



Optimizing Learning

Advanced Warning Operations Course
IC Core 1
Warning Decision Training Branch



This Instructional Component is designed to inform AWOC participants about the learning techniques employed during the course. All of this and more has been shared with training facilitators at each office, however it is important that student participants also be aware of what we're trying to accomplish and how we hope to do it.

Learning Objectives

1. Become familiar with the way learning in AWOC is facilitated by:
 - Understanding adult learning strategies
 - Identifying the levels of evaluation
 - Identifying how the Collaborative Development of Expertise applies to simulations
 - Understanding the role of an LMS

To that end, we'll spend some time on what the education field has identified as ways in which adults learn. We'll discuss how we go about evaluating that learning. Finally, some time will be spent on how learning in general is accomplished in simulations, and in particular, using a technique called Collaborative Development of Expertise.

Overview

1. Adult learning strategies
 - Importance of evaluation
2. Effective simulations using Collaborative Development of Expertise (CDE)
 - Example 1: *Virtual Reality* simulation using the Observation and Assessment Record (OAR)
 - Example 2: *Interval-based* simulation using the Situation Awareness Decision Requirements Tool (SADRT)
3. Using a Learning Management System (LMS)

This lesson will take about 30-40 minutes and will discuss adult learning strategies and importance of evaluation in accomplishing learning. We'll also spend some time looking at 2 types of simulations, Virtual Reality and Interval-based, and how we incorporate these simulations in AWOC. The simulations which are a part of the AWOC course can be run as designed by your local facilitator, or they can be modified to address local office needs.

Finally we'll give you an overview of a tool to be used to help manage and keep track of the learning components of AWOC. This Learning Management System can be used by the student, instructor, management and agency to see what type of training is available and what training has been accomplished.

1. Adult Learning Strategies

- Short-term memory
 - Time and capacity (10-15 sec and gone if unused)
 - 5 to 9 “chunks” of information can be accommodated at a time
- Long-term memory
 - Capacity is limitless
 - Problem is retrieval



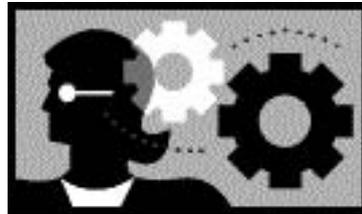
Learning is about change. The whole reason for training, instruction, and education (all unique and distinct approaches to learning) is to enable people to learn. In AWOC, WDTB instructors, through local facilitators, will be trying to change people by transforming learners in ways that are desirable for both them and for the NWS.

So, AWOC is concerned with training the human learner, not just transmitting information. To understand the human learner we start with discussing how we learn - through senses, filters, and memory (see Stolovitch and Keeps, 2003). Remember the human learner has multiple senses (sight, hearing, etc.) each with uniquely different processing capabilities. How we filter the stimuli that continually bombards us depends on our ability to process information. Research suggests that most people can hold only 5-9 items at a time in short-term memory. The size of the items depends on prior knowledge of the learner. For training and learning purposes, it is important to create meaningful chunks that condense several pieces into one. That facilitates perception, learning, and retention. For example, the four cardinal points of a compass are north (N), east (E), west (W), and south (S) (four items to store in memory). But, if you remember the acronym, NEWS, you only have one item to store in memory. By creating a single chunk, you can reduce the short-term memory load.

Long-term memory (for example, thinking about a favorite toy you played with as a child, or that radar topic back in 88D class) depends upon how distinct and unique that memory is. There is virtually limitless storage space in the long-term memory warehouse. Retrieving the information is the harder part; that depends on how it has been organized to the learner's ability and experience levels.

Types of Knowledge

- Declarative
 - Knowledge that allows us to name, explain, and talk about matters
- Procedural
 - Knowledge that enables us to act and do things



The brain processes outside information for learning. That information is transformed into two types of knowledge, declarative and procedural. Declarative knowledge, which has evolved in humans to the highest level in any species, allows us to name, explain, and talk about things. Procedural knowledge, on the other hand, enables us to act and perform tasks. Unlike declarative knowledge, which is almost exclusively restricted to humans, procedural knowledge is available to all animals.

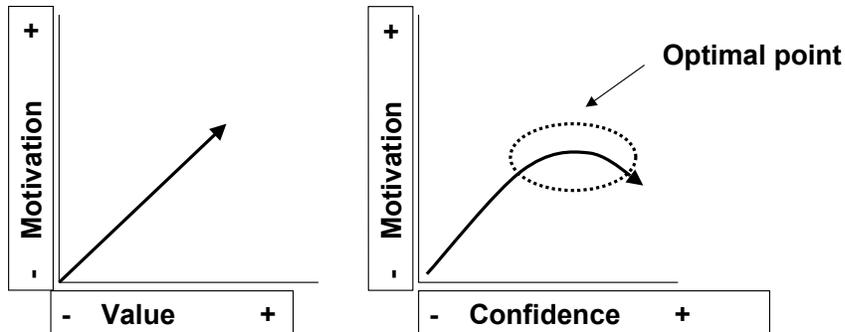
Human learning suggests we process the two types quite differently. Think about trying to name the number of windows in your house. You probably mentally walk around the rooms in your house and count the number of windows before you just say the number. Thus, to learn someone effectively (from this training course, for example), we need to be able to modify the instruction to help us best learn the knowledge. By the way, experts in general have a very hard time converting declarative knowledge into procedural for novice learners. It is also hard for learners to process declarative instructions into procedural. That's why in this course, we have facilitators who are there to help learners perform the training objectives and make the whole process easier.

Key Ingredients for Learning

- Ability
 - What we are born with
- Prior knowledge
 - Helps us to acquire additional knowledge faster
- Motivation
 - Affected by value, confidence, and mood

Cognitive psychology research suggests that 3 major factors influence how much and how well we learn: ability, prior knowledge, and motivation. General ability to learn varies depending on our genes, but it can be built up, like muscles. Prior knowledge is important as we build upon what we already know and have used. Motivation is also important.

Motivation



Overconfidence can lead to a decline in motivation

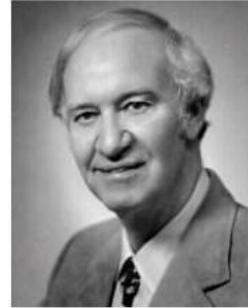
Research (see Stolovitch and Keeps, 2003) and common sense show there is a strong correlation of value to motivation. The left-hand graph illustrates this. In the right-hand graph, the data shows that if the learner feels “this is so easy, I don’t even need to try,” motivation plummets. The optimal point of motivation is where the learner has enough confidence to feel he/she can succeed, but not so much that the incentive to learn declines. Most of us are motivated by challenges (the high point on the curve) and security (“if I work at it I know I can succeed”).

As far as mood goes (graph not shown), motivation is directly related. A positive learning/work environment tends to improve a person’s mood and hence, his or her motivation. But, a frivolous or manic mood might have unpredictable effects on motivation.

As trainers and learners, we can influence all the factors for learning (ability, prior knowledge, and motivation) in a positive way (good news!).

Key Adult Learning Principles

- Readiness
- Experience
- Autonomy
- Action

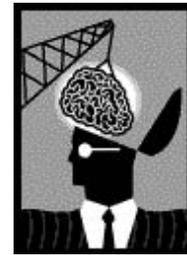


Malcolm Knowles (1913-1997)

Lots of research in this area. These principles are from Malcolm Knowles , a leader in the field of adult education. We will discuss each of these.

Readiness

- Training (learning) can be effective in “opening an adult’s mind” to receive knowledge by:
 - Solves a problem or avoids one for them
 - Provides an opportunity or increased status
 - Includes professional or personal growth



To preclude wasted effort in training , and to make sure learning is receivable, the research is clear that the training , instruction, or education must be for the **learners**. The focus must be on the learner’s needs not on facilitator’s or organization’s needs.

Experience

- A critical part of learning
- Must be factored into design and delivery
- If considered, makes learning outcomes much more effective

The experience principle is that the more you factor the experience of the learners into the design and delivery of training, the more effective the learning outcome. A lot of this consideration applies to the primary trainer, or facilitator.

Autonomy

- Adult learners want to make their own decisions
- Adult learners want to be treated as independent, capable individuals
- Adult learners need opportunities to participate and contribute to training/learning activities



Adults learn best if they take charge of their learning. They need all these attributes to succeed. Most examples of good training include many elements of learner autonomy.

Action

- If learners can't put the concepts taught in the classroom (or in distance) into action back on the job, their interest and learning decrease
 - Evaluations from Winter Weather and Severe Weather WDM Workshops have shown this to be the case

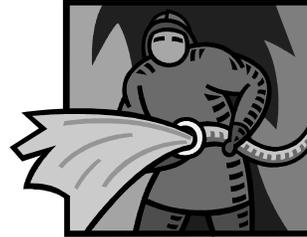


In training (and learning), application is very important. There needs to be an action mindset with all training activities. If a great lecture or online module is developed but there is no way forecasters can go back and apply what is taught operationally, then any interest in that subject is quickly forgotten. That is why simulations are usually rated as the highest things on workshop evaluations, because the lessons learned in simulations can be easily practiced back on the job.

Training Approaches and Learning Activities

1. Receptive

- Water hose approach
- To be used sparingly



2. Directive

- Follow me approach
- Well suited for learners with little experience with the learning content

The bottom line on adult learning principles is that training can be a waste of time , for all involved, if it doesn't work. **If the focus of the training is on the learners – their needs and characteristics, the chances of success skyrocket.**

There are lots of innovative training approaches and many, many learning activities that have been shown to be successful with adults.

The four types , according to Clark (1998) are: receptive, directive, guided discovery, and exploratory. Which one works best with a trainee depends upon the individual characteristics of the learner.

Receptive is most used, but least effective. Directive learning provides trainer and organization with the greatest control. The side effects are decreased learner activities and more narrow, transfer of learning potential.

Training Approaches and Learning Activities

3. Guided Discovery

- Shared control
- Case-based
- Similar to some types of WES simulations
- Can require more time



These are from Table 5-1 of Stolovitch and Keeps (2003) book. To summarize, all types are different ways of approaching training. All have a place in training, but the receptive approach is the most frequently used method, and it should be the least often employed. It is telling, not training. Guided Discovery is excellent, balanced training approach for encouraging learner initiative under safe conditions. Learning results are usually stronger and more fluid (can be transferred to a broad range of situations).

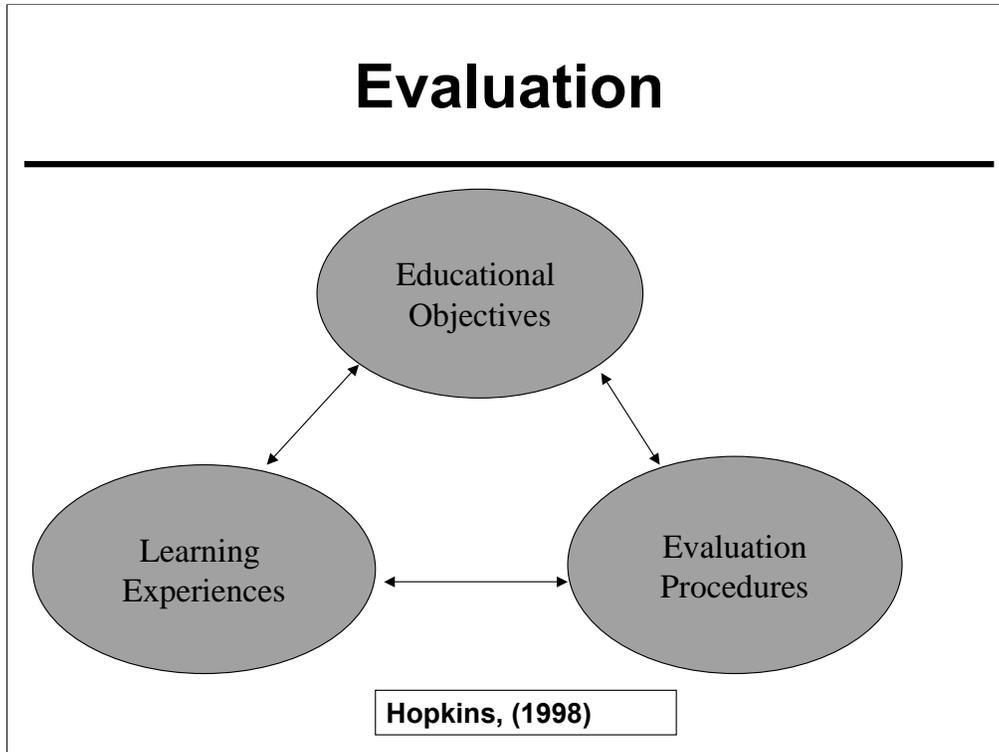
Training Approaches and Learning Activities

4. Exploratory

- Self-initiated learning
- Provides maximum freedom for learner
- Requires highly self-motivated learner
- Low control; learner can get lost



Exploratory learning is powerful for sophisticated, capable learners. It allows for greater individualization and personalization of learning. However, it requires sufficient resources, decreases trainer control, and is unpredictable in terms of specific outcomes.



Graphical representation (from Hopkins, 1998) of the three interacting components of the educational process. Evaluation is needed in training to determine the extent of learning the knowledge or skills (level 2). Measurement of performance of newly acquired skills is a type of level 3 evaluation.

Evaluation – The 4 Levels

- Level 1 – Reaction (*student evaluations*)
- Level 2 – Learning (*testing*)
- Level 3 – Performance/Behavior (*performance in exercises, simulations, or on the job*)
- Level 4 – Results (organizational or business impacts)
- Level 5 – Return on Investment (ROI)

The 4 levels of evaluation were initially defined from Kirkpatrick (1959). In addition, some training practitioners refer to a 5th level, Return on investment (ROI), developed in the 90s as business human resource divisions determined the need to measure monetary effects of training investments. In the AWOC, we will be evaluating at the first 3 levels. Evaluation of training at level 1 typically is about perceptions and has little else to offer trainers (Hodges, 2002). Level 2 evaluation is used to determine the extent that the trainee was able to meet the learning objectives. The evaluation tool, usually an objective based test, measures the extent to which the trainees acquired the knowledge or skills specified in the training program (or course).

The purpose for Level 3 evaluation is to determine the extent to which the training program (or course) has met its performance objectives (we have these for each instructional component in AWOC). Level 3 evaluation in AWOC will help WDTB and others determine the extent to which forecasters have been able to apply or transfer the knowledge gained or skills acquired, to the job.

Note there are often factors external to the training course design and implementation, and learner actions, that enable or disable successful outcomes in a level 3 evaluation. Some of these factors include inadequate office time/support from management to complete training, and poor facilitator (coaching) support. The purpose for level 4 (often called impact evaluation) is to determine the degree to which the training program has met its business objectives, or goals. These expectations are often determined by stakeholders (those who have a vested interest in the program) and could include measuring output increases, cost savings, timesaving, and quality improvement (Phillips, 1997). The evaluator may conduct an ROI analysis as part of this evaluation.

2. Simulations in AWOC: Collaborative Development of Expertise (CDE)

- With CDE, transfer of expertise builds on:
 - Setting the right learning climate
 - Defining roles and responsibilities
 - Developing a trainer-trainee learning partnership
- Provides a means of Level III evaluation
- Goal is to advance expertise and critical thinking skills through discussion

AWOC simulations will facilitate learning via a technique called Collaborative Development of Expertise. As the name implies, the goal is to develop expertise (refer to IC Core 3, Lesson 1 for more on expertise), and do so by forming a trainer-trainee partnership. The important element of simulations run in this fashion is the exchange of ideas which takes place between trainer and trainee. The simulations can be very focused, maybe not something you are as familiar with. It involves having focused objectives when going through simulations and evaluating their outcome. This is different than just experiencing a data case.

Much of the information presented here results from work done by Klein Associates to tailor CDE techniques for simulations in AWOC.

CDE Development

- CDE was originally developed for the Navy
- Other domains studied to develop this concept:
 - Music tutors
 - NICU nurses
 - A photo finishing retail organization
 - Army National Guard units
 - Navy Air Defense Coordinators
- Result was an On-the-Job Training process for *trainer/trainee team*

CDE was something developed for the Navy to use during cross-oceanic travel. Simulations were fit into whatever time period was available for the trainee...sometimes a couple hours but sometimes just 20 minutes here and there. Other domains have since been able to apply this concept. The result takes an On-the-Job Training type process which is heavily focused around mentoring.

CDE strategies given to the trainer

1. ASK OPEN-ENDED QUESTIONS
 - What should you say when you hear X?
 - Why did you...? What just happened?
 - What is the most important thing on your screen right now?
2. TELL
 - When the signature changes like this you should...
 - When X happens then you should be saying...
3. PASS ON YOUR EXPERIENCE
 - When I was in a similar situation, I did...
 - I've seen X before...
4. GIVE FEEDBACK
 - If this is an X type of plane here, what is this?
 - What should you do next?
5. OFFER PROMPTS
 - First I want you to concentrate on learning X.
 - When X is happening, I want you to be looking at Y.

The strategies given to the trainer in doing simulations (and by the way, anyone with expertise in one area or another can be a trainer in that area) are listed here. These strategies all involve sharing knowledge and expertise. They try to get at reasoning, not just action.

Setting the right climate



- Spend time on setting up an open and safe learning environment:
 - safe to admit lack of knowledge
 - safe to voice confusion
 - safe to talk to superior about those things without repercussions
 - there are no dumb questions

In any learning environment it is very important for the learner to know everything is fair game. Think of the best learning you've been able to do in your life. It has more than likely been in a situation in which it was ok to ask questions and make mistakes. In those environments, you feel free to ask long standing questions about stuff you were "suppose to have learned" long ago but never really grasped, and as time went on, the opportunity to ask without feeling stupid never really presented itself.

Roles and responsibilities of the trainer

- Develop a clear set of learning objectives
 - Develop training in support of those objectives
- Provide trainee with motivation
- Provide opportunities for questions and for implementation of learning tools (ex, SADRT)
- Use strategies to observe and evaluate trainee's progress and the effectiveness of the training materials



Motivation, not cheerleading, is what we're after. Motivation in this context is meant to show the trainee why they should put forward the effort. Students should have an expectation of the learning effort needed. The effort should pay off with a better understanding of the task, which can lead to better decision making and performance results.

What makes effective One-On-One Training?

The trainer and trainee work together to determine where trainee needs help. Potential areas:

Knowing

Does trainee know what he/she needs to know from the science and from policies?

Thinking

Is the trainee noticing, evaluating, and anticipating events correctly?

Doing

Is the trainee making good decisions?
Has the trainee mastered standard sequences of actions?

Research has shown that some of the most effective learning is accomplished with one-on-one training where the trainer and trainee work together as a team. The trainer's job is to guide and interject. They should be checking to make sure that the trainee knows everything they need to before the training begins. They should also make some assessment as to what the trainee is "thinking". This is not easy to do but can be helped by discussion or by using evaluation tools. Finally the trainer should look at the actions and see if they make sense based on what the trainee has shared so far.

CDE: A trainer-trainee partnership

Training strategies for the *trainer*

1. **Ask questions about facts**

What is that X?

What did Y tell you?

2. **Summarize what you know**

In accordance with our standard procedures
you need to...

3. **Identify reference material**

You seem to be having trouble with X, go
study Y.



These are some of the questions that a trainer could ask to solicit feedback in the “knowing” category. Of course, these would be tailored to the individuals particular domain and simulation.

CDE: A trainer-trainee partnership

Training strategies for the *trainer*

1. **Direct trainee's attention**
Did you notice X here?
Make sure you watch X because...
2. **Ask for trainee's SA**
At point X in the scenario, what did you think was going on?
What's the big picture at the moment?
3. **Ask trainee to explain why/why not**
Why did you do X then?
Why did you decide not to say Y?

Questions which try to get into a trainee's thinking process usually involve getting at the reasoning behind decisions or actions.

CDE: A trainer-trainee partnership

Training strategies for the *trainer*

4. **Identify potential problems**
Given X, what could go wrong in the next two minutes?
What is your biggest concern at the moment?
5. **Ask hypothetical questions**
If X moves to point Y, what will you need to do?
6. **Use examples, analogues, and stories**
When I was at X, a similar problem occurred and it turned out like....

They may also go beyond current actions to get at a higher order of thinking such as contemplating possibilities, sort of thinking ahead.

CDE: A trainer-trainee partnership

Training strategies for the *trainer*

1. Guide trainee through task verbally as they do task
So next, what do you need to do?
2. Explain the right way and the wrong way to do things
When you want to get information from X, you need to say Y
If you attend to channel X at Y time, then you are going to get Z information which isn't what you want
3. Break material into smaller pieces
Right now just listen to channel X. What do you hear?
Now listen to channel Y. What do you hear?

This is the action step. Knowing background information is one thing. Thinking about what it means is the next. Actually doing an action as a result is the final step. You will find in later instructional components that the Know, Think, and Do steps can be related very well to the three levels of situation awareness (IC Core 2 Lesson 1: perception, comprehension and projection).

Roles and Responsibilities of the Trainee

- Active participant in training, not passive receiver of information but stakeholder in his/her own progress
- Receives rules of engagement and strategies to be active participant



This is what really sets this training apart from other training approaches is that the trainee is being assigned an active role in the process, with rules of engagement but also strategies (tools) to gain the required knowledge and skill.

CDE: A trainer-trainee partnership

Learning strategies for the trainee

- 1. Clarify expectations**
What are the goals for this training session?
What should i focus on during the scenario?
- 2. Discuss with trainer what could go wrong**
What should I be worrying about?
- 3. State when you need help**
I understood part X, but not Y. Could you explain?
I feel like i'm starting to lose track of the big picture.
- 4. Ask again when you are confused by trainer's explanation**
What's the key difference between X and Y?
- 5. Ask for other examples**
So, are there other times when X happens?

Here's is what the trainee is expected to contribute in a simulation using CDE strategies. It mainly involves discussion and asking questions when you don't know what to do or why something should be done.

CDE: A trainer-trainee partnership

Learning strategies for the trainee

- 6. Request feedback**
 - Was that the best way to express X?
 - Should i have passed on that information?
- 7. Ask trainer questions about his/her thinking?**
 - When x was happening, what were you noticing the most?
 - What would you have done in x situation?
- 8. Discuss with trainer if you took x action, what are the likely consequences**
 - If I do X, what is likely to happen? Why?
 - When x happened, how should i have known that y was going to happen?
- 9. If unsure, clarify what you should do next**
 - I'm not sure what to do next. What should I do?
- 10. Ask for resources to learn off-line**
 - I'm having some trouble with X, what do you recommend that I do or read?

It is fair game to get into the thinking process of the trainer. Discuss possible actions. Discuss why or why not one course of action might work out better than another.

What does this look like in action?

- Trainer needs to know that trainee is actually gaining the knowledge and skills
- Confirm that the training simulation is an effective tool in teaching the desired skills



So using the simulation as a mechanism to assess learning, the trainer can see if knowledge can be applied correctly.

Example 1: Virtual Reality Simulation

1. Prebrief of exercise
 - Establish goals of simulation
2. Training exercise
 - Trainer fills out OAR form during simulation
3. One-on-one debrief
 - Trainee fills out self-evaluation (OAR) form
 - Then trainee and trainer discuss perspectives
4. Team debrief (optional)

We have identified 2 types of simulations that we will provide with AWOC, each with a different way of operating and a different goal. The first is a “Virtual Reality” Simulation. In this type of simulation, the flow of the data mimics that in real time. The trainee goes through tasks as they would in real life. During this simulation, the trainer will note the process used by the trainee. They can do this on a form called an “Observation and Assessment Record” (OAR). They are making notes on here to use in the debrief. You can see a copy of this form on the next slide. After the exercise, the trainee fills out a self-evaluation OAR. Then both the trainer and trainee discuss their findings and their perspectives.

Observation and Assessment Record (OAR) *Trainer Form* –Filled out during event

Challenges	Examples of what trainee is doing: Good	Examples of what trainee is doing: Other
<i>Science</i>		
- Understanding/Applying Conceptual model		
- Discriminating severity		
<i>Technology</i>		
- Use of Applications (WARNGEN, FFMP, SCAN, procedures, etc.)		
- Use of data sets		
<i>Human Factors</i>		
- Getting/Maintaining SA		
- Managing workload		
- Threat communication to public		
- Managing sectors/topology		
Follow up actions:		

This is the form the trainer would fill out as the event is worked. These categories and subcategories can be tailored to fit the office focus, the student need, or the simulation itself.

OAR Form - Trainer, example

Trainee LizQ Observation and Assessment Record (OAR) Date 6/10/04 Trainer Joe

Trainer Form

Challenges	Examples of what trainee is doing: Good	Examples of what trainee is doing: Other
Science		
- Understanding/Applying Conceptual model	Caught on to the potential for supercells. Recognized cyclic nature as seen in radar data	Did not consider nature of training echoes and potential impact on FF
- Discriminating severity	Good job with tornado threat	Large A report - failed to correlate with TBSS
Technology		
- Use of Applications (WARNGEN, FFMP, SCAN, procedures, etc)	Good use of ALLTILTS feature, 4panels	Warning sent with bad motions. Difficult to keep warnings straight with orientation of stng
- Use of data sets	Noted boundary interactions in mesonet data near tornadoic storm	Not accessing other radars very often. Not looking at precip data
Human Factors		
- Getting/Maintaining SA	Initially very well with regard to tornado threat.	Needed additional radar data on storms in south part of CWA (by 1). No monitoring of FF threat (by 2).
- Managing workload	Did well early on.	Needed to ask for help with unexpected reports came in.
- Threat communication to public	Communicated tornado threat well. Kept steady stream of S&S's	Disregarded large hail report - didn't see radar support.
- Managing sectors/ technology		A difficult situation...needed better coordination for

An example of the kind of stuff a trainer might fill out during an event.

OAR Form

Trainee Form - Filled out after event

Challenges	How am I doing?				Specific Examples from Scenario
	Great	OK	Stinky	Clueless	
<i>Science</i>					
- Understanding/Applying Conceptual model					
- Discriminating severity					
<i>Technology</i>					
- Use of Applications (WARNGEN, FFMP, SCAN, procedures, etc)					
- Use of data sets					
<i>Human Factors</i>					
- Getting/Maintaining SA					
- Managing workload					
- Threat communication to public					
- Managing sectors/topology					
What would you do different next time? (Filled out with trainer after debrief)					
Follow up actions you'd like to take:					

This is the form the trainee fills out at the end of the simulation.

OAR – Trainee Form, example

Trainee Liz O Scenario Debrief Worksheet Date 6/10/04 Trainer Bill
Trainee Form

Challenges	How did I do?				Specific Examples from Scenario
	Great	OK	Shaky	Clueless	
Science					
- Understanding/Applying Conceptual model	X				Expected a long duration cyclic supercell and kept warnings on storm
- Discriminating severity			X		Hail size in warnings over southern sections was different than reports
Technology					
- Use of Applications (WARNGEN, FFMP, SCAN, procedures, etc)		X			Handled WARNGEN but sent out some bad motions. Alerts used extensively and showed good rotation in tornado storms.
- Use of data sets			X		Didn't look at other radars very often. Didn't check precip til report came in
Human Factors					
- Getting/Maintaining SA		X			SA would have been improved by alternate radar view (should have done earlier). Report of ff a total surprise. Good job in tornado threat.
- Managing workload			X		Wasn't able to investigate storms in south part of CWA very well (too busy)
- Threat communication to public		X			Tornado threat communicated but hail size not correlated (see above). Missed ff.
- Managing sectors/technology				X	Total mess trying to coordinate boxes with adjacent sector
What would you do different next time? (Filled out with trainer after debrief). Sectorize differently (or more quickly change sectors if not working). Look more often at alternate radars (would have shown TBSS and might have included higher hail size in warning). Always include FF monitoring in routine, even if not expected (farm out if too busy)					
Follow up actions you'd like to take: Work on developing some procedures to help with other radar views. Develop ff monitoring					

A sample of the type of things a trainee might fill out. You get to assess yourself in the same areas as the trainer did. Sometimes we can be our own worst critic and we've actually done better than we think. On the other hand, sometimes we can think we're doing well but really we are totally unaware of just how bad things have gotten. Comparing this form with the similar one from the trainer can be very revealing.

Generally, both parties learn something during the ensuing discussion. This effort can point to areas which need attention. This might be help with the understanding of a conceptual model. Or it might be some work with the software (using WARNGEN, for ex). It could also show very effective strategies used by the learner which had not been considered by the trainer. It really is a two-way street.

Example 2: Interval-based Simulation

1. Prebrief of exercise
 - Establish goals of simulation
2. Training exercise includes stop times where:
 - Trainee fills out SADRT form
 - Trainer has “ideal” solution
3. One-on-one debrief
 - Trainee and trainer perspectives
 - Discuss differences and similarities in forms
4. Simulation continued until next stop time

The second type of simulation we've provided in AWOC is an “Interval-Based” simulation. This is a very different type of simulation and unlike the Virtual Reality simulation, we are not trying to totally duplicate the real world. The goals can be extremely focused on very specific learning objectives. That may feel counter-intuitive for some but the goal is to take something which was taught, and see if it can be practiced. In this type, the simulation will run as normal for a period of time, and then be “paused”. The trainee will answer a series of questions. The questions are on the form (slide 40) and attempt to assess the trainee's Situation Awareness, hence the “Situation Awareness Decision Requirements Table” (SADRT) form.

Interval-based simulation using SADRT

Situation Awareness Decision Requirements Tool: A tool to assess SA during a simulation exercise

- Based on over 12 years of research in assessing SA and the decision process with:
 - U.S. Marine Corps
 - Nuclear Power Plants
 - Hospital Emergency Rooms and ICUs
 - AWACS Weapons Directors
- Used to:
 - Chart and document progress
 - Assess the impact of training materials

This is some background on the use of the SADRT form. This form is modified to fit the domain in which the simulation is occurring. The goal is to get “inside” the trainee’s head and look at their process and reasoning.

FYI - This tool was originally developed for use by those in nuclear power plants during simulations of not-so-routine events. It was then modified and is used in real-time critical events by the shift leader who gets input from the entire operational team. This gives him/her a quick status of events based on everyone’s perceptions...a sort of 1 minute SA *time-out* to make sure nothing is being missed!

How SADRT is used in simulations

1. Discuss objectives of the simulation
 - Very pointed and focused (not the scope of a live event)
 - Looking at how the trainee maintains SA re objectives
 - Goal is to advance critical thinking skills via discussions
2. Begin running simulation
3. Simulation stopped at various points.
 - Trainee fills out SADRT (trainer has a “completed” version based on their knowledge of the events and objectives)
4. Trainer and trainee review SADRT
 - What are similarities?
 - What are differences? Why?
 - Were objectives addressed? Why or why not?
 - Things to consider when simulation resumes
5. Resume simulation

In using the SADRT during simulations, the simulation will be paused at points unknown to the trainee. The trainee will take 1-2 minutes to quickly fill this out, mainly jotting things to prompt their memory, while keeping in mind the objectives of the simulation. The trainer on the other hand, has an “idealized” answer key...one which would reflect “perfect” SA. It’s not that anyone expects you to always have perfect SA (this is very difficult for lots of reasons). It’s just to see and compare. Trainer and trainee then discuss their respective “solutions” and take a few minutes to see why their answers are different. Some strategies or areas on which to focus might be discussed. The process here is to develop critical thinking skills through the discussion.

After 5-10 minutes, the simulation is resumed. The trainee almost always feels more in control after going through the process at the first stop time. As many stops as are needed can be included in this simulation. Generally, the stop times have been associated with key decision points in the simulation. At the end, the trainer and trainee can again look at areas which are being done well, and areas which can benefit from additional resources or training.

SADRT

Filled out by trainee at stop times

Stop Time:

<u>Assessments so far?</u>
<u>What watches/warnings if any do you have out?</u>
<u>What are you worried about now?</u>
<u>What data is most important right now?</u>
<u>What data or information do you need that you're not getting? Are there any system status issues?</u>
<u>What is this situation going to look like in ()hours/minutes?</u>
<u>What will be your next action?</u>

The questions are fairly generic, as opposed to filling out a “check list” of items. SA is what is in your head at any moment in time, what your awareness level is. Fill this out keeping in mind the specific objectives of this simulation.

SADRT...an example

Type of information we are looking for...a sample "answer sheet" for stop 1,2

Stop Time: 18:30z

Events/Assessments so far? Squall line developing with isolated storms (showing supercell characteristics) out ahead. Very saturated ground and potential training echoes.
What watches/warnings if any do you have out? Flash flood watch; Svr tstm.
What are you worried about now? Training echoes; Storms moving into area with few spotters. Concerned about high winds in developing bows. Area of rf masking parts of the line. Line configuration makes it hard to sectorize (potential warnings overlapping or being lost). Workload is becoming an issue – difficult to do good base data analysis on all storms.
What data is most important right now? Radar ref, hi-res v and sm. Mesonet data may show storms moving into more conducive environment.
What data or information do you need that you're not getting? Are there any system status issues? Spotter reports. Low-level velocity data at far end of squall line. Not getting any radar data from KXXX.
What is this situation going to look like in 1 hour? Could have additional isolated storms develop. May have large scale damaging wind event underway. May also have ff threat near metro area.
What will be your next action? Notify law enforcement/Ham operators of need for reports in remote areas. Experiment with PRF changes. Get someone to do updated mesoanalysis. Probably need to redistribute workload and see who is available to come in and help. Order pizza.

Here's the kind of stuff you might have in a filled out SADRT at a stop time. Of course, you wouldn't be stopping to make a word document and would likely just jot down notes and abbreviations.

3. Learning Management System

- The NWS is moving to a LMS to track training.
- AWOC is the first NWS developed course on the new LMS.
- Same system as E-Learning @ NOAA
- <http://e-learning.doc.gov/NOAA/>

The last section of the Optimizing Learning IC will describe a tool which will be used to help in the delivery of AWOC, in addition to other training. The National Weather Service is using a Learning Management System (LMS) to track training. AWOC is the first NWS developed course to use the new LMS. Many people are already familiar with the LMS since it is the same system used by E-Learning@NOAA. To get to the LMS, go to [http://e-learning.doc.gov/NOAA.](http://e-learning.doc.gov/NOAA/)

LMS Quick Start

- Visit WDTB's AWOC Student Page
 - <http://wdtb.noaa.gov/courses/awoc>
- List of AWOC Instructional Components
 - AWOC ICs listed in preferred order.
- Basic guidance on using the LMS for AWOC.

For a “Quick Start” on the LMS, visit WDTB's AWOC Student page at <http://wdtb.noaa.gov/courses/awoc>. On the AWOC page, students can find a listing of all AWOC Instructional Components (IC) and the preferred order to take the ICs. We have also included basic information about using the LMS for AWOC.

E-Learning@NOAA

- Lobby
- Select “Log On” to start



Welcome to E-Learning@NOAA, a state-of-the-art e-learning system. This site is designed as a multistory building hosting a variety of services. Each floor within the learning center houses a major learning function, such as online courses, testing, and evaluation. On each floor, rooms act as gateways to these learning applications.

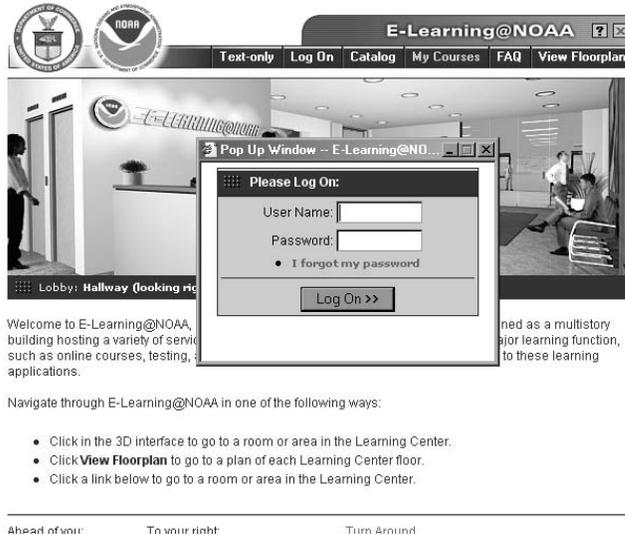
Navigate through E-Learning@NOAA in one of the following ways:

- Click in the 3D interface to go to a room or area in the Learning Center.
- Click **View Floorplan** to go to a plan of each Learning Center floor.
- Click a link below to go to a room or area in the Learning Center.

Here is a screen capture of the “lobby” you enter when you visit E-Learning@NOAA. To get started, click the “Log On” button.

Logging On

- Login using email name
- After Login, select “My Courses” button
- Forgot your password? It can be mailed to you.



Most people in NWS have probably already logged onto the LMS. Your User Name is the first part of your email address (before the @ symbol). If you don't remember your password, click on "I forgot my password" and it will be emailed to you.

“My Courses”



- Choose “Show Learning Path/IDP”.
- AWOC is a Learning Path (LP).
- You can access AWOC modules from the LP.
- LP assigned at the AWOC Facilitator Workshop.

Once logged on, go to the “My Courses” tab. Then, click the drop down to “Show Learning Path/IDP”. AWOC is a learning path (LP) in the LMS. Learning paths are assigned to students. If you don’t see the AWOC LP after choosing the drop down, the LP may not have been assigned to you yet. Contact your SOO/DOH or Training Officer for more information. During the AWOC Facilitator Workshop, your training officer will get detailed information on how to use and navigate through the LMS. The LPs will most likely be assigned during the AWOC Facilitator Workshop, so you may not see the AWOC LP until your office’s representative has attended the AWOC Workshop.

Review

- There are important considerations for adult learning
- Several levels of evaluation are important in order to detect real learning
- It is critical to establish a safe learning environment for the trainee
- There must be clear learning objectives upon which the training medium is based
- A learning partnership is critical to the CDE method of developing expertise via simulations
- AWOC will take advantage of a LMS to help better facilitate the learning process

Contact Information

- For questions on this IC
 - Contact your SOO
 - WDTB focal points for AWOC Core Track IC1
 - iccore1@wdtb.noaa.gov

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