training**
   - Credible Information & Good Instructional Design
5. **Evaluating Training Effectiveness**
   - Four Levels & Continuous Improvement
QUESTIONS?
What’s Next / Additional Resources

– *Questions:* Here/now or at Convergence table (booth 108)

– *Leave your card* on table in front and I’ll email you a series of resources

– *Take my card* from table in front and email me or check our blog

– *Hand-outs* give URL for Convergence Training blog article with webinar on this topic plus a lot of related articles

– *Put it to use!* Use it or lose it!

– *Review it and build on it!*