# INSTRUCTOR TRAINING USING EMBEDDED TRAINING COURSEWARE (ETC)

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## ABSTRACT

The Seawolf Ship Control Operator Trainer (SCOT) uses Embedded Training Courseware (ETC) as the primary method to train and familiarize instructors with the trainer's operational and instructional capabilities. The ETC consists of a series of self-paced interactive, computer-controlled, branched tutorial lessons arrayed on two separate levels of instruction according to complexity and dynamics. The level 1 lessons include instructor tasks, familiarization, and power-up/power-down procedures. The level 2 ETC lessons include interactive practice at the Instructor Operator Station (IOS) in a real time environment in developing, setting-up and conducting an exercise as well as measuring individual progress.

This paper examines how the Seawolf SCOT ETC provides an effective self-paced training and practice environment for instructors to develop individual skills related to conducting training exercises.

## ABOUT THE AUTHORS

Jeffery Russell is an Instructional Systems Specialist (ISS) in the Technical Manuals/Training Systems Manuals code of the Naval Air Warfare Center Training Systems Division with twenty years of experience in military training systems. He is currently a member of the team responsible for implementing Embedded Training Courseware for training instructors and operator personnel for the Seawolf Ship Control Operator Trainer. He is also the ISS for the TRIDENT submarine program, Landing Craft Air Cushion Trainers, and Submarine Combat Systems Trainers. Mr. Russell received a Bachelor of Arts degree from the University of North Carolina.

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## BACKGROUND

Much of Navy submarine training is focused on how to operate the tactical equipment. Fleet personnel participate in formal classroom instruction, studying technical manuals, hands-on and over-the-shoulder training, using high-tech simulators, and embedded training. Each of these methods provides training and practice in job performance skills.

The Navy has put in place some of the most advanced training systems for onboard and shorebased applications. One of these systems, embedded training, has shown to be effective in providing training and skill practice on complex systems in remote settings, such as, aboard ship at sea and pier side. Embedded training is added to the operational equipment. It can provide training and practice in job skills for personnel operating specialized and complex operational equipment (Hoskin, Jorgensen, Manglass & Reynolds 1989).

Many of the highly technical trainers, particularly crew training simulators, require operation by a qualified instructor. How are the instructors trained to operate these complex systems and to use them to effectively provide instruction to fleet personnel?

When a trainer is first delivered, the contractor usually provides a one time only formal instructor/operator course which may run from one or two days up to two weeks. The textbook for this course is a Training System Utilization Handbook (TSUH). This manual includes a description of the system, operating procedures, and a listing of training exercises the trainer can support.

Instructors on board the command at the time of trainer acceptance receive the formal course conducted by the contractor. The course includes classroom lectures and hands on laboratory sessions to provide comprehensive instruction in operating the device. Instructors assigned to the trainer after the system has been accepted by the government miss the opportunity to receive any kind of formal training program and practice in device operation. How do these new instructors-in-training receive familiarization and training on operation of the trainer?

**Training System Utilization Handbook (TSUH)**

Instructors-in-training may be given the TSUH to read. The handbook contains a great deal of information and usually consists of over one hundred pages. This large volume of material may prevent the instructor from easily locating specific information. The handbook length may also create minimum interest in spending significant time reading it.

Reading the TSUH does not allow the instructor to gain hands-on experience with the training device. While the instructor-in-training wants to "play" with the trainer by operating the instructor console and practice in a training exercise environment, the TSUH presents a dry, technical manual training approach.

**One-On-One Training**

The instructor can be trained one-on-one by a senior instructor. This method may require schedule adjustments by both instructors to allocate adequate time on the trainer when it is available in order to learn equipment configuration and operation of the switches, meters, controls and displays.

This type of training requires the senior instructor to devote valuable time to individual training. This may conflict with many other duties of supporting a busy device training schedule requiring availability of staff instructors.

**On The Job Training**

The instructor-in-training can learn on the job during operation of the trainer while a training exercise is being conducted. Training is received by simply observing "over the shoulder" of the experienced instructors.

This method enables the instructor-in-training to become familiar with the device configuration as well as the functions for trainer operation. It normally does not allow for hands-on practice or individualized instruction during high activity of a training session. The instructor may not be able to fully observe all instructor tasks because many actions may be happening at the same time or in quick succession.

Also, the tendency may be to only learn the most often used features of the trainer under the guidance of other instructors or when studying the TSUH. Many of the more subtle or obscure features of the trainer may be perceived as too complex or may go unnoticed and unused. In many cases these features are useful tools that are not presented or learned in an unstructured training program. Knowledge transfer via informal instruction has the potential for some information to be overlooked or forgotten due to limited use.

All of these methods for training instructors who miss the opportunity to participate in a formalized course on operating complex simulators can accomplish the goal of preparing them for the new training environment.

Today's training world encompasses new training media. It is one of computers, a variety of man/machine interfaces, multimedia formatted training applications, realistic visualization with eye-pleasing graphic presentations, and real world

simulation. Embedded training includes many of these characteristics and has demon-strated it can be effective in training fleet personnel to operate the tactical equipment.

The same method can be applied to training the instructor how to operate a training simulator.

## INTRODUCTION

The Seawolf Ship Control Operator Trainer (SCOT) (See Figure 1) provides crew training in ship control familiarization, operating procedures, and mission control procedures. The trainer provides familiarization with ship control equipment configuration, training and/or practice in normal operating procedures, identifying malfunctions and abnormal conditions, and initiating appropriate emergency recovery procedures.

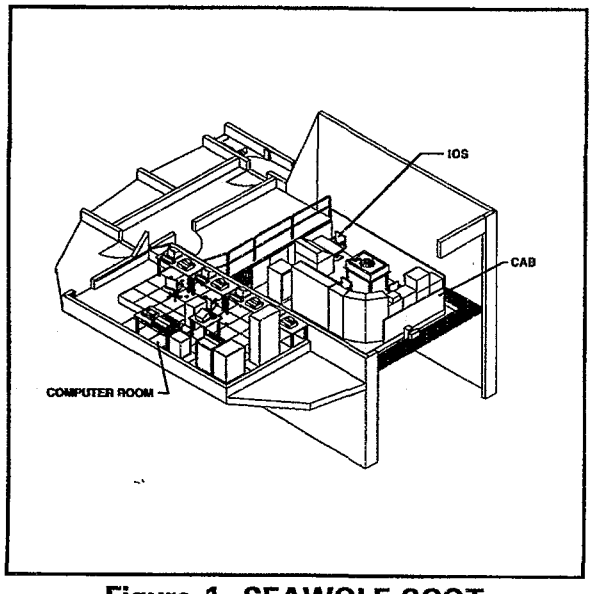


**Figure 1. SEAWOLF SCOT**

The motion system provides two degrees of freedom which simulates the pitch and roll motion of the submarine. The travel envelopes of the trainer are a pitch of ± 45 and a roll of ± 30 degrees.

Training scenarios conducted on the SCOT include normal operating depths of a submarine in open ocean, operations at periscope depth, transition to and from the surface, mine and obstacle avoidance, emergency recovery conditions, and maneuvering under ice.

The trainer cab is the simulated ship control center. It realistically replicates all relevant tactical instrumentation and crew positions.

### Instructor Operator Station (IOS)

The IOS, (See Figure 2), is located in the aft starboard corner of the replicated cab.
At this position the instructor can observe the training crew and the ship control panels during a training exercise. From this position the instructor prepares and conducts each training exercise. The primary instructor interface with the trainer is the keyboard and two trackball-controlled monitor screens. One monitor displays menu driven screens

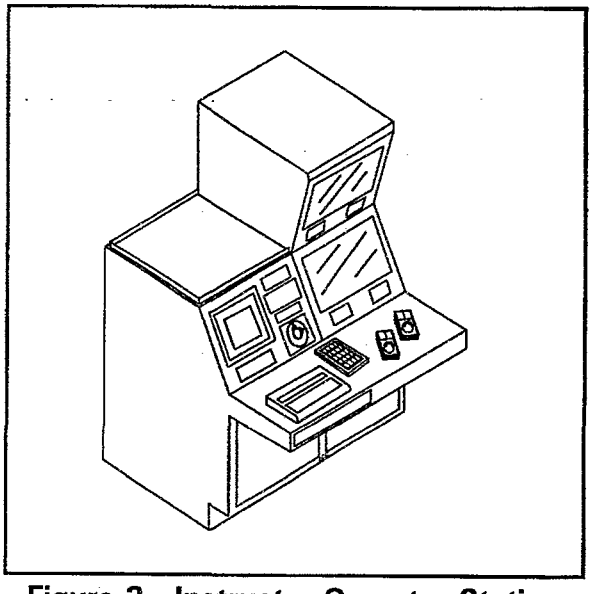

**Figure 2. Instructor Operator Station**

that prompt the instructor as the exercise progresses.

The second monitor is used to display the Plan View of the gaming area and the Profile View of the ocean. These visual displays give the instructor a comprehensive view of the scenario throughout the training exercise. Events can be anticipated and altered before they occur.

In addition to the interactive displays, the Instructor has access to trainer-unique control panels for electric power, motion system control, tape recording control, ambient temperature control and communication.

The SCOT has Embedded Training Courseware (ETC) built into the trainer in order for the instructor-in-training to attain familiarization and learn operation of the IOS.

The ETC can be taken by instructors-in-training from the IOS when the SCOT is not being used for training fleet personnel or at a separate console in the computer room when
the trainer is in operation. The instructor-in-training simply selects ETC at the main menu and proceeds to interact with the embedded training courseware. Due to safety considerations for equipment and personnel, the ETC does not activate the SCOT motion system or require the ship control positions to be manned.

**EMBEDDED TRAINING COURSEWARE**

The Embedded Training Courseware is divided into five lessons, each containing several parts.

Lesson No. 1 Trainer Overview
Lesson No. 2 Trainer Usage Goals
Lesson No. 3 Trainer Operation
Lesson No. 4 Training Exercise
Lesson No. 5 Trainer Real Ship Differences

Lesson Nos. 1, 2 and 5 are Level 1 instructions and Lesson Nos. 3 and 4 are Level 2 instructions. Level 1 instruction provides descriptive material without student interaction with the courseware. Level 2 instruction allows the instructor-in-training to interact with the courseware.

At the end of each lesson part a series of multiple choice questions are presented to measure the instructor-in-training's comprehension. The courseware is designed to provide remediation if a question is answered incorrectly. The ETC returns to the start of the same lesson part. When the correct answer is selected the ETC will provide added explanation and enforcement on the same screen before advancing to the next screen.

The tutorial text for each lesson is displayed on one monitor and the supporting visual is displayed on a second monitor. The visuals are menu screens or pictorial diagrams depending on the subject matter.

During the course a log of events is compiled for supervisory personnel to evaluate the performance of the instructor-in-training. This management report contains the number of correct answers and remediations. Additional data includes the instructor-in-training choices of all lesson and part options offered within the course.

## HOW ETC PROVIDES TRAINING FOR INSTRUCTORS

### Lesson No 1, Trainer Overview

Lesson No 1 in the Embedded Training Courseware is a Level 1 instruction designed as an introductory lesson to provide the instructor-in-training with an overview of the trainer. It provides a description of the training mission and identifies the various components of the trainer and describes the IOS. This lesson covers the following subjects:

Part 1 Trainer Mission
Part 2 Trainer Major Components
Part 3 Instructor Operator Station

### Lesson No 2, Trainer Usage Goals

Lesson No 2 in the Embedded Training Courseware is a Level 1 instruction addressing the trainer usage goals as they pertain to the job tasks the instructor must learn to qualify as an instructor on the SCOT. The lesson is divided into six parts.

Part 1 Trainer Start Up and Readiness
Part 2 Training Exercise Development
Part 3 Training Exercise Set Up
Part 4 Training Exercise Control
Part 5 Trainer Emergency Shut Down
Part 6 Trainer Shut Down

In terms of training goals these Parts equate to the following:

1. Establish trainer readiness
2. Establish guidelines for developing a training exercise
3. Establish method for setting up a training exercise
4. Gain proficiency to train personnel in ship control
5. Prevent injury to personnel and damage to equipment
6. Ensure orderly trainer shutdown

### Lesson No 3, Trainer Operation

Lesson No 3 in the Embedded Training Courseware is a detailed description of the procedures associated with the usage goals defined in Lesson No 2. This is a Level 2 Instruction and therefore provides interactive training with positive feedback. The instructor-in-training interacts with the menu screens using a keyboard and trackballs during the lesson. The instructor uses them in the same manner while interacting with the screens during conduct of an actual training exercise. The lesson is divided into seven parts.

Part 1 Power Up Procedure
Part 2 System Start Up Procedure
Part 3 Motion Inhibit/Enable Procedure
Part 4 Daily Readiness Test Procedure
Part 5 Trainer Control
Part 6 Trainer Shut Down Procedure
Part 7 Emergency Procedures

Lesson No 3 covers the following procedures:

Trainer Power Up
Trainer Start Up
Motion Platform Leveling
Daily Readiness Test
Motion System Status and Control
Trainer Control
- o CRT Contrast Control
- o Ownship Initial Conditions Control
- o Off Line Ocean File Edit
- o Sound Velocity Profile Edit

- o Common Alarm Selection
- o Ocean Environment Control
- o Malfunction Activation
- o Casualty Activation
- o Override Activation
- o Local Operations Control
- o Trainer Mode Control
- o Ship Alarm Control
- o Sound Level Control
- o Display Position Control
- o Trainer Power Down
- o Tape Recorder Control

**Trainer Shut Down**
**Emergency Shut Down**

The tutorial text screen for each procedure is supported by visuals on a second screen. In some cases the visual illustrates the location of the trainer equipment within the trainer. The text for procedures dealing with more abstract topics, such as editing ocean files, is enhanced with visual illustrations of ice objects such as icebergs and ice keels.

The trainer is delivered with several stored ocean files for use in creating a variety of training scenarios. The Instructor may use these files "as is" or modify them and add or delete ocean objects and change the size, shape and location of each object in the ocean. Each file created may be saved for future use or discarded. This is a powerful tool and the instructor-in-training must learn how to use these files in order to fully utilize the training capabilities of the SCOT. The files provide virtually an infinite number of scenarios for training the ship control crew. A significant portion of this lesson is devoted to describing the procedures associated with using the trainers programmed files and creating new ocean files.

The visuals are used to reinforce training where an image of the physical world is important for comprehension. For example a graphic of the gaming area, (See Figure 3), is used to support the text which describes objects in the ocean.

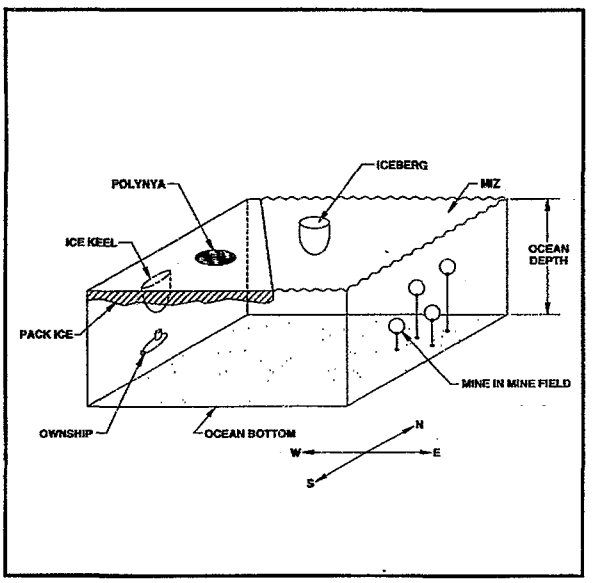


**Figure 3. Ice Objects in Gaming Area**

This simple diagram helps explain the relationship between the ship (Ownship), the ice canopy and the ocean objects as they might exist during a training exercise. Subsequent tutorials on creating ice objects are supported by a graphic such as an iceberg (See Figure 4). This graphic depicts the dimensional parameters associated with the iceberg's size and shape which the Instructor must identify in the training scenario creation process.

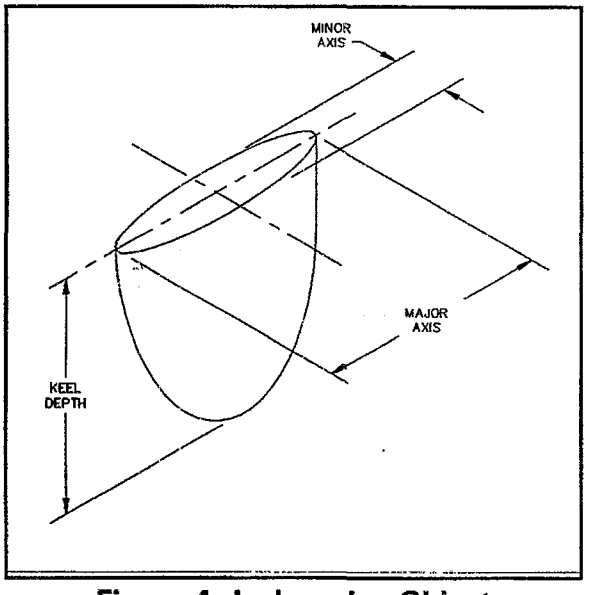


**Figure 4 Iceberg Ice Object**

**Lesson No 4, Training Exercise**

Lesson No 4 in the Embedded Training Courseware is a Level 2 instruction designed to merge the earlier lessons in the course into the primary learning objective; teaching the instructor-in-training how to prepare and conduct a training exercise on the SCOT. This lesson is unique in that it provides a training scenario incorporating all tasks involved in conducting a training exercise. This innovative concept of providing a sample training scenario as part of the instructor training was introduced on the Seawolf

Program to simplify the job task of the instructor-in-training. The sample scenario provides the link between the trainer and the real ship. The realistic simulation enables the instructor-in-training to learn and practice mission training on the SCOT.

The Lesson is divided into four Parts:

Part 1 Developing a Training Exercise
Part 2 Setting Up a Training Exercise
Part 3 Conducting a Training Exercise
Part 4 Performance Monitoring

Part 1, Developing a Training Exercise, emphasizes the trainer mission in the context of how the instructor might participate during the mission. It includes a suggested checklist for the instructor to review in preparing each training exercise, thus establishing a disciplined method of developing the exercise as opposed to a more arbitrary method.

Part 2, Setting Up A Training Exercise, is made easy for the instructor-in-training to address because of knowledge of the IOS set-up functions learned in Lesson 3. The set-up functions and the associated parameters are selected based on the specific sample scenario.

Part 3, Conducting a Training Exercise, requires integrating Seawolf ship operations knowledge with knowledge of the trainer.

The interaction between the instructor and trainees during a crew training exercise is presented to ensure realism while meeting the training goals of the instructor-in-training. This lesson is designed to portray the instructor's presence as a role player primarily impersonating ship crewmen outside the ship control center. The instructor should blend, virtually unnoticed, into this darkened undersea world communicating with the crew-in-training almost entirely by phone as the scenario unfolds. The scenario is an arctic run,

partially under-ice, with a goal to include as many learning objectives as possible.

The lesson includes the following:

Tactical Training
Operational Training
Ice Keel and Iceberg Avoidance
Diving/Ascent
Mine Avoidance
Trim
Polynya delineation
Ship Control
Navigation (track)
Ballast Control
Top/Bottom Recognition
Systems Operation
Communications

In the training mission scenario the ship is initially positioned under ice, in trim, at a specified depth, on a specified heading, moving at a specified speed. The destination is established at a point in the open ocean. During the mission the ship would encounter ice keels, polynyas, mines and icebergs. The ship would also surface through the ice and submerge again and at one point strike an iceberg. This may be considered an unusually eventful journey in the eyes of submariners but it was intended to cover a range of different "evolutions" and to exercise the skill of all the crew members. Since the instructor-in-training is an experienced submariner, the most significant training derived from this lesson part is the integrated role of the instructor during a realistic mission conducted on the SCOT.

Part 4, Performance Monitoring, provides information on ways the instructor can monitor the actions of trainees during a simulated mission in support of trainee evaluation. The instructor serves as a role player to include the Captain, engine room crew and several other ship crew members. The instructor can monitor the trainees responses to orders, ship conditions, abnormal conditions, and obstacle avoidance skills.

**Lesson No 5, Trainer Real Ship Differences**

Lesson No 5 of the embedded training course is a Level 1 instruction designed to identify the differences between the real ship and the SCOT. These differences occur for a number of reasons, the most significant of which on this program was the concurrent development of the ship and the trainer. The lesson contains two parts:

Part 1 Trainer/Real ship Differences
Part 2 Trainer Limitations

The differences between the SCOT and the ship can foster negative training. In order to mitigate this effect, this lesson identifies these differences for the instructor so they may be addressed in the training curriculum.

Trainer limitations are due essentially to simulation simplifications. These limitations are identified to preclude the instructor from designing curriculum that goes beyond the scope of the simulation or what is necessary for specific training goals.

## LESSONS LEARNED

On the Seawolf SCOT program the lessons learned occurred during the development portion of the embedded training courseware.

### Follow the Prescribed Path for Development

The prescribed path for development of the Seawolf SCOT ETC is as follows:

- Prepare and submit the ETC Design Strategy Document
- Prepare and submit the ETC Flow-charts Document
- Prepare and submit the ETC Story-board Document

When approaching this task the designer is often tempted to bypass this prescribed sequence and jump to the story-board and presentation development. This is because the story-board and finally the presentation are the most interesting portions of the task. The Seawolf SCOT ETC was no exception. The designers wanted to see the end result of their creative effort as soon as possible. The early design concepts were quickly converted by the designers to the ingredients of the story-board and the presentation. This impulse proved flawed, resulting in a design that was both disjointed and contained no provision for many important training features. During review of the Design Strategy, one of the early training documents, the customer advised that the ETC must provide simplified access directly to a specific part within any of the five lessons. The ETC contains large amounts of information, including remediation branching options. The customer wanted easy access primarily because the ETC may be taken over an extended period. Therefore, the instructor-in-training must be able to quickly locate where the previous training session ended. The user must be provided with ready access to any lesson or part of a lesson in the course without having to advance through other portions of the course or lesson. In locating specific lesson material the user may not necessarily want to advance through unrelated material or information learned in a previous ETC training session. This capability is also critical because the course will be used as a source of information by administrators and other instructors in searching for operational information.

After a few false starts, it was apparent early in the program that a disciplined, methodical approach to ETC development was best for two reasons: First, a methodical process provided design clarity for the customer. The customer must have a means to measure progress and sense direction early to ascertain whether the design is on track. Secondly, it forced the designers to consider many things they might have otherwise overlooked whereby important elements of the training envelope could have been missed.

This became evident when it was recognized that more consideration had to be given to the method used to measure performance and remediate the student during the course. Tests are necessary, not only to evaluate the instructor-in-training, but to reinforce knowledge. Therefore, performance criteria were established to measure progress of the instructor-in-training on each of the five ETC lessons.

The performance criteria addressed correct and incorrect responses by the instructor-in-training. When the answer to a question is correct the instructor-in-training is notified on the text screen with an explanation of why the answer is correct. The instructor-in-training is then permitted to proceed with the lesson. The reason for the explanation is to reinforce learning and to ensure knowledge of why the answer is correct in the event the instructor-in-training guesses the answer. The correct answer is recorded in the management report. When the answer to a question is incorrect, remediation requires repeating that part of the subject matter containing the correct answer to the question. Additionally the incorrect answer is recorded in the management report file and the question is repeated when that same point in the lesson is reached. If the question is answered incorrectly the second time, the correct answer is displayed and the instructor-in-training is allowed to proceed with the lesson. The incorrect answer would again be recorded on the management report file. The training supervisor can discuss results with the instructor-in-training after reviewing the management report.

The first attempt at designing a repertory of questions for the course was inadequate because a set of basic guidelines was not established. As a result the questions were grouped without regard to strategic placement within the lesson, some multiple choice questions were ambiguous and some questions were not sufficiently challenging. The most significant effect was a lack of definition of the remediation process. After defining the remediation process it was necessary to revise some tutorials to ensure the answer to the question was clearly presented in the tutorial. The guidelines used were:

A. Group questions at the end of each part of the lesson wherein the answer to the question can be found.

B. Design multiple choice questions with one clearly indisputable answer.

C. Design questions that are sufficiently challenging and test the comprehension of the student.

D. Devise a remediation process that reinforces learning and ensures comprehension. This is accomplished by requiring a second review of the same material when an incorrect answer is selected.

**Use Simple Diagrams**

A visual should be used whenever possible to support tutorial text. Visuals offer a greater potential for retention of the subject matter by the instructor-in-training versus text only presentations. This was found to be particularly true when the subject involves teaching the student how to create ocean objects like icebergs and locating these objects in the submarine gaming area. For this reason a visual of each object is used to define the dimensions of the object and how its position in the gaming area is established by the Instructor.

Initial attempts to depict certain subjects during the development of the storyboard material fell short of the intended goal. This was discovered when the visuals were presented to non-technical personnel

associated with the trainer program to obtain their reaction. Most tended to disregard the visuals because they appeared too complex. This was attributed to the fact that while technical personnel are comfortable with detailed visuals, others may find them confusing. Subsequently the visuals were revised to a less detailed format in order to provide optimum clarity.

**Use Simple Tutorial Text**

The text, as it appears on the monitor in the embedded training courseware, is the primary method of instruction in the course. For this reason particular attention must be paid to selecting each word in order to achieve the goal of effective training in such an environment.

The textual portion of the tutorials was limited to a few simple and direct statements. This is best done using complete sentences and not cryptic phrases. This goal of word austerity prevented screen clutter which has a tendency to misrepresent the subject as being complicated and/or tedious. At one time or another each of us has encountered the familiar "HELP" screens associated with most computer software packages. Many of these attempts at helping the user fall short because the text is verbose and convoluted.

Instructions are best written from the view point of the instructor (third person, singular) as they will be thinking like an instructor as they progress through the course. For example, the statement: "the Instructor can change the value of sea state by inserting the SEA STATE number at the Ocean Environment screen," is more effective than using the statement: "The value of sea state can be changed by inserting the SEA STATE number at the Ocean Environment screen". This simple phrasing leaves no doubt that the instructor must perform this action as well as directing attention toward a specific task the instructor-in-training is required to learn.

**Know the Training Audience**

The SCOT ETC training audience is the instructor who has both submarine experience and teaching experience. The training mission of the course is to teach the instructor-in-training how to use all features of the trainer effectively and safely.

During the tutorial development phase there was a natural temptation to include aspects of ship handling procedures as part of the instruction. This temptation should be resisted and attention directed only to teaching the instructor-in-training how to use the trainer as a tool to teach fleet personnel their jobs aboard ship. The curriculum for training personnel for shipboard duty is the job of the instructor upon completion of the ETC and not the task of the ETC designer.

The only exception to this tendency toward limited encroachment on the curriculum is found in Lesson No. 4. This lesson includes; "Developing a Training Exercise, Setting Up a Training Exercise, Conducting a Training Exercise and Performance Monitoring". The how to conduct a training exercise part of this lesson required particular attention to avoid the temptation to encroach on the crew training curriculum. In this lesson part, the ETC designer provided a sample scenario. The scenario drew upon several areas that make up the school curriculum. In most cases, after becoming familiar with the

trainer, the instructor assumes a less regimented training format. The instructor may improvise during the training exercise rather than follow the planned scenario. For example, while conducting a flooding casualty scenario, the instructor may decide during the exercise to insert an unplanned instrument failure at the Ship Control Panel (SCP) which would effect the trainee's decision on the flood recovery method. This flexibility allows the instructor to focus on the specific training needs of each crew member.

## SUMMARY AND RECOMMENDATIONS

Embedded Training Courseware is a viable alternative to conventional classroom training and the TSUH for training instructors. It has the inherent advantage of ensuring training uniformity from one generation of instructors-in-training to the next. It also relieves the instructor of dependency on the availability of senior Instructors, the TSUH or the trainer to learn about the trainer.

ETC offers several advantages for training instructors in how to operate the training simulator. It's presentation format embodies a training program that offers a unique training approach that uses some of the latest interactive computer technology. It provides a real world environment during the training period via a controlled interface of machine and instructor. The instructor is able to operate the equipment while taking the course to learn the system. This can also help to satisfy the instructor's desire to begin working hands-on with the trainer from the outset of the training cycle. The ETC builds confidence in operating the system starting with the first lesson.

ETC can provide realistic visuals of the scenario environment. These characteristics contribute to maintaining interest and encourage learning.

ETC allows the instructor to learn and practice the job of conducting training exercises with the operational system. This can be accomplished during down time in the fleet training schedule and when the trainer is in continual use.

ETC provides a consistent, complete, formal training program to all instructors. Yet it is presented in an informal one on one setting. It is available at whatever time is convenient for the instructor.

ETC frees the senior instructors from the task of having to personally guide the new instructor through the instructional program. It is a self-paced course and can be repeated as often as is necessary. ETC provides a management report which gives senior instructors a record of the course progress for each new instructor throughout all lessons.

The embedded training courseware designer should approach the design from the point of view of the Instructor. This should be done early in the program to head off any mistaken interpretation of the instructor requirements.

A lesson devoted to a sample mission should be included in the embedded training courseware. The mission scenario should be discussed with and reviewed by the Instructor(s) from the trainer site before

committing to the final ETC design. This mission scenario will help bridge the gap between the trainer usage goals and the lesson plans that the qualified Instructor will be required to prepare after completing the course.

Communication with instructors, instructional system specialists and subject matter experts should begin before Embedded Training Courseware development starts and continue throughout the ETC generation process.
A comprehensive review and input by all cognizant personnel during evolution of the planning documents can prevent ETC problems later on. This teaming of expertise will provide for a more complete courseware program that effectively meets the user's training requirements.

**REFERENCE**

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