

DESIGN DOCUMENT – ITF VR SAFETY TRAINING MODULE

SUMMARY

This document serves as the design plan for the virtual reality Jobsite Safety Training module to be produced for the International Training Fund (ITF).

TRAINING OVERVIEW

This virtual reality experience is intended to immerse learners in a jobsite to practice decision-making skills surrounding targeted safety issues. The experience will allow learners to encounter potentially life-threatening situations in the safety of a virtual environment.

By the end of this experience, the learner should have a greater understanding of the safety issues on a jobsite, including their responsibility to monitor themselves and others, what issues to be aware of, how to mitigate identified issues, and where to access additional information about jobsite safety and OSHA safety regulations.

TARGET AUDIENCE

The target audience includes any apprentice or journeyman that is interested in or required to learn more about jobsite safety.

TYPE OF TRAINING

This will be an online exploratory module that will be driven by content created by Mosaic Learning (ML) and delivered through the Virtual Reality Library (VRL), intended to easily deploy any number of VR training modules to the local union training centers.

Learners must be located at the Training Center and equipped with the VR headset and controllers to participate in this training. Training facilitators will orient the learner and will launch the module after logging into the VRL. Learners will explore the virtual jobsite until they have encountered each hazard in the module or until they (or their instructors) feel comfortable with their experience.

ASSUMPTIONS

ML has made the following assumptions in designing this training module:

- Learners have received some form of previous basic training about OSHA Focus Four jobsite safety hazards and basic Personal Protective Equipment (PPE) protection.
- This module is a part of a larger learning experience for industry or safety training.
- Learners are inexperienced with learning in a VR environment.

CONTENT REQUIREMENTS

Key content requirements of this training experience include that:

- It will take from 10 to 15 minutes to complete.
- The jobsite environment will be a mechanical room with mezzanine that encompasses all of the designed hazards interactions.
- Learners will use simple controller movements to navigate through the virtual environment ("teleport"), and, where applicable, to manipulate objects in the environment or answer questions posed to resolve safety issues.
- The experience will introduce from 5 to 8 hazard interactions from the OSHA Focus Four of the most encountered jobsite safety hazards, as identified and approved of by the UA.
 - ML will work with UA subject matter experts (SMEs) to identify specifics of each chosen hazard, the interaction and remediation.
 - Wherever possible, interactions will allow learners to take simple actions to resolve safety issues and proceed (e.g., moving a ladder or placing safety cones).
 - Wherever feasible, actual consequences of incorrect actions will be displayed (e.g., ignoring a misplaced ladder, learner hears a noise and "looks back" within the environment to see the ladder on a fallen coworker).
 - Interactions may include answering questions within the environment to proceed.
 - All interactions will include brief remediation of correct/incorrect responses or actions taken or ignored (text response or consequences visually displayed).
 - Remediation will include an Information (i) icon that, when selected, reveals a brief statement of the OSHA regulation covered or the UA Standard for Safety or UA Standard for Excellence addressed.
- To reinforce the mindset of personal safety on the job and how PPE can change depending on the work at hand, learners will be prompted to check their PPE as they enter the room and as they enter each new hazard area.

- For each interaction or area of interactions, they will view a panel of possible PPE items to choose from (including distractors) on a worker (e.g., gender-neutral human outline) and select items they need for that area. They will not be allowed to proceed without "proper PPE."
- The PPE interaction will be built as one of the "hazard interactions" (e.g., platform safety issue of no harness) but may be included up to 4 additional times with slight modifications to PPE requirements to allow for continuous PPE checks within budget.

DESIGN CONSIDERATIONS / CONCEPT

ML will design the VR environment to allow logical, easy movement among several areas, each of which presents specific identified hazards. As the learner moves into the virtual workspace and into new areas, they will be prompted to reconsider their use of PPE and to consider applicable regulations (through links to this information or feedback through information icons).

The exact design and layout of the mechanical room space will be finalized as hazard interactions are defined and approved. To guide discussion, ML has developed a basic graphical Mechanical Room Layout on a virtual whiteboard at https://realtimeboard.com/app/board/o9J_k0edE-8/. This layout will be referenced below in the Objectives section of this document. Approval of this concept/layout and the actual hazards will take place in the next phase of development.

TECHNICAL REQUIREMENTS

The immersive VR environment will be designed to function with the Oculus Rift headset and controllers. ML recommends the following to maximize use of this technology at each Training Center (one set of requirements per learner to experience the training at any one time):

- Oculus Rift + Touch bundle, including the headset, touch controllers, and two sensors. A third sensor is recommended for larger scale experiences as tracking can be lost when facing away from the sensors.
- Minimum working area of 3'x3' and maximum area of 10'x10', clear of all obstacles and with no distractions.
- Computer maximized for use with the Oculus Rift. (Contact ML for specific recommendations or visit <https://www.oculus.com/rift/#oui-csl-rift-games=mages-tale> and view Recommended PC Specifications.)

DELIVERABLE

ML will develop and deliver one Jobsite Safety Training module in VR format with Oculus Rift functionality, including 5 to 8 hazard interactions.

This deliverable will not have SCORM reporting capabilities or report on specific activities; such functionality may be requested for additional cost.

OVERVIEW OF TRAINING DESIGN/INSTRUCTIONAL FLOW/OBJECTIVES

The following tables detail all objectives for this learning experience. Each module objective corresponds to a Bloom's Taxonomy level objective. Bloom's Taxonomy knowledge levels are derived from best practices for adult learning design as documented in the American Council on Education (ACE) Evaluator Handbook. The alignment of objectives to content is intended to provide a one-to-one correlation between learning objectives and content, to inform design of the overall learning experience.

For specific information on how each objective will be assessed, please refer to the tables below.

KNOWLEDGE LEVELS

The objectives will be based on Bloom's Taxonomy and will relate directly to what a learner is required to master in order to show proficiency in the following content areas:

- K1: Remember
- K2: Understand
- K3: Apply
- K4: Analyze
- K5: Evaluate
- K6: Create

TERMINAL LEARNING OBJECTIVE

Given basic current OSHA and industry information regarding construction worksite illnesses, injuries, and/or fatalities, learners will be able to recognize Focus Four Hazards in construction and apply understanding of PPE, OSHA regulations, and UA Standard for Safety to protect themselves and others on the job. Specifically, by the end of this training, learners will be able to:

MODULE OBJECTIVES

Objective Number	Module Objective	Knowledge Level
01	Identify major hazards in four areas as described in the OSHA Focus Four (Falls, Caught-In or -Between, Struck-By, and Electrocution).	K2
02	Choose how to resolve specific hazardous situations in the OSHA Focus Four areas to protect themselves and others.	K6
03	Evaluate PPE requirements for jobsite interactions.	K5
04	Describe how to access guidelines that apply to the jobsite, including applicable OSHA regulations and the UA Standard for Safety and UA Standard for Excellence.	K2
05	Explain how understanding the UA Standard for Safety may affect safety on the jobsite.	K2

Objective numbering in the following tables follows the convention of Module objective number, hazard number, and number of objective within the hazard. For example: *03.0101* indicates first objective of the first hazard, which covers the third overall module objective (reading backwards).

HAZARD COMPONENT 1: ENTRANCE AREA AND PPE CHECKS

This component presents learners with a basic understanding of safety considerations when they enter a jobsite, including PPE, OSHA safety regulations, jobsite and customer requirements, and UA Standard for Safety. From a practical perspective, the entrance area also orients learners to using the Oculus controls to navigate the training experience. This component is represented on the Mechanical Room Layout by the Entrance Area and PPE CHECKS that take place as the learner enters a new area of the Mechanical Room. Additional options for reinforcing understanding of cell phone use on the jobsite are represented by Cell Reminder interactions in two work areas, in which the learner encounters a worker using a cell phone and must interact briefly to indicate their understanding of policy and the UA Standard for Safety and UA Standard for Excellence.

After completing this component, learners will be able to:

Objective Number	Module Objective	K Level
03.0101	Recall when to check for PPE requirements when entering different environments or work situations.	K2
03.0102	Identify PPE required for general jobsite safety.	K2
03.0103	Identify PPE required for materials storage area safety.	K2
03.0104	Identify PPE required for machine shop safety.	K2
03.0105	Identify PPE required for prevention of electrical shock.	K2

03.0106	Identify PPE required to prevent falls when working on elevated platforms or work areas.	K2
04.0105	Use controls to view posters related to the UA Standard for Safety and UA Standard for Excellence and learn how to access complete guidelines.	K2
05.0106	Describe how the UA Standard for Safety correlates to safety on the job.	K2

HAZARD COMPONENT 2: FALLS

This component presents learners with hazards relating to falls in construction areas and suggests the interaction between hazards that may increase the possibility of injury on the job (e.g., *falling* objects creating a *struck-by* incident). This component is represented on the Mechanical Room Layout by interactions in the Scaffolding/Ladders and Confined Spaces areas, including hazards related to working with scaffolding, ladders, and open floor areas (see H1 – H4). After completing this component, learners will be able to:

Objective Number	Module Objective	K Level
01.0201	Recognize incorrect placement of a ladder on the jobsite.	K2
01.0202	Explain the procedure for ensuring that scaffolding is safe for use.	K2
01.0203	Describe why unguarded floor openings on the jobsite represent dangerous fall and struck-by hazards.	K2
01.0204	Identify unattended tools and materials as potential struck-by hazards.	K2
02.0205	Demonstrate correct placement of a ladder on the jobsite.	K3
02.0206	Demonstrate understanding of inspection requirements for scaffolds prior to use.	K3
02.0207	Practice placing protective guards on and around floor openings.	K3
02.0208	Practice retrieval and storage of tools or materials that may contribute to struck-by incidents.	K3
03.0209	Identify PPE required for fall protection when working on an elevated platforms or work areas.	K2

HAZARD COMPONENT 3: STRUCK-BY

This component presents learners with hazards relating to being struck-by objects on a construction site. This component is represented on the Mechanical Room Layout by interactions in the Materials Storage (H5a) and Confined Space (H5b) spaces. After completing this component, learners will be able to:

Objective Number	Module Objective	K Level
01.0101	Identify unattended tools and materials as potential struck-by hazards.	K2
01.0102	Describe basic requirements for ensuring a safe lift with a gantry crane.	K2
02.0101	Practice retrieval and storage of tools or materials that may contribute to struck-by incidents.	K3
02.0102	Demonstrate how to prevent hazards created by dropped objects.	K3
02.0103	Demonstrate areas to inspect for ensuring a safe lift with a gantry crane.	K3
03.0101	Identify PPE required for struck-by protection.	K2

HAZARD COMPONENT 4: CAUGHT-IN OR -BETWEEN

This component presents learners with hazards relating to caught-in or -between issues in a construction machine shop. This component is represented on the Mechanical Room Layout by an interaction in the Machine Shop space (H6). After completing this component, learners will be able to:

Objective Number	Module Objective	K Level
01.0101	Identify equipment that must be protected with machine guards for safe operation.	K2
01.0102	Explain lockout/tagout requirements for construction equipment.	K2
02.0101	Demonstrate how to place machine guards before operating machinery.	K2
03.0101	Identify PPE required for caught-between protection.	K2

HAZARD COMPONENT 5: ELECTROCUTION

This component presents learners with hazards relating to electrocution on a construction site. This component is represented on the Mechanical Room Layout by interactions in the Machine Shop and Materials Storage spaces (H7 and H8). After completing this component, learners will be able to:

Objective Number	Module Objective	K Level
01.0101	Describe how to identify if equipment is energized, using proper PPE and testing equipment.	K2
01.0102	Explain lockout/tagout requirements for construction equipment.	K2
02.0101	Demonstrate proper procedure for intervening when a worker is approaches energized equipment.	K2
02.0103	Demonstrate understanding of the approach boundaries to energized equipment as required by NFPA 70E: <i>Standard for Electrical Safety in the Workplace</i> .	K3
02.0103	Demonstrate actions to take to prevent logout/tagout from being ignored and compromising safety.	K2
03.0101	Identify PPE required for protection from electrocution and arc flash hazards.	K2

ASSESSMENTS

This training incorporates assessment to each interaction that the learner has throughout the environment. Depending on the interaction, assessment may require the learner to move and place objects or select items or answers to questions posed in the environment.

Under the current contract assessments are not recorded or reported on in any way. There are no additional, external assessments on the training.

PRIORITIES

1. The first critical priority is to inform VR environment design by creating targeted objectives that outline the exact hazards that learners should experience and behavioral outcomes of each interaction.
2. A second critical piece to this immersive experience will be the design of the VR environment. The virtual mechanical room environment should present realistic scenarios in context so that learners may practice recognizing and mitigating hazards and internalize responsibilities for safety on the job.

SUMMARY

This design document is the first draft produced by the instructional designer. Internal and client reviews are integral to framing out the relevant content as it relates to this module, with the addition of Content Maps that outline content for each objective. Careful consideration should be given to the module objectives, as well as to how students are to be assessed to show content mastery for each objective. It is recommended that this document be revisited and any “TBD” areas be further elaborated on prior to any development.

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