

“How to Install a Solar Panel the *Right Way*”: Instructional Design Project Overview

Caroline Boschetto

Introduction

A hypothetical small-scale solar panel company needs an efficient and effective way to train new employees on how to safely, efficiently, and correctly install solar panel systems for customers. My mission will be to replace the company’s current on-the-job training approach with a standardized eLearning course.

From a business perspective, the goals of this training include:

1. Training new-hires to carry out their job function of installing solar panels efficiently and effectively to successfully meet installation deadlines and ensure customer satisfaction.
2. Training new-hires on safety practices related to solar panel installation to minimize risk of injury and damage to products or property.

The target audience for this course will be the company’s newly hired installation technicians. This audience should possess a general understanding of electrical engineering and labor industry concepts and best practices. Some participants may have prior experience in solar panel installation, while others may not. We can assume that this audience is fairly motivated to engage with the course, as they will be required to implement the concepts relayed through the module in their daily work duties. The audience will include working professionals between the ages of 18-62 who are high-school graduates.

After completing this elearning training, as well as an in-person practical training component:

1. Employees will be able to demonstrate safe work practices 100% of the time when installing solar panels.
2. Employees will be familiar with the tools and installation processes necessary to carry out installations correctly 100% of the time when installing solar panels.
3. Employees will complete 95% of installations on-time when installing solar panels.

Assessment Techniques

This training program will feature formative assessments following each eLearning module, a summative assessment at the end of the eLearning course, and a skills demonstration assessment following the practical component of employee training. The summative and skills demonstration assessments will be used to assess trainee preparedness to graduate from the training program and begin working on a live installation crew.

The company’s training team will not evaluate trainees based on their scores on the formative assessments, however, these assessments will help trainees gauge their own retention and comprehension of the training content. Formative assessments may include mini quizzes, learning games, and simulation activities. Learners will be prompted to complete a summative

assessment at the end of the course. This assessment will include both declarative and procedural knowledge checks in the form of a variety of question types and formats, as well as simulation activities. Learners will be given three chances to score 100% on the assessment. If they cannot achieve 100% after three attempts, the training manager will connect with the trainee to discuss additional support that they may need/other next steps. Once a trainee passes the assessment, they will move on to the in-person component of this employee training program.

Trainees, along with the training team, will be privy to their summative assessment score in the form of a percentage. Because the purpose of this assessment is to gauge whether or not a student is ready to move onto the in-person training, data regarding the number of attempts students required to pass the assessment will not be captured. In that sense, no formal grading data will be attached to a trainee's record in the way it would be if this were a college course, for example.

Because this eLearning course's summative assessment will be used to judge whether or not trainees are prepared to safely and correctly perform high-responsibility job duties, it is critical that this assessment is both valid and reliable. In order to ensure its reliability and validity, the team will ensure the following:

- The assessment covers the key learning objectives and most critical content elements of the course.
- The assessment is of an appropriate difficulty level and does not aim to "trick" students, nor does it aim to give them an easy A.
- The assessment questions are clear and concise.
- No technical or design errors prevent trainees from completing the assessment fully and correctly.
- The training adequately prepares trainees for success on the assessment.
- The assessment includes a variety of question types.
- The assessment includes enough questions to serve as a reliable measure of students' understanding.

The formative and summative assessments delivered throughout the course will test both declarative and procedural knowledge. Because of the limitations of the virtual classroom, many questions will require students to recount how to perform procedures rather than actually perform them. Simulation activities featured in the course will give students the opportunity to demonstrate their procedural knowledge, however. After the course, students would progress to an in-person training session in which they would have additional opportunities to practice and demonstrate their procedural knowledge of solar panel installation with actual tools and materials.

This course's assessment tool will capture quantitative data on student performance in their assessment because of the technical nature of this training content. Judgements regarding whether ropes access safety procedures were followed correctly or solar panel wiring was

connected correctly, for example, are objective matters. As such, a quantitative rather than qualitative assessment of a trainees' knowledge of how to conduct such tasks will be most appropriate. Because the structure of trainee progress within this training program is pass/fail in terms of whether or not they will move on to in-person training, the most critical data point that will be captured is whether or not students pass the assessment within three attempts. The assessment tool will, however, capture data on each students' assessment attempts. Through this information, the training team can learn which questions pertaining to which topics students answer incorrectly most frequently. Using this information, the training team can make adjustments and improvements to the training program to best support learners in understanding those more challenging topics.

The instructor will take a fairly hands-off approach during the eLearning portion of this course. The formative and summative assessments will be automatically graded without the need for input from the instructor. Students will receive feedback built into the eLearning course itself regarding whether or not they are answering questions correctly and why or why not. Once students move on to the in-person component of this training, the instructor will take the stage and provide direct instruction and feedback to students. The instructor will, however, extend the offer for students to reach out at any point during the eLearning course if they need assistance. During the final skills demonstration assessment, the instructor will conduct the assessment using an objective scoring checklist. Trainees will receive points based on their ability to correctly perform each of the listed installation steps and procedures.

Assessment Tools

The course's formative and summative assessments will be developed using the Adobe Captivate eLearning authoring tool and embedded in the training course. These assessments will include a variety of question formats and activities to support trainees of varying learning styles and produce the most reliable and beneficial assessment strategy. Because of the technical, objective nature of the target behaviors the trainees will learn throughout the course, the assessments will feature question types and activities best suited to assess knowledge of this nature.

Both formative and summative assessments will include multiple choice question sets, true or false questions, fill in the blank questions, matching activities, hotspot activities, and procedural ordering activities. This wide variety of assessment tools will provide ample opportunity for trainees to demonstrate not only their declarative knowledge of correct solar panel installation procedures, but also their procedural knowledge of how an employee should correctly use the given tools and materials to produce the desired results. All assessment tools will be scored objectively and automatically.

An example of a formative assessment activity featured in this training course involves trainees clicking and dragging the correct wires to the correct connection points in order to correctly hook up a solar panel. Trainees will be given feedback after each attempt to complete the activity, providing information regarding why their choice was incorrect and tips for which training sections to return to in order to reinforce their understanding.

An example of a summative assessment activity featured in this training course involves trainees being prompted to place images of an installation procedure in the correct order. The images will display an employee preparing the necessary materials and tools, securing safety ropes, installing the panel brackets, and then attaching the solar panels to the brackets. Trainees must be able to identify the tools, materials, and procedures shown in the images, as well as understand their relationship to one another, in order to complete this assessment.

No URLs are available at this time to electronic tools used for these assessment purposes.

Evaluation

The effectiveness of this training course will be assessed based on several feedback and evaluation tools deployed to evaluate variables of training program graduation rates, trainee knowledge retention, trainee on-the-job performance, and installation project success rates. The data collected from these evaluation mechanisms will be used to assess whether the training initiative met its target goals.

Firstly, collective trainee performance in the eLearning and hands-on training courses themselves will be used to assess whether the eLearning training adequately prepares trainees for their job roles. Because the average new-hire should be able to complete both training components within the designated period of time, if a high number of individuals are unable to do so, this will indicate that improvements are needed to the training materials, the assessment tools, and/or the training timeline.

Following trainee graduation from the training program, the evaluation team will collect data on employee job performance in terms of safety, accuracy, and efficiency. This will be done by requiring installation managers to complete monthly performance evaluation surveys on each of the new crew members for four months following their graduation. These surveys will center on the skills and behaviors demonstrated by the employee (level 3) and the impact that the new employee is having on the overall quality and efficiency of the installation project (level 4). Prior to the rollout of this new eLearning training initiative, managers will be required to complete surveys on crew members who have been recently trained using the old method in order to establish a baseline for comparison.

Trainees themselves will also complete post-training surveys on a monthly basis after joining the installation crew. These surveys will capture data on employee retention of knowledge from training (level 2), as well as their on-the-job practices and behavior (level 3). Lastly, level 4 data will be collected over the six month period on the average installation time and error margin for solar panel installation projects since the new training project has been introduced. This data will be compared to data from months prior to the new training initiative to identify what impact, if any, the initiative has had on the overall success of the company's installation projects.

In order to ensure that all data collected is valid and objective, post-training surveys and performance evaluation questionnaires will be created with a focus on questions that solicit quantitative data. Qualitative responses will be interpreted using an evaluation rubric. Questions will be written in a clear and concise manner to ensure answers directly relate to the data

evaluators aim to capture. Installation managers will also be coached on how to perform effective performance assessments to ensure that they do not allow personal opinions on non-relevant factors such as personality, age, physical characteristics, etc. of an employee to color their reports.

The data collected from these evaluation mechanisms will be used to assess whether the training initiative met its target goals. If employees can complete training in a timely manner and continue to meet or exceed expectations in terms of installation efficiency, safety, and effectiveness while being trained partially through elearning content, the initiative will be deemed a success. After collecting and analyzing evaluation data collected over a six month period, the training team will identify and implement changes to the training program or assessment process if deemed necessary. Depending on the success of the initiative, the company may choose to expand this eLearning approach to training to meet the needs of other departments as well.