# Learners First:

## Creating Engaging and Interactive Learning Experiences

U.S. Department of Transportation
**Federal Highway Administration**

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# Table of Contents

# List of Figures

## List of Tables

# How to Use this Handbook

To be successful in their training, learners need to frequently and meaningfully engage with the course content. There are many instructional strategies, and it is not always easy for course designers and instructors to find ones that match the content, the classroom limitations, and participants' learning needs. This handbook is designed to provide instructors, project managers, subject matter experts, and instructional designers with tools and techniques to help make a course more interactive and engaging. The handbook provides background information to help users select the most appropriate option. Users will also find instructions and examples to help them replicate the strategy or tool in a course. You can choose to read this handbook from cover to cover, or you can focus in on a few tools to use in the course you are currently developing or teaching. Either way, this handbook will be easy for you to navigate and use.

The handbook is divided into three main chapters. Chapter 1 is for both course designers and instructors and explains the importance of learning outcomes, how best to work with adult learners, and ways to meet learners' needs. Chapter 2 is targeted at course designers and makes the link between training needs, learning outcomes, instructional and practice activities, and assessments. Chapter 3 is designed for instructors and provides information on and examples of instructional best practices. All of the instructional strategies and tools mentioned in chapters 1, 2, and 3 are linked to a detailed explanation in the appendix. Follow the links to learn more about the strategy or tool, including a description, its pros and cons, examples, instructions, and application ideas for instructor-led training (ILT), web-based training (WBT), and web conference training (WCT) formats. If you have followed a link to a new section, select the link at the end of the description to take you back to the previous section.

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# Acknowledgements

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# Chapter 1: Information for Course Designers and Instructors

## Working with Learning Outcomes

Learning outcomes, or "objectives," were first described by Dr. Robert Mager, a well-known behavioral psychologist, as the "guides that will guarantee that you are teaching what needs to be taught." Learning outcomes are clearly defined statements that describe the intended results of training. They describe what participants will be able to do when they are competent. They do not describe what instructors will do or the content of the lesson or unit.

Because learning outcomes describe a participant's performance, they begin with an action verb that describes the behavior or skill participants should perform by the end of the unit or course. These outcomes should be both observable and measurable. To illustrate, the verb "describe" is an action verb because we can observe a participant describing something and we can measure the quality of their description using a set of criteria. On the other hand, the verb "understand" is not an action verb because we are unable to observe or measure a participant as they understand. To avoid using "understand," think about what participants would be able to do if they understood a concept and you will be able to determine the appropriate action verb. Sometimes learning outcomes have conditions that explain the performance criteria, such as a time limit or use of a job aid. Course developers design knowledge checks and end-of-course assessments to measure participants' mastery of the learning outcomes.

Learning outcomes are also important because they define the scope of the content. Learning outcomes can help to separate the "nice to know" information from the "need to know" information. Focusing on the content required to achieve the learning outcomes rather than just covering content can show what should be taught and how to determine if the training accomplished what was attended.

Learning outcomes help control the information in a training course and guide the evaluation of participant's mastery of the content. As figure 1 demonstrates, instructional strategies connect learning outcomes with learner mastery. There should be clear alignment between a learning outcome, the instructional strategy, and the assessment used to determine learner mastery. A variety of instructional strategies are described in detail in appendix: Tools and Techniques.



**Figure 1. The connection between learning outcomes and learner mastery**

**Example**

Learning outcomes for a lesson on underwater bridge inspection frequencies.

At the end of this lesson, you will be able to:

- Identify the National Bridge Inspection Standards (NBIS) inspection frequencies for above water bridge inspections
- Identify the NBIS inspection frequencies for underwater bridge inspections
- Explain the difference between the NBIS and the National Bridge Inventory (NBI)
- Estimate the scour undermining of an example bridge

Return to What is the "need-to-know" and "nice-to-know" information?

# Understanding Bloom's Taxonomy

Bloom's Taxonomy organizes learning outcomes (action verbs) into levels according to their cognitive complexity**.** Figure 2 shows the six levels in the revised Bloom's Taxonomy:

1. At the remembering level, participants can remember or recall previously learned information.
2. At the understanding level, participants can demonstrate their understanding by explaining ideas or concepts.
3. At the applying level, participants can use the new information in another familiar situation.
4. At the analyzing level, participants can break information into parts to see how the parts relate to one another and to the overall conceptual structure.
5. At the evaluating level, participants can make judgements using criteria and standards and can justify a decision or course or action.
6. At the highest level, participants can create new ideas, products, or ways of viewing things by reorganizing information into new patterns or structures.
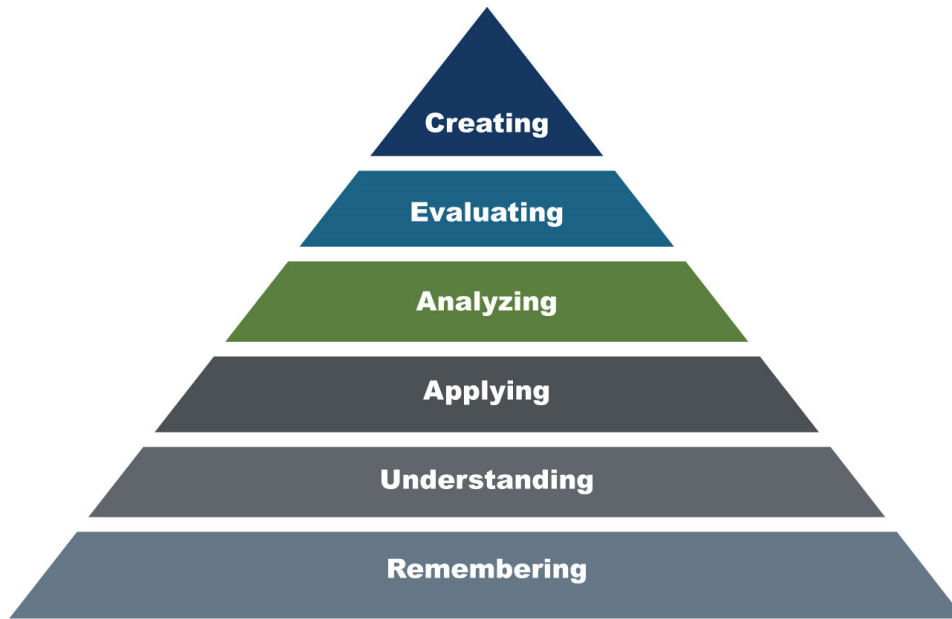
**Figure 2. Bloom's Taxonomy**

Use Bloom's Taxonomy to see how lower-level thinking skills are used to support higher-level skills later in the course. Bloom's Taxonomy can be used as a guide to selecting appropriate instructional strategies and aligning the questions and activities with the learning outcomes.

# Understanding Adult Learners

## Knowles' Adult Learning Principles

To develop courses for adults or to be an effective instructor, it is important that you understand what motivates adults to learn. A lot of what we know about adult learners comes from the research of Malcolm Knowles. He proposed his Adult Learning Theory model. This model states adult learners:

1. Need to know why they should learn.
2. Learn through experience and use their prior experience in the process.
3. Want to take responsibility for their learning.
4. Want learning to be immediately relevant to their lives or jobs.
5. Are task-oriented rather than information-oriented.
6. Respond better to internal versus external motivators.

To be successful as an instructor, step away from the traditional teacher-student role. Instead, adopt a learner-centered approach to training that allows participants to engage with the content and provide them with problem-solving opportunities. Participants bring a wealth of knowledge and experience to the classroom, but they

need help connecting it to new information. Explain how participants can use the training to improve their lives or jobs, and create a supportive learning environment, so participants will be less anxious about making mistakes when trying something new.

For more information on meeting the needs of adult learners, you can refer to the following NHI publications:

- *The Circle of Learning*, https://www.nhi.fhwa.dot.gov/resources/docs/circle_of_learning.pdf
- Adult Learning Considerations, https://www.nhi.fhwa.dot.gov/resources/docs/adult_learning.pdf

## Learning and Instructional Preferences

It is important to remember that when we learn, we access information through different sensory pathways or modalities. Some researchers have identified four modalities of learning: visual, auditory, reading/writing, and kinethestic and it was thought that learners prefer one modality over another. However, other researchers found that participant learning preferences for learning change depending on the content or the task. For example, there may be times when participants are most successful if they take notes or build a model. Other times watching a video or reading an article clarifies a concept for them. Sometimes they benefit from discussing or debating ideas, and other times they may prefer to work alone with a checklist or set of procedures.

It is also important to recognize that personal learning preferences can affect an instructor's style. Instructors may rely on a certain style of instruction such as discussions as a way for participants to use their new knowledge, or include short reflective writing activities and graphic organizers because they have worked in the past. However, participants may not always find those activities beneficial. To appeal to different preferences and deepen their understanding, it is a best practice to provide participants with more than one way to engage with the content. It is a good idea to plan a mix of activities so participants to discuss, create, organize, and reflect on their learning.

For more information on learning preferences, refer to the NHI publication, *The Circle of Learning,* https://www.nhi.fhwa.dot.gov/resources/docs/circle_of_learning.pdf

## Working with Different Types of Learners

Educational researchers Peter Honey and Alan Mumford looked into the different ways people approached the learning process. Using the results from their learning style questionnaire, they identified four types of learners:

- **Activists**—people who learn by doing
- **Theorists**—people who like to understand the theory behind the concept

- **Pragmatists**—people who need to put learning into practice
- **Reflectors**—people who learn by observing and thinking about what happened

The participants in any course will likely include a mix of these types of learners. It is important that you, as their instructor, understand how each group prefers to engage with the content and which activities are most fulfilling to them.

## Activists

Have you had participants who seemed disinterested in the lecture and immediately started looking ahead in their workbook? Or began exploring the software or the equipment before instructions are finished? These people are what Honey and Mumford called "activists." They want to learn by doing and are willing to experiment and fail as they figure it out on their own. They aren't interested in abstract concepts or how-to manuals. They just want to get involved now.

### Suggested Activities

Here are some activities that can help satisfy the activists' need for rich personal engagement:

- Brainstorming
- Problem Solving/Problem-Based Learning
- Group Discussions
- Role Playing
- Hands-on Practice Activities

## Theorists

Do you find that some participants tend to question everything? Are they interested in the research behind the concepts or theories? Do they like to work logically through a process? Do they prefer to have a model or system to follow? Are they uncomfortable with ambiguity and ill-defined problems? These are what Honey and Mumford called the "theorists." They aren't interested in creative assignments; they prefer structured activities where they can analyze and synthesize information. They like activities that allow them to work with statistics or to compile evidence to answer their questions. Here are some activities that meet the "theorists" need for structure and data.

### Suggested Activities

- Models
- Statistics
- Background Information
- Theories

## Pragmatists

You may notice some participants need to know the relevance of abstract concepts or theories to their lives. They want you to provide examples and will often ask for them. They require clear information up front about how they are going to be assessed. These participants are what Honey and Mumford call the "pragmatists." They need to see how they can put their learning into practice. They like activities where they can experiment and try out new ideas, theories, and techniques in realistic scenarios.

### Suggested Activities

- Group Discusions
- Theoretical Applications, see Theories
- Case Studies
- Problem Solving/Problem-Based Learning
- Action Plans

## Reflectors

You may observe that some participants step back while others in the class participate in a demonstration. Are they happy to take notes for their group? Or, do they ask for additional sources of information on the topics discussed in class? These participants are what Honey and Mumford call the "reflectors." They prefer to gather data by reading and observing others in action and reflect on what they have learned before they come to a conclusion. They liked to be well prepared before joining in an activity and are often uncomfortable when asked to take the leader role. Reflectors appreciate activities where they can observe or obtain multiple perspectives on an idea.

### Suggested Activities

- Think-Pair-Share
- Observational Activities
- Feedback—Peer or Instructor

# Meeting Learners' Needs

## Maslow's Hierarchy of Needs

In the 1940s, Abraham Maslow proposed a theory about motivation that, for the first time, linked human biological needs and human psychology. According to Maslow, humans strive to meet their needs in a predictable order or hierarchy, as shown in figure 3. People's physical and safety needs must be met before they can focus on their higher-order needs. Next, people need their social and self-esteem needs met. They need to feel loved and accepted as part of a group. Then, they can focus on

achievement and gaining the respect of those around them. Only after all those needs are fulfilled can they focus on self-actualization, or achieving their highest potential, through professional growth, education, or other enrichment.



**Figure 3. Maslow's hierarchy of needs**

To create a positive relationship and allow participants to focus on learning, it is important to address their basic physiological needs, for example:

- What is the temperature of the room?
- Are they hungry?
- Are the seats uncomfortable?
- Do they need a bathroom break?

Providing "housekeeping" information at the beginning of the training session, including directions to the restrooms, food and drink options and policies, class hours and breaks, and emergency procedures helps to reduce participants' anxiety. You also need to consider their safety needs, for example:

- Are they intimidated by another participant?
- Are they worried about returning to their car or to public transportation?
- Is their job at risk if they do not perform well in the course?

Offer to meet with participants privately so they can share their concerns and so you can come up with ways to address them.

It is important to recognize and address participants' social needs, for example:

- Are they among strangers?
- Are they seated with their supervisors or managers?

- Are they separated from others from their organization?

Icebreakers, team building activities, and temporarily mixing up groups and partners can provide opportunities for participants to work collaboratively with different people and become more comfortable with each other.

Participants' self-esteem needs must be met as well, for example:

- Do they think they are in the right course for their needs?
- Are they different from other participants in terms of experience, age, culture, or gender?
- Is someone dominating the conversations?

Collaborating with the participants in class to set and enforce ground rules will set clear expectations for behavior. By partnering more experienced participants with novices, the experts are given a role to play in the classroom while providing support that less experienced learners need.

## Creating Classroom and Virtual Learning Spaces

### Why Layout is Important

To do their best learning, participants need to feel comfortable both mentally and physically (see Maslow's Hierarchy of Needs). The way an instructor organizes and manages participants' physical (or virtual) learning space will have a major impact on their readiness to learn. If participants struggle to see or hear important information, are too hot or too cold, or are forced to work in cramped conditions, they may become frustrated or fixated on thoughts of relief and disengage themselves from the leaning process. To prevent this from happening, proactively think about participants' needs, and set up the tables and chairs in the training room in a way that will facilitate learning and accomplish the learning outcomes.

The room layout is important for another reason: participants will make immediate assumptions about the course just from the room layout. For example, if they see a classroom or auditorium-style arrangement, they will assume it will be a lecture-based course. On the other hand, if they see chairs arranged in table groups, they will expect an interactive course with small group discussions or team work.

Sometimes you don't have any choice about the layout of the room. But when you do, it's well worth the time and effort to create an arrangement that best matches the interactivity planned in the course.
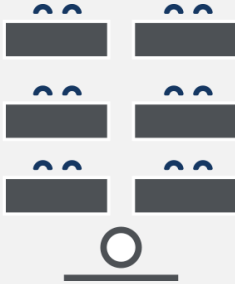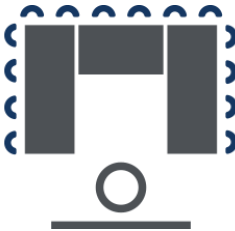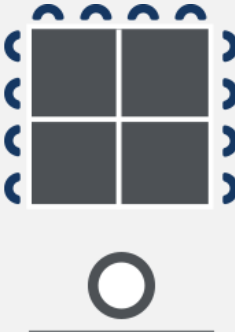
## Classroom Layouts
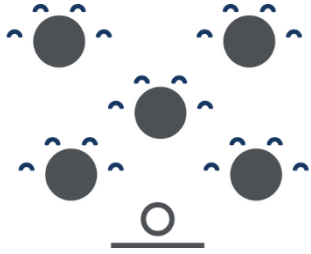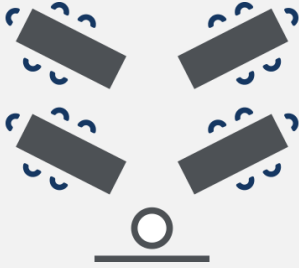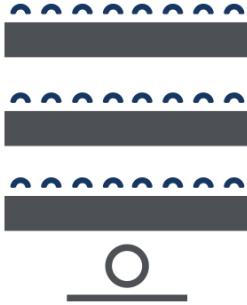
When choosing a room layout, consider the following factors:

- **Room size:** The room should accommodate the number of participants comfortably. If the room is large, you can move the tables closer to one another and closer to the front of the room.
- **Training requirements:** If you expect participants to take notes, work in small groups, or perform role plays, make sure they have the room to do so. Will they work individually, frequently confer with a partner, or have small group discussions? What seating arrangement will support the type(s) of learning?
- **Accessibility:** Leave at least 36 inches between rows of chairs to create aisles wide enough for participants with mobility issues to maneuver. Check the position of all chairs to ensure that all participants have an unobstructed view of you and the projection screen. Make sure that they do not need to twist around to see the screen and then twist back again to take notes or talk with their tablemates. Make sure that extension cords and cables do not present tripping hazards.
- **Lighting:** Make sure there is adequate lighting for reading and taking notes. Close window blinds and adjust lighting configurations to minimize glare on the screen. You may need to adjust the lights as the day progresses and conditions change.
- **Whiteboards and wall space:** Some classrooms and video and web conference platforms have whiteboards that you can use to record key points or valuable information for participants to reference throughout the course. Also, look to see if there is any space you can use to hang chart paper or easel pad sheets for reference. Be sure to leave at least 6 inches of space at the bottom, and hang any visual aid high enough so that people on the other side of the room can read everything that is written on it.
- **Climate control:** It is impossible to find the perfect temperature for every individual, but you need to be aware of how the room responds to thermostat changes. Is the room cool in the morning but heats up because of afternoon sun? Is there a noisy fan that makes it hard for participants to hear when it turns on? Let participants know about known changes in advance and tell them that the efforts that will be made to accommodate their learning needs.
- **Audio:** Is a microphone needed for the participants to hear the instructor? Is there one to provide to participants for group report outs or question and answer sessions? Will participants need headphones and microphones to participate in the web conference training or virtual training?

There are many different types of classroom layouts (or seating arrangements). Table 1 displays some of the most common classroom layout options along with the pros and cons of each of them.

**Table 1: Classroom Layout Options**

| Layout | Description |
|---|---|
| | **Partner Groups**—Arrange small tables in a row with two seats per desk, facing the instructor. More intimate than traditional classroom layout. Good for hands-on work and note taking. Facilitates partner discussions. Small groups can be formed by pairs turning and talking to the partners behind them. Easy for instructor to observe and listen to participants as they work together. |
| | **U-shape**—Move tables to create a large U-shape. Place chairs on the outside. The open space in the middle provides room for the instructor to walk and pass out handouts or to place a low table for the projection system. This layout allows participants to see both the instructor and all their peers at the same time. Plenty of room for note taking. Easy to break the group into two or three small groups for discussions. Harder to arrange a small group discussion with participants from more than one side of the U. If sides of the U are long, it can be hard for participants at opposite ends to make eye contact. |
| | **Conference**—Similar to the U-shape, tables are placed to make one long rectangle or square and chairs are placed along three sides. Participants have good visibility of instructor, peers, and visuals. Sometimes there is limited space for demonstrations or role play in front, or to move behind chairs. Like with a U-shape, easy to form groups along one side of the joined tables. More difficult to hold discussions across the joined tables. |

| Layout | Description |
|---|---|
| | **Clusters**—Four to six seats are arranged around one half of round tables or tables grouped to form small squares or rectangles. This prevents participants from having their backs to the instructor. This arrangement promotes teamwork and facilitates discussions. Best for courses where the majority of the content will be delivered through small group work. Easy for instructor to walk around and monitor discussions. |
| | **V-shape or herringbone**—Tables are arranged in diagonal rows on either side of a classroom. Two to five chairs are placed at each table so that all seats face or are at right angles to the instructor. Good for note taking and partner work or small group work. Easy for instructors to walk around and listen to discussions. Effective for computer training as it allows the instructor to see all participants and move through the aisles. |
| | **Traditional classroom**—Create long rows of tables with chairs on one side facing the instructor. Provides all participants with an unobstructed view of the visuals. Good for lectures and interactive lectures. Although participants can turn and talk to a partner or person behind them, is not conducive for small group discussions. |

Source: NHI (2018).

Return to Visual Aids

## Changing Participants' Seats

It is important to note that once participants are settled and comfortable in their groups, they may resist any request for them to change seats or form new groups. You can lessen participants' discomfort by explaining that the new seating arrangement is temporary and they will be able to return to their original seats.

There are other times when you may want to make a permanent change in participants' seats (due to personality conflicts, physical accommodations, etc.) and you can re-assign seats for all participants or shift one person from each table at the start of each activity. For virtual instructor-led and web conference deliveries, you can change the composition of participant breakout groups.

## Online Course Web Pages

The virtual interface created for an online course can play a large role in usability and student success. Most learning platforms and course development apps provide templates that provide design options. No matter which design you choose, the location of reading materials, assignments, tasks, collaborative opportunities, etc., should be consistent and easy to find. You can create a course overview or home page that lists all required readings, tasks and assignments, and their due dates. Some development apps allow you to insert links directly to reading materials, assignments, and rubrics.

You can keep participants engaged by posting weekly announcements about due dates or highlights of upcoming assignments. Adding instructor photos or videos and asking participants to upload their photos also can help everyone associate a face with a name. Course websites can offer many ways for participants to collaborate, including emails, discussion boards, video conferencing, group phone calls, etc. Participants can also create and post wikis, blogs and podcasts to engage their peers and demonstrate their learning. Figure 4 shows a sample course webpage that provides a thumbnail photo of the instructor, links to assignments, class discussion board, classmate information, course files, collaboration platforms, etc.

## Example



**Figure 4: Sample course webpage**

## Web or Video Conference Meeting Rooms

Whether you are instructing a single webinar or a series of web or video conferences as part of a blended learning course, you can incorporate many of the engagement activities used in a physical classroom in the virtual meeting space.

Each video or web conference platform has its own combination of features, but some of the common features are as follows:

- **Attendees list**—A list of all of the attendees for the session. This list allows you and the participants to see who is signed in for the day. You can save the list as proof of attendance.
- **Chat messaging**—Allows participants and instructors to unobtrusively ask and answer questions. Chats can be either visible to the entire class or private. Often a host or co-instructor is needed to monitor and respond to chat messages. The downside of the chat feature is that it facilitates side conversations that may detract from learning.
- **Polling**—You can write and post poll questions to probe participants' past experiences, gather opinions, or test their comprehension. Poll results can be displayed on a bar graph and can be either shared with the class or kept private. You can use poll data to guide review or reteaching. Like with chats, it is useful to have a host or co-instructor post and summarize the poll results.

- **Screensharing**—Web conference platforms allow instructors (and sometimes participants) to share whatever is on their computer screen or monitor directly with the class, including software demonstrations, videos, PowerPoint presentations, documents, spreadsheets, webpages, etc. You can also upload documents to share during class.
- **Voice and audio controls**—Not all participants remember to mute their microphones when they join a web conference. Instructors can use the default mute setting to avoid distracting background noises and unintended comments from being heard in the classroom. Instructors and participants can later adjust their personal audio and microphone settings to allow them to hear and be heard by others.
- **Video controls**—Instructors can choose to include live webcam video feeds as part of their web conference interface. Seeing and hearing the instructor and/or their peers can help keep participants engaged in a virtual class. However, internet limitations and makeshift home offices may make live video broadcasts problematic for some.
- **Breakout rooms**—Assign participants to small groups and set up virtual breakout rooms for small group activities. It is best to first explain the activity before breaking the class out into groups and then post the instructions to the breakout room chat pod as a reminder. The instructor can pop in and out of breakout rooms to monitor group discussions and answer questions. Some instructors find that not sharing their webcam video when they enter a breakout room results in the least disruption to the group dynamics.
- **Meeting recording**—Sometimes a participant may request a recording of the class. If the recording will be made available only to the class, you need to notify participants that you will be recording the session and explain why. If the recording will be released to people outside of those in the class, you will need to obtain written (or emailed) permission from all people seen or heard in the recording.
- **Reaction icons**—Increase the interactivity of a class by encouraging participants to use the reaction options available on the web conference platform. Participants can communicate their sentiments non-verbally by using icons for raise/lower hand, applause, thumbs up/down, yes/no, etc.) Reaction icons can be used with polls or knowledge checks.

Other options that may be available include the following:

- **Waiting room**—Can be used to screen viewers and allow registered participants to enter the course space all at the same time. Sometimes instructors will post poll or survey questions for participants to answer while they wait.
- **Multi-screen sharing**—Some web conference platforms allow instructors and/or participants to share content from two monitors or screens at the same

time. With multiple screens visible, participants can compare or make connections between any combination of websites, documents, presentations, or videos. The downside to multi-screen sharing is that the two screens are not full-sized, and some text and images may be difficult to see clearly.

- **File sharing**—Using the Adobe Connect Content library, instructors and participants can upload and download an image, audio, or video file or a PDF, PPT, or HTML file. Multiple files need to be compressed and uploaded in a ZIP file. Other web conference platforms may have different options or limitations.
- **Document collaboration**—Some web conference platforms allow participants to interact and collaborate on documents. If that feature is not available, you can share links to collaborative documents hosted on other websites.
- **Interactive or collaborative whiteboard**—Adobe Connect offers whiteboards with both clear and white backgrounds. Instructors can add text, lines, shapes, or other freehand drawings in real time. The white background is like a conventional whiteboard. The clear background allows instructors to create an overlay screen and write or draw on top of an existing document in the Share pod. You can print the contents of a whiteboard. Other web conference platforms also allow participants to collaborate on whiteboards in whole group or breakout sessions.
- **Timer**—Using a digital countdown timer helps to bring participants back from breaks on time. They also help instructors and participants keep track of the time left for a discussion or activity. There are several timers available, and displaying different ones throughout the day can introduce a little variety.
- **Closed captioning**—All media presented as part of a course needs to include closed captioning. Captioned materials are sometimes identified with a "CC" or TV icon. If a participant required closed captioning, you could contract with a professional captioning service or assign in-meeting captioners. The captions are transmitted to the Caption Pod in Adobe Connect. Other web conference platforms allow attendees to be designated as captioners, and their typing appears as captions in real-time.
- **End-of-meeting feedback**—NHI has its own course evaluation form, but if you want to gather more specific feedback or follow up with participants to see how they are applying their new learning on the job, you can send attendees a survey via email.

Research the features and technology tools available in the conference platform. Plan interactions in advance, such as discussion questions, poll questions and response options, assigning participants to small groups, etc., and set them up in the meeting space before the course begins. Sometimes it is easier to manage a web or video conference if a host or facilitator posts poll questions, reviews and answers participant questions, sets timers, troubleshoots technical issues, etc., while you focus on presenting the training.

**Instructions**

To run an effective web or video training conference:

1. Plan how you will incorporate the available technologies into the conference, such as video clips, poll or survey questions, question and answer chats, small group breakouts, collaborative documents or whiteboards, etc.
2. Create a one-page, timed agenda.
3. Gather all presentation and content materials and make sure they will appear and function as intended.
4. If it is a web conference, create a slide that will appear when participants log in so that they know they're at the right meeting site.
5. Plan to post a chat question for participants to answer while they are waiting for the conference to begin that will give you an idea of their prior knowledge.
6. In the email invitation to participants include the link and access code, attach any advance materials, and provide instructions on how they should prepare for the conference. Including a link to an online pre-course survey to gather feedback on participants' background and expectations for the course is also helpful.
7. Prepare another survey to gather feedback from participants after the conference.
8. Practice! Run through the presentation using the moderator tools until to practice posting questions, share your screen, switch to a different breakout room, or review poll results. If there is a facilitator, practice with that person so transitions are smooth.
9. Based on practice runs, make changes to the agenda, interactions, and/or materials.
10. Conduct a dry run. Unlike a practice run, you will teach the entire course just like you would during actual training.
11. Open the conferencing software at least 30 minutes before the meeting is scheduled to start. Be sure all the links and content are working properly.
12. Send an email to participants, thanking them and asking them to complete the post-course survey. Use the survey results to improve future web or video conferences.

Refer to [Surveys/Interactive Polls](#) and [Word Clouds/Interactive Polls f](#)or ideas on ways to use interactive polls during a web conference course.

Refer to [Group Discussions](#) for more information on using small group discussions in a web conference course.

For more information on classroom layouts, check out NHI's *Circle of Learning*, https://www.nhi.fhwa.dot.gov/resources/docs/circle_of_learning.pdf. For more information on NHI's web conference standards, refer to the NHI *Web-conference*

*Training Standards Guide*,
https://www.nhi.fhwa.dot.gov/resources/docs/wct_standards_guide_May2017.pdf.

Return to Group Discussions

Return to Surveys/Interactive Polls

Return to Word Clouds/Interactive Polls

## Activating Participants' Prior Knowledge

Adult learners bring their knowledge, experiences, skills, beliefs, and attitudes with them into the classroom. Participants use their prior knowledge to help them to process new information. They try to fit the new information into their current understanding. When they can connect old and new, the new information moves from their working memory into their long-term memory.

Since prior knowledge is so important for participant comprehension and retention, it is a good idea to help participants make connections at the start of a lesson. The information you get from tapping into participants' prior knowledge is also useful to you, the instructor. Use that information to help decide the pace of your instruction, organize group activities, and determine whether participants with less experience need extra help. Take the time to draw out participants' memories, ask questions to determine if some participants have misunderstanding that needs to be corrected.

Activating prior knowledge can be as simple as asking some basic questions, for example:

- What do you already know about this topic?
- What have you read about this topic?
- What are your experiences in this field?

Several more techniques you can use to prime participants to learn include the following:

- Analogies
- Anticipation Guides
- Brainstorming
- K-W-L Charts
- Quick Writes/Entrance Tickets
- Skimming and Scanning
- Surveys/Interactive Polls

## Example

Jonathan McDade created a matching activity for his NHI "Instructor Development Course" training presentation, "Risk-Based Stewardship and Oversight." The activity was designed to activate participants' prior knowledge. It also gave him an idea of how familiar participants were with basic stewardship and oversight terminology. Figure 5 displays the matching activity slide.



Source: McDade (2018).

**Figure 5: Example prior knowledge activation activity slide**

## Lesson Planning Challenge

Take a look at one lesson or unit to see which method for activating participants' prior knowledge would be a good match for the content.

- Is there a difficult concept? Share an analogy.
- Do participants often have misconceptions or strong opinions on the topic? Create an anticipation guide.
- Is there a lot of reading material? Ask them to skim the text.
- Do you often have participants with varying levels of experiences? Create a survey or poll.
- Do you want to get all participants involved right from the start? Ask them to brainstorm together.

Return to Redefining Instructor and Learner Roles

Return to Supporting Participants

Return to What do participants already know?

## Supporting Participants

The primary role as an instructor is to bridge the gap between what the participants currently know and what they are expected to do at the end of the training session. To do that, you will need to move them step-by-step toward a deeper understanding. At the end of the training, participants should be able to perform the skill, task, or behavior independently. It is helpful is for participants who are new to the topic or skill to receive a little extra help. This help is sometimes referred to as "scaffolding." Like the framework used to support a building under construction, instructional scaffolding is meant to provide temporary assistance to learners as they grow more competent in their ability to perform independently. In the scaffolding process, the instructor systematically gives participants the chance to acquire the necessary skills incrementally. Participants can practice and receive feedback that reinforces their learning. As participants become more independent, the instructor gradually removes the "supports." This process is sometimes referred to as "crawl, walk, run." There are many instructional strategies and techniques you can use to scaffold participant learning.

However, there are some downsides to scaffolding. It takes time to plan and implement scaffolding activities. It can be difficult to find the appropriate scaffold to meet the needs of all participants in the class. And it is not always clear when participants are able to work independently and no longer need the scaffolding.

Some common scaffolding strategies include the following:

- Clearly make connections to knowledge and skills that participants learned in a previous lesson. Refer to [Step 3: Plan Your Opening](#) for ideas on creating links during a lesson introduction and [Activating Participants' Prior Knowledge](#) for a list of effective activities.
- Break a lesson into mini-lessons that allow participants to master easier skills first before moving onto more complex skills. Check for comprehension between each mini-lesson.
- Present multiple opportunities for participants to engage with the material. For example, you can orally describe the concept, show a video clip, and ask participants to sketch a diagram or write a descriptions of how they would apply the concept on the job. Using these or similar methods helps participants to interact aurally, visually, and kinesthetically with the content.
- Provide participants with a high-quality example of what they are going to be asked to complete. Explain the features of the assignment and what makes the example exemplary. You can also model a process so participants can see how it is performed before they try it themselves.
- Clearly explain the purpose of an activity, provide step-by-step instructions, and supply the rubric, checklist, or other scoring tool that will be used to evaluate participants' work. When participants understand the relevance of an assignment and how they will be assessed they will be more motivated to

achieve the learning goal. Refer to [Assessing Learning](#) for more information on assessment tools.

Other instructional tools you can use to support participants' learning are:

- [Analogies](#)
- [Case Studies](#)
- [Concrete Examples](#)
- [Cooperative and Collaborative Learning](#)
- [Games](#)
- [Graphic Organizers](#)
- [Infographics](#)
- [Job Aids](#)
- [K-W-L Charts](#)
- [Models](#)
- [Role Playing](#)
- [Visual Aids](#)
- [Worked Examples](#)

## Example

As part of his NHI "Instructor Development Course" training presentation on "Global Girder Stability," Douglas Whittaker created scaffolded worksheets (figure 6) to help participants understand how length impacts the stability of a girder. He provided the equation to calculate girder stability and the variables for two girders of different length. A second sheet provided the same equations with boxes to enter the data for the two girders. By providing the equation, participants could focus on calculating the impact of a change in length—which was the intended outcome for the lesson.



Source: Whittaker (2019)

**Figure 6: Example scaffolded calculation worksheet**

**Lesson Planning Challenge**

Look at one lesson or unit in a course. Think about how you could help bridge the gap between what the participants know and what you want them to be able to do.

- Do you want them to complete a multi-step process? Create a handout with a flow chart or a list of instructions to use as a job aid.
- Do you expect a mix of novice, experienced, and expert participants? Create mixed groups and allow participants to work with a partner.
- Do participants struggle with an abstract concept? Come up with an analogy or concrete example that participants will recognize.

Return to Games

Return to How can I best meet participants' learning needs?

Return to Job Aids

Return to Step 3: Plan Your Opening

Return to Worked Examples

## Maximizing Participant Workbook Elements

Participant workbooks are the physical takeaways that learners get from a course. They should be designed to be both interactive learning tools in the classroom and job aids for use back at the job sites. They should contain much more than just copies of the PowerPoint slides and should include key messages and important phrases or quotes. They should also provide spaces for participants to take notes, write questions and answers, and record their thoughts and summaries.

Interactive features, like note-taking sections, help to support learning. When participants write about their learning, they will consider what they have heard and how it connects to what they already know or have experienced. Then, they need to find the words to express their thinking. Any time you ask participants to identify key points, answer knowledge check questions, or express their opinions in writing, you reinforce their learning and support retention and transfer. After the course, participants can refer to their notes or job aids to refresh their memories.

Some of the common features in a high-quality participant workbook include the following:

- Concept Maps
- Course Outline/Syllabus
- Journaling
- Self-Questioning

- [Structured Notes](#)
- [Summarizing](#)

Familiarize yourself with the features of the course's participant workbook. Plan how participants can engage with their workbooks at key times during the lesson. Participants won't take advantage of all the benefits their participant workbooks provide unless they are directed to do so.

---

### Lesson Planning Challenge

Look at the participant workbook for the course to find the answers to these questions:

- How is the participant workbook different from the instructor guide?
- What interactive features does it contain?
- How can you plan to incorporate these features into the lesson?
- If it is a "barebones" workbook, is there a handout to increase participant engagement with the content?

## Providing Effective Feedback

Constructive feedback, in the form of comments or suggestions from instructors or peers, plays an important role in participants' mastery of learning outcomes. Without feedback, participants are unsure if they have grasped a concept or are performing a task correctly. Instructor feedback can be either informal, like clarifications after a class discussion, or formal, like final exam results or notes on a checklist or rubric. Refer to [Assessing Learning](#) for more information on assessment activities and tools.

However, participants may not always perceive feedback positively. You need to provide effective feedback to avoid damaging participants' morale and negatively impacting their job performance.

Research has shown that to be effective, feedback must be:

- **Specific and objective**—The feedback must provide participants with exact details on what they have done correctly and the areas that still require improvement. It can also be useful to tell participants what they are doing differently than before.
- **Immediate**—The sooner you can provide feedback to participants, the more successful they will be in improving their performance.
- **Outcome oriented**—The feedback should be based on a goal that participants are working towards. It should provide clear information to help participants improve their performance to achieve that actionable goal.

- **Noncompetitive**—Participants should be aware of the purpose of all observations and assessments and that the feedback is intended to guide their improvement. It is also important to clarify that the feedback is not meant to create competition between participants.
- **Transparent**—Participants should have access to information about their performance. This knowledge helps them develop self-awareness about their own learning. It also improves their ability to identify their own mistakes and to develop long-term strategies for addressing their weaknesses.
- **Limited**—Too much feedback can be hard to process and, therefore, can be counterproductive.

Peer feedback can be as effective as instructor feedback. Participants all have different perspectives and their feedback can supplement feedback from the instructor. Peer feedback can have another advantage. Sometimes receiving feedback from a peer can be less intimidating than receiving it from an instructor.

However, you need to manage peer feedback well. You need to train participants to observe and objectively measure peer performance based on clearly defined standards. They also need to be trained to provide specific details in their comments. As with instructor-delivered feedback, peer feedback should include comments both about what participants did well and suggestions for improvement. To help participants to be receptive to feedback, explain that their role is to listen and not try to justify any choices or actions.

**Instructions**

How to provide guidance on peer feedback:

1. Explain the purpose of peer feedback.
2. Emphasize that feedback should be objective, not personal.
3. Describe participants' responsibilities during the observation process.
4. Explain that positive feedback will be delivered first and suggestions for improvement will be shared afterward.
5. Share a peer assessment tool that details performance criteria.
6. Ask participants if they have any questions about the feedback procedure.
7. Remind participants that, when it is their turn to receive feedback, they are to listen and not try to justify their choices or actions.
8. Once participants have gathered observational data on a peer's performance, ask for one or two volunteers to provide feedback.
9. Prompt the volunteers to first provide positive feedback and then provide constructive feedback.
10. Ask all participants to share their completed assessment tool with comments with the performer.
11. Continue the observation and feedback activity for the next participant.

> **Example**
>
> Every few years, the FHWA Discipline Council conducts peer reviews. The disciplines represent 22 technical fields including construction, safety, environment, human resources, etc. The peer review assessments evaluate the health of the discipline—identify its areas of strength, challenge, and improvement—and any best practices or lessons learned that should be implemented by all disciplines. The peer assessments feature a rating system and data collection form. To provide a wide perspective, representatives from the disciplines are assigned the roles of both reviewers and receivers so they are exposed to the practices of at least two other disciplines. Peer reviews can be conducted virtually using SharePoint Online and MS Teams platforms. The FHWA Discipline Council uses the results from the peer reviews to inform its action plan and strengthen its overall Discipline Support System.

Return to Assessing Learning

Return to Self-Questioning

# Guiding Review

Review activities clarify and highlight key points for participants. You can plan review activities during or at the end of a lesson or unit. These reminders help overcome participants' natural tendency to forget what they have learned. Research has shown it can up to seven exposures before people can consistently recall a message. To ensure the training sinks in, you need to regularly incorporate review into the lessons. A good rule of thumb is to build in some type of review activity every 15-20 minutes.

Some review should focus on recalling important details but you should spend more time getting participants to explain how they plan apply their new knowledge. See Step 5: Plan for Knowledge Checks for more information on recall and application questions. You can ask review questions orally or print them on a handout. If you ask for written responses, you will need to give participants some time to think and compose their responses. Reinforce the content by sharing the correct answers at the end of the activity.

**Instructions**

To conduct an effective oral review session:

1. Identify topics that support the learning outcomes you want to reinforce.
2. Write questions to elicit the level of information required by the outcome and also the answers.
3. Announce the oral review. Explain that participants will be able to share their answers out loud and will not need to write anything down.
4. Pose the questions to the whole group, half of the room, or to a table group.

5. If an answer is incomplete, ask if there is anyone else who can provide more details.
6. At the end of the review, provide participants with a copy of the questions and answers you created earlier.
7. End the review by asking, "What other questions do you have on the topic?"

To conduct a written review after a significant amount of new content has been covered:

1. Identify topics or concepts that support the learning outcomes you want to reinforce.
2. Write questions to elicit the level of information required by the outcome and also some expected answers.
3. Create a review handout with the questions and room for participants to write their responses.
4. Announce the written review and tell participants the amount of time they will have to answer the questions (typically 10-20 minutes).
5. When the allowed time is up, go over the answers while you display a slide or slides with the questions and the answers. Encourage participants to add to their notes or correct their answers.
6. End the review by asking, "What are your questions on this topic?"

Other review activities can include the following:

- Concept Maps
- Cooperative and Collaborative Learning
- Games
- Mind Maps, see Graphic Organizers
- Summarizing

### Example

For his NHI "Instructor Development Course" training presentation, "Sidewalk Collapse US 1 over Earman River," Richard Kerr created a True/False review question slide (figure 7) that used animation to display the correct answers.



**Overturning Force**

**Review Exercise 1 True False**

• The Sidewalk and Barrier created an overturning force

• The Fascia beam alone can resist the overturning forces

• The condition of the transverse Post-tensioned rods can be observed during routine bridge inspections

Source: Kerr (2019)

**Figure 7: Review question slides from "Sidewalk Collapse US 1 over Earman River"**

# Chapter 2: Designing Courses for Adult Learners

## Identifying Learning Outcomes

Course developers identify and create learning outcomes using the Instructional Systems Design (ISD) process, which is a systematic approach to designing, developing, and evaluating training. ISD focuses on the needs of the participants. It begins with analysis of why there is a need for the training, who needs the training, and to what degree. It also determines how to measure training success. Learning outcomes are developed based on the training needs analysis and take into consideration the target audience and organizational goals. Subject matter experts (SMEs) and key stakeholders verify and approve the learning outcomes, instructional strategies, and assessment strategies.

Return to Step 2: Review the Learning Outcomes

## Using the Outcome Verb to Make Instructional Decisions

There are two categories of outcome verbs: recall or application. Recall verbs indicate that participants will be asked to recall facts or details about a concept or topic. Application verbs indicate that participants will be asked to apply their recently acquired knowledge to a new situation. Often, lessons or units include a mix of recall and application verbs to allow participants to build their foundational knowledge so they can apply their learning by the course's end. Refer to table 2 for a list of common recall and application verbs used in NHI training courses.

**Table 2. Common Action Verbs Used in Learning Outcomes**

| Recall Verbs | Application Verbs |
|---|---|
| Arrange | **Apply** |
| Classify | **Choose** |
| Compare | **Construct** |
| Define | **Create** |
| Describe | **Defend** |
| Explain | **Demonstrate** |
| Identify | **Derive** |
| Label | **Diagram** |
| List | **Differentiate** |

| Recall Verbs | Application Verbs |
|---|---|
| Locate | **Illustrate** |
| Match | **Interpret** |
| Name | **Measure** |
| Outline | **Operate** |
| Relate | **Organize** |
| Replace | **Perform** |
| Report | **Set up** |
| Restate | **Solve** |
| Select | **Test** |
| Sequence | **Translate** |
| State | **Use** |
| Summarize | |

Source: NHI (2018).

If a learning outcome begins with a recall verb like "explain," such as in "**Explain** how dimensional variables affect global buckling capacity," it suggests that the instructor should provide an explanation of the equation used to compute global buckling capacity and provide an opportunity for participants to substitute different variables to see the impact on the results. Then, participants should have an opportunity to discuss their findings with a partner or table group.

However, if the learning outcome begins with an application verb like "demonstrate," such as in **"Demonstrate** how dimensional variables affect global buckling capacity," it suggests a very different learning experience for participants. To demonstrate how changing the variables affects the equation results, participants would have to have access to 3D modeling software or other simulation method.

### Lesson Planning Challenge

Start with one lesson or unit in the course and examine the action verbs used in the learning outcome listed. Ask:

- Are they all recall verbs? All application verbs? Or are they a mix of both?
- What does the verb expect participants to do to demonstrate their learning?
- What instructional strategy will allow participants to practice that skill or behavior?

> ■ What assessment activity will give them the opportunity to demonstrate their learning?
>
> Review the lesson plan in the instructor guide and make notes where you think you need to add a discussion, practice opportunity, or other engagement activity to best support the participants' needs.

Return to Assessing Learning

Return to Step 2: Review the Learning Outcomes

Return to Step 4: Select the Learning Strategies

Return to Test Questions

Return to What is the "need-to-know" and "nice-to-know" information?

## Assessing Learning

The final step in the training process is the assessment or evaluation of participant learning. Assessments measure and document participants' acquisition of skills and knowledge. To measure the effectiveness of the training, some courses supply a pre-course assessment. The pre-test results create a baseline. Any improvements participants show on their post-course assessment scores are a direct result of the training they received.

Assessments should not be an afterthought in course design and delivery. To accurately measure training effectiveness, assessments need to be aligned with the course learning outcomes. Once the learning outcomes are identified, it is good practice to outline the assessment technique most appropriate to measure their mastery. Then, design instructional and practice activities so participants can successfully complete the assessments. See Using the Outcome Verb to Make Instructional Decisions.

The traditional multiple-choice final exam is the most used assessment tool. However, there are several other options that might be better suited to measure the skills, tasks, and behaviors expected in the learning outcomes:

- ■ Assessment Checklists
- ■ Case Studies
- ■ Concept Maps
- ■ Oral Presentations
- ■ Rubrics
- ■ Test Questions

## Example

A multiple-choice test would not be the best way to measure achievement of the learning outcomes for the Arizona Department of Transportation "Flagger Certification Training Course." A performance assessment is a better option. An assessment checklist or rubric can be used to document participants' motions during the assessment activity. During his NHI "Instructor Development Course" training presentation, Edgard Baltodano provided props (paper copies of the Slow/Stop paddle) so participants could demonstrate the motions while he observed the sequence and clarity of the gestures.

Figure 8 shows slides from his training presentation and the mockup paddle props he provided. Figure 9 displays an example assessment checklist for the activity.



Source: Baltodano (2019).

**Figure 8: Performance outcomes, directions, and props from "Flagger Certification Training Course"**

## Flagger Signal Assessment

Date: _____

| Name | Stop | | Release | | Slow | | Pass/Fail |
|---|---|---|---|---|---|---|---|
| | Paddle | Hand | Paddle | Hand | Paddle | Hand | |
| Participant A | x | x | | x | x | x | Fail |
| Participant B | x | x | x | x | x | x | Pass |
| Participant C | x | x | x | x | x | x | Pass |
| Participant D | x | x | x | x | x | x | Pass |

Source: Baltodano (2019).

**Figure 9: Assessment checklist for "Flagger Certification Training Course"**

### Lesson Design Challenge

Review a course lesson or module to see which method to assess participants' learning would be a good match for the stated learning outcomes.

- Is a physical skill or behavior required? Create a performance checklist and ask participants to demonstrate their ability to perform the skill or behavior.
- Is a written or oral report, plan, or presentation required? Create a rubric based on the required elements that includes clear descriptions and scores for the different levels of quality that participants may produce.
- Are participants expected to produce the results of calculations or other exact answers? Create objective multiple choice test questions.
- Do participants need to recall the meaning of important terminology? Develop a matching exercise for them to link the term to its definition.

Return to Maximizing Participant Workbook Elements

Return to Providing Effective Feedback

Return to Supporting Participants

# Chapter 3: Using Best Instructional Practices

## Setting the Hook

Not every participant comes into the classroom with a burning desire to learn. It is easy to recognize the "Volunteers" (those who willingly signed up for a course) and the "Convicts" (those who were told to attend). You need to start the course with a strong opening statement that grabs even the most unmotivated participant's attention and creates a desire in them to learn more. The "hook" should be a contextual anecdote, thought-provoking question or statistics, statement, quote, video, or scenario. A hook is *not* a preview of what topics will be covered. You will need to provide hooks at the start of each module and lesson to focus participants' attention again.

Here are some ideas to use to create contextual hooks for a course or module:

- [Current Event Articles or Commentaries](#)
- [Demonstrations](#)
- [Real-World Problems](#)
- [Statistics](#)

**Example**

Figure 10 displays the hook for the NHI "Utility Investigations" web-based training course. A TV news reporter announces that road construction crews have severed a buried cable, causing a wide spread power outage. The next screenshot (figure 11) relates the factors that caused the mock incident to the purpose of the course. A compelling diagram (figure 12) shows what happens if information from the course is not applied during construction planning.

Source: NHI (n.d.g.)

**Figure 10: Screenshots of the dynamic opening for "Utility Investigations"**
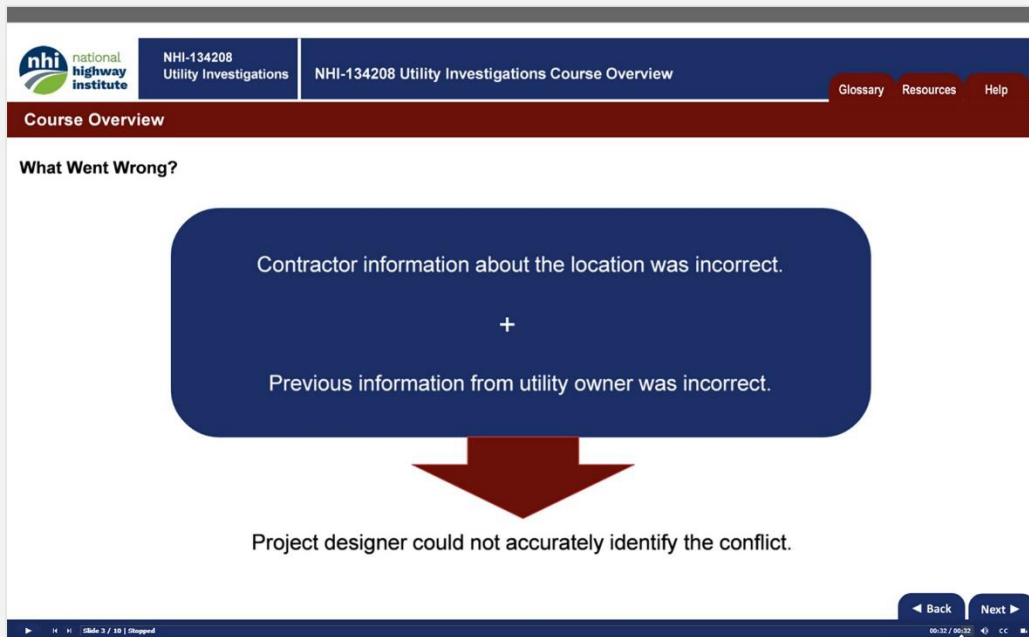


Source: NHI (n.d.g.)

**Figure 11: Slide showing link from mock incident to "Utility Investigations" course content**

Source: NHI (n.d.g.)

**Figure 12: Illustration showing impact of not using "Utility Investigations" course training**
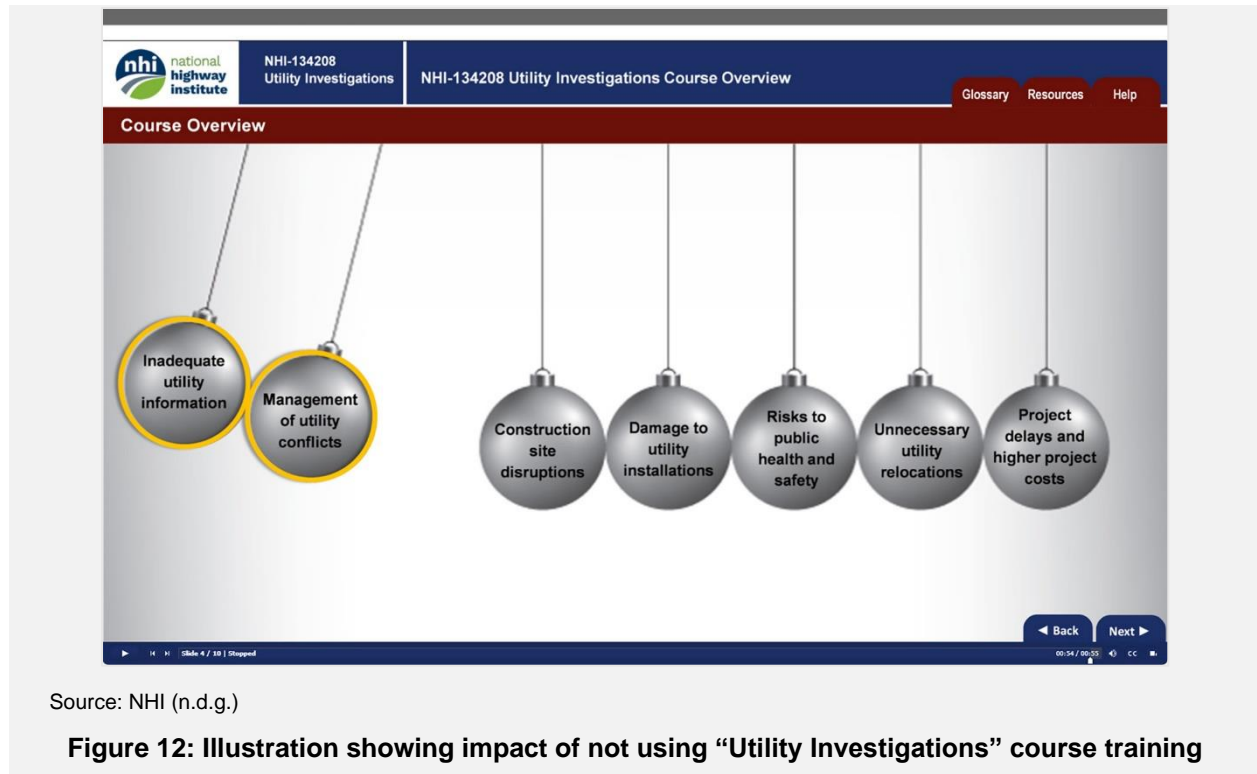
Return to Step 3: Plan Your Opening

## Sharing the "What's in it for me?"

Participants may become intrigued by a dynamic opening, but they need a compelling reason to learn. As an instructor, it is important to discuss the value of the course. To motivate learners to fully engage in the training session, it is necessary to explain the learning outcomes in a way that makes them relevant to participants. They need to know what they are going to learn and why the learning will be important to them. This is referred to as sharing the "What's in it for me?" or WIIFM. One way to share the WIIFM is to explain how the new skills or behavior can help solve a workplace problem. Another way is to link the training to more advanced professional opportunities. Participant expectations are a great place to look to get ideas for WIIFMs.

Here are some ideas to use to create a WIIFM for a lesson:

- Anticipation Guides
- K-W-L Charts
- Quick Writes/Entrance Tickets
- Real-World Problems
- Soliciting Participants' Expectations
- Surveys/Interactive Polls
- Word Clouds/Interactive Polls

**Example**

The course overview in the NHI "Utility Investigations" course provides a clear link between the course learning outcomes and the benefit to learners (figure 13).



Source: NHI (n.d.g.)

**Figure 13: WIIFM screenshot from "Utility Investigations" course**

## Creating a Positive Relationship

We've all been in uncomfortable situations—whether sitting with our organization leadership team or sitting in a new class with a group of strangers—where we don't feel comfortable enough to participate. For training to be successful, participants need to alter or change their behavior. For that to happen, they need to feel secure enough to take risks and try something new. Anxiety is a real barrier for learning. As an instructor, building a positive relationship between you and the participants and among participants themselves is essential for creating an open, supportive learning environment that meets the physical and psychological needs of adult learners.

## Respecting Diversity

Course participants bring a wide range of characteristics, backgrounds, and experiences to the classroom. It is the instructor's responsibility to respect participants' differences and create an inclusive environment that meets the communication needs of all members of the class. Introductions, icebreakers, and team-building activities can

help instructors and participants to create positive relationships by finding common areas of interest or experience, personally and/or professionally.

There are many factors that influence how a person communicates and interacts with others. However, there are some fixed factors which we have no control over. These factors are as follows:

- Physical qualities and abilities
- Race
- Ethnicity
- Gender
- Sexual orientation
- Age

It is critical to be aware of these factors because they affect both the instructor and the course participants and they impact interpersonal relations in the class.

## Communicating Ground Rules and "Netiquette"

Ground rules are an important classroom management tool. When you define respectful behavior during interactions and discussions, it establishes clear expectations for classroom conduct and promotes an inclusive learning environment. Ground rules give an instructor the recourse to stop disrespectful or disruptive behavior in the classroom. Ground rules are most effective if you develop them with input from the class because participants are more likely to take ownership of the rules and adhere to them. It is best to set ground rules at the beginning of a course, but you can always take the time later in the course to stop and create a list of rules to address unproductive or disrespectful behavior.

Some examples of ground rules are:

- No side conversations
- Turn off or silence cell phones
- Turn off emails and other software programs prior to class
- Respect all opinions
- One person speaks at a time
- Class starts on time, don't be late

The lack of face-to-face interaction in an online course can sometimes result in a sense of anonymity. To encourage courteous and respectful online dialogues between participants and instructors, it is necessary to address the challenges of communicating without body language and verbal cues. If you are instructing an online course, it is important to publish and enforce "netiquette," which refers to a list of expectations for social and academic behavior and writing style for online participants.

Here are some examples of netiquette ground rules:

- Work in a separate room to maintain focus
- Address others by name and be mindful of tone
- Avoid writing in capital letters because it can be perceived as shouting
- Respect other people's opinions
- Base disagreements on published facts
- Be professional by using spell check and avoiding slang and emoticons
- Communicate tactfully and avoid profanity

[Return to Difficulties with Participants](#)

## Redefining Instructor and Learner Roles

In traditional information-oriented classrooms, instructors act as experts who impart their knowledge through one-sided lectures. The role of the learner in those classrooms is to passively listen and take notes so they can memorize and reproduce the information on exams. This "sage on the stage" model is effective in presenting large amounts of information. However, it does not support retention of learning and its application in the workplace.

A more effective training model shifts the emphasis from information to the learner. In a learner-centered classroom, the instructor becomes a "guide on the side," facilitating active learning situations in which participants use their existing knowledge and prior experiences to help them understand the new material. Participants engage with the content by discussing, analyzing, and manipulating it to reconstruct it in new and personally meaningful ways. By linking the new information to what they already know, it is easier for participants to recall and apply the information later in a different setting.

### Example

A brainstorming session is a fast and easy way to encourage participants to link new learning to existing knowledge. In his NHI "Instructor Development Course" training presentation, "Conducting Effective Program Reviews," Jon-Paul Kohler displayed this slide (figure 14) and asked table groups to brainstorm answers to the question, "Why are objectives critical to a good review?" Kohler distributed index cards so participants could record their ideas. After allowing time for small group discussion, he called on one group to report their answers. He then added onto participants' prior experiences with the following explanation:

"There is a logical relationship among objectives, observations, and recommendations. The review objectives focus the review and tie it all together. Everything about the review can be traced back to the objectives and they are vital for a review in establishing logic, structure, and meaning."

Source: Kohler (2019).

**Figure 14: Brainstorming prompt from "Conducting Effective Program Reviews"**
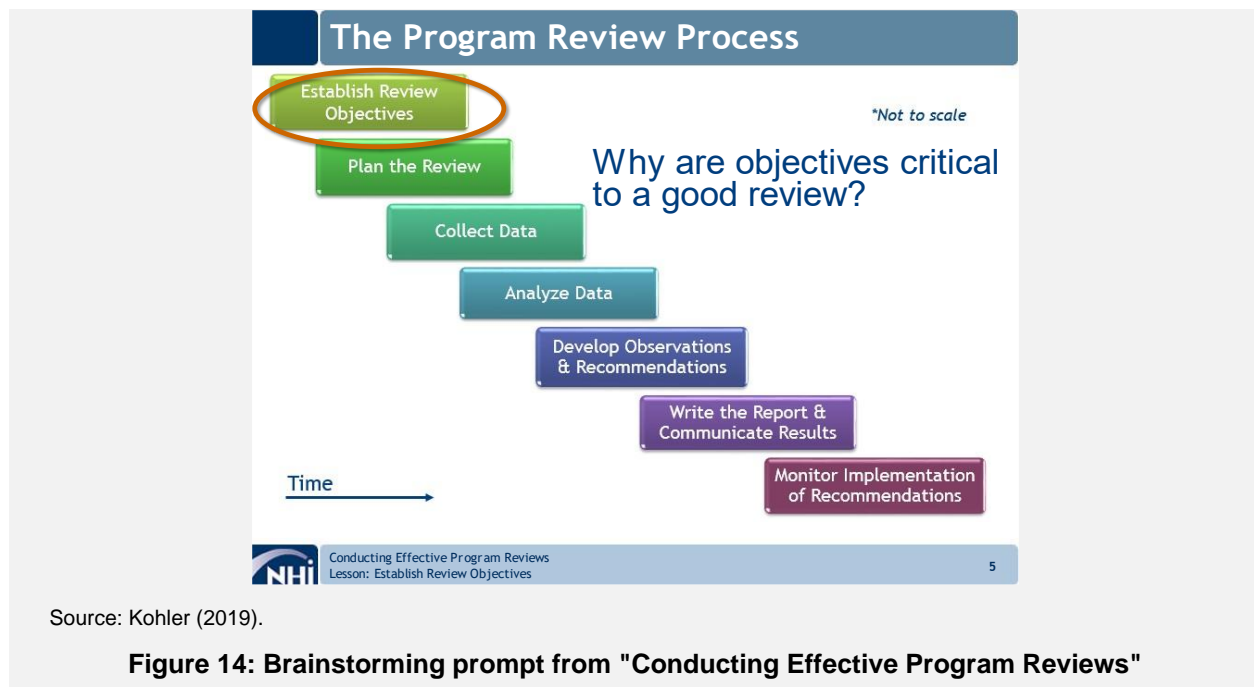
For more ideas on ways to help participants link new information to their existing knowledge, refer to Activating Participants' Prior Knowledge.

Online learning presents unique challenges, and the instructor's role in this setting expands to meet participants' technological and learning needs. In an online course, the participant accesses and consumes the new information. The instructor's role can be to create discussions among participants on the critical concepts, principles, and skills. The instructor also must work hard to create a sense of class community, so participants are comfortable working together and sharing their thoughts online. Student introductions, group work assignments, and netiquette expectations can meet the social and psychological needs of participants. Like in a face-to-face classroom setting, online instructors manage the online classroom. It is also the instructor's role to make sure participants can use the features of the learning management system, including the online discussion tools and any software required for the course. Instructors often share "how-to" guides and instructions as part of pre-course reading assignments, along with technical support resources.

### Lesson Planning Challenge

Open the instructor guide to the course and review the introduction unit. Does it include time to collaboratively create ground rules with the participants? If it doesn't or if that activity was skipped in the past, take a moment to jot down the four most important rules for behavior in the classroom on a large sticky note or piece of paper. Then, insert that note into the instructor guide as a reminder. When the course is taught again, write the rules on a large piece of chart paper or a flip

chart to start the activity. Then ask participants if they have any other rules they would like to add. Post the rules in a visible spot in the room (or in the Notes pod in Adobe Connect) and refer to them if you observe any behavior that violates those rules.

# Dealing with Difficulties

## Difficulties with Course Content

Despite their expertise in a subject, instructors will sometimes encounter challenges with the content in a course. Sometimes there is too much content and an instructor may feel the need to to rush through the slides and skip the activities. Sometimes participants are disappointed that the content isn't challenging enough. Other times, participants don't have the necessary background knowledge and struggle to keep up. To overcome these challenges, instructors need to take a hard look at the course content to answer to some essential questions. Based on the answers to these questions, instructors need to adjust their lesson plans or create instructional support to improve the training experience for participants.

### What is the "need-to-know" and "nice-to-know" information?

The learning outcomes clearly state what participants are expected to be able to do at the end of the lesson. The learning outcomes should set the parameters for the lesson. However, course designers sometimes include extra background material or examples that expand the scope of a lesson. Depending on participants' background knowledge, this extra information may be considered review material or extraneous. Other times, the examples may be outdated or irrelevant to participants' work situations.

The learning outcomes should be the guide to what is "need to know" information. Anything beyond that can be considered "nice to know" Information. Carefully compare the course materials to the learning outcomes and highlight or mark the "nice to know" information. If you are pressed for time, another option is to display a slide and ask participants what bullet(s) is most important to them or which bullet(s) they have a question about. For more information on using learning outcomes to make instruction decisions, refer to Working with Learning Outcomes and Using the Outcome Verb to Make Instructional Decisions.

### What do participants already know?

The sorting of "need to know" and "nice to know" information becomes easier when an instructor has a good idea of what participants already know. There are several ways an instructor can learn what education, training, and experiences participants bring to the classroom. Depending on the size of the class, an instructor can ask participants to share this information when they introduce themselves to the class or provide this information in a brief biography. If the group is too large for personal introductions, the

instructor can survey the group on their training and experience. Using the information gathered, the instructor can then decide if it is necessary to present the information, skim over it quickly, or provide it as a handout for reference. The beginning of the course is the best time to gather information about participants' general knowledge. The start of a lesson is a good time to ascertain their background knowledge of key concepts or topics. Write questions to elicit that information from participants. Think of different ways to gather that information, for example, an oral survey with a show of hands, a brainstorming session, or another method. For more information on gauging participants' prior knowledge, refer to Quick Writes/Entrance Tickets, Surveys/Interactive Polls, and Activating Participants' Prior Knowledge.

## How can I best meet participants' learning needs?

If the class features a mix of experienced and novice learners, an instructor has a couple of instructional choices. If the majority of learners are experienced, the instructor can discreetly ask for mentors to assist their less experienced table mates. The instructor can also create supplemental handouts or job aids with calculations, step-by-step instructions, or other essential information to support the struggling learners. If the group is primarily made up of beginners, the instructor can again draw upon the knowledge of the more experienced learners. It may be necessary to change how an activity or discussion is structured to best take advantage of the brain power in the classroom. For more information on how to bridge the gap between participants' knowledge and the course content, refer to Supporting Participants.

## How can I adapt a discussion or practice activity?

If novice participants will not benefit from whole group discussions and independent activities, the instructor can adapt the instructional methods to better meet their needs. Instead of posing questions to the group and calling on one or two participants to answer, an instructor can turn it into a partner activity. After posing the question, the instructor can ask participants to discuss their answers with a peer. This provides an opportunity for the more experienced learners to share their knowledge with a peer and provide additional feedback, if necessary. If the lesson plan describes an independent practice activity, the instructor can alter the instructions so the task can be accomplished either with a partner or as a group. Ask participants to work with one set of material and ask each member of a group to be responsible for a part of the process. To debrief the activity, call on table groups to report on their accomplishments, challenges, and discoveries. For more information on collaborative learning activities, refer to Think-Pair-Share and Cooperative and Collaborative Learning.

# Difficulties with Technology

One challenge all instructors dread is when a battery or light bulb burns out and the slideshow, video, or microphone doesn't work. While this can be a shock, it does not mean the training session will be a failure. The PowerPoint slides are not the course.

They are just visual aids designed to be a reference tool for the instructor and a common focus of attention for participants. If the slides are suddenly unavailable and the participant workbook contains copies of the slides, the instructor can ask participants to turn to the page in their workbook with the slide image and continue instruction from there. If the participant workbook does not contain copies of the slides, the instructor can continue teaching without the slides and, if possible, print lesson slide handouts for the class during the next break. If the projection system malfunctions but the video is available on the instructor's laptop, small groups of participants can take turns standing around the laptop to view the video. If the video is available on the internet, the instructor can share the URL and participants can use their smart phones to access it. The best way to deal with a malfunctioning microphone is to move away from the projection screen and closer to the learners. This can mean pausing and delivering instruction while you circulate around the tables or up and down the aisles. It will be important to check in with participants to make sure they all can hear you. If they cannot hear you, turn to face them and repeat the information. This is also a good opportunity to convert whole group discussions into partner or small group activities.

Return to Visual Aids

Return to PowerPoint Slides

## Difficulties with Challenging Personalities

Classroom management is another challenge instructors face. It is the instructor's responsibility to create and maintain a positive and supportive learning environment. That means addressing any comments or behaviors that negatively impact the learning of others in the classroom. Clearly communicating expectations for participant behavior is a good way to set the tone for interactions and avoid common disruptions. Most often, ground rules are established at the start of a course, but they can be agreed upon or revisited any time it is necessary. For more information on developing and enforcing class rules for behavior, refer to Ground Rules and "Netiquette" or refer to "Ground Rules" in the NHI publication, *The Circle of Learning*, available at https://www.nhi.fhwa.dot.gov/resources/docs/circle_of_learning.pdf.

### Types of Problems

There are two types of problems with participants: those that need to be addressed immediately and those that are best handled outside the classroom. Disruptions such as violating ground rules, conducting continual sidebar conversations, disrespecting other participants or the instructor, telling off-color or racist jokes, etc., should be dealt with in the classroom, but in a professional manner.

On the other hand, if a reaction from the instructor would embarrass the participant or make the situation worse, it is best to make a "quick fix" and speak to the participant during the next break. Behaviors like habitually interrupting other participants,

continuously challenging the instructor, continually arriving late, etc., should be managed through one-on-one conversations outside of class time.

If an intervention is necessary, be sure it is non-punitive. Make sure the intervention or response to the behavior is not intended to hurt, insult, or put a participant on the defense. Decide when you will speak with the participant. It is important to address the situation in a timely manner. Be specific and honest when you describe the disruptive behavior. An important question to ask is why the participant is exhibiting the behavior. You may be surprised to learn there is a legitimate reason for the behavior. Then, get consensus with the participant on how he or she will change their behavior.

## Difficulties with Virtual Learning

Some difficulties or disruptions are unique to virtual or remote learning situations. Among these may be the fact that participants may not be wholly focused on the course and also may be looking at other projects or computer screens during the training. One way to engage students in web conference or remote/virtual learning is to incorporate polls and discussions in chat pods, but there are many other methods to help participants link facts and information back to the content and purpose of the course. Table 3 presents several techniques to help participants engage with the content and connect to the instructor and their peers.

**Table 3: WCT Engagement Techniques**

| Technique | Description |
|---|---|
| **Sort-it-Out** | This is a digital version of the traditional concept mapping exercise. It challenges participants to examine how key concepts in a unit, lesson, or chapter relate to one another. Participants can work independently or in pairs to develop the digital concept map. Ask participants to combine text and visuals to show the relationship between concepts. Instructors can have participants complete this activity online asynchronously and then share them during face-to-face sessions (blended) or in video conferencing sessions (online). |
| **Use Chat or Polls to Check Understanding** | Post survey or poll questions to check participant understanding of concepts. Give the participants time to consider the question and respond. |

| Technique | Description |
|---|---|
| **Spider Web Discussions** | Prior to a remote learning session, participants first answer questions independently. Then either participants discuss their answers with a team that subsequently shares the team's responses with the class, or each participant can share their own answers independently at the start of the class as part of a larger class discussion. |
| **Flipped Classroom** | Provide content to participants through a link to a video, through an earlier class session, or through assigned reading. Then have participants work individually or in groups to present their synthesis of the information to the rest of the class in the synchronous session. |
| **Virtual Think-Pair-Share/or Small Group Work** | Use project-based learning techniques to engage participants by giving participants a prompt, breaking them into groups, and having them record their answers on a shared document, presentation, or Adobe Connect whiteboard. Once participants return to the main classroom, ask volunteers from each group to share their answers with everyone. |
| **Teach Backs** | Have participants work in groups to study a niche element of the lesson or unit. Then have them develop a presentation and use it to teach the class. With this method, the instructor will need to have clear expectations of what will be in the presentation and how long it will be. The instructor also will need to provide an overview of anything the participants missed in their presentation. |
| **Non-Verbal Feedback** | Allow participants to express their opinions by selecting an icon (e.g., raise hand, thumbs up or down, etc.) |

## Making It Your Own

### Customizing Your Lesson Plan

Although instructors have great training resources at their disposal, they still need to prepare for teaching by customizing their lesson plans. When you mark up the instructor guide with good questions or ideas for alternative activities or insert copies of job aids or

handouts you have created, you are, in a sense, making the course your own. You can refer to appendix: Tool and Techniques for information on a wide range of instructional techniques and strategies, practice activities, assessment methods and tools, and ideas you can use to customize the lesson plan. You can also add content with references to local conditions or issues to increase the relevance of the course.

While instructors need to cover all the technical content in a course and use the provided instructor guide and visuals, you can adapt the instructional strategies to meet the needs of the participants. For instance, if a specific group of participants is hesitant to join in the class discussions, you can switch to small group activities to encourage their participation. Or, if you are pressed for time and you know that the participants already have strong backgrounds in content in one unit, you can find a different way to present what is review material without as much time on each of the slides in the unit.

The benefits to customizing the lesson plan include:

- **Ownership of the material:** If you have taken the time to customize your lesson plan, you will have a better sense of ownership of the material. Based on the instructional experience and your individual teaching style, you are free to choose the specific teaching methods, illustrative examples, or practice activities that meet the participants' learning needs.
- **Grasp of the delivery:** As you review and make notes in the instructor guide, you will become more familiar with the material and the options for delivery. The process helps to create a more intimate relationship with the content. The experience will help you project more confidence and personal experience when you teach.
- **Self-Awareness:** When you customize the course lesson plan, consider how you will deliver the content. It is important to recognize that the slides are not your script and that they are just visual aids to help reinforce your training delivery. It will help you think ahead regarding what you are going to say, do, and ask participants. Thinking about this in advance will help you become more self-aware as an instructor. It will also push you to assess what your strengths are as an instructor.
  - Are you effective at asking thought-provoking questions? Then brainstorm interesting questions in advance to help learners think through problems together with you.
  - Do you have great examples to enhance the content? Use them.
  - Can you think of an interesting scenario to role-play? Plan it out in advance.

The lesson plan customization process forces you to think about the flow of the training session. It also gives you a chance to consider if there are other ways for you to explain and sequence the content. You might choose to follow the sequence of slides, but if a different sequence makes more sense for your approach to the content, you are free to change the order of the slides. If you change the slide order, remember to let

participants know so they can follow along in their workbooks.

It is important to remember that a lesson plan is a living document. Not every activity or technique works the same with every audience. But keep experimenting with your delivery. Make a note when things go well, as well as ideas for improvement when things don't go as planned. If you review and update the lesson plan regularly, you will eventually figure out a range of effective teaching approaches.

The following sections in this chapter will lead you through the 7-step process that experienced instructors use to plan an excellent training session (figure 15). If you are an inexperienced instructor or new to lesson planning, you can start small and customize one unit at a time. If you are more familiar with the process, you can take a hard look at your delivery and the content of an entire you. You can use the action plan at the end of this chapter to help you customize a lesson.

## Steps for Planning an Excellent Training Session

| STEP 1 | Participants' Needs |
| STEP 2 | Outcomes |
| STEP 3 | Opening |
| STEP 4 | Learning Strategies |
| STEP 5 | Knowledge Checks |
| STEP 6 | Conclusion |
| STEP 7 | Timeline |
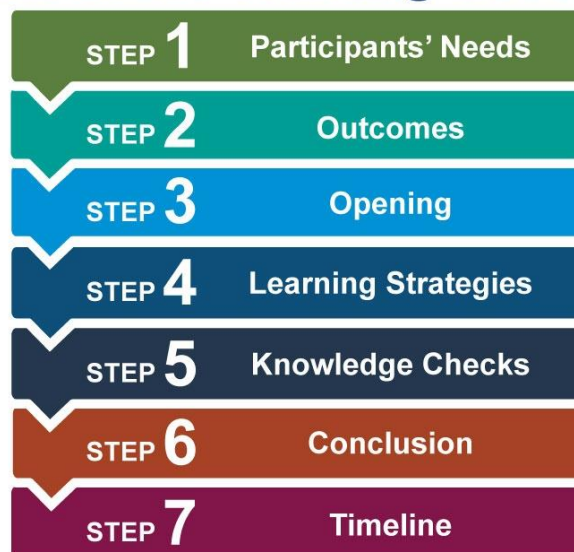
Source: NHI (2018).

**Figure 15: Steps for Planning an Excellent Training Session**

## Step 1: Analyze Participants' Learning Needs

The first step is to think about the course from the participants' viewpoint. Ask yourself:

- What job(s) do they want or need to get done?
- What do they need to do differently?
- What are they going to learn from this training?
- What decision(s) do they need to make?

> ■ How will you know they are successful?

## Step 2: Review the Learning Outcomes

It is crucial for you to review the learning outcomes before you customize the lesson plan. The learning outcomes can give you a good sense of the scope of the lesson. They will help you prioritize the "need to know" content rather than focusing on the "nice to know" content. Look at the action verb that starts each learning outcome. It will explain what participants are expected to do when they are competent at the task, skill, or behavior. The verb can also be a clue to which instructional strategy or strategies you should use to help participants demonstrate mastery.

For more information on lesson planning using learning outcomes, refer to Identifying Learning Outcomes and Using the Outcome Verb to Make Instructional Decisions.

Return to Identifying Learning Outcomes

## Step 3: Plan Your Opening

A great lesson always has a solid opening. The opening is often what determines whether the instructor will be successful in a course or lesson. But openings are often rushed or overlooked. It is essential to plan and practice an effective opening to open a course and start each unit or lesson.

Openings are very versatile. You can use an opening to:

> ■ Gain a better understanding of the participants
> ■ Trigger interest in the topic
> ■ Preview new material
> ■ Highlight key points

If you use the few minutes of the lesson strategically, you can create a sense of excitement and desire to learn in the participants. At the same time, you can gather key details about them that will help you tailor the course to their specific needs.

For example, if you choose to introduce a topic with a hypothetical scenario, you will immediately engage participants in the content by getting them to consider possible outcomes. Their responses will provide you with information about their background knowledge and experience so you can better meet participants' needs.

To start his NHI "Instructor Development Course" training presentation, the "Project Development Process," Ed Woolford led with a question, "How many of you have had project delays caused by late utility discoveries?" The question served two purposes: it immediately gave participants a reason to pay attention and gave Ed an idea of how many participants in his group had project development experience.

For more information on options for creating a strong opening, refer to Setting the Hook.

Return to Supporting Participants

## Step 4: Select the Learning Strategies

The instructor's goal is to create an active learning environment for the participants so they will be able to master the learning outcomes. Active learning strategies produce knowledge that lasts beyond the classroom. They also encourage critical thinking, creativity, and collaboration that are highly valued in the workplace.

The instructor guide may feature a lecture script, but you can take that as just a suggestion. You are expected to incorporate different instructional and practice strategies that will better align with the learning outcomes. Use the action verb in each learning outcome as a guide to select an appropriate learning strategy.

Note: If something works, don't break it. But, if your experience shows the as-written material does not fully meet the needs of participants, you should consider what strategy might support learners better. This may be the case when you often have a large population of non-target audience members in your class.

The 10 most common learning strategies used in NHI courses are:

- Lectures, see Lectures and Interactive Lectures
- Interactive Lectures, see Lectures and Interactive Lectures
- Large-group Discussions, see Group Discussions
- Small-group Discussions, see Group Discussions
- Case Studies
- Quick Writes/Entrance Tickets
- Demonstrations
- Role Playing
- Hands-on Practice Activities
- Games

For more information on selecting an appropriate instructional strategy refer to Using the Outcome Verb to Make Instructional Decisions.

It is important to note that you are not restricted to the frequently used strategies listed above. You can explore the wide range of instructional techniques and strategies, practice activities, assessment methods and tools, and ideas for course materials in appendix: Tools and Techniques.

Return to Using the Outcome Verb to Make Instructional Decisions

## Step 5: Plan for Knowledge Checks

As you look across the classroom, how can you tell which participants are keeping up with the content and which ones need clarification or extra support? Tests and quizzes are just one way for you to take measure of learner comprehension. But it is best not to

wait until the end of a lesson to determine that some participants have knowledge gaps or came away with misconceptions.
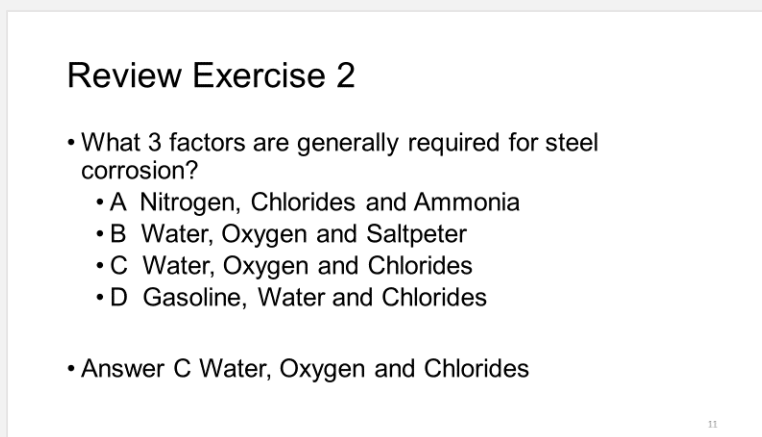
One simple, but effective way for you and the participants to monitor their learning is to ask thoughtful knowledge check questions at strategic points during a lesson. When customizing your lesson plan, review the learning outcomes and ask yourself: "What are the most important and difficult concepts in this lesson?" Then, write questions to address those difficult concepts. It is a good rule of thumb to insert a meaningful question every 3–5 minutes during an interactive lecture.

When writing questions, it is important to remember that there are two types of questions: application and recall. Use recall questions when you want participants to produce facts or other details from the course. For example, "What are the characteristics of a Thru-Turn intersection?" Application questions require higher level thinking because participants need to apply their knowledge in a unique way. They are often open-ended and do not have a single, correct answer. An example of an application question is, "How would you sell the concept of a Thru-Turn intersection to your local planning committee?"

Another way to check on participants' understanding is to insert short quiz questions at key points in your training presentation. You can ask participants to respond through a show of hands or, if you have the technology, use electronic "clickers." For more information on incorporating quiz questions into the lesson, refer to Surveys/Interactive Polls.

## Example

In his NHI "Instructor Development Course" training presentation, "Sidewalk Collapse US 1 over Earman River," Richard Kerr inserted an animated slide with a multiple-choice question to help monitor his participants' understanding (figure 16). He presented the answer after participants responded.

### Review Exercise 2

- What 3 factors are generally required for steel corrosion?
  - A Nitrogen, Chlorides and Ammonia
  - B Water, Oxygen and Saltpeter
  - C Water, Oxygen and Chlorides
  - D Gasoline, Water and Chlorides

- Answer C Water, Oxygen and Chlorides

11

Source: Kerr (2019).

**Figure 16: Knowledge check slide from "Sidewalk Collapse US 1 over Earman River"**

# Step 6: Plan Your Conclusion

Another often overlooked component of a successful training session is the conclusion to the lesson. A well-written conclusion can:

- Reinforce learning
- Reiterate key points
- Connect new learning to previously covered topics
- Present a call to action
- Preview future lessons

Some phrases you can use to begin your conclusion include:

- "What is something you learned today that you will apply right away when you get back to your job?"
- "What are your big takeaways from this lesson?
- "In our next lesson, we are going to expand on _____."
- "Building on what we learned in the previous lesson, ..."
- "How do you plan to use this information during your next ____?"

# Step 7: Estimate Your Timeline

One of the greatest challenges for instructors is to deliver the "need to know" content and complete all the planned activities in the given period. Often, instructors find that they take too long in some sections and feel they need to rush through content or skip activities in later sections.

Getting a handle on the pacing of your instruction can take time and practice. But customizing your lesson plan gives you an opportunity to explore and preview the timeline for your training session.

When planning your timeline for instruction:

- Decide how much time each activity will take and write it into your plan.
- Identify what material must be covered fully and what items can be skipped if you are short on time.
- Try not to spend more than 20 minutes on one single activity (unless it is individual work/writing/calculations). An average person has an attention span of 20 minutes or less, so your instruction will suffer if you don't introduce a dynamic change at that point.
- Make sure that you are prepared, and have all activities in writing, even if you explain them verbally. A lot of useful instructional time can get lost on awkward explanations and clunky transitions.

# Lesson Planning Action Plan

Use the action plan in table 4 to guide your decisions when planning a lesson.

**Table 4: Seven Steps for Planning a Lesson**

| Step | Considerations |
|---|---|
| **Step 1: Participants' Needs** | The first step is to think about the course from the participants' viewpoint. Ask yourself:<br><br>■ What are they going to learn from this training?<br>■ What do they need to do differently?<br>■ What job(s) do they want or need to get done?<br>■ What decision(s) do they need to make?<br>■ How will you know they are successful? |
| Use this space to record your thoughts about participants' learning needs. | |
| **Step 2: Outcomes** | Learning outcomes help you focus on the critical content and control what is taught. Critical information and skills are the "need to know" elements of the training and should be reflected in the learning outcomes; anything else is "nice to know" information that participants shouldn't be held accountable for learning.<br><br>You need to communicate the learning outcomes in a way that links them to participants' professional development needs. They need to know what they are going to learn and why the learning is important.  Ask yourself:<br><br>■ How can I make the learning outcomes relevant to participants? |
| Use this space to record your thoughts about learning outcomes: | |

| Step | Considerations |
|------|----------------|
|  |  |
| **Step 3: Opening** | A great lesson will always have a solid opening. Openings are very versatile. They can be used to gain a better understanding of your participants and trigger interest in the topic. How much do they know? How can I modify this presentation to fit this specific group of participants? These questions can be answered if you use your first minutes of your lesson strategically. |
| Use this space to record your thoughts about an opening: |  |
| **Step 4: Learning Strategies** | Every instructional strategy has advantages and challenges. NHI will provide recommended strategies for you. As an instructor, you know what your participants need, what they already know about the content, how they might use it, and what they want to get out of the training course. What mechanisms might help these participants best interact with the content? |
| Use this space to record your thoughts about learning strategies: |  |

| Step | Considerations |
|---|---|
| **Step 5: Check for Understanding** | The instructor must plan to check for understanding during each segment of training. Thoughtful and timely questions are the best way to measure participants' progress and comprehension ahead of formal assessments. |
| Use this space to record your thoughts about how you will evaluate the participant understanding: | |
| **Step 6: Conclusion** | A great lesson plan would use a conclusion strategically, to reinforce learning and retention and to build logical bridges between new and old content. |
| Use this space to record your thoughts about concluding the lesson: | |
| **Step 7: Timing** | The timeline of instruction—or "pace"—is central to the efficiency of the training. Decide how much time each activity will take, and write it into your plan. Decide what material must be covered fully, and what items can be dropped if you are short on time. |
| Use this space to record your thoughts about how much time you will use for each component of your lesson: | |

[Return to Customizing Your Lesson Plan](#)

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# Appendix: Tools and Techniques

Return to Customizing Your Lesson Plan

Return to Step 4: Select the Learning Strategies

Return to Working with Learning Outcomes

## Action Plans

An action plan is a strategic planning tool used to record the tasks required to reach a goal. It is like a roadmap that divides the tasks into actionable segments along a timeline. Each task has its own due date and person responsible for completing it. An action plan can also be used to track a project's schedule and budget. It is a living document and can be updated or adjusted to meet the organization's needs.

An action plan can include:

- A well-defined goal description
- Steps or tasks that need to be complete to reach the goal
- Names of people assigned to each task
- Deadlines and milestones
- Necessary resources
- Measures for evaluating progress

## Course Format Recommendations

### Instructor-Led Training

Ask participants to begin an action plan on how they will implement what they have learned in class when they return to their workplace. Ask them to identify two or three changes they want to make, any resources they will need, any incremental steps they will need to take in preparation, people who can assist or collaborate, and personal deadlines. You can create a template to facilitate their planning.

### Web Conference Training

If the course features collaborative work over several weeks, ask participants to create an action plan outlining the incremental tasks, roles, responsibilities, resources required, and deadlines. Participants can use the Gantt chart plug-in for PowerPoint to detail the timeline for their project.

Return to Pragmatists

## Analogies

An analogy is a comparison of two things that are alike in some way. Research has shown that analogies can help participants understand the structure of new material in

terms of what they already know. You can help participants recognize key features of a new concept by creating analogies based on physical similarities or other relationships such as synonyms, antonyms, part/whole, cause effect, thing/function, etc.

Analogies are very useful but they have their limitations. Participants can learn the analogy but not truly understand the underlying relationship. When that happens, they are unable to transfer their knowledge to a new situation. You can help them stretch their understanding by providing more than one analogy. Or ask them to come up with their own analogy and share it with a partner or small group. If you overhear an incorrect analogy, you can help the participant understand what is incorrect about the relationship they are trying to make and suggest another conceptually correct one.

### Examples

During his NHI "Instructor Development Course" training presentation, "Highway Plan Reading: Centerline Stationing," Jeff Jasper used a knotted rope as an analogy to explain highway stationing notation (figure 17).

"Highway stationing might be compared with a rope having knots at 100-foot intervals. The beginning of the rope would be 0, the first knot at 100 feet would be Station number 1 and would be written as 1+00. The second station number would be 2 (which is 200 feet from the beginning) and would be written as 2+00 and so on."



Source: Jasper (2018).

**Figure 17: Knotted rope analogy for highway station numbering**

Return to Activating Participants' Prior Knowledge

Return to Supporting Participants

# Anticipation Guides

Anticipation guides are an easy way to get participants to think of what they know about a topic and then help them link new information to their prior knowledge. Anticipation guides are a list of statements related to a topic. Participants read the statements and mark whether they agree or disagree. Anticipation guides also help participants set a purpose for learning because they will want to look for information to confirm their initial beliefs or provide reasons to rethink them.

Writing anticipation guide statements takes some thinking. Good anticipation guide statements should:

- Focus on the information you want participants to think about (learning outcomes)
- Be based on information in the course materials that either supports or opposes the statement
- Challenge participants' beliefs
- Be general rather than specific

**Instructions**

How to use an anticipation guide:

1. Create an anticipation guide using 2–10 statements and provide a way for participants to mark their agreement or disagreement. The statements should relate to the learning outcomes.
2. Ask participants to complete the anticipation guide independently. Then ask participants to discuss their responses with a partner or small group. After the discussion, give participants the opportunity to change their response if they want.
3. Participants read and/or listen and engage with your interactive lecture with the purpose of finding information about the statements. They take notes as to where they found their supporting or disproving information and should be allowed to change their response if they want.
4. At the end of the lesson or unit, conduct a brief class discussion and ask participants if they changed their position about any of the statements. Ask participants to supply specific examples from the course materials.

**Example**

An example of one statement in an anticipation guide that Abdalla Abdelmoez could have used in his NHI "Instructor Development Course" training presentation, "Impacts under the National Environmental Policy Act (NEPA)", is shown in figure 18.

| Statement | Before | Notes | After |
|---|---|---|---|
| National Environmental Policy Act (NEPA) mandates are unreasonable. | T/F | | T/F |
| | T/F | | T/F |

Source: Abdelmoez (2018).

**Figure 18: "NEPA Impacts" anticipation guide**

# Course Format Recommendations

**Instructor-Led Training**

Provide a printed copy of the anticipation guide questions as a handout for participants to complete and then revisit at the end of the lesson or unit. Or create the anticipation guide using a free online form-building software and send participants a link to complete it online. You can display the results and use them as a discussion starter later in the lesson. Allow participants to take the survey again at the end of the lesson or course to see if any of them have changed their minds.

**Web-Based Training**

Format anticipation guide statements as on-screen questions at the start of a lesson or unit (for example, "Do you think/believe ….?"). Follow up with the question, "Why or why not?" Present the questions again at the end of the lesson or module with slightly different phrasing (for example, "What do you think now?" "Do you think/believe ….?"). Again, follow up with the "why or why not" question. Self-answered questions like these increase the level of active learning in an independent study or online course.

**Web Conference Training**

You can enter the anticipation guide statements as poll questions that appear while participants are waiting for the online session to begin. You can display the poll results and use them as a discussion starter later in the lesson. Re-post them again at the end of the lesson or module to see if participants have changed their minds.

Sharing the "What's in it for me?"

Return to Activating Participants' Prior Knowledge

Return to Summarizing

# Assessment Checklists

A checklist is an assessment tool that lists the specific criteria for the skills, behaviors, or attitudes that participants should demonstrate to show successful learning from training. Checklists usually feature statements or questions about the participant's performance of each criteria. Answer choices are generally limited to "Yes" or "No." Because they clearly state the skills, behaviors, and/or attitudes expected at the end of training, both participants and instructors can use checklists to monitor learning. Instructors and peers can use checklists to record their observations during participant demonstrations or performances.

**Instructions**

To create an assessment checklist:

1.  Identify the key skills, behaviors, or attitudes in a learning outcome, as well as

any conditions (time limits, resources used, etc.)

2. Write a clear, specific, observable description of the skill, behavior, or attitude.
3. Write a sentence or question for each description.
4. Create a checklist document and leave a space for the date. This will help you track participant progress if more than observation will take place.
5. Organize the statements/questions into a table with spaces for checkmarks or Yes/No responses.
6. Leave space(s) to write anecdotal comments
7. Share the assessment checklist with participants at the start of the training.

### Example

Figure 19 displays an assessment checklist that could be used with Jeff Jasper's NHI "Instructor Development Course" training presentation, "Highway Plan Reading: Centerline Stationing," is shown below.

Participant Name: _____        Date: _____

### Centerline Stationing Checklist

| Criteria | Yes | No |
|---|---|---|
| Participant uses correct terminology when defining centerline notation: | | |
| ■ Centerline | X | |
| ■ Station | X | |
| ■ Offset | X | |
| Participant can mark a centerline station if given stationing notation. | X | |
| Participant can write notation for a station marked on a centerline. | X | |
| Participant can calculate the distance and direction of an offset from the centerline. | X | |

Comments:

Source: Jasper (2018).

**Figure 19: Centerline stationing assessment checklist**

Return to Assessing Learning

Return to Oral Presentations

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## Background Information

Background information should provide the participants with relevant information about the topic to be studied. Background information can include research studies, records of historical events, statistics, case studies, interviews, etc. Background information can provide context for the topic and help participants evaluate and organize new information.

### Course Format Recommendations

#### Instructor-Led Training

In preparation for the course, gather industry references, professional articles, research studies, or other resources that can provide additional details and context for interested participants. Make copies of the background information and lay them out on a resources table for participants to either peruse or—if you have enough copies—take home to read.

#### Web Conference Training

In preparation for the course, gather industry references, professional articles, research studies, or other resources that can provide additional details and context for interested participants. Upload a resources list with publication and document titles and links to the File Share Pod. At appropriate times during the course, mention a document or publication listed in the File Share Pod that might interest participants. If a participant suggests another document, allow them to share it using the Web Share Pod.

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## Brainstorming

Brainstorming is a creative, collaborative method you can use to generate a list of ideas or possible solutions to a problem. It is a powerful team building activity because all participants can play a role. Everyone is invited to share their ideas without fear of criticism. The goal of brainstorming is to generate many ideas quickly, and "out-of-the-box" thinking can be encouraged. The ideas are then discussed, merged, and refined. The group eventually works to achieve a consensus on the final list or best approach to solve the problem.

You can also encounter challenges running a brainstorming activity. Some participants need more time to formulate their ideas or are reluctant to speak in front of a group.

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Other participants will sometimes try to dominate the session. Also, if you find that you are working in an organization with hierarchical leadership, participants may be less motivated to share new ideas if they believe they will be ignored. You may have to actively manage the activity so all voices can be heard. While the idea-generating part of the activity is supposed to be judgement-free, disagreements can flare up during the review and evaluation stage. Consensus building is not always peaceful.

Here are some guidelines for an effective brainstorming session:

- Set a time limit
- Provide a clearly defined question or goal
- Prohibit negative feedback (words or body language)
- Encourage different perspectives
- Allow one speaker at a time
- Encourage quantity and quality
- Expand on others' ideas
- Record all ideas

**Instructions**

How to conduct a brainstorming activity:

1. Introduce the challenge (generate a list, come up with solutions, etc.).
2. Explain the ground rules for the activity.
3. Set the timer.
4. Participants take turns sharing their ideas.
5. Encourage creative, non-traditional thinking.
6. Record all ideas on a white board, easel paper, or sticky notes.
7. When time is up, review the ideas.
8. Guide a discussion on how to group or organize the ideas to refine the list
9. If the goal is to arrive at a recommended solution, facilitate a discussion on the merits of the refined ideas.
10. Achieve a consensus with the group on the best option.

**Example**

At a meeting on a corporate initiative, the Knowledge Management Unit gathered participant input during a problem-solving brainstorming session using crowdsourcing. The goal of the brainstorming session was to get information on best practices, lessons learned, and action items. To encourage participation, the unit sent registrants pre-event emails with question prompts and explained how participant input would be used. At scheduled times during the event, the session host posted open-ended questions, polls, and word cloud prompts in the virtual platform (i.e., Microsoft Teams or Adobe Connect.) After the set time elapsed for each prompt, the session host displayed the answers, poll results, or word cloud. The session moderator facilitated discussions on the brainstorming results and explained what would be done with the collected information. For registrants who may have missed the event, a post-event survey was provided with all the crowdsource questions.

# Course Format Recommendations

### Instructor-Led Training

Instead of verbally sharing, provide participants with a stack of sticky notes or note cards so they can write down their ideas. Then, ask them to read their ideas aloud, have the groups move around and read each other's notes, or collect them and read them to the group. Sticky notes make it easier to group and organize the ideas during the refinement part of the activity.

### Web-Based Training

For online courses, set a time limit in terms of hours instead of minutes. Participants can post ideas to a common wiki or collaborative document. As they review the posted comments, they can leave comments or contribute additional ideas if they become inspired. If a consensus is required, schedule a web conference meeting, and facilitate the discussion.

### Web Conference Training

There are several collaborative online tools that allow participants to type on virtual note cards or whiteboards during a live or asynchronous session. Using the web conference platform, you can set up small discussion groups so participants can edit or expand the ideas and arrange the cards or idea bubbles into groups or categories. Then bring the groups together for a whole group discussion where they can present their ideas and work together to achieve a consensus that meets the activity goal.

Return to Activists

Return to Activating Participants' Prior Knowledge

# Case Studies

A case study refers to an in-depth study of a person or issue to get a multifaceted view. Information is gathered from different sources, such as through observation and interviews. The collected data is reviewed and relevant theories are applied to recommend a course of action. While the case study method originated in the medical field as a study of a patient, many professional fields use the case study method to better understand a person, group, community, or event.

There are two types of case studies:

- Problem-solving case studies are used to investigate a problem or situation and use analysis and theory to recommend a solution.
- Descriptive case studies are used to understand a situation better. This type of case study looks closely at particular aspects of a situation, person, or group to identify what happened and why. Descriptive case studies are useful for guiding decision making in other cases with similar features.

Case studies offer some unique benefits. They provide in-depth information that otherwise might not be able to be phyiscally or ethically created. Case studies also provide a wealth of context to help understand a problem or situation. They allow participants to analyze concrete data, and then view it through a theoretical lens, and apply theoretical knowledge in real-life situations. Because the situation may resemble actual workplace problems, case studies support the transfer of knowledge.

For more information on effectively using theories in instruction, refer to Theories.

There are also cons to using case studies in training. An existing case study may not fit your training needs and developing a case study is a time-consuming process. It also takes participants more time to work with a case study than other instructional methods. To manage class time, make sure that participants clearly understand the objectives of the case study analysis, any outside resources they can use, your expecations of their final product, and the time limit. A rubric is the best assessment tool to measure the quality and completeness of participant work. As there is no one, correct answer, the results of the case study can be ambiguous. This can be a source of frustration to some participants.

There are two options for using a case study in the training environment. You can present one or more short scenarios that focus on a single aspect or problem. This is good if you have a short class or want to concentrate on one learning outcome. Or you can weave a case study of a complex situation throughout the course so the participants can use it to master several objectives. In any case, you need to orient participants to the points to note, provide questions for them to answer, and, in the end,

ask for their takeaways from the activity.

**Example**

Here is an example to show how to use one case study throughout a course. The activity is designed to meet the following objectives:

- Manage changes to construction projects
- Manage stakeholder expectations of change

The instructor presents a project charter with limited background information and project requirements. The participants analyze the project charter and ask questions to get a better perspective on the project scope and objectives. Throughout the course, participants refer to the case study scenario to develop project planning components including a:

- Scope statement
- Communication plan
- Project schedule
- Risk identification and management
- Stakeholder matrix

At some point during the activity, the instructor adds a change to the project to force participants to think through how they can manage project changes. By the end of the course, the participants have practiced applying all the topics they had learned to a "real-life" project.

## Course Format Recommendations

### Instructor-Led Training

You can ask participants to create a diagram to demonstrate their comprehension of complex case study scenario. While they record what they know, they will be able to identify information they are missing. Diagramming can also help them to visualize the sequence, organization, or hierarchy involved in the decision-making process. You will need to create and share a checklist or other assessment tool with criteria so participants will be aware of the purpose and expectations for their final product.

### Web-Based Training

Independent study courses offer an opportunity to add an interesting twist to the case study analysis activity. Start with a compelling story and use avatar characters to create an emotional appeal. Add branching options so participants need to navigate realistic workplace situations. Each branching option allows participants to check their assumptions or find more information. Participants get to see the consequences of their choices as they work to achieve their desired outcomes, and if they don't succeed the first time, they can back up or begin again to test different choices.

**Web Conference Training**

You can create small participant groups to analyze and discuss a case study. They can communicate synchronously or asynchronously using a web conferencing platform or other video or chat application. Assign participants roles in the case study analysis or let them decide within their group who will do what. Using collaborating writing applications, they can gather and organize their ideas, and create a final presentation to share with the whole class.

Return to Assessing Learning

Return to Cooperative and Collaborative Learning

Return to Pragmatists

Return to Step 4: Select the Learning Strategies

Return to Supporting Participants

Return to Theories

# Concept Maps

A concept map is a diagram that visually represents relationships between concepts and ideas. Ideas are contained in boxes or circles (or nodes) and are arranged in a hierarchical structure connected with lines or arrows. The concepts are connected by lines labeled with words and phrases to help explain the connections. You can hand-draw a concept map or use an online concept map maker.

You can create a concept map to give participants a "big picture" view of a course and show how the different topics fit together. Or you can ask participants to create their own concept maps to demonstrate their understanding. One of the downsides to using a concept map as an assessment is that you will need to develop a checklist or rubric to assess the quality and completeness of the participants' concept maps. Another downside is that grading concept maps can be a time-consuming process.

### Example

Figure 20 displays a concept map based on some details from NHI's *Post-Tensioning Tendon Installation and Grouting Manual*.
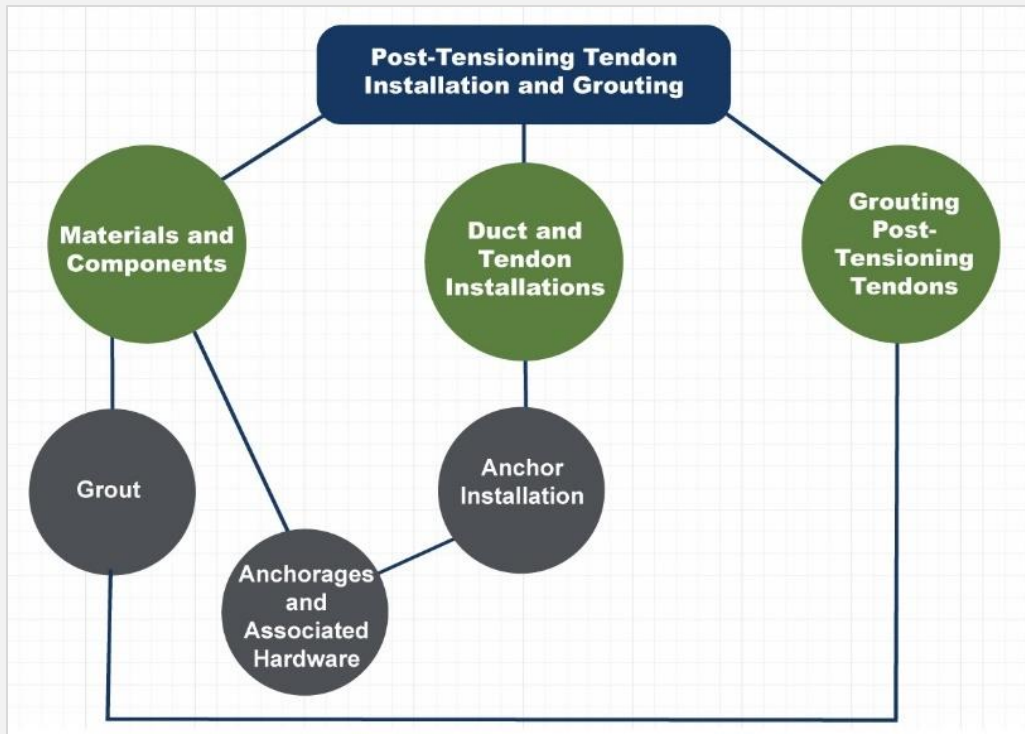


**Figure 20: Post-tensioning tendon installation and grouting concept map**

### Instructions

To create a concept map activity:

1. Create a focus question from a learning outcome, such as "Why is cybersecurity important to the transportation ecosystem?" or "How do all the elements of a construction program review report relate?"
2. At the beginning of a lesson or module, ask participants to generate a list of relevant concepts and details to answer the question. Encourage them to organize their information hierarchically by level of specificity.
3. Demonstrate how they can draw or create a draft concept map using the chosen method. Explain that, if needed, they can make multiple connections between concepts.
4. At different points in the lesson, allow participants to add details to their map. Ask them to provide examples to clarify the meaning of concepts.
5. If designed as an assessment, collect the concept maps for grading.
6. If designed as a practice activity, display an example concept map and ask participants to discuss the map with a partner and share any other details or connections they identified.

## Course Format Recommendations

**Instructor-Led Training**

Print out major details from the course on address labels and apply them to index cards. Keep the details for each lesson separate from one another. Distribute the groups of details among the table groups. Ask participants to review the details and, as a table group, arrange them to show their connections to one another. Then, each group can attach them to an easel pad sheet and share them with class. Other table groups can point out connections to the details being shared. The concept maps can be hung on the classroom wall and reviewed at the end of a lesson.

**Web Conference Training**

Create a concept map from the most important details of the course. Share the concept map with participants at the start of the course to provide a general overview of what the course will cover. Review the map again at the start of each lesson to allow participants to see how the details to be covered fit into the context of the entire course.

Return to Assessing Learning

Return to Graphic Organizers

Return to Guiding Review

Return to Maximizing Participant Workbook Elements

Return to Structured Notes

## Concrete Examples

Concrete examples are specific, real-life examples used to illustrate an idea. They can be useful in helping participants grasp abstract concepts because they present the conceptual elements in a recognizable context. Concrete examples can be verbal descriptions, stories, actual objects (realia), and models. It can take time to come up with a concrete example. Some ways to identify examples are to recognize concrete examples used by your peers; search books, articles, and other courses for examples; and be on the lookout for examples as you go about your day. As vivid and captivating as they may be, concrete examples may not be enough for participants to truly grasp the underlying concepts. You will need to explicitly point out the elements of the concept in the example. You will also need to reference them again when you ask participants to transfer their conceptual understanding to a new context.

## Example

In his NHI "Instructor Development Course" presentation, "Drilled Shaft Volume," Don Dwyer used three coffee mugs as a concrete examples to explain the challenges of estimating the capacity of an irregularly-shaped hole. The mugs were the same height but had different diameters (figure 21). He filled the mugs with water, then measured the capacity of each by pouring its contents into a translucent measuring cup. Next, he asked participants to explain why the mugs had different capacities even though their heights were the same. He then asked participants to use what they had learned about the impact of diameter on the capacity of the mugs to estimate the capacity of a drilled shaft. Figure 22 shows slides containing the formula for calculating capacity of a cylinder, instructions for plotting the depth of poured concrete in a drilled shaft, and examples of the data recorded for concrete poured into two irregularly shaped shafts.

He explained, "A drilled shaft has the 'perfect' volume of concrete for its designed diameter and length. But because the 'mouth' of the shaft is at the surface of the ground and the rest is hidden underground, you cannot see the shape. So how can we learn something about the shape using the volume?"



**Figure 21: Coffee mugs used as a concrete example**

Source: Dwyer (2018)

**Figure 22: Slides relating cylinder volume to drilled shaft capacity from "Drilled Shaft Volume,"**
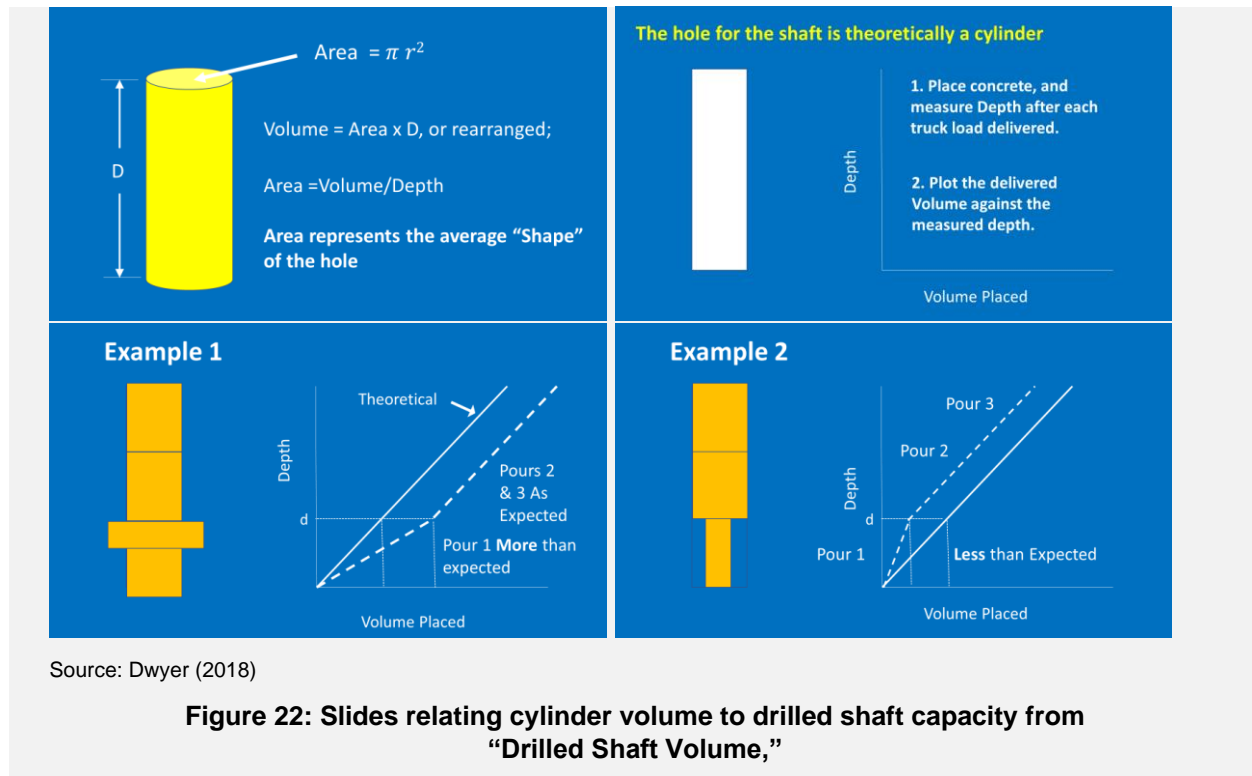
Return to Supporting Participants
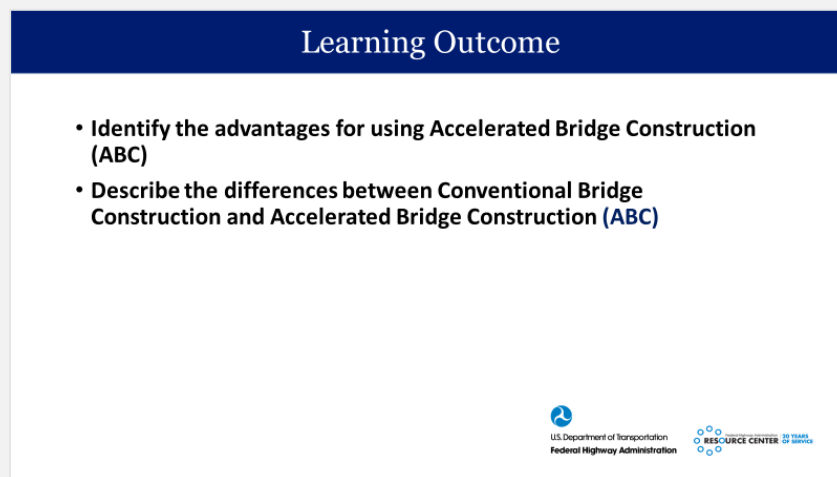
# Cooperative and Collaborative Learning

Collaborative learning is an instructional strategy that asks participants to work in teams to explore a significant question or create a meaningful project. Participants can be located in the same classroom or can work together on the shared assignment via the internet. Collaborative teams can hold discussions or contribute during real-time meetings or post comments, upload files, or work on collaborative online documents during times convenient to individual members. For ideas on how to structure a collaborative learning assignment, refer to Projects, Case Studies, Observational Activities, and Oral Presentations.

Unlike collaborative learning, which is designed for self-directed learning and exploration, cooperative learning is organized around structured projects or activities. While collaborative learning teams can work independently and combine their contributions, cooperative groups meet face to face and their work is assessed both individually and as a team. For collaborative and cooperative groups to succeed, they need to be small enough so that all members can make meaningful contributions, and they need clearly defined tasks.

## Example

Jamal Elkaissi incorporated a collaborative activity into his NHI "Instructor Development Course" training presentation on "Accelerated Bridge Construction." Figure 23 displays the learning outcomes for his training presentation. To assess achievement of the first outcome, "identify the advantages for using Accelerated Bridge Construction," he divided the class into groups of three. He then asked them to identify the advantages from the perspectives of a bridge owner, bridge engineer/designer, and construction contractor. The activity helped reinforce the purpose of lesson: to be able to communicate the advantages of the novel construction method. Participants had to reflect on their learning and then evaluate it based on their assigned role. The activity served not only as a review and assessment but also provided participants with an opportunity to practice using their new information when they were back on the job.



Source: Elkaissi (2019).

**Figure 23: Learning outcomes from "Accelerated Bridge Construction"**

Collaborative and cooperative learning is beneficial for groups with mixed skill or experience levels. Despite their differences, members can share and contribute. When participants engage in collaborative and cooperative learning activities, they "construct" new ideas based on both their own experiences and understandings and those of their team members. The two learning strategies result in deeper understanding of the content, increased engagement, and heightened motivation. Participants in collaborative and cooperative learning activities tend to take ownership of the material and think more critically about related issues when they work as a team. Collaborative and cooperative learning also increases the number of opportunities learners get to receive feedback. Unlike in whole group activities, where just one or two participants get feedback from the instructor, small group members get personal feedback from their peers on their ideas and responses.

As with any group activity, group dynamics can come into play, and instructors may occasionally need to address any conflicts that arise. The instructor should be aware that collaborative or cooperative activities may place an unfair burden on more experienced participants if they are expected to both teach their less experienced team members and also produce more of the finished product. More assertive members also may take it upon themselves to take over their groups and discount or ignore the contributions of their peers. Instructors need to monitor group work and keep in touch with all participants to make sure that all participants' voices are heard and that their contributions are valued.

## Course Format Recommendations

### Instructor-Led Training

"Catch-Up" is an easy collaborative activity that can break up a lecture-heavy lesson. At a transition point in the lecture, stop and ask participants to turn to a partner or work in a small group. Explain that they will have 2–3 minutes to compare notes and ask clarifying questions. Once the time is up, open the floor to a few questions.

### Web Conference Training

"Four Corners" can be adapted to a web conference course by creating breakout rooms or small group chats.

### Instructions:

1. Select a topic aligned to the learning outcomes and provide participants with four choices (for example, 4 bridge types, 4 construction methods, 4 crash modification factors, etc.).
2. Ask participants to choose one. Based on the learning outcome, ask participants to think of two or three examples, characteristics, issues, etc. Explain that they will share their ideas with a partner who has made the same choice.
3. Create a "corner," i.e., a breakout room or small group chat space, for each choice. Post the choices and assignment in the chat space as a reminder.
4. Set a time limit for small group discussions.
5. Participants navigate to their appropriate "corner."
6. Participants pair up and discuss their answers with their partner.
7. When the time is up, the whole group returns to the main room and the instructor calls on each "corner" to share their ideas.

[Return to Supporting Participants](#)

[Return to Guiding Review](#)

[Return to How can I adapt a discussion or practice activity?](#)

# Course Outline/Syllabus

A course outline, or syllabus, is a document that contains key information about a course. It also explains the class rules, policies, and procedures and expectations for behavior. A course outline can be a learning tool for participants because it clearly describes what they need to be effective learners and provides information about academic resources to support them. As it documents what is covered in a course, at what level, and for what kind of credit, a course outline also serves as a permanent record for the course.

Course outlines generally include the following information:

- Course description
- Course schedule
- Learning outcomes
- Learning/assessment tasks
- Due dates for assessments
- Assessment criteria
- Assessment submission procedures
- Prescribed texts and recommended readings
- Grades of assessment
- Participant responsibilities

If participants have a course outline, they will know what to expect from the course and can plan their workloads accordingly. A course outline also allows participants to see how the course content fits into other learning they may have accomplished or how it is part of a larger learning progression. However, as many an instructor can relate, participants do not always read their course outlines completely or carefully.

Return to Maximizing Participant Workbook Elements

# Current Event Articles or Commentaries

Transportation is often in the background of many social or natural events. Starting off with an article or opinion column on current events can offer participants a chance to analyze a course or lesson through a different lens.

**Instructions**

1. Share a pertinent quote or section from the article or commentary and supply a complete copy of the published piece for participants to review.
2. Start a brief discussion by asking some open-ended questions, like:

   - What are the transportation issues associated with this event?
   - The name of this module/lesson is _____. How do you think this article/ commentary relates to that topic?

- What information do you think is missing?
- How does this event affect your community/job?
- What do you want to learn to be better prepared for events like this in the future?

## Course Format Recommendations

### Instructor-Led Training

Instead of displaying an image of the current events article or commentary on a slide, just display the headline or short quote, and include the author's name and the title of the publication. Supply a copy of the entire text as a handout.

### Web Conference Training

You can post a link to a current events article or commentary and assign it as pre-reading. Then, either discuss it at the beginning of the first course conference session or have participants create a discussion thread using the chat feature in the video conferencing platform.

[Return to Setting the Hook](#)

## Demonstrations

Demonstrations can prime participants for learning because they make participants think of what they already know about a topic. Watching a demonstration can sometimes highlight a participant's misconceptions or gaps in knowledge and create a desire to learn more.

Demonstrations can include:

- Experiments
- Surveys
- Data analysis
- Simulations

When an instructor uses a demonstration to walk participants through a website or software interface, it is sometimes called a "tutorial tour."

### Instructions

How to conduct a demonstration:

1. Demonstrations need to be carefully planned, and it is a good idea to practice them several times in advance.
2. Explain the demonstration and ask participants to make predictions about the result.
3. Ask participants to take notes as you perform the demonstration in front of the

class.

4. After the demonstration, ask participants to reflect on what they saw and identify the differences between what occurred and their predictions.

### Example

In his NHI "Instructor Development Course" training presentation, "Drilled Shaft Volume," Don Dwyer presented a demonstration on the challenges of estimating drilled shaft volume. He used three coffee mugs that had the same height but different diameters. He then related the volume and shape of the mugs to the volume and shape of a drilled shaft. Figure 24 displays the slide he used to link the coffee mug demonstration to the task.

- Put out three coffee cups of the same height.
- Ask the class to describe and compare the volume and shape of the cups.
- Ask if you can you infer relative volumes from your observations?
- Ask how could you better determine volumes of each cup?
- Connect this to drilled shafts.
- A drilled shaft has the "perfect" volume of concrete for its designed diameter and length. But because the "mouth" of the shaft is at the surface of the ground and the rest is hidden underground, you cannot see the shape. So how can we learn something about the shape using the volume?
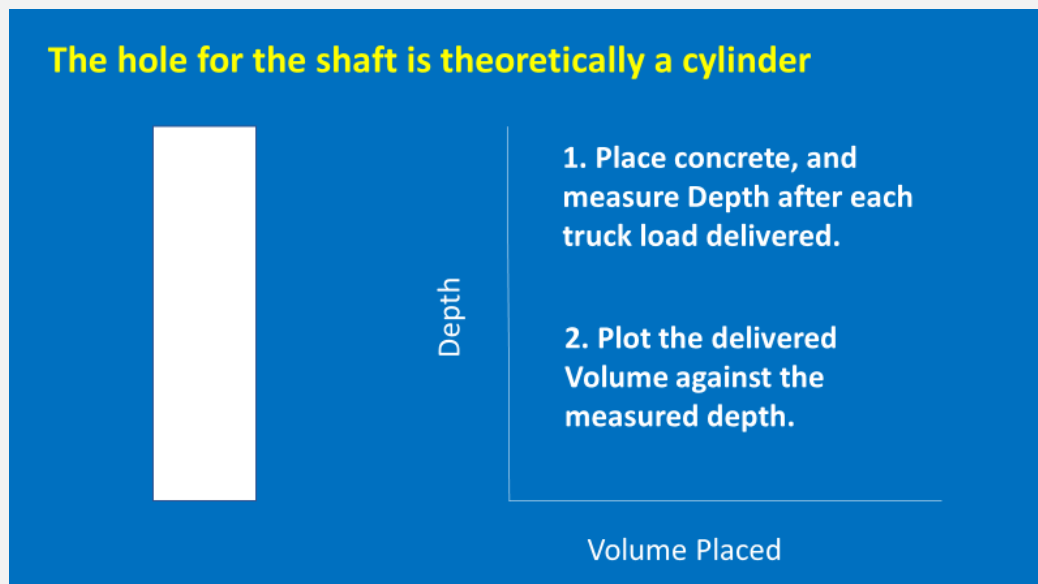


Source: Dwyer (2018)

**Figure 24: Demonstration explanation slide from "Drilled Shaft Volume"**

- We know the theoretical volume of the shaft. The volume vs. depth plots in a straight line because Volume = Area x Depth.
- When area is constant, volume is linearly related to depth.

■ Concrete is delivered in trucks holding known volumes. If we plot the volume vs. depth to top of concrete, we can compare this to the theoretical volume.

## Course Format Recommendations

### Instructor-Led Training

Take the number of participants and your classroom layout into consideration when planning a demonstration. Will they all be able to see it? Would it be better if they left their seats and gathered at the front of the room? Is physical safety a consideration? Can you record the demonstration in advance and play the video instead? Can you leave the classroom and conduct the demonstration outside or in another part of the building?

### Web-Based Training

Find a video of a similar demonstration or record yourself performing the demonstration and embed it into the course materials. Preface the demonstration with predictive questions and follow it with reflective questions.

### Web Conference Training

Find a video of a similar demonstration or record yourself performing the demonstration and present it during a course web conference. You can use the video conferencing platforms polling tools or chat feature to allow participants to record their predictions beforehand. Display the poll results after the demonstration and use them to start a follow-on discussion.

[Return to Setting the Hook](#)

[Return to Step 4: Select the Learning Strategies](#)

## Feedback—Peer or Instructor

Constructive feedback, in the form of comments or suggestions from instructors or peers, plays an important role in participants' mastery of learning outcomes. Without feedback, participants are unsure if they have grasped a concept or are performing a task correctly. Instructor feedback can be informal, like clarifications after a class discussion, or formal, like notes on a checklist or rubric or final exam results. However, participants may not always perceive feedback positively, provide effective feedback to avoid damaging participants' morale and negatively impacting their job performance.

Research has shown that to be effective, feedback must be:

■ **Specific and objective**—The feedback must provide participants with exact details on what they have done correctly and the areas that still require improvement. It can also be useful to tell the participants what they are doing differently than before.

- **Immediate**—The sooner you can provide feedback to participants, the more successful they will be in improving their performance.
- **Outcome oriented**—The feedback should be based on a goal the participants are working towards. It should provide clear information to help them improve their performance to achieve that actionable goal.
- **Noncompetitive**—Participants should be aware of the purpose of all observations and assessments and that the feedback is intended to guide their improvement. It is also important to clarify that the feedback is not meant to create competition between participants.
- **Transparent**—Participants should have access to information about their performance. This knowledge helps them develop self-awareness about their own learning. It also improves their ability to identify their own mistakes and to develop long-term strategies for addressing areas that need improvement.

Peer feedback can be as effective as instructor feedback. If work teams are training together, members can learn about each other's strengths and weaknesses and build friendships based on mutual support during feedback sessions. Participant peers that work closely together can provide each other accurate and detailed feedback based on their unique perspective. Also, receiving feedback from a peer can be less intimidating than from an instructor.

However, you must manage peer feedback well. Participants must be trained to observe and objectively measure peer performance based on identified criteria. They also need to be trained to provide specific details in their comments. As with instructor delivered feedback, peer reviews should include comments on what participants are doing well as well as suggestions for improvement. To help participants receiving feedback to remain open to suggestions, explain that their role is to listen to the feedback and not try to justify any choices or actions.

### Instructions

How to provide guidance on peer feedback:

1. Share peer assessment tool that details performance criteria.
2. Explain the purpose of peer feedback.
3. Emphasize that feedback should be objective, not personal.
4. Describe participants' responsibilities during the observation process.
5. Explain that positive feedback will be delivered first, suggestions for improvement will be shared afterwards.
6. Ask for questions about the feedback procedure.
7. Remind participants that, when it is their turn to receive feedback, they are to listen and not try to justify their choices or actions.
8. Once participants have gathered observational data on a peer's performance, ask for one or two volunteers to provide feedback.
9. Prompt the volunteers to provide positive feedback first, then constructive

        feedback second.

10. Ask all participants to share their completed assessment tool with comments with the performer.
11. Continue the observation and feedback activity for the next participant.

**Example**

Every few years, the FHWA Discipline Council conducts peer reviews. The disciplines represent 22 technical fields including construction, safety, environment, human resources, etc. The peer review assessments evaluate the health of the discipline—identify its areas of strength, challenge, and improvement—and any best practices or lessons learned that should be implemented by all disciplines. The peer assessments feature a rating system and data collection form. To provide a wide perspective, representatives from the disciplines are assigned the role of reviewers and receivers so they are exposed to the practices of at least two other disciplines. Peer reviews can be conducted virtually using SharePoint Online and MS Teams platforms. The FHWA Discipline Council uses the results from the peer reviews to inform its action plan and strengthen its overall Discipline Support System.

# Course Format Recommendations

**Instructor-Led Training**

At the end of an individual or group presentation, ask for volunteers from the class to provide one or two positive comments and one recommendation or growth-producing comment.

**Web Conference Training**

Instead of just highlighting the correct answers on knowledge check poll questions and surveys, remind participants why the other answers are incorrect.

[Return to Reflectors](#)

# Games

Typically, games are competitive activities based on rules. Competitive games include BINGO and other games based on popular TV shows. Players compete individually or as part of a team. Competitive games are versatile and are great for openings, team building, review, or to energize a group during a period of low energy.

But did you know there are noncompetitive games that encourage participants to interact or collaborate to achieve a common goal? These are great to use as icebreakers at the start a course or new day of training.

Games introduce pleasure, reward, and spontaneity into the classroom. They provide a safe environment for experimentation and failure. Games are motivating because they give participants a sense of autonomy and competency. Games force participants to demonstrate their learning and they receive immediate feedback. As a result, games increase learning and retention. Research shows that after playing a training game, employees become more confident in their ability to perform the task, skill, or behavior on the job.

Games have some drawbacks, though. Not all content is suitable for a game. Some participants don't see the value in games and feel they make the training less "serious". Games also take time to plan, test, and describe. Participants can become confused and disengaged if a game is poorly designed. Games may also bring out the hyper competitiveness in some participants and they may overwhelm or apply undue pressure on their teammates to perform. Quieter, less assertive participants may feel uncomfortable participating in boisterous team activities. Games may also inhibit learning if the focus is on winning and not the support of learning outcomes.

**Instructions**

How to conduct a game:

1. Explain the objective of the game, how it will be scored, what is required to win, and any time limits.
2. Describe the possible actions or moves.
3. If the game will involve more than one round, explain the game sequence.
4. Assign the players to teams if the game features team play.
5. Allow the team to choose their own captain or leader.
6. Distribute any game materials.
7. Answer any questions.
8. Start the game and remind players of the time limit.
9. At the end of the stated time, signal to the players that the game or round is over.
10. If the game is aligned with a learning outcome, conduct a short debrief with the participants on their takeaway.

## Example

You can use a BINGO generating app to produce customized cards with words or phrases. The app scrambles the location of the items to produce unique cards. The BINGO card shown in figure 25 is based on key vocabulary and concepts from Steve Miller's NHI "Instructor Development Course" training presentation, "Steel Bridge Inspection: Understanding and Identifying Fracture Critical Members." Participants would attentively listen to the lecture and read the slides to identify the words and phrases and mark them on their cards. The winner of the game would mark all squares in a vertical, horizontal, or diagonal row. Another option is to require the winner to mark the four corner squares.

| B | I | N | G | O |
|---|---|---|---|---|
| steel member in tension | weld detail | cause a portion or the entire bridge to collapse | performing the bridge inspection | structural redundancy |
| tendency of a member to fail | fatigue cycles | stability | elastic limit | continued load cycles |
| tension element | primary causes of failure | FREE | fracture critical member | failure stage |
| stress concentration | degree of redundancy | multiple independent load paths | more elements of support than are necessary | hands-on inspection |
| subject to cyclical loading | internal redundancy | fatigue life | crack initiation | continuity of load path |

Source: Miller (2018).

**Figure 25: BINGO card for "Steel Bridge Inspection"**

# Course Format Recommendations

## Instructor-Led Training

A fun, noncompetitive game is Line Up. It is a good option for an icebreaker or to enliven participants during the post-lunch doldrums. Ask participants to line up in order of height (tallest to shortest) without talking. You can repeat the challenge with more challenging tasks: line up by date of birth (youngest to oldest), line up by where you were born (farthest to closest).

## Web-Based Training

Sometimes employees are reluctant to complete mandatory compliance training courses. Structuring the course around a game can increase worker motivation. The game scenario heightens awareness of potential noncompliant situations. Employees must use the desired decision-making skills or procedures to complete the game narrative. Job aids or other reinforcements support after-course retention. As part of the gamification program, employees are awarded points for completing the course and they can see their standings among their peers on a virtual scoreboard. One organization converted its annual ethics training course into an online game. Learners had to explore a city to find the key to a code document. Branching options allowed them to choose their path through the city. At each stage of the course, they were challenged with real-life ethical situations. As they progressed through the game levels, the learners earned points based on their decisions and level of expertise they achieved.

## Web Conference Training

Looking Around is a game that translates well to web or video conference courses. Ask participants to turn on their video cameras so their heads are visible on screen (figure 26). Tell them you are going to tell them which direction to look. They will just need to turn their heads (not their bodies) in the appropriate direction: toward the ceiling for "up," toward the floor for "down," to the right on "right," and to the left for "left." After about a minute, tell participants you are going to make a change. "Up" will mean look down and vice versa, but "left" and "right" will mean the same as before. Call out the four directions in random order and ask participants to follow the new directions. After another minute, end the activity. Debrief: How difficult was it to follow the new directions? What are some similar real-life experiences you may have had?

**Figure 26: Looking Around game**

[Return to Guiding Review](#)

[Return to Skimming and Scanning](#)

[Return to Step 4: Select the Learning Strategies](#)

[Return to Supporting Participants](#)

# Graphic Organizers

A graphic organizer is a visual representation of the relationships between facts, terms, or ideas. They are usually a one-page form with blank areas. Graphic organizers come in a variety of formats, each one best suited to organizing a particular type of information. They allow participants to organize, clarify, or simplify complex information. You can find or create graphic organizers to document sequences, to organize ideas during brainstorming, to compare and contrast, for planning or decision making, and many other purposes. For more ideas on how to use graphic organizers to support participant learning, refer to [K-W-L Charts](#) and [Concept Maps](#). You can create graphic organizers using Word, PowerPoint, and other document design tools, or you can find templates online.

Graphic organizers scaffold learning because they provide participants with a way to categorize a large amount of information, recognize patterns, and compare perspectives. However, if the task is limited to participants filling in the boxes, they may not develop the conceptual understanding or unique insights you intended. Participants need an opportunity to apply the information they have deconstructed. They can apply the information through a discussion, written explanation, plan for action, or other method as determined by the learning outcome.

# T-charts

A T-chart is a simple table that provides space for participants to list two facets of a topic, for example, pros and cons, advantages and disadvantages, before and after, etc. They can be used for brainstorming, decision making, preparation for writing, and many other purposes. Because you only need to draw two lines, T-charts are fast to create on the fly. They are suitable to any topic. However, you can only consider two options or sides of an issue.

### Example

Figure 27 displays an example T-chart for comparing conventional bridge construction and accelerated bridge construction techniques.



Source: Elkaissi (2019).

**Figure 27: Bridge construction technique T-chart graphic organizer**

# Attribute Matrices

An attribute matrix, or decision matrix, is a table where you can enter the names of options and list their respective attributes. Unlike the T-chart, which is limited to two options, an attribute matrix can be used to compare the attributes of several options. You can use an attribute matrix to prioritize tasks, support decision making, solve problems, or defend a decision you have already made. For decision making or prioritizing, you can assign weights to the different attributes and total the score for each choice. The highest scoring option will be the best or first choice of action. Attribute tables are best for comparing options with quantifiable criteria. They can become unwieldy if there are too many options to consider.

### Example

Figure 28 displays an example attribute matrix for comparing the attributes of Median U-Turn, Thru-Turn, and Four-way intersections. This matrix is based on the NHI "Instructor Development Course" training presentation, "Thru-Turn Intersections," by David Cox.

| | Median U-Turn Intersection | Thru-Turn Intersection | Four-way Intersection |
|---|---|---|---|
| Traffic movement | | | |
| Signal phasing | | | |
| Vehicle conflict points | | | |
| Pedestrian conflict points | | | |

Source: Cox (2019)

**Figure 28: Attribute matrix for intersection types**

## Flow Charts

A flow chart is a diagram that represents the sequential steps in a process or plan. All the actions, inputs and outputs, decision points, people involved, time involved, and process measurements can all be displayed in a flow chart. Flow charts are useful for understanding how a process works, explaining a process to someone else, finding ways to improve a process, or planning a process. You can provide a flowchart to participants to support their learning, or you can ask them to create their own to document their understanding. A downside of flow charts is that you need to manually trace the path to find any errors. Depending on the complexity of the process, it can be tricky to make changes to a flowchart. Flowcharts for very complex logical processes can also become messy and disorganized.

### Example

Figure 29 displays a simplified flow chart for level 1 and level 2 underwater bridge inspections procedures.
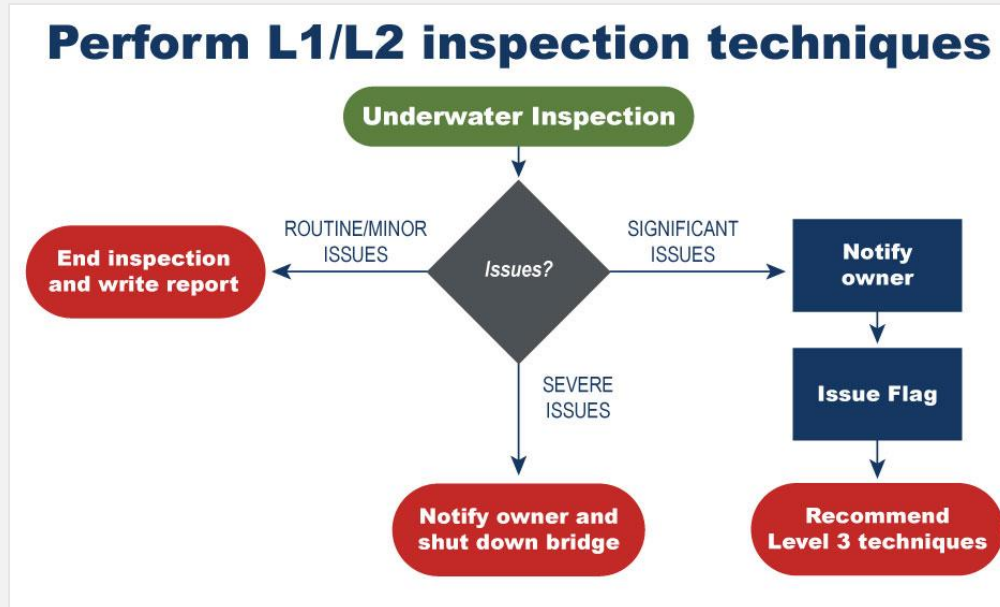


Source: Cornish (2019).

**Figure 29: Underwater bridge inspection procedure flow chart**

## Mind Maps

Mind maps diagram used to visually organize information. To create a mind map, write the title, main idea, or concept in the center and write related concepts or ideas around the center. Draw lines to show how they link to the main idea. You can use words, phrases, or images in a mind map. As you add more details, or "nodes" to the main idea or related ideas, the diagram spreads out. Mind maps created during a brainstorming session often become free-form and flowing. You can also use mind maps for taking meeting notes, outlining reports or documents, or documenting tasks. It is important to keep mind maps uncomplicated. If you use complete sentences instead of key words and phrases, they become difficult to understand. You can draw mind map free hand or create them using software programs. If you create them by hand, it is sometimes hard to predict how much space you will need and it is difficult to move a node to another place on the diagram. Mind maps are best for less complex ideas or concepts because the number of nodes and lines increases with each detail.

### Example

Figure 30 displays a mind map that captures some of the main points of the NHI *Post-Tensioning Tendon Installation and Grouting Manual*.
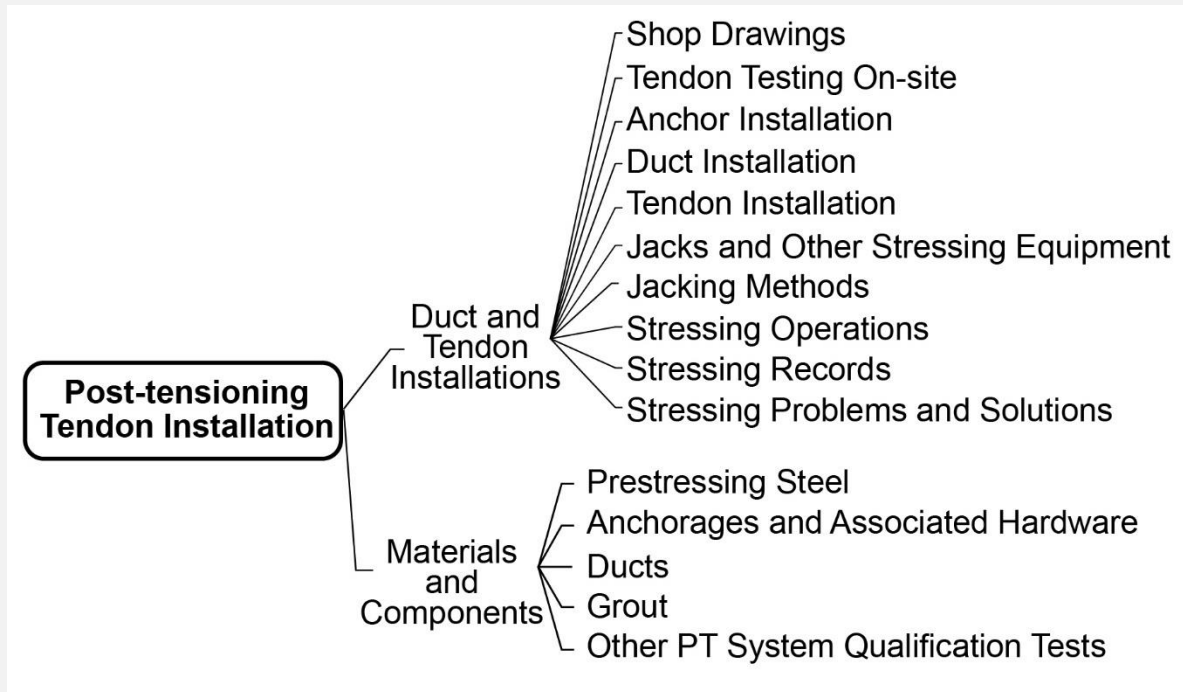


**Figure 30: Post-tensioning tendon installation mind map**

[Return to Guiding Review](#)

[Return to Structured Notes](#)

[Return to Supporting Participants](#)

## Group Discussions

Group discussions are more than requests to respond to recall questions. Group discussions can help participants explore and interpret a topic. You can plan whole group discussions, small group discussions, or even one-on-one partner discussions. They all provide an opportunity for critical thinking in the classroom. Participants get a chance to share their experiences and defend their opinions. Group discussions promote a deeper understanding of a topic and increase long-term retention. Group discussions can also help increase participants' attention and help maintain their focus by involving them in the learning process. Group discussions can also provide feedback to instructors on participant comprehension. If you notice that participants are struggling with a concept or are missing key information, you can step in and provide more context or rephrase the information to fill the gap.

It is easy to monitor responses in a whole group discussion. However, the number of participants who contribute is often limited. You can increase participation if you shift to a small group or table group discussions. So, the whole group can benefit from the small group discussions, you can assign a spokesperson to report out for each group. You will get the highest level of participation if you simply ask participants to turn and talk with a partner. (If there is an odd number at a table, create a set of "triplets.") Ask participants to report what their partner said.

To make sure everyone can benefit from the small group or partner discussions, you may need to provide a microphone to the group spokesperson.

**Instructions**

1. Identify a learning outcome from the module or lesson.
2. Prepare an open-ended question that will elicit responses that demonstrate participants' knowledge of the content.
3. At an appropriate time in the lesson or module, introduce the activity and explain participants' role.
4. Present the question and the time limit.
5. If possible, circulate around the room listening in to the conversations.
6. At the end of the time limit, ask for report outs from group spokespersons.
7. Provide clarification and reinforce correct information.

## Course Format Recommendations

**Instructor-Led Training**

You can facilitate the cross pollination of ideas around your class by rotating one or two members of a group to other tables. Then, provide a different, but related concept for the groups to discuss. This allows participants to share information from their previous discussions with their new partners, but you will need to encourage the new table group members to share ideas that were raised in their original groups. This helps keep the participants engaged. The next time you introduce a question, ask one or two of the participants who haven't yet moved to rotate to a new table.

**Web-Based Training**

Voice chat apps allow you to have a spoken discussion that is not in real-time. You can set up user groups and members can record and share their thoughts when it is convenient for them. Other users can listen and add layers to the dialog by recording their own messages.

**Web Conference Training**

As an alternative to small or large group text chats, you can use a video chat app to allow participants to have "face-to-face" discussions in breakout groups. Some web conference platforms offer video conferencing as a feature. If yours doesn't, you can check with the Office of Information Technology for an approved video conference

platforms so they can join in on the conversation.

# Hands-on Practice Activities

A hands-on activity is an instructional technique that allows participants to learn by doing. During a hands-on activity participants are directly involved in their learning. Participants get direct practical experience as they apply their learning and learn from their failures. Hands-on learning is appropriate for both physical and mental skills and tasks.

Hands-on learning provides many benefits. Studies have shown that participants, who are given the chance to practice what they have learned, retain 75% of the information presented. The transfer of learning to the workplace is high with hands-on activities because the materials and equipment are the same as what they will be using on the job. Because the learning is relevant and immediate, participants in a hands-on learning environment are highly engaged and motivated. Hands-on learning also supports critical thinking and problem-solving skills as participants are expected to be more self-reliant as they work through the activity.

There are also disadvantages to hands-on learning activities. While the activity demonstration will focus on key skills, you still need to troubleshoot issues and answer a wide range of participant questions. Often, you will find that more than one instructor is needed. The primary instructor presents the demonstration and the other(s) circulate around checking in on participants' progress and answering questions. Also, hands-on training is sometimes rushed. Participants may find they do not get enough practice opportunities to memorize the steps. If you create a high-quality job aid to guide participants during the training, you can help them recall the correct sequence or procedure when they are back on the job.

For more ideas on how to use job aids to support participant learning, refer to Job Aids.

**Instructions**

How to conduct an effective hands-on activity:

1. (Optional) Distribute and describe how to use the job aid designed for the task, technique, or procedure.
2. Demonstrate how to perform the task, technique, or procedure. Explain what you are doing and pause to demonstrate the steps. Refer to the job aid when appropriate.

3. Ask participants to turn and describe the process to their partner. This helps participants internalize what they have learned. It also serves as a knowledge check as they can verify their memories of details with their partner.

4. Ask participants questions about the key points of the demonstration. Answer participant questions.

5. Monitor and provide guidance as participants practice performing the task, technique, or procedure.

6. Provide both positive and corrective feedback so participants understand when they did something right and when they made mistakes.

7. Allow participants to practice until they can perform the action without any errors.

## Example

In the NHI "Bridge Inspector Refresher Training" course, participants practice selecting the appropriate codes for structure inventory and appraisal and structure type for the National Bridge Inventory (NBI). For his NHI "Instructor Development Course" training presentation, "Superstructure Type Identification," Patrick Kane created a job aid for a hands-on activity using a page from the participant workbook. Figure 31 displays the practice coding worksheet Kane created for his training presentation. Figure 32 displays the job aid for used in the NBI coding activity.



Source: Kane (2018)

**Figure 31:Practice coding worksheet from "Superstructure Type Identification"**

**NHI Course 130053 – Bridge Inspection Refresher**          **Participants Workbook**

Item 43 – Structure Type Main                                        3 digits

Record the description on the inspection form and indicate the type of structure for the main span(s) with a 3-digit code composed of 2 segments.

| Segment | Description | Length |
|---------|-------------|--------|
| 43A | Kind of material and/or design | 1 digit |
| 43B | Type of design and/or construction | 2 digits |

The first digit indicates the kind of material and/or design and shall be coded using one of the following codes:

| Code | Description |
|------|-------------|
| 1 | Concrete |
| 2 | Concrete continuous |
| 3 | Steel |
| 4 | Steel continuous |
| 5 | Prestressed concrete * |
| 6 | Prestressed concrete continuous * |
| 7 | Wood or Timber |
| 8 | Masonry |
| 9 | Aluminum, Wrought Iron, or Cast Iron |
| 0 | Other |

* Post-tensioned concrete should be coded as prestressed concrete.

Item 43 – Structure Type, Main (cont'd)

The second and third digits indicate the predominant type of design and/or type of construction and shall be coded using one of the following codes:

| Code | Description |
|------|-------------|
| 01 | Slab |
| 02 | Stringer/Multi-beam or Girder |
| 03 | Girder and Floorbeam System |
| 04 | Tee Beam |
| 05 | Box Beam or Girders – Multiple |
| 06 | Box Beam or Girders – Single or Spread |
| 07 | Frame (except frame culverts) |
| 08 | Orthotropic |
| 09 | Truss – Deck |
| 10 | Truss – Thru |
| 11 | Arch – Deck |
| 12 | Arch – Thru |
| 13 | Suspension |
| 14 | Stayed Girder |
| 15 | Movable – Lift |
| 16 | Movable – Bascule |
| 17 | Movable – Swing |
| 18 | Tunnel |
| 19 | Culvert (includes frame culverts) |
| 20 * | Mixed types |
| 21 | Segmental Box Girder |
| 22 | Channel Beam |
| 00 | Other |

*Applicable only to approach spans – Item 44

| EXAMPLES | Code |
|----------|------|
| Wood or Timber Through Truss | 710 |
| Masonry Culvert | 819 |
| Steel Suspension | 313 |
| Continuous Concrete Multiple Box Girders | 205 |
| Simple Span Concrete Slab | 101 |
| Tunnel in Rock | 018 |

**Module 5: Lesson 3-21**

Source: NHI (n.d.)

**Figure 32: Job aid from "Superstructure Type Identification"**

## Course Format Recommendations

**Instructor-Led Training**

If the practice activity is complex, you can ask participants to work with a partner or in a table group to complete it. Facilitate the collaboration by providing only one set of documentation so that participants have to get out of their chairs in order to work together.

**Web Conference Training**

If participants will be working independently, provide a [worked example](#) or [job aid](#) to follow. Give participants a way to contact the instructor directly if they have any questions or difficulties while completing the activity.

[Return to Activists](#)

[Return to Step 4: Select the Learning Strategies](#)

## Infographics

An infographic is a visual representation of information or data. Infographics combine imagery, statistics, and minimal text to convey large amounts of information quickly and clearly. They allow readers to get a quick overview of a topic. Because they use eye-catching visuals, diagrams, graphs, and charts, they are useful in presenting complex processes or cause and effect relationships in a user friendly way. You can incorporate existing U.S. Department of Transportation or other infographics into a course, if appropriate, or create one of your own using a template. However, because infographics are simplified by nature, they don't always give the full story. They also require careful distillation of data to create a clear message. A graphics designer is often required to create the most effective layout and images. Sometimes infographics can be overwhelming because they present too many statistics without providing enough interpretation to help the reader grasp the meaning behind the numbers.

**Example**

USDOT has published a variety of infographics on Intelligent Transportation Systems. Figure 33 displays an infographic showing how the Connected Vehicle Safety for Rail system works.

Source: USDOT (n.d.)

**Figure 33: Infographic on Connected Vehicle Safety for Rail system**

# Job Aids

Job aids are any tool that directs or guides a performance of work. They can be high tech, like the [mobile Bridge Inspector Reference Manual app](https://www.fhwa.dot.gov/bridge/birm/) (available at https://www.fhwa.dot.gov/bridge/birm/); low tech, like a document template; or no tech, like a reminder scribbled on a sticky note. What makes job aids so useful is that they are handy, easy to read, and focused. Job aids can feature graphics, tables, diagrams, and photographs to support workers with low literacy skills or non-native English readers. They can be used in a classroom setting, for on-the-job training, or as post-training reinforcements. Job aids can be created for all kinds of repetitive tasks, complex processes, unique situations, or changes in work routines.

Job aids help to decrease training or retraining time, reduce errors; boost productivity; and increase customer and employee satisfaction. One downside to job aids is that those designed for complex tasks or processes can be very long. Workers may need to scan a large poster or flip pages in a manual to find the section(s) they need to reference.

Common job aids include:

- **Information sources**—Contain facts that are organized according to their natural structure or how they will be used. A phone directory or a list of error codes are examples of information sources.
- **Process prompts**—Explain how and when to do something. Tend to be verb-oriented. Examples of process prompts include instruction sheets or flow charts.
- **Coaching guides**—Provide suggestions, not directions on how to complete the work. Good for new, difficult, or ambiguous situations. Sometimes present different perspectives. This handbook is an example of a coaching guide.

Table 5 presents several job aids and when they may be useful.

**Table 5: Job Aid Options**

| Job Aid Format | Description | Useful Situations |
|---|---|---|
| **Checklist** | Groups of items to remember or consider | A task with:<br>- Steps that do not need to be completed in specific sequence<br>- Inspection, observation, or planning components |

| Job Aid Format | Description | Useful Situations |
|---|---|---|
| **Decision Table** | Table that lists options for completing a task based on a set of conditions | A task with:<br><br>■ Several conditions or variables<br>■ Limited options for each decision variable |
| **Flow Chart** | Diagram with tasks organized sequentially with decision points and conditions | A task with:<br><br>■ Several yes/no decisions to be made<br>■ Decisions that must be made in a specific order<br>■ A completion path guided by answers to the questions |
| **Form or Worksheet** | Directions that guide worker through the process and provide a place to record information | A task with:<br><br>■ Steps that must be completed in a specific sequence<br>■ A routine that involves calculations<br>■ Information that must be documented so it can be referenced later |
| **Reference Source** | Information required to complete the task | A task with:<br><br>■ Steps that do not need to be completed in specific sequence<br>■ A need for data not performance of a process or procedure |
| **Step-by-step Instructions** | Information and direction presented in a sequence | A task with:<br><br>■ Steps that must be completed in a specific sequence<br>■ A linear procedure that requires no decision making<br>■ Only one completion path to follow |

## Example

For his NHI "Instructor Development Course" training presentation on "Business Objects Basics: Building a Simple Query," Ian Kiwan created a set of job aids using his PowerPoint slides. He combined images of the slides with his slide notes. Participants could see where to click on the software interface and what information they needed to enter to complete the task. Figure 34 displays one page of the job aid that guides participants through opening the Business Objects program.
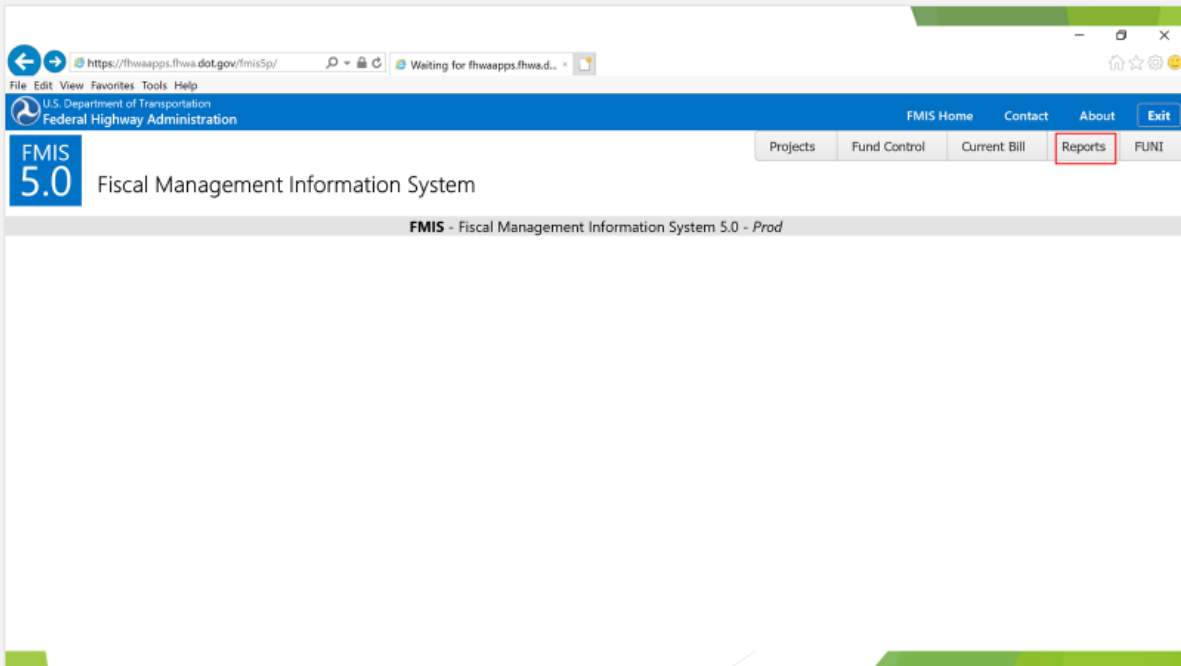


From the FMIS Launch Page, mouse over the "Reports" button
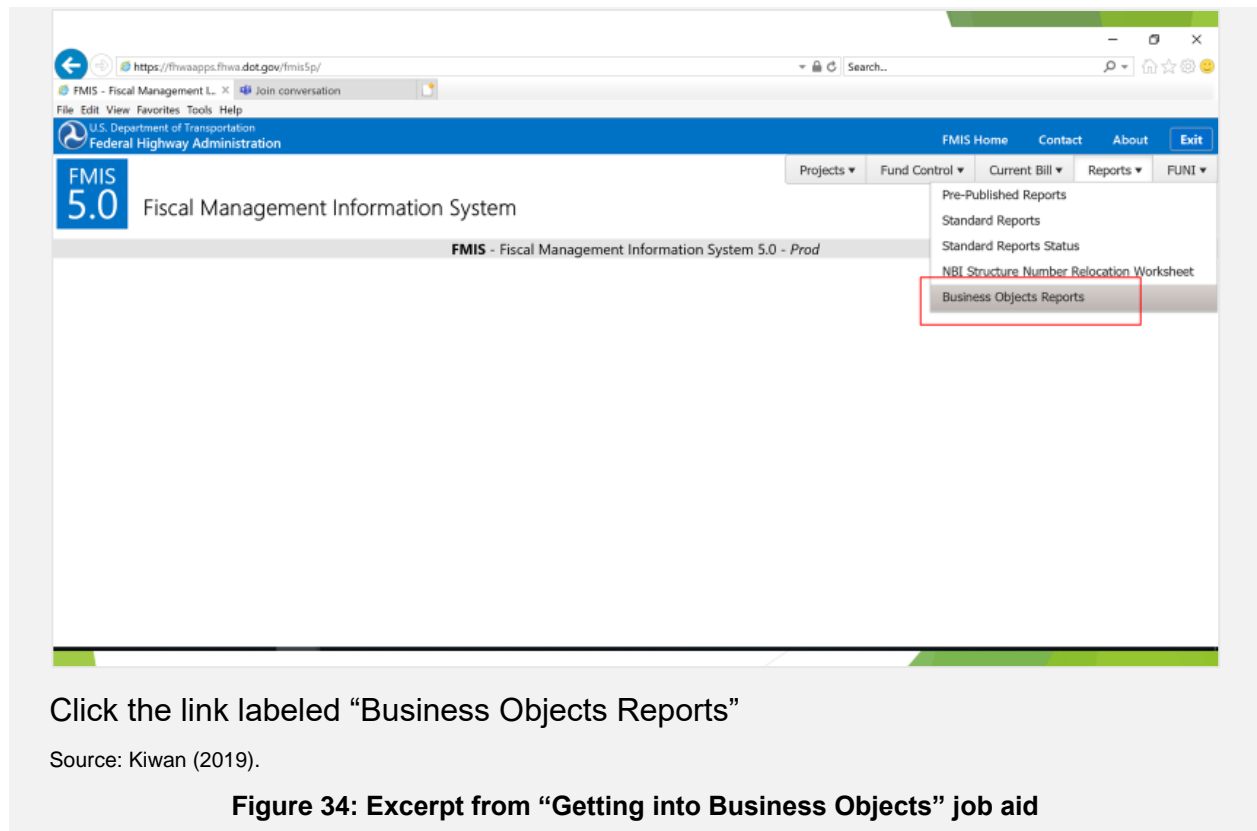
Click the link labeled "Business Objects Reports"

Source: Kiwan (2019).

**Figure 34: Excerpt from "Getting into Business Objects" job aid**

[Return to Hands-on Practice Activities](#)

[Return to Supporting Participants](#)

# Journaling

Journaling is the practice of writing accounts of the day, reactions to experiences, personal reflections, and questions. Journaling promotes critical thinking because participants will ponder and then express the links between new information and their existing knowledge. Journaling is beneficial to those participants who need more time to reflect to be able to express their ideas or who are not good oral speakers. Journaling can be free-form reflective writing or you can add more structure to the exercise by providing short answer prompts linked to learning outcomes.

Some of the types of prompts you can use in a journaling activity include:

- **Self-questioning:** This type of journaling prompt asks participants to create their own questions about their learning. They can choose to answer them or just pose them for reflection.
- **Metacognitive:** Participants are asked to write about their own thinking, that is, if they noticed any trends, recognized any knowledge gaps or misconceptions, or realized their thinking changed during the course.

- **Change:** Training should result in a permanent change. This type of journaling prompt ask participants to express the changes in their knowledge, skills, and/or behaviors. They can also write about the impact of their new knowledge on their pre-existing knowledge.
- **Connecting:** This type of journaling prompt asks participants to make connections between their new knowledge and their prior knowledge or to the world at large—data, business, technology, science, society, etc.
- **Transfer:** Participants are asked to express how they would transfer their learning to the workplace and to new and unfamiliar circumstances, for example, health and safety or home design.
- **Visualization:** This type of journaling prompt asks participants to create a visual metaphor or analogy for the function of something they have learned.
- **Sketch:** Participants are free to sketch or diagram how they visualize their learning.
- **Concept/example:** This type of journal prompt asks participants to explain an abstract concept and provide concrete examples of how it appears or functions in real life.
- **Five Ws:** Participants ask asked to explain the who, what, where, why, and when of their new knowledge.

Journaling can be used as a review activity. To refresh their memories, participants could reread the entries they recorded in the designated spaces in their workbooks.

## Course Format Recommendations

### Instructor-Led Training

Distribute several large sticky notes to each participant. At the end of each day, ask them to take 2-3 minutes to record the "ah-ha" moments, questions, connections, or other impressions they had of the day's learning. Ask them to stick these notes inside the cover of their workbook binders as mini journal entries. At the end of the course, ask for volunteers to share some of their reflections that relate to the expectations expressed at the beginning of the course.

### Web Conference Training

At the end of the day, ask participants to compose a short email to themselves to record the "ah-ha" moments, questions, connections, or other impressions they had of the day's learning. Explain that they will read their own emails the next morning as part of a review activity. The next day, facilitate a review of the previous day's learning by asking for volunteers to share some of their reflections or questions.

Return to Maximizing Participant Workbook Elements

Return to Rubrics

# K-W-L Charts

A K-W-L chart is a three-column graphic organizer that provides space for participants to record what they **K**now, what they **W**ant to know, and what they have **L**earned. K-W-L charts are an easy way to activate participants' prior knowledge and get them to set an intention for their learning. You can start the activity as a brainstorming session and use the chart to record information gathered or ask participants to fill them out individually. At the end of a lesson or module, participants can reflect and record their new, expanded knowledge in their own words.

One drawback to a K-W-L chart is that participants sometimes recall incorrect information, and it may be a challenge for them to let go of their misconceptions.

**Instructions**

How to use a K-W-L chart:

1. Create a blank K-W-L chart following the example and make a copy for each participant. Or ask participants to fold a piece of paper into three sections and label them Know, Want to Know, and Learned.
2. Ask participants to brainstorm the words, phrases, or terms they associate with the topic and record them in the Know column.
3. Ask participants to record what they want to learn about the topic, in the form of questions, in the Want to Know column. Ask for a few volunteers to share their learning intentions with the group.
4. As a review activity, ask participants to share the new knowledge they recorded in the Learned column, as well as their "ah ha" moments and unanswered questions.
5. Provide resources to assist participants in locating additional information to answer unresolved questions.

### Example

Figure 35 shows a K-W-L chart based on David Cornish's NHI "Instructor Development Course" training presentation, "Diving Inspection Intensity Levels."

| Know | Want to Know | Learned |
|---|---|---|
| **Basic visual and tactile techniques for underwater bridge inspections** | What do I need to do and look for at the different levels of inspections?<br><br>How are the procedures different for piers and pilings? | Level I:<br><br>- Detect obvious damage/deterioration of the total exterior surface<br>- Detect undermining or exposure<br>- Limited probing |

Source: Cornish (2018).

**Figure 35: K-W-L chart for "Diving Inspection Intensity Levels"**

## Course Format Recommendations

### Instructor-Led Training

A digital option to printing paper K-W-L charts is to create and share a fillable PDF form that participants can complete on their laptops or smart phones. An alternative to participants working individually is to create a K-W-L chart as a whole group activity. You can record the results of a brainstorming session on one piece of easel paper labeled Know. Then ask for volunteers to share their areas of interest and record them on a second piece of easel paper labeled Want to Know. At the end of the module or lesson, refer to the Want to Know list and ask for input from volunteers to complete the Learned list.

### Web-Based Training

You can create and share the K-W-L chart using free online form-building software to gather information on participants' background knowledge and areas of interest. If the course is hosted on a learning management system (LMS), you can create a K-W-L chart on a wiki or other collaborative writing platform or have participants complete and post a K-W-L chart on the course discussion board.

### Web Conference Training

One option is to create and share the K-W-L chart using free online form-building software. Another option is to use the web conference platform's chat feature to gather information on participants' background knowledge and areas of interest. Depending on the size the group, you can also consider asking participants to create and post a K-W-L chart on one (or three) PowerPoint slide(s) and post them to the web conference

platform.

Return to Sharing the "What's in it for me?"

Return to Activating Participants' Prior Knowledge

Return to Graphic Organizers

Return to Summarizing

Return to Supporting Participants

## Lectures and Interactive Lectures

A lecture is an oral presentation that is used to present a large amount of information to a group. Lectures are a form of one-sided communication. Participants are expected to play a passive role as listeners. Because they prioritize the delivery of content, lectures are an information-centered instructional approach.

You will find that lectures are good if training time is limited because a lot of information can be presented quickly. Lectures are also preferred if the subject matter changes quickly. Lectures are the most economical choice when training a large group. It is much easier to keep the group together and on the same point if you use a lecture.

While lectures are a common instructional method, they are not as effective as other methods that engage learners in the content. Because they are passive learners, participants may lose focus and their interest may wander. As we all know, lectures can be boring if the instructor is not dynamic or the same instructor presents all day. Participants who are non-native English speakers or have hearing impairments may find it difficult to follow along with a lecture. Another drawback is that it is difficult to assess participant learning during a lecture.

Interactive lectures provide all the benefits of a lecture and, at the same time, minimize the drawbacks. You can make your lecture more interactive by incorporating frequent question and answer sessions. Questions turn a passive learning event into an active one by engaging participants in the content now and then. The act of remembering what they heard and putting it into their own words forces learners to use both their short-term and working memories. Higher-level questions support critical thinking. If participants can link the new information to some knowledge or experience in their memories, then they will be more likely to remember and use it back on the job. Asking questions is a quick method to test how well participants understand the topic. For more information on questioning techniques, refer to Step 5: Plan for Knowledge Checks. While the size of the group sometimes makes it difficult for all participants to share their answers, thinking of an answer is just as beneficial.

There are different techniques for directing questions to a group and for directing questions to an individual.

**Instructions**

To direct a question to the whole class, one side of the room, or a table group:

1. **Ask**—Pose the question to the whole class
2. **Plant**—Wait 5–10 seconds for someone to respond
3. **Call**—If you don't get an answer, call out to the class, one side of the room, or a table group for a response

It is not a good idea to direct a question to an individual participant without first asking permission. When surprised, some participants may not be able to provide their best answer or may become embarrassed because they were singled out. Other participants may shut down for fear that you will do the same to them.

To direct a question to an individual:

1. **Confirm**—Make sure the participant you plan to question is an expert in the topic.
2. **Ask permission**—Before class or on a break (or via a private chat during a WCT course), explain that you would like to draw on their expertise. Ask permission to direct a question to them.
3. **Call**—Call on the individual participant.
4. **Ask**—Pose the question.
5. **Plant**—Wait for the response.

**Example**

At a key point in his interactive lecture on "Construction Quality Assurance: Measuring Quality with Inspection," Greg Doyle asked participants in his NHI "Instructor Development Course" training session a thought-provoking question, "Who is responsible for inspection?" To prompt a robust class discussion, he displayed four photographs on the slide (figure 36) that showed workmen during different stages of a paving project.



Source: Dwyer (2018)

**Figure 36: Thought-provoking question slide from "Construction Quality Assurance: Measuring Quality with Inspection"**

# Course Format Recommendations

### Instructor-Led Training

To encourage all participants to participate in a whole group question and answer session, you can ask them to share their answers with a partner. Depending on the size of the group and the room layout, you can either walk around and listen to the discussions or call on a few partners to share their responses. For instructions on how to conduct this activity, refer to Think-Pair-Share.

### Web Conference Training

Instead of requiring oral answers, you can ask participants to respond to poll questions or provide short answers in the web conference platform's chat pod. You can post the results of the poll for everyone to see and provide clarification or correction when needed. For short answer responses, it may be more efficient if a WCT host or technical

assistant sorts the answers and provides you with a summary of the results. For instructions on how to conduct this activity, refer to Surveys/Interactive Polls.

Return to Step 4: Select the Learning Strategies

# Models

A model is a representation of a system, thing, phenomena, or process that is used to make it easier to understand. Models are used to describe observed behavior or results from an experiment, to explain why the behaviors or results occurred as they did, and to predict future behaviors or results.

There are four types of models:

- **Visual models:** Graphical representations of objects and systems. They include flowcharts, pictures, and diagrams. Visual models are useful as educational tools.
- **Physical models:** Larger or smaller three-dimensional representations of an object. They display the characteristics of the original but on a scale that is easier to view. Some physical models are interactive and have moving parts. They are used for experiments, visualization, or education.

## Example 1

Before the new Woodrow Wilson Bridge was built across the Potomac River, physical models were tested for scour in FHWA Hydraulics labs (figure 37).



Source: Kevin Kerdash/ FHWA, (2000).

**Figure 37: Scour testing on Woodrow Wilson Bridge model**

## Example 2

During his NHI "Instructor Development Course" training presentation, "Vibration vs. Oscillation," Daniel Sant Anselmo used a cut-out model of a Hamm asphalt roller drum (figure 38) to demonstrate how the inner mechanisms created the oscillating effect. He rotated the drum by turning a handle. The participants could see the resulting movement of the weighted cams.



Source: Sant Anselmo (2020)

**Figure 38: Cut-out model of Hamm asphalt roller drum**

- **Mathematical models:** Descriptions of a system using mathematical concepts and language. They include statistical models, differential equations, dynamic systems, and game theory models. Mathematical models are used to predict what will happen in the future and to design new devices, processes, and systems. Some technical courses will include mathematical models.
- **Computer models:** Computer program versions of mathematical models. They are used to run computer simulations of complex real-world events. Using computer models, researchers can quickly obtain results that are not available through mathematical analysis or natural experimentation. An example of a computer model is the Interactive Highway Safety Design Model (IHSDM). The IHSDM is used to evaluate the safety and operational effects of geometric design decisions on highways.

There are some limitations to working with models. While model makers strive for accuracy, they are not always able to include all the details of the actual object or complex natural phenomena. Because our knowledge of the world is limited, some models include approximations which affects the accuracy of predictions upon which

they are based. To help us understand complex structures or concepts, some models are simplified and lack details that are present in real life.

## Course Format Recommendations

### Instructor-Led Training

If a physical model is not available but a diagram is, before explaining how things work, ask participants to make predictions based on the diagram and share them with their table group. Call on table groups to share their predictions. Then, use their ideas, supplementing or correcting when necessary, to explain the model's functionality.

### Web Conference Training

Before showing a video of a model, ask participants to predict what they think would be a part of the model. Ask probing questions to reveal more about their thinking. Then, show the video and follow up with a discussion of how close their preconceptions were to reality.

Return to Theorists

Return to Supporting Participants

Return to Visual Aids

## Observational Activities

Solid thinking depends on careful observations. Critical thinkers gather data during observations, and they sift out the irrelevant details to focus on the meaningful information. They look for subtle differences or patterns in the details. They compare their observations to information that already exists to form new ideas or hypotheses. Participants can make observations when viewing role play scenarios, videos, photo series, and other activities.

You can help participants become better observers by setting expectations. Participants need to why they are to observe, what their role is as observers, and the specific information you want them to look for. They need to know what question they are expected to answer at the end of their observation. You can also ask participants to come up with their own questions about what they have seen. A graphic organizer or other structured note-taking form can help participants record their observations. Before you debrief the activity, it is a good idea to give participants time to reflect on their notes. You can ask them to reflect individually, with a partner, or in a small group before holding a whole group discussion.

### Instructions

How to conduct an observational activity:

1. Identify a learning outcome from the module or lesson.

2.  Obtain an appropriate video (or video clip) or develop a role play or other physical activity for observation that supports the learning outcome.
3.  Write one or more essential questions for participants to seek answers to or identify a hypothesis for them to gather data to test during their observation.
4.  Explain the purpose of the observational activity.
5.  Describe participants' roles and responsibilities as observers.
6.  Share the essential question or hypothesis with participants.
7.  Distribute graphic organizer or note-taking outline.
8.  Encourage participants to formulate their own questions to be answered.
9.  Begin the role play/video/other activity. Set a time limit for the activity.
10. At the end of the observational activity, provide 5 minutes for participants to review their notes with a partner or group.
11. Conduct a whole group discussion to identify key details, patterns, or other observations to answer the essential question or support or refute the hypothesis.
12. Ask volunteers to share their questions and use the class as a resource for the answers.

## Example

For his NHI "Instructor Development Course" training presentation, "Local Road Safety," Marvin Ta developed an observational activity to illustrate the impact of a community's vision on its roadway design. Ta asked participants to share their observations on the road designs in two communities (figure 39 and figure 40). This activity was modified so that, participants could use Cornell notes (figure 41) to record their observations and questions before sharing them in a group discussion.



Source: Ta (2019)

**Figure 39: Photo of Community #1's road design in "Local Road Safety"**

Source: Ta (2019)

**Figure 40: Photo of Community #2's road design in "Local Road Safety"**

| Cornell Notes | Local Road Safety |
|---|---|
| **Topic/Outcome:**<br>Describe a community's transportation vision based on its roadway design | **Name:** Participant A |
| **Essential Question:** | Based on evidence in the photos, what do you think are the community's transportation priorities? |
| **Questions:** | **Notes:** |
| Why is the bike lane between the sidewalk and parked cars? Usually it's on the roadway side of parked cars.<br><br>Why isn't this design used more often?<br><br>How many pedestrian and bicyclist fatalities have happened on this road? | Community #1—bike lane, parked cars and white delineators create buffer from roadway. Wide sidewalk, tree boxes create additional landscape buffer for pedestrians<br><br><br><br>Community #2—lack of sidewalks, no shoulder or bike lanes, telephone pole right next to road, houses very close to the road, but the hydrant is set back |
| **Summary:** | Community #1's road design shows that its transportation vision prioritizes walking and biking. Community #2's road design shows that it prioritizes moving cars from Point A to Point B in the least amount of time. It has a car-centered vision. |

Source: Ta (2019).

**Figure 41: Cornell notes for observational activity in "Local Road Safety"**

## Course Format Recommendations

**Instructor-Led Training**

Create a script for a short skit that demonstrates effective reactions to a negative workplace situation. At least one day in advance, ask one or two participants to prepare to act out the skit with you. Before presenting the skit, explain the purpose of the activity and provide the participants in the audience with a note-taking sheet with questions like,

- "What triggered the interaction?"
- "How was it different than what you have observed in the past?"
- "What physical behaviors did you observe?"
- "What phrases or words seemed to be most effective?"

"What questions do you have about the situation, the behaviors, or the reactions?" Debrief the activity by asking for volunteers to share their observations and questions.

**Web Conference Training**

If the task or skill is being performed by others at the same workplace, assign participants an on-the-job observational activity to be completed between web conferences. Set a time limit for the observation. Provide a list of questions to answer and behaviors to observe, and ask them to generate their own questions about what they see. During the next web conference, break the class into groups. Ask participants to type their observations (redacting names of observed employees) into their small group chat pod. Encourage participants to share their observations and questions. Then, reconvene the group and ask for volunteers to share salient observations and unanswered questions.

Return to Reflectors

Return to Oral Presentations

Return to Cooperative and Collaborative Learning

# Oral Presentations

An oral presentation is a short talk on a topic given to class or group. In an oral presentation one or more participants present their views on a topic based on their reading or research. A discussion generally follows, prompted by questions from the instructor and class. Oral presentations tend to be short, around 10–15 minutes. Participants may need to prepare visual aids, such as PowerPoint slides or handouts, or may mark impromptu sketches or notes on a white board or easel pad. Oral presentations can be held in person or via web or video conferences.

A good oral presentation will have the following components:

- **Introduction**—The participant should state the topic and the focus of the presentation and outline its main points.
- **Body**—The participant should develop the main points. The presentation can be organized chronologically, by theme, or order of importance. The participant should provide clear links between main points, explanations, and examples.
- **Conclusion**—The participant should clearly restate the premise and summarize the main points.

Oral presentations are good for both mid-course and final assessments. They can reveal participants' abilities to find relevant information and combine it into a logical and coherent package. Instructors can use probing follow-on questions to assess participants' deeper comprehension. Another advantage to oral presentations is that they don't take long to grade. An assessment checklist or rubric can be used as a scoring tool. For more information on how to structure and describe assessment criteria, refer to [Assessment Checklists](#) and [Rubrics](#). Whatever the assessment tool, it must be shared in advance with students so they know exactly what they need to do to achieve the highest scores.

There are a few downsides to oral presentations. Good public speakers have an advantage with oral presentations. However, it may be difficult for non-native speakers or participants who find public speaking intimidating to fully demonstrate their learning. It also takes time, often outside of class, for participants to prepare their presentations and it takes in-class time to present them.

[Return to Assessing Learning](#)

[Return to Cooperative and Collaborative Learning](#)

[Return to Observational Activities](#)

[Return to Rubrics](#)

## Problem Solving/Problem-Based Learning

In a problem-based learning (PBL) classroom, participants learn about a subject by working in groups to come up solutions to complex real-world problems. Unlike in traditional courses, with PBL, participants are self-directed in their learning. The instructor's role is more of a facilitator and coach. The instructor starts a PBL activity with a problem that participants are likely to encounter in their jobs. Participants work together in groups to solve it with the information they already have. They next identify what else they think they need to know and independently review information resources. They regroup and apply what they have learned to try to resolve the problem. At the end of the activity, participants constructively assess their own learning as well as their peers'.

Some of the benefits of PBL are that participants take ownership for their own learning.

They are engaged in the information gathering and evaluation process and reflect on their effectiveness as a learner at the end. PBL promotes knowledge retention and transfer to the workplace. PBL also supports interpersonal and group problem-solving skills. Some of the downsides to a PBL activity are the amount of time required for participants to complete the assignment and the time involved in monitoring and grading of participants' performances. For more information on facilitating and monitoring group work on projects, refer to [Projects.](#)

**Instructions**

1. Identify the learning outcomes for participants to achieve.
2. Determine how participants will demonstrate their learning.
3. Develop assessment tools to measure participant mastery (rubric, learning reflection/self-assessment, etc.)
4. Design the scenario or scenarios based on a real-life problem.
5. Introduce the PBL, the assignment expectations, rubrics, and timelines and lets the groups read through the scenario(s).
6. Facilitate a brainstorming activity to activate participants' background knowledge and identify what other information they need, along with available information sources.
7. Ask groups to create a hypothesis to test as they research their solution.
8. Groups self-assign roles and research responsibilities.
9. Groups synthesize their research and create a presentation on their solution(s).
10. Evaluate the groups' products and performances.

## Course Format Recommendations

**Instructor-Led Training**

Ask participants in a multi-week advanced course to brainstorm a list of industry and/or workplace problems. Ask them to identify the items on the list that fit within the scope of the course. Then, allow the participants to form groups, based on their interest in a particular problem, to develop a solution. Introduce the problem-solving project rubric and delivery schedule. Over the following weeks, the instructor(s) serves as a facilitator, guiding problem-solving actions, prompting discussions, and modeling strategies for thinking and learning. The groups collaborate inside and outside of class to research, write, and develop their final presentations. During class time, the instructor(s) meets with each group to provide guidance and monitor group work. Provide a template for group meeting minutes and require groups to submit the minutes after each facilitation period. At the end of the course, groups present their solutions and a brief summary of their research. Peers ask questions and provide oral or written feedback on the presentations.

**Web Conference Training**

Provide a complex, open-ended problem and divide the class into groups to work

together to find a solution. Use a rotating team of four instructors/assistants to meet with each group during web conferences to provide the needed facilitation/monitoring time. Provide a template for group meeting minutes and require groups to submit them after each facilitation period. Post recorded mini-lectures by guest speakers related to the course content so participants can access instruction at times that are convenient to them. At the end of the course, each group uploads a recorded presentation of its solution and research. Peers post questions and feedback on the presentations.

[Return to Activists](#)

[Return to Pragmatists](#)

## Projects

A project requires participants, either working on their own or as part of a team, to develop a unique product that demonstrates their learning. To complete their projects, participants need to synthesize and apply their new learning to solve a problem. The assignment also may require participants to practice their communication skills if it includes a final presentation. Working through projects, participants practice their critical thinking, problem-solving, interpersonal, and time management skills.

Because participants work to solve authentic problems, projects enhance comprehension and improve retention and transfer of knowledge and skills to the workplace. Collaborative projects also allow participants to share their experiences and hear different viewpoints. The working relationships created in a project group can continue outside of the classroom and can expand participants' professional networks. Participants take ownership of their projects and become fully engaged as they direct their own learning. As a result, the instructor becomes more of a guide during the project.

Depending on the time available and the learning outcomes, projects can be simple or complex. More involved projects can feature interim deadlines to allow participants to get feedback from instructors and/or peers. Rubrics or assessment checklists are often used to clarify the project's requirements and grading scale. For more information on assessment tools, refer to [Assessment Checklists](#) and [Rubrics](#). Because participants are more focused on applying knowledge than memorizing details, often they do not perform well on multiple-choice and short-answer question tests. It is recommended that a course not include both written tests and projects.

While less time is spent on direct instruction, instructors still need to monitor and assess participants' work. The instructor will need to explain the project, its deadlines, and how to interpret the grading tool. If a project has interim deadlines, the instructor will need to review and provide feedback to all learners on each deliverable as well as on the final product(s). Sometimes the instructor may be asked to counsel personality conflicts or adjust grades based on individual contributions to group projects.

However, the biggest drawback for using projects in training is that it takes time for participants to complete the work and deliver their presentations. This work often needs to occur outside of the classroom. As class time is limited, projects are more appropriate for blended learning or web-conference courses where independent and online collaboration are already part of the course structure. For instructor-led courses, projects are most appropriate for advanced level courses that meet several times over the course of a year.

**Instructions:**

How to create a project:

1. Determine the essential question. It should tie directly to the course content. The best essential questions are open ended and have more than one possible solution or answer.
2. Create a plan for the project. What are learners expected to be able to do by the end of the course? What will participants need to research, create, and/or communicate to achieve those outcomes? What resources do they need? Will they create the project in stages? How will all the project components come together? What will the final product look like? How will it be shared with the class?
3. Create an assessment tool. What is required to complete the project? What are the most important project components or elements? What are the less important ones? What will be the grading scheme? How would you describe good (excellent and unacceptable) work? What will be the passing and failing scores?
4. Develop a schedule. How much time do you have for the entire project (including presentations)? How much time should each component take to complete? How much time will be needed for reviews and revisions? Will they work on the project in class or work online with their teammates?
5. Prepare to monitor progress. Schedule check-ins to observe participant progress, assess interim components, and answer questions. How do you want participants to share their work with you or their peers? What feedback will they need to guide their project development? Refer to the assessment tool you created. Can you suggest any additional resources?

Return to Cooperative and Collaborative Learning

Return to Problem Solving/Problem-Based Learning

## Quick Writes/Entrance Tickets

A quick write is a fast and easy way to get participants to collect their ideas and put them into writing. During a quick write, give participants 2 to 10 minutes to write a response to an open-ended prompt or question. Participants can jot their thoughts on a

piece of paper or large notecard. Quick writes can be used before a module or lesson (called an entrance ticket), during a module or lesson, or after a module or lesson (called an exit ticket) to encourage participants to think about what they already know about a concept or to reflect on their learning.

If you use a quick write as part of an introduction, you can get a quick measure of participant's past experiences with the topic so you can better tailor your message to their level of understanding. You can also use a quick write as a quick knowledge check to help you and participants monitor their comprehension. Because time is limited and the focus is on content, it is important to stress to participants that grammar and spelling are not graded in a quick write activity.

Writing is a challenge for some participants and adding a time limit can increase the stress they feel to produce something of value. This activity may also be challenging for non-native English writers. Depending on the size of the group, you may find it hard to find enough time to review dozens of quick writes. Also, it is often difficult to read other people's handwriting, especially when it was hastily written.

### Instructions

How to use a quick write as an entrance ticket:

1. Write an open-ended question or prompt.
2. Print the prompt and instructions for the activity on a half sheet of paper.
3. Distribute the entrance ticket to participants as they enter the classroom.
4. Explain the activity and set a timer.
5. Collect the unsigned writing sheets and review them on your next break.

## Course Format Recommendations

### Instructor-Led Training

Instead of collecting the quick writes/entrance tickets, you can ask participants to share their writing with a partner or table group. Then, ask table group representatives to summarize the ideas shared at their tables. You can also put a digital twist on the quick write and ask participants to compose a response in the form of a Twitter message using a hashtag unique to your class or a text message to you. To avoid sharing personal information, you can install a free app to set up an alternative phone number that connects to your smart phone or other device.

### Web-Based Training

Instead of setting a time limit, you can set a word limit (e.g., Twitter's 240-word limit). You can ask participants to post their quick write/entrance ticket to the course discussion board at the start of a lesson or module.

### Web Conference Training

You can use either the public or private chat function on the web conference platform to

collect participants' quick writes/entrance tickets. Some platforms allow you to save and print out chat threads so you can review and analyze them later.

[Return to Activating Participants' Prior Knowledge](#)

[Return to Sharing the "What's in it for me?"](#)

[Return to Step 4: Select the Learning Strategies](#)

[Return to Summarizing](#)

[Return to Think-Pair-Share](#)

[Return to What do participants already know?](#)

# Real-World Problems

Real-world problems are authentic issues that affect people outside of the classroom environment. Participants learn best when a topic is of immediate value to them. You can instill a sense of purpose if you introduce a real-world problem at the start of the course. During the course, ask participants to consider or investigate potential solutions to the problem.

### Example 1

To begin his NHI "Instructor Development Course" presentation on "Local Road Safety," Marvin Ta cited this statistic and considered its impact on a family:

- "In 2014, there were 511 passenger car deaths. But think of how many devasted family and friends. What if this was your child? Your world's gone just like that? Witnessing a mother lose a child. Attending your child's funeral is something you hope to never experience."
- "Is it preventable? Certainly."
- "On March 28, 2014, I lost a good friend, Adiv Lift, in a car crash."

Figure 42 displays the slide Ta showed during his presentation to personalize the problem.
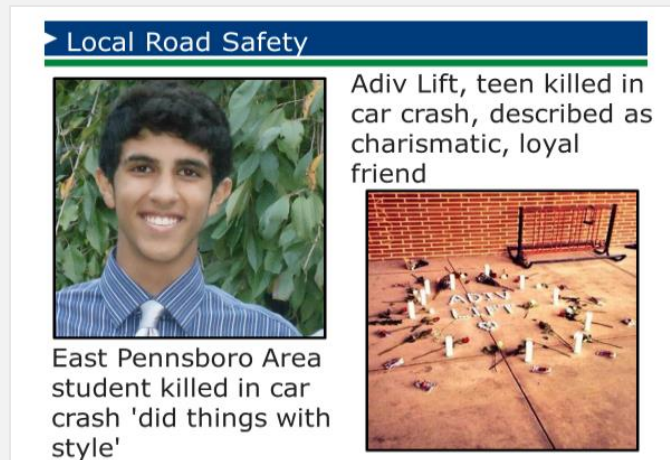


Source: Ta (2019).

**Figure 42: Real-world problem slide from "Local Road Safety"**

### Example 2

To being his NHI "Instructor Development Course" training presentation on "Drilled Shaft Volume," Don Dwyer displayed a photo of exposed reinforcement bars to illustrate the negative impact of miscalculating the volume of a drilled shaft. Figure 43 displays the slide that graphically demonstrates the impact of poor monitoring during concrete pours.



Source: Dwyer (2018)

**Figure 43: Real-world problem slide from "Drilled Shaft Volume"**

## Course Format Recommendations

**Instructor-Led Training**

Go beyond industry statistics and display the headline and photos from an accident, incident, or scandal. Ask participants if something similar has happened or could happen in their community. Participants can share their responses in a small group discussion or chat before discussing as a whole group what could be done to prevent it.

**Web Conference Training**

As a pre-course assignment, ask participants to share an example of a real-world experience or problem that relates to the course content. Create an interactive list of topics using a collaborative document platform. When getting ready to introduce a topic, ask participants who selected that topic to briefly share their story or issue.

# Role Playing

In role playing scenarios, a participant assumes the role of an employee to practice job skills or behaviors in simulated work conditions. Role playing allows participants to interact with other people in managed situations so they can try different strategies and gain experience in a supportive environment. Role play activities are best for practicing listening skills and quick decision making. While they role play, participants demonstrate their current level of skill and can use instructor and peer feedback to improve their performance. Group discussions can produce additional responses or solutions, expanding the options available on the job. It is important to note that role play is not for everyone. Some participants may be uncomfortable acting in front of others, while others may find it too theatrical and may not take the exercise seriously. Also, there might not be enough time for all participants to take part in the activity, so the role play becomes a demonstration exercise for them.

**Instructions**

To conduct role playing activities:

1. Identify the learning outcomes for the lesson.
2. Craft or choose a scenario around this content.
3. Explain the role play activity and your expectations.
4. Introduce the problem and allow a 3–5 minutes for participants to discuss the relevant issues.
5. Describe the workplace scenario, adding details to make it realistic.

## Example

For his NHI "Instructor Development Course" training presentation, the "Influence of Context on Traffic Signal Operational Objectives," Eddie Curtis developed a role play activity with two scenarios to illustrate how people in the community respond to poor signal timing. The purpose of the activity was to help participants articulate the operations objectives for equitable distribution of green time and smooth flow at the intersection and network level in under-saturated conditions. Below are his instructor notes and the slides that support the activity.

- Activity #1 introduction (figure 44)
- Activity #1 role descriptions (figure 45)
- Activity #1 intersection photo (figure 46)

**Role Play #1 Set-up:** Break the class in to pairs. One person is the driver, and the other person is the agency official that you meet at a dinner party, have the two roles introduce themselves. The agency person describes who they are and that they've just completed a signal retiming on the main street corridor that connects the driver's neighborhood local road to Main Street. The instructor will provide a picture of an intersection with a red light. The driver will explain to the agency official why they are dissatisfied with the operation.

Based on the outcome of the discussion, using the flip chart, articulate the objective of equitable distribution of green time.



Source: Curtis (2019)

**Figure 44: Context slide for role playing activity #1 in "Influence of Context on Traffic Signal Operational Objectives"**

Source: Curtis (2019)

**Figure 45: Character slide for role playing activity #1 in "Influence of Context on Traffic Signal Operational Objectives"**



Source: Curtis (2019)

**Figure 46: Intersection photo for role playing activity #1 in "Influence of Context on Traffic Signal Operational Objectives"**

- Activity #2 introduction (figure 47)
- Activity #2 role descriptions (figure 48)
- Activity #2 intersection photos (figures 49–51)

**Role Play #2 Set-up:** Break the class into pairs. One person is the driver the other person is the agency official that meet at a dinner party. Have the two roles introduce themselves, the agency person describes who they are and that they've just completed a signal retiming on the main street corridor that provides regional connectivity along the arterial. The instructor will provide three photos of consecutive intersections where the driver experiences red lights. The driver will explain to the agency official why they are dissatisfied with the operation.

Based on the outcome of the discussion, using the flip chart, articulate the objective of smooth flow.



Source: Curtis (2019)

**Figure 47: Context slide for role playing activity #2 in "Influence of Context on Traffic Signal Operational Objectives"**



Source: Curtis (2019)

**Figure 48: Character slide for role playing activity #1 in "Influence of Context on Traffic Signal Operational Objectives"**

Source: Curtis (2019)

**Figure 49: Intersection photo #1 for role playing activity #2 in "Influence of Context on Traffic Signal Operational Objectives"**



Source: Curtis (2019)

**Figure 50: Intersection photo #2 for role playing activity #2 in "Influence of Context on Traffic Signal Operational Objectives"**

Source: Curtis (2019)

**Figure 51: Intersection photo #3 for role playing activity #2 in "Influence of Context on Traffic Signal Operational Objectives"**

## Course Format Recommendations

### Instructor-Led Training

Depending on the size of the group or the classroom layout, either conduct one role play activity for the whole group to observe or conduct several role play activities concurrently. To run more than one role play at a time, you can assign acting and observing roles to small groups of participants. Set a time limit for the first round, then ask the observers to provide feedback before the groups switch the acting and observing roles. After all participants have had a chance to participate, you can facilitate a whole group discussion on what they learned.

### Web Conference Training

Depending on the web conference platform features, you can assign participants to breakout rooms. They can either use the platform's video chat feature or a standalone app to record their performance as they assume their roles and act out the scenario. The groups can share their videos on the web conference platform for review and comment. You can hold a group discussion on the lessons learned and suggested solutions to the identified problem.

Return to Activists

Return to Supporting Participants

Return to Step 4: Select the Learning Strategies

# Rubrics

A rubric is an assessment matrix used to score or provide feedback on a participant's performance. Rubrics can be used for a variety of work: papers, projects, oral presentations, group projects, demonstrations, etc. A rubric may be appropriate when a multiple-choice test would not provide an accurate measure of participant learning.

A rubric lists the major components or elements of a performance and establishes a scale for quality. Explicit descriptions of the work expected at the different levels of a quality scale are provided for each element so that each element can be scored separately. Higher quality work receives more points than lower quality work. Additional weight can be assigned to more important elements, and the final score is based on the total points.

Rubrics are beneficial to both instructors and participants. The explicit descriptions in a rubric give participants a clear understanding of what is expected from them. They also can get a better idea of their strengths and weaknesses and can use that information to direct their learning. Rubrics also help instructors grade more consistently by requiring them to rely on the rubric descriptions instead of assigning their own values to participant performances. While rubrics do have their advantages, they are also time consuming to create, explain, and use. Writing multiple performance descriptions for each element takes time. Explaining the rubric to learners takes time. Reviewing a report or performance and rating the quality of each of its elements takes time. If more than one person will be using the rubric to grade, it also take time to train each person to make sure they are consistent in their scoring.

## Example

Instructors for the NHI "Instructor Development Course" use a rubric to assess participants when they give their final training presentation. The rubric is based on behaviors demonstrated by competent instructors. Table 6 displays the rubric grading scheme and definitions for the different levels of mastery. Figure 52 shows an excerpt from the classroom management portion of the NHI instructor rubric.

**Table 6: "Instructor Development Course" Grading Scheme**

| Score | Performance Metric Definitions |
|-------|-------------------------------|
| 3 | Excellent – Performance exceed the expectations and demonstrates complete mastery |
| 2 | Acceptable — Performance meets the expectations and demonstrates competency |
| 1 | Marginal — Elements of competency were exhibited but performance does not demonstrate master |

| Score | Performance Metric Definitions |
|---|---|
| 0 | Unacceptable—Performance was expected but not demonstrate |
| Passing requirements | Trainer must achieve at least one "Excellent" in each section and receive no less than "acceptable" for each competency skill. |

Source: NHI (2018).

## NHI Instructor Rubric—Classroom Management

| Skill | 3—Excellent | 2—Acceptable | 1—Marginal | 0—Unacceptable |
|---|---|---|---|---|
| **Use of room** | Moves around the room to engage and encourage participant without being a distraction. Directs dialog and focuses on all participants in the room. Allows for participants to see instructor at all times. | Moves around the room to encourage participant and engages participants. | Limited movement around the room. Directs dialog to one section of the room or single participant. | Instructors from the front of the room: behind the lectern or stands in front of the screen. |
| **Manages disruptions** | Instructor manages disruptions effectively that could interfere with learning (e.g., side-bar conversations, disruptions). Instructor has the ability to reengage participants to maintain class order and schedule. | Instructor manages disruptions effectively that could interfere with learning (e.g., side-bar conversations, disruptions). | Instructor does not constantly manage disruptions that interfere with learning (e.g., side-bar conversations, disruptions). | Instructor does not attempt to manage any disruptions that interfere with learning (e.g., side-bar conversations, disruptions). |
| **Section Total** | | | | |

Source: NHI (2018).

**Figure 52: Excerpt from classroom management section of NHI Instructor Rubric**

# Self-Questioning

The self-questioning strategy asks learners to generate, contemplate, and answer high-level questions about a text or lecture. The activity increases participants' curiosity and they engage more deeply with the content. Self-questioning helps to focus participants' attention, asks them to mentally organize the information, and helps them integrate new information with their existing knowledge. Some participant workbooks provide space for participant questions and answers. If they don't, participants can write their questions and answers on index cards or sticky notes. One disadvantage of this strategy is that it takes more time to explain the activity and for participants to compose their questions and responses than conducting a simple question and answer session. More time is required for one or two volunteers to share their questions and answers. Also, the self-questioning strategy demands a higher mental load. For participants who have difficulty juggling multiple mental tasks at one time, the strategy may overload their ability to process information effectively.

## Example

Some questions participants may ask themselves before a lecture or reading assignment may include:

- Why am I reading/listening to this?
- How can I use this information?
- What will I learn in this lesson?

Questions participants might seek answers to while listening to the lecture or during their reading may include:

- What is the main idea of _____?
- How does this relate to what I already know/have learned?
- What is different or what conflicts with my personal experience or knowledge?

At the end of the lesson or reading passage, participants can ask themselves questions like these:

- How has my knowledge changed?
- What other questions do I have about the topic?
- How will I apply this information on the job?

**Instructions:**

To conduct a self-answering question activity:

1. Decide whether participants will generate and answer their questions before, during, or after the lesson.
2. Create a list of example questions for participant consideration.
3. If space is not provided in the participant workbook, distribute index cards or

sticky notes.

4. Explain the purpose of the self-questioning activity.
5. Share the example questions and encourage participants to use one or more of the examples or generate their own questions and write them on the note card, sticky note, or space provided in the participant workbook.
6. For "before" questions, allow time before the lesson for participants to write their predictions.
7. For "during" or "after" questions, allow time after the completion of the lesson for participants to write their answers.
8. Circulate around the room to observe participants' questions and responses.
9. Call on one or two participants to share their questions and answers.

### Course format recommendations

**Instructor-Led Training**

Distribute index cards as participants enter the class in the morning or after lunch. Explain that, to exit the class, they will need to answer one or two higher-level questions of their choice based on the upcoming lesson. Collect the "exit tickets" at the end of the day (or before lunch), and summarize the responses when participants return again to the room.

**Web Conference Training**

Set up small groups in breakout rooms. Ask the group members to post their questions to the chat pod and discuss their answers. Afterwards, briefly join the breakout groups and listen to the discussions.

Return to Maximizing Participant Workbook Elements

## Skimming and Scanning

Skimming is a rapid reading technique used to get a general overview of a document. You can ask participants to skim through their participant workbook, a handout, or other document as a preview before doing more detailed reading. Scanning is a similar technique. When you scan, you read rapidly to find specific facts. You can skim to get a general idea about a document. You would scan to locate a particular fact. It is important to note skimming and scanning provide an incomplete understanding, and participants may overlook nuances and key details if they don't go back and read more thoroughly.

When skimming, readers should pay attention to:

- Text features, like headings, boldface and italic type
- Indented text
- Bulleted and numbered lists
- Key words and phrases

- Names of people and places
- Important dates

**Instructions**

You can guide participants through a skimming and scanning activity. Ask them to complete one or more of the following steps:

1. Read the table of contents or chapter overview to learn how the information is organized.
2. Quickly scan main headings and subheadings.
3. Read the sentences that contain bolded or italicized key words.
4. Read the introductory paragraph or abstract.

# Course Format Recommendations

### Instructor-Led Training

When introducing the participant workbook at the start of a course, encourage participants to just read through the table of contents, main headings, and subheadings in the different lessons. Ask participants to make predictions about the content based on their quick preview and then to skim read to check if their predictions were correct.

### Web Conference Training

To get participants engaged with assigned articles, websites, or other reading materials, ask them to scan to identify key words and phrases. Ask for volunteers to share items that caught their eye or spurred a question they were interested in answering.

Return to Activating Participants' Prior Knowledge

Return to Games

# Soliciting Participants' Expectations

Sometimes participants are unsure of what they will encounter in a course. At other times, they come to class with expectations that are too narrow or beyond the scope of the course content. It is important to get a sense of participants' expectations at the start of the course so you can respond to any concerns and deal respectfully with any misconceptions. This strategy will help you establish credibility with the participants and creates positive expectations for the course. To help participants self-assess their learning and place a value on the course, you can review participant expectations at the end of the course and ask if they believe they have been met.

Some of the questions you can ask are:

- What are your expectations for this course?
- What do you want to learn in this course?

- How do you envision applying your learning from this course at your job?
- What questions do you hope to get answered in this course?
- What would you like to accomplish this year? How do you see this course helping you to achieve that goal?

**Instructions**

How to solicit participants expectations:

1. Ask participants for their expectations for learning for the course.
2. Record their responses on chart paper.
3. Write participants' initials next to their comments.
4. Post the chart paper in a visible place in the room.
5. At the end of each day, review participants' expectations and ask if they believe they were met. If necessary, supply examples from the course to jog the memory of those who disagree.

## Course Format Recommendations

### Instructor-Led Training

A digital alternative to recording participants' learning expectations on easel paper is to ask them to respond to a digital survey. You can use free software or apps to create an interactive form or online survey. One option is to email the survey or link in advance as part of a pre-course assignment. Or make it available on the first day of the course.

### Web-Based Training

You can post your question to the course discussion board or create an online survey using the essay question feature on the learning management system (LMS). Both will display text fields where participants can enter their expectations for learning.

### Web Conference Training

Some web conference platforms have a question and answer feature. You can post your question about participant expectations to the Q&A pod or window. You may be able to keep the window open throughout the course or reopen it at the end of the course for review and reflection.

Return to Sharing the "What's in it for me?"

## Statistics

Statistics are a collection of quantitative data. They are produced by analyzing large quantities of numerical data. Statistics are often used to estimate what proportion a sample of data represents in the whole set of data. There are pros and cons for using statistics. Statistics and data can help us better understand the world. They help us to

make predictions and evaluate the quality of products or processes. You can use statistics to increase your credibility or create an emotional impact on participants. But be careful in your choice of statistics. It is important to use trusted sources for data and statistics. Government statistics are generally high quality because they are based on very large samples. However, the information sometimes is collected for a political purpose. Data collection or calculation may be manipulated to fit that bias. Make sure that the statistics you choose supports the message or argument. When choosing a statistic, think about what data the participants will find interesting. Showing how the statistic has changed over time can increase the power of the message. Be sure to connect the statistic to the participants' lives or jobs. Sometimes you will need to help participants understand statistical terminology, like mean, median, standard deviation, and statistical significance, so they can interpret statistical data. You can help put statistics into context for the participants by creating graphs or other visual aids.

**Instructions**

To present statistics for maximum impact:

1. Identify the appropriate statistic.
2. Create a slide to display the statistic. Highlight it in a chart or graph or use a photograph to make an emotional connection.
3. When instructing, speak slower than your normal rate to signal the importance of the statistic.
4. Pause immediately before the statistic, to create suspense.
5. Use body language, like spreading your arms, to demonstrate the magnitude of the statistic.
6. Pause immediately after the statistic, to allow participants to process the meaning.
7. Use facial expressions to convey the appropriate reaction.

For more information on using statistics to provide background information, refer to Background Information.

Return to Setting the Hook

Return to Theorists
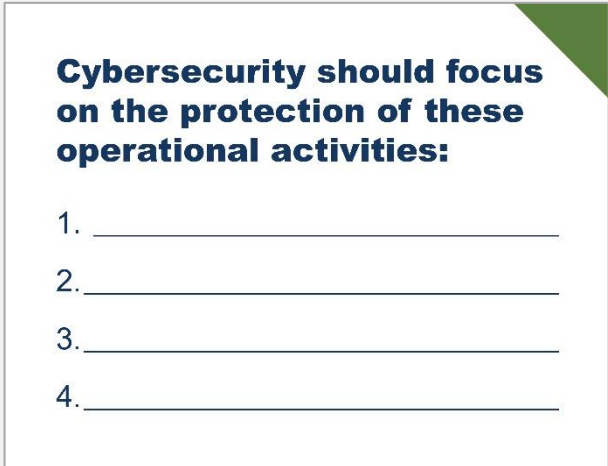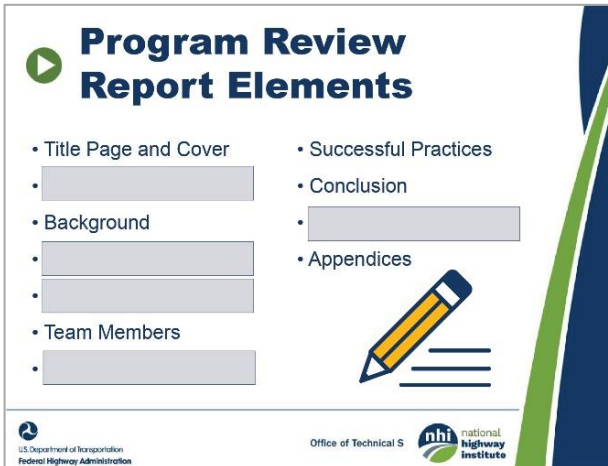
**For More Information**
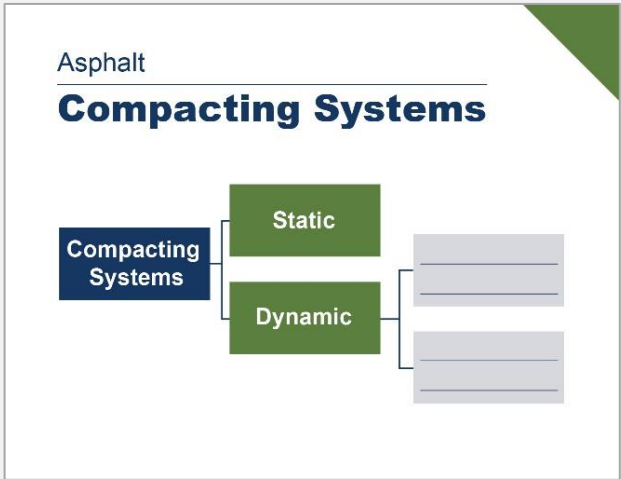
For more information about transportation statistics, refer to the United States Department of Transportation, Bureau of Transportation Statistics website, https://www.bts.dot.gov/

# Structured Notes

Many participants use their workbook's margins and blank spaces to take free-form notes during a course. But a more effective retention method is to ask them to answer questions or jot down key details in structured notes sections in their participant workbooks. Structured notes prompt participants to recall and process information at key points during a lesson. They help keep participants engaged and create a sense of ownership in the learning process. Structured notes also provide a great take away from the training that participants can refer to later. However, participants will grow bored if note taking becomes predictable. It is best to provide a variety of formats and match them to the participants' information processing needs. If structured notes are not part of the course's participant workbook, create them as handouts for participants to slip into their books at the appropriate spot. Table 7 displays some structured notes formats available in course participant workbooks.

**Table 7: Example Structured Notes Formats**

| Structured Notes Format | Example |
|---|---|
| **Questions with lines**—Participants will find a box or a dedicated area that displays a question and provides space for precise answers or steps. Sometimes the lines are numbered to help participants recall all the details or a sequence. These are effective for answering critical or complex questions or recalling multi-step processes or workflows. |   Source: Murphy (2019). |
| **Copies of screenshots with blanks**—Anytime you display a complicated image with labels or a slide with a lot of textual information, these fill-in-the-blank replicas can provide spaces for participants to record the key details as you point them out. |  |

| Structured Notes Format | Example |
|---|---|
| | Source: NHI (2017). |
| **Blank or partially-completed diagrams or graphic organizers**—These are useful because they help participants identify discrete features or visualize how information, systems, or processes are organized. More examples of common graphic organizers, refer to Graphic Organizers. | Asphalt<br>**Compacting Systems**<br><br>Compacting Systems — Static<br>— Dynamic<br><br>Source: San Anselmo (2018). |
| **Group notes**—These are large, open spaces to record the results of group brainstorming sessions or other small group activities. Often these spaces are preceded by the directions for the activity and/or the essential questions to be answered. | **With your partner, write a purpose and need statement for the historic I-bar chain suspension bridge in Youngstown, Ohio.**<br><br>1. Purpose (1-2 sentences)<br><br>2. Need (1-2 paragraph/need element)<br><br>Source: Mehlo (2019). |

## Instructions

- If you choose to write answers on a whiteboard or easel pad, you will need to write down exactly what is shown on the structured note-taking section in advance. Use different colored markers to record participants' ideas as you fill it out together.
- If you choose to create a slide for displaying answers, use animation and a remote to display first the prompt and then the answer(s). Make sure you walk around and monitor participants' progress, because it takes them more time to write than for you to click.

## Course Format Recommendations

### Instructor-Led Training

To provide more structure to a small group discussion, create a handout with the discussion question, any other information about the assignment, and space for the groups to record their ideas.

### Web Conference Training

Create an interactive document (like a course outline or replica of slides) that displays only part of the information. Participants can type in key details as they are covered during the end-of-lesson or end-of-course review.

Return to Maximizing Participant Workbook Elements

## Summarizing

A summary is a brief statement of the main points of something. When participants are asked to summarize, they must determine the most important ideas, ignore any irrelevant information, and integrate the central ideas in a meaningful way. The mental effort involved in producing a summary supports long-term retention. Studies have shown that participants asked to summarize recalled more information than those who engaged in self-question and note-taking activities. But summarizing has its limitations. Because learners focus on main ideas and major details, they often can't recall smaller details.

There are five different ways to summarize:

- Generalization followed by an example
- General statement followed by a more particular statement
- General preview followed by a discussion of detail
- Compatibility review where different situations are compared and contrasted
- Situation evaluation:
  - If the situation is satisfactory, then the summary outlines the positive evaluation.
  - If the situation is unsatisfactory, then the summary outlines the problem and the attempts to find a solution.

Summarizing can be incorporated in many different engagement activities including Quick Writes, Brainstorming, K-W-L Charts, Anticipation Guides, Think-Pair-Share, and Think-Pair-Write, see Think-Pair-Share.

## Course format Recommendations

**Instructor-Led Training**

Before moving onto the next lesson, pose a thought-provoking question like:

- So what?
- What do you want to remember?
- What do you want to share with someone else?

Provide an index card or sticky note for participants to write their answers or ask them to share their responses with a partner. Call on one or two participants to share with the group.

**Web Conference Training**

The 3-2-1 summary activity adapts well to web conference training. At the end of a lesson or day, ask participants to list three main points, two controversial ideas (or things they disagree with), and one question related to the key concept or learning. Participants can post their summaries to the chat pod on the web conference platform.

Return to Guiding Review

Return to Maximizing Participant Workbook Elements

## Surveys/Interactive Polls

A quick survey at the start of a course, lesson, or module can engage the participants and provide them with a glimpse of the important concepts they are going to encounter. You can use a survey to get a rough measure of the participants' background knowledge so you can adjust your delivery to better meet their needs.

To get the answers you need, ask the right questions. Use the learning outcomes as a guide when choosing question topics. Depending on the information needed, you can write questions that require factual answers or questions that solicit participants' opinions.

Survey questions can include:

- What is your experience with the topic?
- What other courses related to this topic have you taken?
- What is your job title (or job responsibilities)?
- What are the "pain points" in your job?
- What are you interested in learning from this course?
- How do you see yourself applying what you will learn from this course?

### Example

Module 5 of the NHI "Bridge Inspector Refresher Training" course includes the following survey question about structure inventory and appraisal and structure type codes. The module is designed to gauge participants' experiences in appraising bridge structural components and entering codes into the National Bridge Inventory database. Figure 53 displays the survey question slide from the Superstructure Type Identification module.
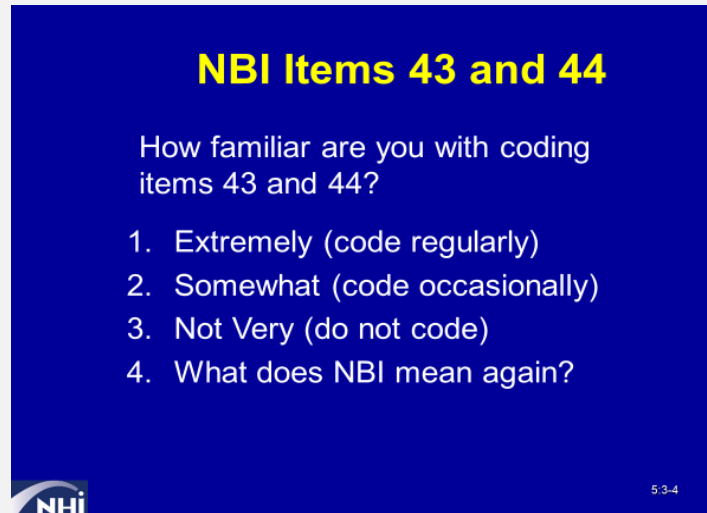


Source: NHI

**Figure 53: Survey question slide from "Bridge Inspector Refresher Training"**

## Course Format Recommendations

### Instructor-Led Training

You can create a PowerPoint slide to display the poll question. Collect survey responses on note cards, by a show of hands, or using "clicker" polling devices. Another option is to create and share a survey using free online form-building software or an online survey app that participants can access via their laptops or smart phones. The benefits of online or clicker devices are that they can be anonymous, and they allow results to be displayed to the class in real time. Be aware: while clicker devices are popular with participants, they can malfunction or run out of battery power. So, this may require you to carry more equipment to the course site.

### Web-Based Training

Some learning management systems (LMS) include polling features. Others require you to embed a link to poll hosted on an online polling site or to a form you created with form-building software on the course page. Another option is for you to embed a poll on a content page that participants can access using a free mobile app.

**Web Conference Training**

Your web conference platform is likely to support multiple choice or true/false poll questions. You can keep the results of the poll private or share the graphed results of the poll with participants.

[Return to Activating Participants' Prior Knowledge](#)

[Return to Lectures and Interactive Lectures](#)

[Return to Sharing the "What's in it for me?"](#)

[Return to Step 5: Plan for Knowledge Checks](#)

[Return to Web or Video Conference Meeting Rooms](#)

[Return to What do participants already know?](#)

# Test Questions

Test questions are used to assess participants' familiarity with course content and to check for misconceptions. They can be written to assess a wide range of learning objectives in all content areas. Test questions are either objective or subjective.

- **Objective questions** have one correct answer. Participants either select the answer from a list of options or complete a sentence by providing a missing word or phrase. Objective tests are appropriate when large groups need to be tested. They are also useful if the test will be reused. Objective tests are used when impartiality and fairness are a high priority and there can be no scoring bias. Well-designed and tested objective questions also can produce highly reliable scores that support statistical analysis.
- On the other hand, **subjective questions** require participants to provide an original answer. For some subjective questions, responses can be as short as a single word or as long as multiple paragraphs. Subjective test questions are good when testing a small group and the test won't be reused. They are also good if you want to support written communication and/or analysis, synthesis, and evaluation skills. Because participants' responses are not always uniform, grader bias is a real concern. Essay questions may require a rubric or assessment checklist to standardize grading. For more information on creating assessment tools to measure mastery of learning outcomes, refer to [Rubrics](#) and [Assessment Checklists.](#)

Within the objective and subjective categories, there are several different types of test questions, each of which have advantages and disadvantages. Regardless of their type, test questions can be written to test comprehension and application of knowledge, as well as critical thinking and problem-solving abilities. Choosing a type or type(s) of questions to use will be based on the course's learning outcomes, time available for

testing and scoring, and the testing requirements or restrictions. Table 8 describes different types of objective test question. For more information on linking assessments and learning outcomes, refer to [Using the Outcome Verb to Make Instructional Decisions.](#)

Table 8: Objective Test Questions

| Question Type | Description |
|---|---|
| Multiple choice | Most often multiple choice questions have a question stem and multiple answer choices. Typically there is one correct answer and the others are distractors. One of the drawbacks to this type of question is that writing several plausible distractors for each multiple-choice test item is time consuming. Multiple-choice questions are popular because participants can answer them quickly. Machine-readable response sheets and templates can make grading a fast and accurate process. |
| True/False | True/false questions feature a statement and two possible answers: True or False. Like multiple-choice questions, True/False questions are useful for assessing familiarity with content and checking for common misconceptions. They are also easy to grade. However, since participants have a 50% chance of choosing the correct answer, guessing may create a misleading picture of participant learning. To follow International Association for Continuing Education and Training's (IACET) guidelines, assessments should have no more than 10 percent true/false questions. |
| Matching | Matching questions feature sets of stems and a list of options (e.g., match key terms to their correct definitions). Matching questions are good when participants are expected to recognize and recall detailed information. They are easy to create but often take participants more time to complete than multiple-choice or True/False questions. |

Here are some best practices to follow when writing objective test questions and response options:

- It is best to avoid:
  - Long or complex sentences
  - Trivial statements (focus on the essence of the learning outcome)
  - Negative and double negatives (e.g., no, not, etc.)
  - Restrictions (e.g., except, all except, etc.)
  - Clues to which items are the wrong answer
  - Distractors too close to the correct answer
  - Distractors that are shorter than the others

- Completely implausible distractors
- "All of the above" and "none of the above"
- Dependent responses (e.g., "If 'B' is true, then 'A' is true.")

■ It is best to use:

- One clearly described problem (when appropriate)
- At least three response options
- Plausible distractors
- Statements that address common participant misconceptions
- Options that are true but do not answer the question
- Options that are all about the same length
- Logically or numerically ordered options
- Random distribution of correction options (e.g., evenly distributed across A, B, C, etc.)

Table 9 describes types of subjective test question.

**Table 9: Subjective Test Questions**

| Question Type | Description |
|---|---|
| **Short answer** | Short-answer questions provide a brief prompt that requires participants to write a word, short phrase, or a few sentences to answer. Depending on the desired answer, this type of question can also be written as a multiple-choice question. One advantage of short-answer questions is that they can be written to test higher-order thinking skills. Another advantage is that they are easy to develop and take less time than multiple-choice questions. Also, it is much more difficult for participants to guess when responding to short-answer questions. |
| **Extended response essay** | Extended response essay questions provide a complex prompt that requires written responses that can be as short as a couple of paragraphs to many pages in length. Extended response essays are not commonly used in NHI courses. |

Here are some best practices to follow when writing subjective test questions:

■ It is best to avoid:

- Trivia
- Long, complex sentences
- Complex or ambiguous wording

- Questions that are too broad to address in the time allotted
- It is best to use:
  - Specific problems
  - Direct questions
  - Instructions like "compare and contrast" at the beginning of an essay prompt
  - A rubric to grade essay responses

Return to Assessing Learning

Return to Rubrics

# Theories

Theories are a set of statements that describe and predict behavior. They are important because they guide and give meaning to what we see. It is important to remember that theories are influenced by the cultural values and belief systems of their times. Valid theories are supported by research and can be used to guide decision making.

Theoretical knowledge, on its own, provides a valuable foundation for participants' learning. But, because real life is often more complex than theories, participants tend to separate theory from practice. You must provide the link between theory and the real world. Case studies give participants the opportunity to apply theoretical concepts in realistic settings. This practice will support the long-term retention of theoretical information and transfer of knowledge to the workplace.

For more ideas on using case studies to support the application of theories in the workplace, refer to Case Studies.

Return to Theorists

Return to Pragmatists

# Think-Pair-Share

In a Think-Pair-Share (TPS) activity, participants consider their response to a question, then take turns sharing their ideas with a partner. (If you have an odd number of participants you can create a trio for the activity.) Depending on the prompt, the partner teams either come to a consensus or discuss their different perspectives. You can walk around listening in on the discussions, and at the end of the activity can call on representative partners to share their thoughts with the class.

TPS is a fast way to get all participants engaged with the content. You can plan to use the activity to break up a lecture or insert it into the lesson plan on the fly if you find that the same participants are responding to whole group questions. For most participants, talking with a familiar table mate is less anxiety producing than addressing the whole

class. And even the least motivated participant is likely to respond when they have a partner waiting expectantly for their answer.

TPS is flexible. It works with all kinds and levels of questions. Allow more time for discussion on more thought-provoking questions and less time for recall questions.

**Instructions**

How to incorporate a Think-Pair-Share activity:

1. Identify the learning outcome or difficult concept you want to address.
2. Write a question to elicit the information from participants. For application outcomes, use an open-ended question to stimulate a discussion. For recall outcomes, use a closed-ended question to elicit facts.
3. Explain the steps to the activity (listen, think, take turns sharing ideas, and prepare a joint response in the case you team is called on for a report).
4. Identify the partner groups and their roles: Partner A and Partner B.
5. State the time limits for thinking and sharing.
6. Share the prompt verbally and/or on screen.
7. At the midpoint in the sharing part of the activity, announce that it is Partner B's turn.
8. Circulate around the room to listen in to the discussions.
9. At the end of the sharing part, ask selected teams to share their report.

## Course Format Recommendations

**Instructor-Led Training**

If you add a short writing component, the activity is called Think-Write-Pair-Share. Provide participants with note cards or large sticky notes to jot down their ideas before they share their writing with their partners. For more information on short writing activities, refer to [Quick Writes/Entrance Tickets.](#)

**Web Conference Training**

Think-Pair-Share can also be done in a web conference course using partners in small groups and/or breakout rooms.

[Return to How can I adapt a discussion or practice activity?](#)

[Return to Lectures and Interactive Lectures](#)

[Return to Reflectors](#)

[Return to Summarizing](#)

# Visual Aids

Visual aids are items speakers use to enhance their message. The most commonly used visual aid is a PowerPoint presentation. In addition to or in place of a slide show, some instructors will incorporate photos, videos, posters, charts, diagrams, or other visual items into their presentations. Real-life objects or models that participants can see and touch can also be used as visual aids.

Visual aids are valuable for many reasons:

- **Clarification**—Visual aids can make complicated information more digestible. The adage, "a picture is worth a thousand words," is true. Visual aids can convey meaning and essence more effectively that words alone. For example, it would be hard for an instructor to adequately describe the different levels of bridge and pier deterioration without photographs.
- **Recall**—When they both listen and view (or touch), participants use more than one sensory channel to process the information. Then, they connect the new information to their existing memories in multiple ways. As a result, they retain the new information better and longer than if they had just heard words alone.
- **Focus**—Visual aids can focus participants' attention on essential information. Bulleted phrases on a PowerPoint slide or easel pad can highlight and reinforce key points from a lesson. Maps, diagrams, photos, or other media can emphasize important details and put new information into an understandable context.
- **Variety**—Visual aids also add variety to a training presentation. Video clips and images provide an interesting visual and/or audio break from a lecture or text-heavy slides. But it is important not to add novelty or decorative images or animation to a presentation. They actually can backfire and distract learners from the message.

While visual aids are a valuable support for an instructor, they should not replace the instructor. A good rule of thumb is if the instructor can't present the training without the visual aids, then the instructor is relying on them too much. Human error and technological glitches can and do happen. A competent instructor should be able to adapt and deliver the training without the support of visual aids. For more information on dealing with challenging issues, refer to Difficulties with Technology.

It is also important to make sure that all participants can see the visual aids clearly. When setting up the training room, take a moment to sit in chairs in all four corners of the room. Check to make sure that participants in those locations would have a clear sight line to the projection screen, easel pads, whiteboard, etc. If they would not, move the chair or shift the visual aid to improve visibility. For more information on effective classroom layouts, refer to Creating Classroom and Virtual Learning Spaces.

Also, consider how a participant with visual, hearing, or motor difficulties will be able to access the information in the visual aid. Section 508 of the Americans with Disabilities Act of 2007 guidelines include print, audio, and video media and websites. For more information on how to ensure a visual aid complies with the law, refer to the following sources:

- Create Accessible Digital ProductsCreate Accessible Digital Products, available at https://section508.gov/create
- *NHI Web-Based Training Standards Guide*, available at https://www.nhi.fhwa.dot.gov/resources/docs/NHI_Web_Based_Standards_Guide_20201013_v2.pdf
- *NHI Instructor-led Training Standards Guide*, available at https://www.nhi.fhwa.dot.gov/resources/docs/ilt_standards_guide_072018_01.pdf
- *NHI Web-conference Training Standards Guide*, available at https://www.nhi.fhwa.dot.gov/resources/docs/wct_standards_guide_May2017.pdf

To use visual aids effectively, it is necessary to understand how to maximize their advantages and work around their disadvantages.

## PowerPoint Slides

PowerPoint is popular because it makes it easy to create and modify professional-looking presentations. PowerPoint slides can be simple or elaborate. Colorful templates are available and users can personalize slides with colors and font styles. Slide layouts allow you to insert photos, videos, quizzes, hyperlinks, or other interactions. Also, PowerPoint files are easily transportable. You can store the files on a flash drive or share via email, and there are several handout options available in the PowerPoint print menu.

Sunshine and projection lighting sometimes create glare that obscures the presentation. It may be necessary to dim the lights which can make it hard for some participants to take notes or stay awake. If the instructor doesn't incorporate question and answer sessions or activities, participants will be unable to engage with the content and will become passive learners. PowerPoints are especially vulnerable to technical difficulties that can disrupt a presentation such as burnt out projection bulbs, inoperable slide advancers, sound issues, broken hyperlinks, etc. For information on creating a backup plan, refer to Difficulties with Technology. Images may be clear when viewed on a laptop but are not readable when they are projected. Consider creating handouts for diagrams or other images when participants need to see the details.

## Easel Pads/Chart Paper

Easel pads and chart paper may be low tech, but their simplicity and flexibility make them extremely useful in the training classroom. The blank pages and a few colored

magic markers create nearly unlimited opportunities for expression. They can be used to highlight key points, capture participant ideas, and create expressive diagrams on the fly; or they can be prepared in advance and revealed at appropriate times in the lesson. One tip is to write the information in pencil and trace over it later with a marker. Another tip is to fold the corner of a page you want to turn to later or attach a small sticky note at the bottom of each pre-made sheet to help you flip to the correct page.

Participants can engage with easel pads and chart paper as well. Instructors can hand a marker to one or more participants to record key ideas at the front of the room. If there are enough easels and pads, one can be positioned by each table for a small group activity. If there aren't enough, sheets can be torn off and distributed so the groups can record their ideas. If the information is going to be referred to in the future, the sheets can be tacked or taped to the wall.

Savvy instructors will verify that the training site host will provide enough chart paper or easel pads. Prepared instructors also travel with a set of fresh markers to avoid being stopped mid-sentence if the ink runs out. Paper and markers are expensive and the easel pads' size and shape makes them awkward to transport. Attaching several binder clips to the bottom and sides of an easel pad will keep the pages from separating or from flapping in the wind. In the classroom, they present another disadvantage: participants in the back may not be able to see the full easel pad. For participants to be able to view the entire message, it's a good idea to avoid writing on the bottom of the pad and continue on a new sheet, if necessary. Remember to attach sheets as high on the wall as you can to provide the greatest visibility. Even participants in the front of the room may struggle to read writing that is too small or too close together. For greatest clarity, use wide-tip markers and make letters at least 2 inches high. Leave another 2 inches of space between each line.

## Videos

Videos increase participants' interest because they add motion, images, and audio into the classroom. They also introduce variety with a new "instructor" voice. Videos enhance learning because they can transport participants outside the classroom or provide complex demonstrations. No matter who the instructor is, participants will always get a consistent message from a training video.

Technology is making it easier and less expensive to create videos, but it is not always easy to find one that fits with the learning outcomes in a lesson. Some videos may be available, but are out of date. If a suitable video exists, don't waste participants' time by showing the whole thing. Just show a pertinent clip. Clips should be a maximum of 2 minutes long. Be sure any video you show for a federal government course or presentation is Section 508 compliant. Keep in mind that viewing a video is a passive experience. To increase participant engagement, explain the purpose of the video, how long it will last, and set a clear task for them to accomplish as they watch and listen. Follow the video with a discussion or other engagement activity. And remember, too

much of anything is not good for you. Participants will become bored if videos are overused as an instructional tool.

## Handouts

Handouts are extremely versatile. They can provide review information to support struggling learners. They can provide full-sized versions of charts, tables, and other images that are too small to be read on a slide. They can offer articles or documents related to the content, provide additional resources, and provide a structured space for participants to take notes. Handouts can support skill transfer because participants can use them as job aids or references when they return to their jobs.

Handouts can sometimes present document management challenges. If handouts are distributed too early, they may get lost or may be reviewed out of order, and time will be wasted as participants search for the right page. Participants may become confused if there aren't clear document titles or page numbers. Some participants may become distracted by handouts because they will focus on what is coming up next and not on the current lesson. It is sometimes best to take the just-in-time approach and distribute handouts only when they are needed.

## Whiteboards

Whiteboards are often available in training rooms. Web and video conference platforms also offer interactive, online versions. Like easel pads and chart paper, they are colorful, easy to use, and readily available. They are ideal for reinforcing key information, creating diagrams, explaining key words and phrases, or showing how the material is organized. Like with easel pads and chart paper, whiteboards can be used to capture and share participant input. Important information, like Wi-Fi passwords, key vocabulary, or ground rules can be retained, and participants can refer to them again when needed. Less important information is easily erased.

Because whiteboards are often attached to the wall and can't be repositioned, some participants may not have a clear view of them. It also may be difficult to read something written on a whiteboard from the back of the room. Like easel pads and chart paper, it is necessary to form large, legible letters and leave space between lines of text so participants can read the message. Even on large whiteboards, space is limited and it may be necessary to erase frequently to record new information. Check with participants to make sure they have finished copying information before you erase. Fresh dry-erase markers, erasers, and cleaners are essential, and instructors often need to bring their own supply.

Return to Creating Classroom and Virtual Learning Spaces

Return to Supporting Participants

Return to Difficulties with Technology

# Word Clouds/Interactive Polls

Word clouds are a visually interesting way to highlight key words or phrases that appear in a selected text. The more frequent the words or phrases appear in the text, the larger they are displayed in the word cloud. You can use a word cloud to spark a discussion about participants' prior experiences with the topic or concept or ask participants to predict what they are going to learn in the module or lesson.

Another twist is to use an online word cloud generator. Participants submit their responses using their smartphones or other mobile devices to produce an interactive word cloud on screen. As more words and phrases are submitted, their size and location on screen changes to reflect their frequency.

**Instructions**

How to use a word cloud generator:

1. Copy and paste selected text (or upload a complete document, if that feature is available) in the word cloud generating software. Some word cloud generators allow you to block repetitive non-content words.
2. Capture the resulting word cloud as an image using the computer's Print Screen command or screen-capturing software.
3. If necessary, crop the image.
4. Upload or copy and paste the word cloud image onto a PowerPoint slide.

How to use an interactive word cloud app:

1. Smart phone apps generally require a fee or subscription. Follow the instructions provided for the selected app.
2. Create word cloud poll and embed it into the presentation.
3. Present the poll during the presentation.
4. Participants submit words online or via texts on their smart phones.
5. The words appear on the screen. Frequently shared words grow larger as others grow smaller.

**Example**

A word cloud generated from text selected from the *Soils and Foundations Reference Manual* is shown below (figure 54).
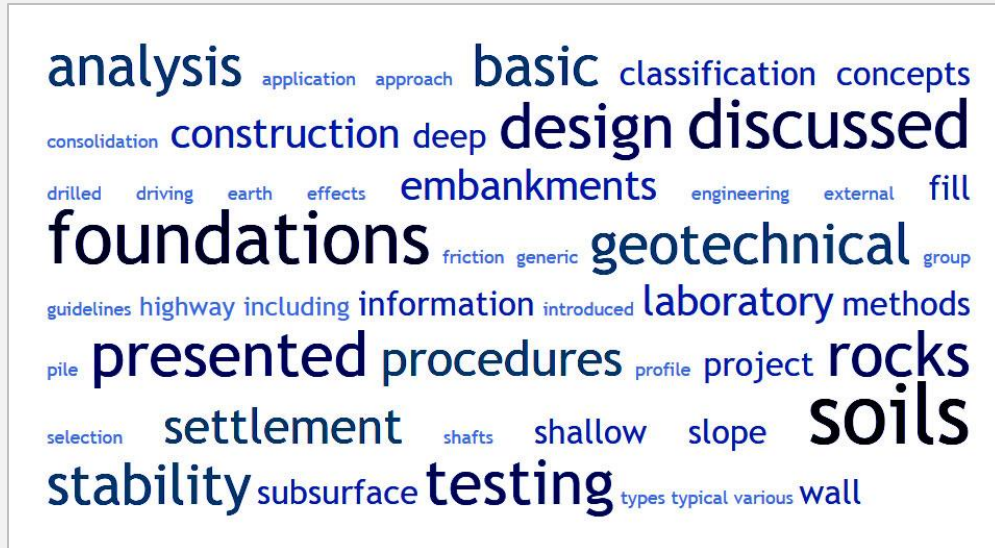


**Figure 54: Word cloud from *Soils and Foundations Reference Manual***

# Course Format Recommendations

**Instructor-Led Training**

You can create a slide that asks participants to predict what topics or concepts they think should appear in the course. Then embed a link to an online interactive poll on the slide. During the course, share the website address and the identifying code with participants. When you open the poll, participants can submit their responses. As participants respond, the word cloud grows and changes.

**Web-Based Training**

Post a word cloud that you generated using the text from an assigned course reading, blog, or website. Ask participants to write several questions they hope they will find answers to during the module and post them to the course discussion board.

**Web Conference Training**

You can get an idea of participants' background knowledge by using an interactive word cloud during a brainstorming activity. Ask participants to think of what they already know about the topic or the experiences they have had with it. Share the link to the word cloud website and watch the results of the survey appear. Take a screenshot to save the image for later analysis.

Return to Sharing the "What's in it for me?"

# Worked Examples

Worked examples, or worked problems, are sometimes provided to support participants who have little or no experience and must learn how to complete a multi-step task or problem. A worked example presents the thought process or interim calculation for each step of the task or problem, as well as the final result. As the instructor explains each step of the required sequence, participants can focus on mastering the individual steps. Instructors can check participant understanding at each step and answer any questions. If you introduce a worked example with an error, you can ask participants to find flaws in the logic or calculations. Participants can also refer to worked examples when doing independent practice. The downside to worked examples is, if participants are provided with only one example, they may not be able to solve a related problem that varies in any way from the example. This challenge can be overcome by creating a series of worked examples with minor variations in the different steps so that participants can experience thinking through small changes to the task or problem.

**Instructions**

To effectively use worked examples:

1. Show the problem with the solution steps obscured.
2. Ask participants to think about how they would approach the problem.
3. Reveal the entire worked solution and give participants time to read through each step.
4. Ask participants to discuss the steps to solve the example worked problem with a partner.
5. Call on participants to have them discuss how to solve the problem.
6. Provide a worked example with a common flaw in the calculation or routine.
7. Ask participants to discuss the flawed example with a partner.
8. Call on one or more participants to explain the error and how to correct it.
9. Provide related practice problems with small changes for participants to try to solve on their own.
10. To check participants' conceptual understanding, call on participants to explain how they solved the practice problem. If errors are discovered, ask for help from other participants to reinforce correct thinking.

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