Navy ILE Instructional Content Style Guide

Interactive Multimedia Instruction & Instructor-Led Training

Integrated Learning Environment

Distribution authorized to DoD and DoD contractors only; other requests for this document shall be referred to the following contact the U.S. Navy.

1 February 2006

List of Effective Pages

Section	Page(s)	Affected paragraph(s)

Change Record

Paragraph	Description of Change	Date	Authorized By

Acronyms, Abbreviations, Definitions

ADL	Advanced Distributed Learning
AIM	Authoring Instructional Materials
CCB	Configuration Control Board
CIN	Course Identification Number
COTS	Commercial Off-the-Shelf
CSS	Cascading Style Sheet
CWF	Critical Work Function
DP	Discussion Point
DTD	Document Type Definition
E-LINC	Electronic Linking and Integration of Navy Content
ELO	Enabling Learning Object
ESC	Executive Steering Committee
FRB	Functional Requirements Board
GOTS	Government Off-the-Shelf
ILE	Integrated Learning Environment
ILT	Instructor-led Training
IMI	Interactive Multimedia Instruction
ISLE	Integrated Submarine Learning Environment
JFMM	Joint Fleet Maintenance Manual
JTA	Job Task Analysis
KSATTR	Knowledge, Skills, Abilities, Tools, Tasks and Resources
LCMS	Learning Content Management System
NAVOSH	Navy Occupational Safety and Health
NCOM	Navy Sharable Content Object Reference Model
NKO	Navy Knowledge Online
RIA	Related Instructor Activity
RSO	Reusable Skill Object
SCO	Sharable Content Object
SECF	Submarine Electronic Computer Field
TG	Trainee Guide
TLO	Terminal Learning Object
TSD	Training Systems Division
XML	Extensible Markup Language
XSL	Extensible Stylesheet Language

See the ILE website for a complete list of acronyms, abbreviations and definitions.

Table of Contents

1. Common Curriculum Elements 1
1.1. Phases of Development 2
1.2. Hierarchy 4
1.3. Lesson Structure 5
1.4. Learning Objectives 5
1.5. Content Types 5
1.6. Content Use Level 7
1.7. Questions 7
1.8. Instruction 13
1.9. Writing Style Guidelines 16
2. IMI Curriculum Development 24
2.1. Content Repurposing and Reuse 24
2.2. Instruction for IMI 24
2.3. Evaluation of IMI 33
3. ILT Curriculum Development 34
3.1. Lesson Plans for ILT 34
3.2. Evaluation of ILT 43
ADDENDUM A 45
ADDENDUM B 47
ADDENDUM C 52
ADDENDUM D 53
ADDENDUM E 54
ADDENDUM F 56

List of Figures

Figure 1 Individualized Learning in the ILE 1
Figure 2 Example Drag and Drop 10
Figure 3 Overview Template for IMI 25
Figure 4 Example of a Storyboard using the Overview Template 27
Figure 5 Example of the Overview Displayed in IMI 27
Figure 6 Section Template for IMI 30
Figure 7 Example of the Section Displayed in IMI 31
Figure 8 Summary Template for IMI 32
Figure 9 Example of the Summary Displayed in IMI 32
Figure 10 Example of Overview for ILT 36
Figure 11 Example of Section Introduction Page for ILT 37
Figure 12 Example of Section Discussion Points Page for ILT 38
Figure 13 Example of Section Discussion Points Page for ILT (Cont'd) . 39
Figure 14 Example Templates 45
Figure 15 Example AIM Screen 48

List of Tables

Table 1 Definition of Terms 2
Table 2 Hierarchy of Relationships 4
Table 3 Lesson Structure 5
Table 4 Assessment Types for Concept Content Type 8
Table 5 Assessment Types for Fact Content Type 8
Table 6 Assessment Types for Procedure Content Type 8
Table 7 Assessment Types for Process Content 9
Table 8 Assessment Types for Principle Content 9
Table 9 Instructional Content for Concept Content Type 14
Table 10 Instructional Content for Fact Content Type 15
Table 11 Instructional Content for Procedure Content Type 15
Table 12 Instructional Content for Process Content Type 15
Table 13 Instructional Content for Principle Content Type 16
Table 14 Say it Simply 20
Table 15 Say it Plainly 20
Table 16 Learn, Explore Practice Description 28
Table 17 Levels of Interactivity Implied by the Group 28
Table 18 Discussion Point (DP)/Trainee Guide (TG) Table 40
Table 19 Use of Trainee Guide Sheets 40
Table 20 Steps to Create AIM SCORM Output 47

1. Common Curriculum Elements

The Integrated Learning Environment (ILE) is the means to deliver individually tailored, high quality learning to all who serve, maximizing career development, and job performance.

The ILE establishes a training management and delivery capability in support of the Revolution in Training to provide the capability for My Learning Plan, My Learning Event, delivered My Way. This blended training approach includes instructor-led training (ILT) and interactive multimedia instruction (IMI), coupled with innovative learning technologies to provide the right mix of instructional strategies to transfer knowledge and skills essential for successful mission accomplishment. The ILE enables the Sailor to have a tailored learning plan, and a personalized course of instruction that recognizes what a Sailor knows, and what is needed. Blended training content development must address a variety of instructional delivery modes for "My Way" delivery. The instructor, as mentor and facilitator, provides the role model, guidance, and subject matter expertise necessary to develop sailors to their full potential to optimize team-based, joint operations.

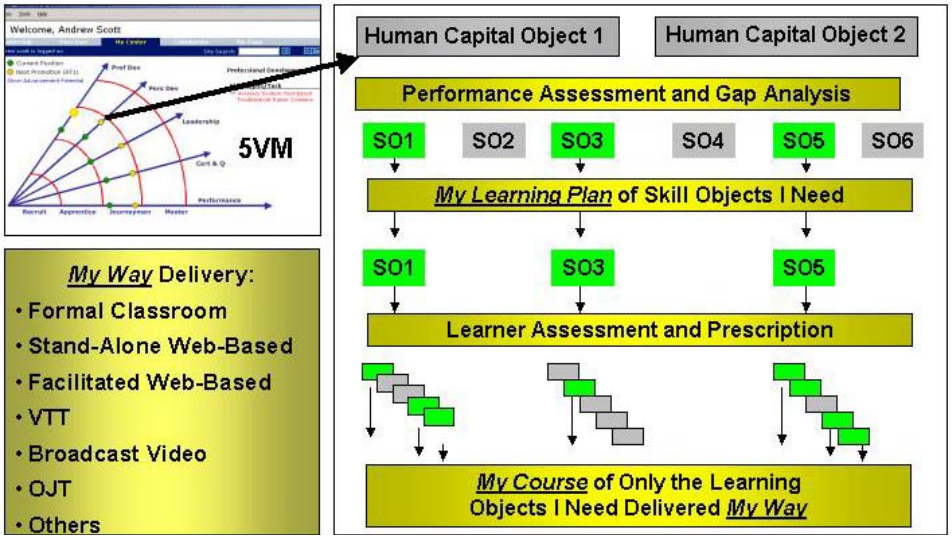

Figure 1 Individualized Learning in the ILE

1.1. Phases of Development

Prior to developing learning content, the first step is to perform a job task analysis (JTA) which identifies the jobs and positions for every enlisted community in the Navy. This is necessary to ensure that common training is identified, and content design strategies can take advantage of reusable learning content. The JTA determines the logically grouped knowledge, skills, abilities, tools, tasks and resources (KSATTR). These logically grouped skills, called a SkillObject™, serve as the foundation for level 1 and level 2 data elements. Refer to Table 1.

The structure of level 1 data provides a connection between the occupational level data and level 2 data that describes training requirements.

Table 1 Definition of Terms

Definitions:[1]	
Critical Work Function	Major responsibilities an individual must fulfill in order to achieve the major requirements of a job or a role.
SkillObject™	An occupational skill that is a re-usable detailed description of what people do in accomplishing work. A SkillObject™ contains logically grouped knowledge, skills, abilities, tools, resources, affective domain, and tasks (2-10) that are required to successfully perform a job.
Task	A duty that is essential and critical to the performance of the job.
Subtask	A group of concrete actions needed to accomplish a task. For example, if the task is “change a car engine’s oil”, the subtask would be “drain old oil from engine”.

A Level 2 Training and Performance Improvement Analysis will determine the tasks that require training.[2] While analyzing the tasks, consider the following:

- What needs to be learned?
- How will the target audience best learn the content of instruction?
- How will learning be transferred?
- How will performance be measured?

After the tasks that require training intervention have been identified, a delivery method analysis is performed to determine the most appropriate method for delivering training. This analysis involves a review of the tasks to consider factors ranging from characteristics of the target audience responsible for the task, the number of people responsible for the task, and the difficulty of the task. If the task has been taught through training intervention in the past, then the analysis will examine the way instruction was delivered by topic, to identify

[1] SkillsNET™ Corporation definitions.

[2] The Human Performance Center will assist developers incorporate the science of learning into their training.

opportunities to reduce training time and reduce training costs through the application of training technologies.[3]

Lessons that are good candidates for IMI delivery generally have the following characteristics:

- Short duration lessons or can be reorganized into small lessons.
- Do not require the use of special training equipment.
- Do not require face-to-face interactions.
- Instructional content does not change too frequently.

Note: To augment the guidance provided in this document, refer to the Navy Instructional Systems Design and Instructional Design Process document.

[3] Several inventories exist to assist with media selection. For example, A Systematic Approach to Media Selection by William W. Lee and Diana Owens, an ASTD white paper may be useful. Citations for additional inventories are provided in the References section of this document.

1.2. Hierarchy

The following hierarchy shows the relationships (at the apprentice level) of SCORM, Navy extensions to the SCORM, and job task analysis data.[4] In the examples, the IMI lesson is designed for an hour of instruction, whereas the ILT lesson is designed for several days of instruction. Depending upon the Center's guidance, the mapping of content may vary based on the nature and length of instruction.

Table 2 Hierarchy of Relationships

SCORM	Navy SCORM[5]	JTA[6]	IMI	IMI Example	ILT	ILT Example
Root Aggregation	Learning Object Aggregation	Critical Work Function	Learning Event	Section Tracking	Learning Event	Auxiliary Equipment Troubleshooting
		Skill Object		Target Motion Analysis		
		Use Case				
		Job Level (Apprentice, Journeyman, Master)				
Aggregation	Terminal Learning Object (TLO)	Task/Subtask	Lesson	Construction of the contact evaluation plot (CEP)	Lesson	Maintaining Auxiliary Equipment
Sharable Content Object	Enabling Learning Object (ELO)	Subtask/Step /Sub Step or Specific knowledge	Section (knowledge associated with a subtask)	Given different steps within the CEP procedure, the learner will be …	Section	Cleaning Auxiliary Equipment
Asset Aggregation			Learn, Explore, Practice	Learn, Explore, Practice		Direct trainee to practice the cleaning procedure
	Assets		Elements	Introduction		

Note: Enabling objective statements are the content foundation for enabling learning objects. Terminal objective statements are the foundation of terminal learning objects and are made up of enabling learning objects.

[4] See Appendix F for a hierarchy showing the relationships among commonly used ILE development tools.

[5] This is the acronym for Navy Shareable Content Object Reference Model.

[6] This is the acronym for Job Task Analysis.

1.3. Lesson Structure

A lesson is a segment of instruction designed to teach one terminal objective statements[7] and several supporting objectives, referred to as enabling objective statements[8]. A lesson includes an introduction, pretest (optional), sections, summary, and lesson progress test. Sections may also include progress tests to facilitate reusability.

Table 3 Lesson Structure

Lesson Structure	Description
Lesson Pretest (optional)	Pretests can be used as an advanced organizer, to bypass training, or to ensure mastery of prerequisite knowledge.
Lesson	Addresses a terminal learning objective.
Lesson Overview	Each lesson begins with an overview. Each overview consists of the following information: introduction, importance, learning objectives addressed, and the bibliography/references.
Section	Addresses an enabling learning objective. In IMI, instruction addresses steps in the attainment of knowledge. These steps are provided in the following groups: Learn, Explore, and Practice.
Summary	Provides a summary of information presented in the section and/or lesson and learning objectives addressed.
Section or Lesson Progress Test (may include practical exams for ILT)	Includes scored test questions, processes, or procedures required for meeting the terminal learning objective and enabling learning objectives. Determines successful completion of the lesson.
Module Test	Occurs after the completion of an entire module, or group of lessons. This is a comprehensive test that assesses terminal learning objectives and enabling learning objectives throughout the module.

1.4. Learning Objectives

The learning objectives for the training lessons are developed following the standards specified in the Navy Learning Objective Statements Specifications and Guidance document.

1.5. Content Types

Any enabling objective statement, and therefore any section, can be classified into one of five content types (Clark & Mayer, 2002). The content types are concepts, facts, procedures, processes, and principles. The definitions for the content types are provided.

[7] A terminal objective statement identifies what the learner must know or be able to apply at the completion of a lesson.

[8] An enabling objective statement supports a terminal objective statement and identifies what the learner must know or be able to apply at the completion of a section.

Note: Although, the content type guidelines are oriented to IMI and ILT, this enabling learning object strategy can be applied to any instructional content, regardless of the delivery format. By using this classification scheme, templates and guidelines can be employed to help speed the development process of sections and produce sections that are designed for reuse.

1.5.1. Concept

Definition: A concept is a category that includes multiple examples. It comprises a group of objects, ideas, or events that are represented by a single word or term, and share common features.

Example: Given a CEP, the learner will categorize the CEP symbols into meaningful groups with no errors by completing learning questions concerning the CEP categories.

1.5.2. Facts

Definition: Facts are unique and specific information usually represented in the form of a statement.

Example: Given a CEP symbol, the learner will recall its meaning by completing learning questions concerning the CEP symbol.

1.5.3. Procedure

Definition: A procedure is a sequence of steps that are followed systematically to achieve a task or make a decision. A procedure contains directions or procedural tasks that are done in the same way every time.

Example: Given different steps within the CEP procedure, the learner will be able to arrange the steps in the proper order by completing learning questions concerning the CEP procedure.

1.5.4. Process

Definition: A process is a flow of events that identify how something works. Topics that list a chain of events that are performed by an organization usually represent a process.

Example: Given a target motion analysis task such as launching a successful attack, the learner will be able to identify the stages by completing learning questions concerning the task.

1.5.5. Principle

Definition: A principle consists of directions that outline guidelines for action in which people must adapt the rules to various situations. Principles typically require a person to make decisions when applying them. Tasks that are completed in different ways each time by applying the guidelines usually represent principles.

Example: Given a tactical situation, the learner will apply the guidelines for action with no error by completing learning questions concerning the situation.

1.6. Content Use Level

After the enabling objective statements are categorized into content types, the “content use level” for each enabling objective statement is determined.

Content use level, or mastery level, is the degree of recognition and performance that a learner is expected to display after completing training at the section level. There are two levels of use, or mastery levels, that may apply to the five content types.

1.6.1. Remember Use Level

The learner recognizes and recalls information. The instructional tactics used to convey the information require the learner to memorize information for short to long-term memory storage.

1.6.2. Apply Use Level

This level requires the learner apply information to accomplish some task or solve a novel problem. The learner must be given opportunities to practice applying the information properly or practice in solving similar and dissimilar problems that move the learner to higher levels of discrimination and problem solving ability. Thus, more complex tactics are appropriate and applicable to this use level. For example, this level may require hands-on interaction with technical training equipment. It may require the use of the actual piece of equipment or possibly a part task trainer, providing a real world model of the equipment in which learning involves physical movement, coordination, and use of motor skills. Development of these skills requires practice and is measured in terms of speed, precision, distance, procedures, or techniques in execution.

1.7. Questions

Questions for the training lessons are developed following the standards specified in the Navy Assessment Question Specifications and Guidance document.

1.7.1. Assigning Questions to Content Types and Use Levels

After the enabling objective statements are categorized into content types and “content use levels”, questions can be developed. Use the following tables to determine the question types to employ based on the classification of each enabling objective statement.

Questions developed for the “Remember content use level” should assess if a learner is able to recognize and recall information.

Apply “content use level” questions are used to assess a learner on the performance of procedures taught during IMI or ILT. The learner may have access to manuals during evaluation. When different actions or a series of actions can accomplish the same task, a single preferred method should be taught and evaluated.

Table 4 Assessment Types for Concept Content Type

Content Use Level	Concept Content Type
Remember	Drag-and-Drop Identify (Hot Spot) Matching Multiple Choice-Multiple Answer Multiple Choice-Single Answer Short Answer (Fill in the Blank)
Apply	Drill & Practice Exercise Simulation

Table 5 Assessment Types for Fact Content Type

Content Use Level	Facts Content Type
Remember	Multiple Choice-Single Answer Short Answer (Fill in the Blank) Two-State
Apply	Not applicable

Table 6 Assessment Types for Procedure Content Type

Content Use Level	Procedure Content Type
Remember	Drag-and-Drop Matching Multiple Choice-Multiple Answer Ordering
Apply	Case Study Essay Exercise Gaming Goal-Based Oral Board Simulation

Table 7 Assessment Types for Process Content

Content Use Level	Process Content Type
Remember	Drag-and-Drop Matching Multiple Choice-Multiple Answer Ordering
Apply	Case Study Essay Exercise Goal-Based Oral Board Simulation

Table 8 Assessment Types for Principle Content

Content Use Level	Principle Content Type
Remember	Drag-and-Drop Matching Multiple Choice-Multiple Answer Multiple Choice-Single Answer Short Answer (Fill in the Blank)
Apply	Case Study Drill & Practice Essay Exercise Goal-Based Oral Board Simulation

1.7.2. Question Development for Remember Content Use Level

Questions developed for the “Remember content use level” should assess if a learner is able to recognize and recall information.

When designing questions to assess a learner on the recognition and recall of information for IMI or ILT consider the following general guidelines:

- State the test item clearly. Be specific yet concise. Do not assume that the learner knows the acronyms or the context of the question. Remember that questions can follow a section, or be included in a lesson progress test. Make sure that the question can stand on its own without additional explanation or instruction.
- Do not write questions that are unnecessarily difficult or easy. If the question is too difficult, then there will not be any discrimination among learners. Likewise, if the question is too easy, there will not be any discrimination value.
- Make sure the question requires comprehension and not recall when comprehension is being measured. For example, do not copy text directly from instruction that is easily identifiable.
- Avoid using negative phrases in the stem. If a negative phrase must be used, highlight it or underline it. NEVER use a negative phrase with negative options.

- Do not include a test item that compromises another test item. Questions that provide an answer to another question should be avoided.

Consider the following specific guidelines when designing each question type:

Drag-and-Drop and Matching
The learner drags text (graphically generated) or graphic objects to the appropriate location on the screen. See Figure **2**.

- This format provides answer choices that can be dragged to target areas on a base image.
- When designing the base image, make sure that the base areas are similar in size. This prevents the learner from guessing as to where to place an element based only on size.

Match each component on the LOS diagram to the correct fire control symbol.

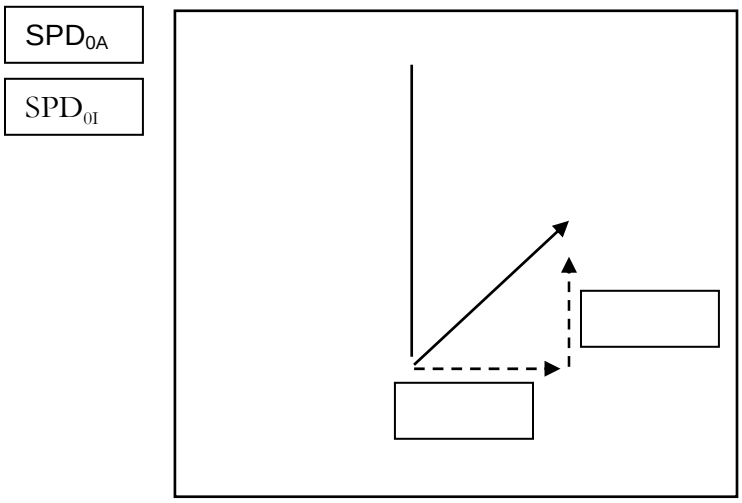

Figure 2 Example Drag and Drop

Identify (Hotspot)
The same image can be used to ask several questions. The image map requires the examinee to select a location on an image using a pointing device. This test format may be used in combination with multiple-choice options displayed on the map.

- The question should indicate that the examinee must select an area on the map.
- The image areas should be large enough that the examinee can pinpoint the area with a pointing device.

Multiple Choice-Single Answer and Multiple Choice-Multiple Answers
A properly developed multiple-choice test item can be challenging and objective consisting of a sound stem and balanced options.

- Present in the interrogative format.
- Use four answer options. More than four options takes too long to read and adds little value. Less than four options increases the effect of guessing. However, multiple-choice questions may include up to five distractors when the question is a multiple choice-multiple answer type.
- Ensure that the options are not misleading.
- Provide answer options in the same units of measurement.
- Make options plausible.
- Avoid the use of “all of the above” or “none of the above” as options. These options can be easily eliminated if one option is either correct or incorrect. They can also be meaningless if options are dynamically selected for display.
- Make sure that the options follow the stem grammatically.
- Avoid the use of qualifiers such as always, never, and sometimes for options.
- The options should be punctuated the same. For example, do not capitalize some options and not others; or end an option in a period while not doing so for others. Only end an option with a period if it is a complete sentence and only if all the options associated with the stem are complete sentences.
- Use discretion when designing questions. If an acronym is frequently used as the common term, then provide it only as an acronym in the body of the question. If it is an uncommon term that can be confused with others, omit the acronym and replace it with the complete term.

Ordering

Ordering requires learners to answer sequentially. The learner may order lists, events, or steps. Consider requiring the learner to order significant steps within a procedure. If there are more than seven steps that need to be put in order, consider chunking the steps into meaningful units and composing the questions into smaller units. Chunking the procedure into units that contain less than seven steps will likely help the learner retain the order well after the assessment is finished.

Short Answer (Fill in the Blank)

Short answers require one-word answers, brief narrative, numbers, or abbreviations. The author should anticipate as many variants of spelling, including misspelled words as possible. Consider using this type of question technique only when it is a requirement for the examinee to recall the exact spelling of the term.

Two-State

Two-state questions require one or two responses that can be objectively graded. Make sure the stem is a complete statement.

1.7.3. Question Development for Apply Content Use Level

Apply “content use level” questions are used to assess a learner on the performance of procedures taught during IMI or ILT. The learner may have access to manuals during evaluation. When different actions or a series of actions can accomplish the same task, a single preferred method should be taught and evaluated.

Case Study
The instructional purpose of a case study is to present the learner with a real-life situation. Case studies are used to help the learner role-play handling situations of a similar nature.

Drill and Practice
Drill and practice is used to elicit the recall of performance-based activities. Practice is usually presented repetitively, changing the nature of the question and the proper method to reach the correct answer slightly each time.

Essay
Essays require the learner to articulate in written form a procedure, process, or principle. In essays, a learner must decide how to approach the problem, what information to use, and how to organize the answer.

1. Writing skills may influence the scoring.
2. Scoring is subjective.

Exercise
An exercise is a series of guided interactions. It requires the learner to perform tasks that involve the application of knowledge and skills in the content of an actual process or procedure. The outcome of an exercise should be the successful completion of the process or procedure. For example, a practical exam is typically an exercise.

1. The expected level of mastery is usually presented before exercise lessons or exercise lesson section(s) begin.
2. Exercises usually include an entire process or procedure from beginning to end.
3. Feedback should be included in an exercise to reveal the incorrect nature of individual learner responses.

Gaming
Games allow learners to experiment with subject matter in a way that should enhance the understanding of the steps, rules and judgments required by procedures and processes. Games are frequently used to motivate the learner and gain the learner's attention.

Goal-Based Assessment
In goal-based assessment, IMI simulates a work environment where learners are provided the opportunity to follow procedures. Learners are able to make the same choices they make in a real situation and learn from mistakes after they occur.

Oral Board Assessment
In oral boards, a learner must be able to articulate reasoning and answer follow-up questions. An advantage of oral questioning is its flexibility and adaptability that makes it possible to discover the learner's level of knowledge and mental processes. For example, the evaluator can start with a hard question and then tailor it until the learner is able to sufficiently answer. This can reveal the deep and specialized knowledge that a learner can retrieve. Scheduling problems can occur when many learners need to be evaluated within a short time.

Simulation
If a multimedia simulation method is used, each graphic and each learner interaction must have the same look and feel as the real equipment or software, and wrong responses and interactions must be allowed.

IMI Assessment Further Guidance

At least two questions should be provided per section depending upon the content of the instruction.

For practice activities, the learner should be provided with two attempts to answer the question or perform the action correctly.

Feedback for practice activities states as a minimum:

- Correct Answer: "Correct," followed by an explanation of why the answer is correct.
- Incorrect Answer: "Incorrect." The screen indicates the learner's choice, places a "check" by the correct answer, and explains why the "corrected answer" is correct.

For progress tests, there should be at least 15 to 20 questions depending upon the content of instruction.

For scored assessment, it is recommended that the passing score be at least 70% for a homogeneous test. Some assessment may require a passing score of 100% to ensure mastery. Policy on passing scores is set by Center Training Directorates. Developers should consult with Learning Standards personnel for guidance.

1.8. Instruction

Once the questions are developed for each enabling objective statement, instructional content is developed. Content designed using skill objects, incorporates knowledge, skills, and abilities necessary for the sailor to perform a job. The skill object also includes tools and resources. For example, if resources include technical publications, those publications will be used at each applicable point in the lesson as indicated by the skill object; if the tools include technical training equipment, the equipment will be used as applicable from the skill object.

The following tables provide a list of instructional tactics that may be used when developing the instructional sections for the lessons. Recall that a section addresses one enabling objective statement. Each enabling objective statement was previously classified by content type, and content use level. Locate the content type and content use level in the tables provided. Based on the classification of each enabling objective statement locate the instructional tactics to use.

Table 9 Instructional Content for Concept Content Type

Content Use Level	Concept Content Type
Remember	Introduction Definition and Illustration Facts (optional) Example Non-example (optional) Analogy (optional) Interaction (optional) Note, Caution, Warning (optional)
Apply	Introduction Definition and Illustration Facts (optional) Example Non-example (optional) Analogy (optional) Interaction (optional) Note, Caution, Warning (optional)

Table 10 Instructional Content for Fact Content Type

Content Use Level	Facts Content Type
Remember	Introduction Facts Example (optional) Non-example (optional) Mnemonics (optional) Interaction (optional) Note, Caution, Warning (optional)
Apply	Not applicable

Table 11 Instructional Content for Procedure Content Type

Content Use Level	Procedure Content Type
Remember	Introduction Facts (optional) Example (optional) Non-example (optional) Analogy (optional) Procedure/ Decision/ Combined table (select one) Interaction (optional) Note, Caution, Warning (optional)
Apply	Introduction Facts (optional) Example (optional) Non-example (optional) Analogy (optional) Procedure/ Decision/ Combined table (select one) Demonstration Interaction Note, Caution, Warning (optional)

Table 12 Instructional Content for Process Content Type

Content Use Level	Process Content Type
Remember	Introduction Facts (optional) Staged table/block diagrams/cycle charts (select one) Interaction (optional) Note, Caution, Warning (optional)
Apply	Introduction Facts (optional) Staged table/block diagrams/cycle charts (select one) Demonstration (optional) Interaction Note, Caution, Warning (optional)

Table 13 Instructional Content for Principle Content Type

Content Use Level	Principle Content Type
Remember	Introduction Facts (optional) Principle statement Guidelines Interaction (optional) Note, Caution, Warning (optional)
Apply	Introduction Facts (optional) Principle statement Guidelines Interaction Note, Caution, Warning (optional)Demonstration

1.9. Writing Style Guidelines

To fully comprehend information, learners need to know how the information applies to them and the questions they are trying to answer. One of the best ways to help them do this is with "top-down" processing. Top-down processing presents an overall concept and then breaks it into smaller, more understandable components. For example, the pictures on each piece of a jigsaw puzzle and their relationship to each other are much easier to understand when you have seen the completed picture on the front of the box.[9] Use the following three concepts to integrate top-down processing into your content:

- Write function-based information
- Write for modular/non-linear use
- Organize content logically

1.9.1. Write Function-based Information

Make your content function-based; that is, design the learning object for a learner whose main purpose is to accomplish a function. Few people read technical learning contents for amusement; your learners read your information to do their jobs. Tell them only what they need to know for the task at hand in a format that is familiar. Extraneous information only confuses and frustrates the learners.

Task-based content arranges information around the result learners want to achieve, not around the product they are using. Product capabilities must be presented in the context of the job or task they support so learners can understand how the capabilities relate to their performance. For instance, a task-based learning element groups information about the Properties menu item under the task "Determining Your Hard Drive Space" because figuring out the available disk space is an actual task the learner must perform.

1.9.2. Write for Modular/Non-linear Reuse

Learning content has reached the interactive, electronic stage. Therefore, when you organize and design your content, plan and design for non-linear, online reading.

[9] Anderson, p. 174.

Non-linear use is similar to hypertext; learners can jump around to find information that helps them complete a task, answer a question, or understand a concept. You cannot assume they will read the training content like a book; front-to-back or start-to-finish. Instead, arrange your learning content in information topics that can stand-alone.

1.9.3. Organize Content Logically

Effective writing presents material when the learners need it and where the learners expect to find it. A sound organizational strategy for instructional text can mean the difference between learners accepting material and rejecting it.

The overall organization depends on the type of training content you are writing. Order the sections so that the learner does not have to search through the entire course for the information that is needed.

Topics may be organized according to:

- A learning order, from the information that is easiest to learn first to more difficult information that builds on the earlier learning.
- The frequency with which the information may be used, from the most frequently used to the least, or vice versa.
- The difficulty of the information for the audience, from the simplest to the most complex.
- The chronology of use from the first information needed to the last.
- A grouping of topics of similar purpose.

1.9.4. Headings

Enabling Learning Object (ELO) headings reveal the organization of your information and provide visual cues for where information can be found. ELO headings also give a preview of the content available in the section.

1.9.5. ELO Names

ELO names identify the information covered in that portion of the content. Help your learners find information. For example, if you name an ELO “Computer,” it does not indicate what information about the computer can be found here. Is it a list of hardware components or instructions for turning it on and off?

To help you write better ELO names, remember the following guidelines:

- Use gerunds (action verbs with an –ing ending) as good descriptive titles. For example, the words “accessing,” “saving,” and “opening” all indicate what task this information will help them perform.
- Write grammatically parallel titles, meaning titles that are written similarly for similar information. For example, in a section describing the start of operations, you might see titles such as Turning on the Server and Starting the Intelligence Mission Applications.

1.9.6. Presenting with Graphics

Use graphics to help learners quickly understand and apply information. Visual presentation helps learners see, at a glance, the information you are trying to explain. For example, a learner that sees a flowchart depicting a process will have an immediate overview of how each part relates to the other. This can then be explained by accompanying text.

When using graphics in your learning content, follow these guidelines:

- Look for places in the text where a graphic will enhance the explanation.
- Use the type of graphic that is appropriate for the information. Remember that screen captures are only one type of graphic; flowcharts, line drawings, graphs, and other types of graphics can also be used.
- Integrate the graphic with your text by referring to it and explaining what the reader is supposed to see or conclude from it.
- If the graphic is complex, annotate it or crop to feature only the area you want to focus on.
- Label and position the graphic relative to the information it supports so your learner can find it easily.

1.9.7. Figures and Graphics

Text informs learners in a sequential way; a figure or graphic informs in an instantaneous way. Because technical concepts are more easily understood when presented in an overall context, figures and graphics are vital to conveying an idea. They simplify and clarify concepts. You can use them to reinforce points, summarize data, and show relationships that are explained in the text.

1.9.8. Lists

One of the simplest things you can do to help learners find and understand information is break down complex statements into lists. When several ideas appear as an unbroken mass of print, it intimidates the learner and makes it difficult for them to pick out the important concepts. Lists add emphasis to key ideas by making them stand out against the surrounding text.

Some general guidelines for using lists are:

- Include two or more list items; a single item is not considered a list.
- Introduce the list with a sentence followed by a colon.
- Use parallel structure.
- If the list items are sentence fragments, begin with a capital letter and omit end punctuation.
- If the list items are complete sentences, begin with a capital letter and include end punctuation.
- Try to use fewer than nine items per list.

1.9.9. Tables

Use tables to clearly present information that is too complex for a list. For example, if the list items have two or more parts, they look better and are easier to understand in a table with headings.

Follow these rules when using a table:

- Provide a descriptive caption.
- Reference tables in the text before the learners encounter them.
- Use parallel structure in information and punctuation.
- Apply formatting to table data only if the conventions specify formatting.
- Do **not** use notes, cautions, or warnings inside a table. Instead, refer to them outside the table.

1.9.10. Incorporating Copyrighted Material

When using material in your learning content from outside sources, such as commercial manuals or reference books, you must appropriately document your sources. These materials are copyrighted and are subject to federal copyright laws.

1.9.11. Writing Clearly

Clear statements leave no question of what learners are supposed to do with the information. The clearer your text, the more readable your learning content is. Eliminate doubt about what learners are supposed to do with the information by writing directive sentences. A directive sentence makes a statement as a command. In procedural learning content, write with the assumption that you are instructing learners how to perform a task as they read your words. The voice of your sentences addresses the learner directly and establishes both an expected action and the learner who performs the action.

Example

Use
Turn on the computer.
Do not use
You should turn on the computer. (Implies uncertainty of the procedure.)
You can turn on the computer. (Implies that the command is an option.)
Turning on the computer is recommended. (Implies that the step can be ignored.)

Avoiding the following *action-optional* words and phrases helps eliminate doubt:

- Should/should be
- May
- Could/can
- Might
- Is recommended

1.9.12. Writing Concisely

Writing concisely simplifies the information and improves the clarity, both of which improve the readability of your learning content. Simple statements require less thought processing and learners can focus on the answer to their question (see Table **14**).

Table 14 Say it Simply

Complex	Simple
In addition	Also
In accordance with	By
In order to	**To**
For the purpose of	To, for
Due to the fact that	Because
It is requested	We request, Please
It is necessary that you	You need to, you must
It is apparent that	Clearly
In the event that	If
In the near future	Soon
Is applicable to	Applies

Use plain words over academic ones. See Table 15, for some commonly used academic words and their replacements.[10]

Table 15 Say it Plainly

Academic	Plain (and understandable)
Aforesaid	The, that
Ascertain	Find out
Commence	Begin, Start
Compensate	Pay
Consequently	So
Constitute	Make up
Endeavor	Try
Expend	Spend
Fabricate	Build
Facilitate	Make easier, help
Heretofore	Until now
Herewith is	Here is
Initiate	Begin
Nevertheless	Still
Notwithstanding	In spite of
Optimum	Best
Prioritize	Rank
Proceed	Go
Promulgate	Issue
Pursuant	Under
Terminate	End
Transmit	Send
The Undersigned	I
Utilize	Use

[10] Anderson, pp. 285-286.

1.9.13. Acronyms

Use these guidelines for when to spell out acronyms:

- Spell out acronyms on the cover and in every title in the Referenced Learning contents section.
- Spell out acronyms in section headings ***if*** it helps the reader identify the content of the section. For example, if the entire manual is about the ISDS, do not spell out *ISDS* in the headings. If a section is about the Error Log Manager (ELM), and most learners are not familiar with the acronym *ELM*, spell out the acronym in the heading.
- Spell out an acronym the first time it appears in the body of learning content and the first time it appears in the body of each main section of a double-sided learning content. Repeat the spelled out phrase more frequently if it is necessary for clarity.[11]
- Do ***not*** spell out an acronym if you are certain the learners understand it. Do make sure you include the spelled out acronym in the appendix.
- Do ***not*** spell out an acronym if you are referring to something the learners are more familiar with in its acronym form, like the title of a window. For example, if a window title is "IP Start," do not write, "The Installation Procedure (IP) Start window appears," because that would be inaccurate.

Use these guidelines to punctuate acronyms:

- Include *a*, *an*, or *the* before the acronym if it is common usage to do so. Choose *a* or *an* depending on how the acronym is pronounced.
- Do ***not*** use an apostrophe with plural acronyms.
- Do ***not*** capitalize the spelled out words unless there is a reason to capitalize them.

Examples

Use
an HTML file
Use
Turn off the TVs.
Update the SAMs.
Do not use
Turn on the TV's.
Update the SAM's.

Use	
GCCS	Global Command and Control System
COTS	commercial off-the-shelf
Do not use	
HTML	HyperText Markup Language
ASAP	As Soon As Possible

[11] Ibid., pp. 52, 98.

1.9.14. Capitalization

Capitalize only these words in your learning contents:

- The first word in headings, captions, and titles.
- The rest of the words in headings, captions, and titles except for *a*, *an*, and *the*; conjunctions (such as *or* and *but*); and prepositions (such as *over* and *with*) of four letters or less.[12]
- The first word in titles of troubleshooting scenarios.
- Learner interface objects, such as buttons and menus, using the capitalization as it appears in the learner interface.
- Names of people, places, programs/applications, segments, departments, or organizations if that body officially requires it.
- Words that make up an acronym only if the words should be capitalized.
- The words *section*, *table*, *figure*, and *step* if they are followed by a number.
- Do ***not*** capitalize generic job titles, such as system administrator or intel analyst.

1.9.15. Commas

Use commas in lists. This means that in lists of three or more items, use a comma before the conjunction (such as *or* and *but*).

Example

Use
We have canoed the Delaware, the Schuylkill, and the Susquehanna rivers.
Do not use
We have canoed the Delaware, the Schuylkill and the Susquehanna rivers.

1.9.16. Gender-Biased Language

Gender-biased language refers to gender unnecessarily. Do not use gender-biased language in your learning contents, because it can be inaccurate and/or offensive.

Example

Use
The intel analysts sit at their workstations.
Write for the people on the ship.
Do not use
The intel analyst sits at his workstation.
Write for the women on the ship.

1.9.17. Grammar and Punctuation (Miscellaneous)

Accurate grammar and punctuation are important, but not at the expense of understanding. When writing, do everything possible to avoid incorrect grammar and punctuation; but above all, do not confuse the reader. Use these guidelines for punctuation and grammar issues not covered elsewhere in this guide:

[12] Ibid.

- Precede a colon with a complete sentence unless the phrase introduces procedures.
- Use small caps and periods for A.M. and P.M.
- Do ***not*** use words like *this* or *it* unless you are absolutely sure the learner will have no doubt about what you are referring to.
- Do ***not*** use contractions.
- Do ***not*** use plural pronouns (such as *they* or *them*) when the word they refer to is singular.

2. IMI Curriculum Development

Interactive multimedia instruction, or IMI, curriculum development is unique in that the developers are designing for instruction that must be able to "stand on its own" without the aid of an instructor. Designing and delivering IMI requires thoughtful analysis and investigation of how to use IMI's potential in concert with instructional design principles. The following guidance will help in preparing IMI for delivery in the ILE.

2.1. Content Repurposing and Reuse

Reuse is the use of an existing object in a new learning event without any modification to its instructional treatment, context, or content. Repurpose is the use of an existing object in a new learning event with minimal modification to its instructional treatment, context, or content.

Lessons will likely be located on a learning content management system (LCMS) during development to support content repurposing and reuse capabilities. Consider the impact of repurposing and reuse when selecting the authoring system for IMI development purposes.

Although, a primary objective of the ILE is to leverage repurposing and reuse, it is important to recall the implications of linking.[13]

Only link to content if:

- You do not "own" the content and do not see any need to own it.
- A change to the content by the owner does not impact your instruction.
- The content belongs to another organization and is therefore maintained by them.

2.2. Instruction for IMI

The instructional content should be modular and provide enough guidance that the assessment questions associated with the content are addressed in the body of the content. It is important to consider that the instructional content should be designed to stand-alone. An instructor will probably not be available to provide additional guidance during instruction. Therefore, the content must be as descriptive as possible to guide the learner through the material and answer the questions a learner may have. It is also important to remember that the learner will read the material on a computer screen. Therefore, use formatting and organizational methods to help guide the learner.

2.2.1. Designing the Overview for IMI

Each lesson begins with an overview. Each overview consists of the following information:

- Introduction
- Learning Objectives

[13] The R^3 model of reuse, repurpose and reference should be considered during instructional content development. If possible, an R^3 analysis should be performed prior to IMI development.

- Importance
- Bibliography/References

A template may be used to help with the development of an overview for the lessons. Figure 3 is an example of a template. Figure 4 is an example of a storyboard of an overview for a lesson. Figure 5 shows how the text will appear in an IMI lesson.

You are about to begin the [Click **here** and insert lesson name] lesson. This lesson describes [Click **here** and insert descriptive text].

This lesson includes [Click here and insert number of CONTENT sections] sections that should take approximately [Click **here** and insert minutes] minutes each. You may take the lesson in increments or in one continuous session—according to your preference.

Section 1 — [Click **here** and insert section name]
Section 2 — [Click **here** and insert section name]
Section 3 — [Click **here** and insert section name]
Section 4— [Click **here** and insert section name]
Section 5 — [Click **here** and insert section name]
Section 6 — [Click **here** and insert section name]

Non-graded quizzes will be presented throughout the lesson to review and reinforce key teaching points. A graded progress test will be delivered at the end of the lesson.

The following learning objectives will be addressed in this lesson:

[Click here and insert learning objective associated with Section 1]
[Click here and insert learning objective associated with Section 2]
[Click here and insert learning objective associated with Section 3]
[Click here and insert learning objective associated with Section 4]
[Click here and insert learning objective associated with Section 5]
[Click here and insert learning objective associated with Section 6]

The following publications provide additional information:

[Click **here** and insert number and name of publication]
[Click **here** and insert number and name of publication]
[Click **here** and insert number and name of publication]

Figure 3 Overview Template for IMI

You are about to begin the lesson on Precision Measuring Devices. The maintenance person must have--and use--the correct tools in order to do work quickly, accurately, and safely. Without the proper tools or knowledge to use them, the maintenance person wastes time, reduces efficiency, and may face injury.

The proper use of tools allows for increased efficiency. If a tool is not used properly, dangerous situations may arise. A tool is to be used ONLY for the purpose for which it is designed. The user must always:

- Be alert for any conditions that will endanger anyone including him/herself.
- Wear personal protective equipment whenever required.
- Follow safety guidelines.

This lesson describes the purpose and proper use of precision measuring tools to include the steel rule, micrometer, vernier caliper, torque wrench, and precision gages.

This lesson includes five sections that should take approximately 20 minutes each. You may take the lesson in increments or in one continuous session—according to your preference.

Section 1 — Steel Rule
Section 2 — Micrometer
Section 3 — Vernier Calipers
Section 4 — Torque Wrenches
Section 5 — Precision Gages

Non-graded quizzes will be presented throughout the lesson to review and reinforce key teaching points. A graded progress test will be delivered at the end of the lesson.

The following learning objectives will be addressed in this lesson:

1. Given a question, the learner will describe the purpose and proper use of the steel rule when taking a knowledge exam in which the student must get 70% correct.
2. Given a question, the learner will identify the types of micrometer and their proper usage when taking a knowledge exam in which the student must get 70% correct.
3. Given a question, the learner will identify the types of Vernier calipers and their proper usage when taking a knowledge exam in which the student must get 70% correct.
4. Given a question, the learner will identify the types of torque wrenches and their proper usage when taking a knowledge exam in which the student must get 70% correct.
5. Given a question, the learner will identify the types of precision gages and their proper usage when taking a knowledge exam in which the student must get 70% correct.

The following publications provide additional information:

- CINCLANTFLT/CINCPACFLTINST 4790.3, Joint Fleet Maintenance Manual (JFMM)

- NAVEDTRA 14104, Fireman

- NAVEDTRA 14256, Tools and Their Uses
- NAVEDTRA 12204-A, Machinery Repairman
- NSTM S9086-CJ-STM-000/CH-075, Fasteners
- OPNAVINST 5100.19 series, Navy Occupational Safety and Health (NAVOSH) Program Manual for Forces Afloat

Figure 4 Example of a Storyboard using the Overview Template

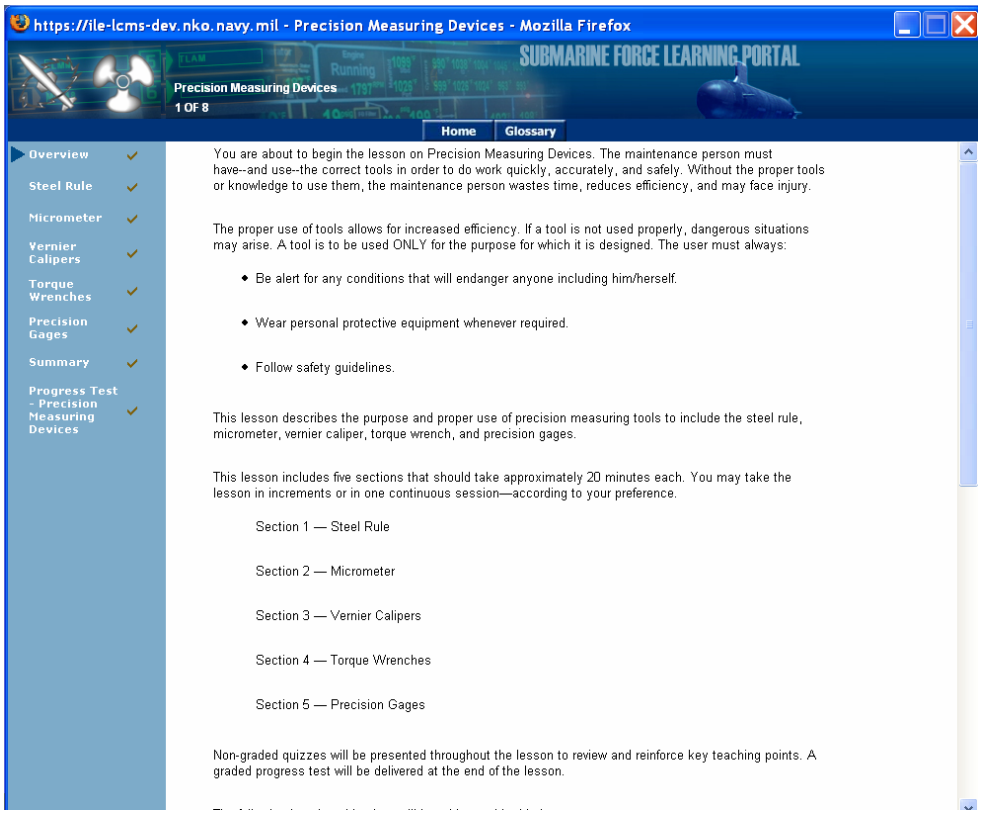

Figure 5 Example of the Overview Displayed in IMI

2.2.2. Designing the Sections for IMI

The instructional content associated with sections depends on the content type identified for the sections.

Each section should be subdivided into a Learn, Explore and Practice group and address various levels of interactivity (see Table 16 and Table 17).

What is the difference between these groups?

The Learn, Explore, Practice groups are used to progressively provide the learner with opportunities to enhance understanding of the learning content. As such, the Learn group usually provides broad descriptive information about the topic in narrative form.

The Learn group contains instruction that is similar to what we equate with lecture-based instruction. In the Learn group, instruction provides a description of the overall concept and then breaks it into smaller, more understandable components. In the Explore group, the learner is provided with more opportunities to improve understanding. This can be done in the Explore group by providing amplifying information, examples, more detail, and different perspectives. The Explore group should leverage the interactive capabilities of IMI. Learning activities and step-by-step problems are presented with coaching which provides opportunities for the learner to progressively internalize the content of instruction. The Practice group contains assessment questions which allow the learner to practice the application of what was learned with informative feedback so that the learner can increasingly enhance understanding of the learning content.

Table 16 Learn, Explore Practice Description

Learn

Guidance: Instructional content contained within the Learn group addresses knowledge attainment. Normally the Learn group consists of the knowledge or familiarization component of instruction. It is typically provided in a linear format and introduces an idea or concept.

Explore

Guidance: Instructional content within the Explore group includes examples, learning activities, and cognitive strategies. This instructional content is provided to help the learner understand the content presented in the Learn group. This includes the recall of more information addressed in the section. Emulations or simulations may be presented to the learner. Activities that help the learner study the information may also be provided within the Explore group.

Practice

Guidance: Includes unscored practice test questions required for meeting the enabling objective statement.

Table 17 Levels of Interactivity Implied by the Group

Group	Level of Interactivity[14]	Category of Interactivity
Learn	Level I	The student acts solely as a receiver of information.
	Level 2	The student makes simple responses to instructional cues.
Explore	Level 2	The student makes simple responses to instructional cues.
	Level 3	The student makes a variety of responses using varied techniques in response to instructional cues.

[14] For a complete description of the levels of interactivity refer to MIL-HDBK-29612-3 31 Aug 2001.

Group	Level of Interactivity[14]	Category of Interactivity
	Level 4	The student is directly involved in a life-like set of complex cues and responses.
Practice	Not applicable.	Not applicable.

Templates may be developed for each content type for storyboard development. For an example of a template, see Figure 6. Figure 7 is an example of the beginning of the Learn group instructional content for an IMI lesson developed using the template.

[Type Section Name **here**]
[Type Learning Objective **here**]
LEARN
[Type Section Name **here**]
[Click **here** and type text for intro]
[Click **here** and type text for facts (optional)]
[Click **here** and insert definition]
[Click **here** and insert graphic]

MEDIA ELEMENT TEMPLATE
Caption: [Click **here** and type text for caption]
Alt text: [Click **here** and enter text that explains what is shown in the graphic.]
Source PathName: [Click **here** and add path from media repository]
Security Classification: [Click **here** and add Classification]
Graphics Instructions: [Add specific instructions for artist]
Key Words & Phrases: [Add 1-5 keywords or phrases]
Suggested File Name **(**Optional): [Add suggested file name]

[Click **here** and insert List (optional)]
[Click **here** and insert table (optional)]

EXPLORE
[Click **here** and type text for greater detail (optional)]
[Click **here** and type text for Example]
[Click **here** and type text for Non-Example (optional)]
[Click **here** and type text for Analogy (optional)]

PRACTICE
Please answer the following questions to review what you have learned.
Assessment type: [Click here and type Assessment type]
Classification: UNCLASSIFIED
Question: [Click **here** and type text for Question]
Correct Answer(s):
[Click here and type 1st answer]
[Click here and type 2nd answer]
[Click here and type 3rd answer]
[Click here and type 4th answer]

Incorrect Answers:
[Click here and type 1st answer]
[Click here and type 2nd answer]
[Click here and type 3rd answer]
[Click here and type 4th answer]

Correct remediation: Correct. [Click here; type additional info]

Incorrect remediation: The answer was incorrect. [Add text here]

Figure 6 Section Template for IMI

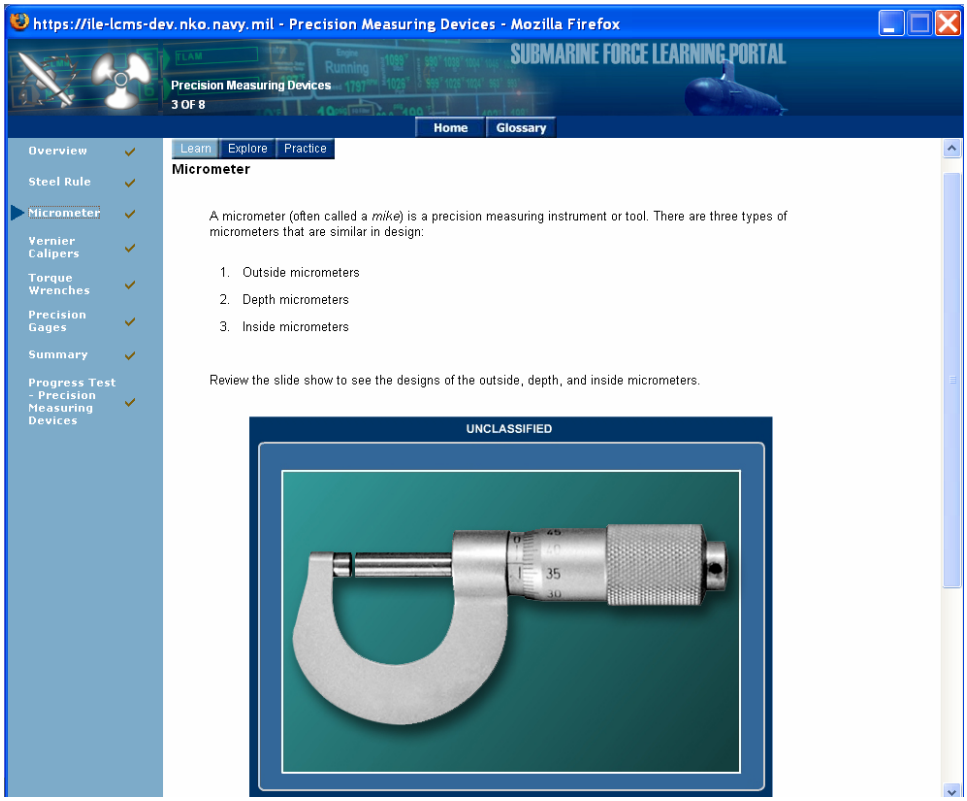

Figure 7 Example of the Section Displayed in IMI

2.2.3. Designing the Summary for IMI

A summary and progress test follows the completion of the lesson.

The summary includes a list of the enabling objective statements addressed in the lesson. The summary may also provide a review, expand on key material, and develop relationships that lead to generalizations.

A template may be used to help with the development of the summary for the lessons. Figure 8 is an example of a summary template. Figure 9 is an example of the summary for an IMI lesson developed using the template.

You have now completed [Click **here** and type lesson name]. The following learning objectives were addressed in this lesson:

[Click here and insert learning objective associated with Section 1]
[Click here and insert learning objective associated with Section 2]
[Click here and insert learning objective associated with Section 3]
[Click here and insert learning objective associated with Section 4]
[Click here and insert learning objective associated with Section 5]
[Click here and insert learning objective associated with Section 6]

Once you are satisfied that you understand the material, press the "Next" button to proceed to the progress test. Your performance on these questions should give you a general idea of your mastery of the material in preparation for the module test.

Figure 8 Summary Template for IMI

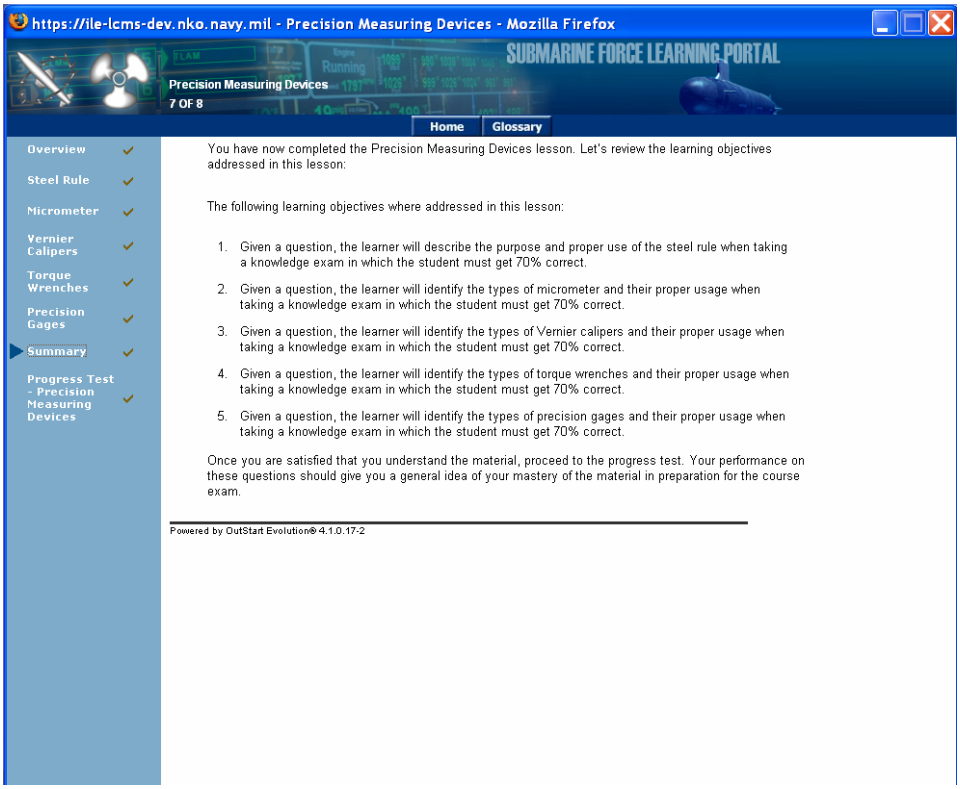

Figure 9 Example of the Summary Displayed in IMI

2.3. Evaluation of IMI

IMI should undergo several evaluations. In the early stages, subject matter experts and instructors review the content for accuracy. When the IMI is piloted, data should be collected regarding the learners' reaction to instruction. In addition, an evaluation should assess the extent students have advanced in skills, knowledge, or attitude. Finally, a longitudinal evaluation may be done to determine if the acquired skills and knowledge are accurately applied in the intended environment. This is a typical approach for evaluating a training program. Based on these evaluations, the IMI is modified and updated.[15]

[15] The Kirkpatrick Model of Training Evaluation provides a representation of the evaluation process for training programs. This model includes four levels of evaluation that measure reaction, learning, behavior, and results.

3. ILT Curriculum Development

Instructor-led training, or ILT, curriculum development is unique in that the developers of Navy training are required to design for instruction that can be delivered in the ILE. Using the following guidelines, developers can more efficiently reuse and repurpose the instructional content to build ILT solutions.

3.1. Lesson Plans for ILT

Course lesson plans should contain certain elements in the front and back matter.

Front matter should contain:

- List of Effective Elements that informs the user that sections have undergone a change. All front matter elements and content are tracked by change level. In new development, such tracking is not necessary since all elements are new.
- Change Record Page that records the entry of changes in the lesson plan.
- Table of Contents listing all elements of the lesson plan.
- Security Awareness as it pertains to the course materials.
- Safety/Hazard Awareness as it pertains to the course materials.
- Information on how the lesson plan should be used.
- Allocation of Instructional Time that provides section, lesson, and module lengths.

Back matter should contain:

- Resource Requirements List
- Answer Sheets for any assignments given
- Fault Applicability List

The instructional content should be modular to the extent possible to allow flexibility for instructional schedules. Content should provide all necessary references to technical publications so the instructor can personalize and prepare for instruction.

Careful consideration should be made to ensure an appropriate link to Navy training requirements (Skill Objects). Courses, modules, lessons, and sections should be structured to support Skill Object data requirements. Notionally, the following structure might apply. However, there must be flexibility to allow developers the freedom to structure content in a manner that best supports the desired learning events.

Courses may be named using the critical work function (CWF) title:

- CWF: Maintain and Operate Auxiliary Systems.
- Course title: Maintaining and Operating Auxiliary Systems.

Modules may be named using the skill object title.

- Skill object: Auxiliary Equipment Troubleshooting.
- Module title: Auxiliary Equipment Troubleshooting.

The lesson titles and terminal objectives may be developed using the skill object's level 1 data.

- Level 1 Data: Maintain auxiliary equipment.
- Lesson Title: Maintaining Auxiliary Equipment.

The sections and ELOs may be developed from the skill object's level 2 data. Examples of level 2 tasks follow:

- Clean auxiliary equipment.
- Inspect auxiliary equipment.
- Lubricate auxiliary equipment.

It is possible that skill objects will sometimes have "broad" tasks assigned, requiring that more specific objectives be developed that are directly related to the tasks from the skill object. It is acceptable to develop objectives and materials that meet the intent of the skill object tasks. Job steps from skill objects are located in the sub discussion points and/or trainee guide.

3.1.1. Designing the Overview for ILT

Each lesson begins with an overview. Each overview consists of the following information:

- Introduction
- Terminal Objective Statements
- Importance
- Bibliography/References

Content that is designed using skill objects includes the knowledge, skills, and abilities necessary for the sailor to perform a job. The skill object will include tools, resources, and unique knowledge required for each learning event. Knowledge, skills, and abilities will be incorporated through the use of level 2 JTA data. Tools and resources will be incorporated into each enabling objective statement through the corresponding discussion points, and related instructor activities. For example, if resources include technical publications, those publications will be used at each applicable point in the discussion points and as indicated by the skill object. If the tools include technical training equipment, the equipment will be used. **Figure 10** is an example of an Overview for ILT.

Lesson: Maintaining Auxiliary Equipment CIN: X-XXX-XXXX
Change 0

OVERVIEW

Introduction: You are about to begin the lesson on Maintaining Auxiliary Equipment. You will learn to clean, inspect and lubricate this equipment. Non-graded quizzes will be given during each section, and graded practical or progress exams will be delivered at the end of each section.

This lesson includes the following sections:

1. Cleaning Auxiliary Equipment
2. Inspecting Auxiliary Equipment
3. Lubricating Auxiliary Equipment

Terminal Learning Objectives:

1. Given the technical publication of the auxiliary equipment, the learner will be able to describe the general, physical, functional operation, interfaces, and documentation of the auxiliary equipment with 90% accuracy on a knowledge-based progress test.

2. Given the technical publication of the auxiliary equipment, the learner will be able to clean, inspect, and lubricate the auxiliary equipment with 90% accuracy on a performance-based test.

Importance: This course introduces you to maintenance procedures required to ensure proper auxiliary equipment operation.

References:

1. Technical Publication XXXX-XX, Auxiliary Equipment

Figure 10 Example of Overview for ILT

3.1.2. Designing the Sections for ILT

The sections and enabling objective statements are developed from the skill object's level 2 data. The instructional content associated with each section depends on the content type identified. The ISD and SME must determine the content type for each enabling objective statement. The section and associated trainee guide is formatted to include the content type elements specific to the content type selected. For instance, if a procedure content type is selected, the section and/or trainee guide contains the following:

- An introduction
- Facts
- Procedure/decision/ combined table (select one)
- A demonstration/example
- Practice

Content type elements can be part of the section content or displayed on a trainee guide sheet. Each objective results in a main discussion point.

Examples of level 2 tasks follow:

Clean auxiliary equipment.
Inspect auxiliary equipment.
Lubricate auxiliary equipment.

Example Section Title for Procedure Content Type: Cleaning Auxiliary Equipment

Example enabling learning objective: *Given the technical publication cleaning steps of the auxiliary equipment cleaning procedure, the learner will clean the auxiliary equipment with 90% accuracy during a performance-based test.*

The first page of the section is the section introduction page, and contains the introduction, enabling objective statements, importance of the subject matter, and references. The section title page must also include trainee preparation materials, instructor preparation material, and any training materials required to conduct the section. See **Figure 11** for an example of Section Introduction Page for ILT.

Lesson: Maintaining Auxiliary Equipment

CIN: X-XXX-XXXX
Change 0

Section: Cleaning Auxiliary Equipment

Introduction: You are about to begin the section on Cleaning Auxiliary Equipment. You will learn to clean this equipment. A graded knowledge/practical progress test will be delivered at the end of this section.

Enabling Learning Objectives:

1. Given the technical publication cleaning steps of the auxiliary equipment cleaning procedure, the learner will clean the auxiliary equipment with 90% accuracy during a performance-based test. XXXX

Importance: This section provides the learner with the skills necessary to clean auxiliary equipment, promoting efficient operation.

Trainee Preparation:
None

Instructor Preparation:
A. Review Assigned Trainee Material
B. Reference Publications
1. XXXX-XX, Auxiliary Equipment

C. Training Materials Required:
1. Trainee Guide
2. References
a. XXXX-XX, Auxiliary Equipment
3. Miscellaneous Materials
a. PowerPoint Presentation X-XXX-

4. Training Devices
a. Auxiliary Equipment
b. Electronic Classroom

Figure 11 Example of Section Introduction Page for ILT

See **Figure 12** for an example of the Section Discussion Points Page, the first main discussion point is “Facts on Cleaning the Auxiliary Equipment.” Sub-level discussion points follow the discussion point. These provide a detailed description of the procedure. This description should directly support the procedure. Steps for the procedure are derived from the skill object, if steps are part of the skill object. It should also contain a sub discussion point on Safety. In many cases, a procedure content type will be preceded by a fact content type (or other “remember” use level content type) that

provides the general, physical, functional, interface or documentation descriptions that indirectly support the procedure.

A main discussion point called “Demonstration” or “Example” follows, allowing the instructor to demonstrate or provide an example of the procedure.

A main discussion point called “Practice” follows the demonstration that allows the trainee to practice the newly developed skill. In the following example of the Section Discussion Points Page, the discussion point related instructor activity column has the instructor refer the trainee to a trainee guide procedure table that contains the procedure, decision, or combined table that steps them through the procedure or points them to the applicable procedure in the technical documentation. This discussion point also contains safety, and safety considerations included in the table.

Lesson: Maintaining Auxiliary Equipment — CIN: X-XXX-XXXX Change 0

Section: Cleaning Auxiliary Equipment

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
1. Facts on Cleaning Auxiliary Equipment	1. Reference Technical Publication XXXX-XX, Auxiliary Equipment. Refer Trainees to Chapter X.
a. Remove…..	
b. Clear…..	
c. Swab…..	
d. Safety	
2. Demonstration	2. Demonstrate the cleaning procedure
a. Safety	
3. Practice	3. Refer Trainees to Job Sheet number XX-XX in the Trainee Guide. Direct Trainees to perform the steps on the Procedure Table. Provide assistance. *(Safety will be included in the table.)*

Figure 12 Example of Section Discussion Points Page for ILT

A discussion point called “Procedure” will follow the practice. The learner will perform the procedure independently.

A discussion point called “Summary” follows the procedure, allowing the instructor to review the ELOs and summarize the learning event that occurred. The summary may also provide a review, expand on key material, and develop relationships that lead to generalizations. See **Figure 13**.

For the procedure content type ("apply" content use level), a performance-based progress test may occur after the section summary. If it makes more sense to conduct a test after a group of sections, typically at the lesson level, the test may be conducted after the completion of the lesson or after a logical group of sections. A knowledge-based progress test should also be used within the section or lesson after the learner has received knowledge-based information or content types ("remember" content use level). One use may be to administer a knowledge-based progress test, the successful completion of which leads to a practical exam.

Lesson: Maintaining Auxiliary Equipment

CIN: X-XXX-XXXX
Change 0

Section: Cleaning Auxiliary Equipment

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
4. Procedure	4. Refer Trainees to Job Sheet number XX-XX in the Trainee Guide. Direct Trainees to perform the steps on the Procedure Table.
5. Summary	
a. Objectives	
b. Review	
6. Progress Test (knowledge and practical)	

Figure 13 Example of Section Discussion Points Page for ILT (Cont'd)

Discussion Points and Trainee Guide Sheets

Discussion points guide the instructor to provide oral instruction, or to refer or direct trainees to technical documents or the trainee guide for amplifying information best taught using graphic illustrations, tables/charts or textual information for the learner. Each trainee guide sheet is "anchored" to a discussion point, using the related instructor activity column to refer or direct the trainees to the associated trainee guide sheet. The following table provides some suggestions for the contents of the trainee guide and discussion points based on content types and the elements of each. Some content type elements are optional; all others are required. In some cases the use of a discussion point will suffice; in others the trainee guide should be used to provide tables, charts, graphics, and textual information to support the instruction. See **Table 18**.

Table 18 Discussion Point (DP)/Trainee Guide (TG) Table

Fact	Concept	Principle	Process	Procedure
Facts: DP/TG Sheet	Facts (optional): DP/TG Sheet	Facts (optional): DP/TG Sheet	Facts (optional): DP/TG Sheet	Facts (optional): DP/TG Sheet
Graphic (optional): TG Sheet	Define: DP/TG Sheet	Principle statement: DP/TG Sheet	Staged table/block diagrams/cycle charts (select one): TG Sheet	Procedure/Decision/ Combined table (select one): TG Sheet
List (optional): DP/TG Sheet	List (optional): DP/TG Sheet	Guidelines: DP/TG Sheet	Practice: DP/TG Sheet	Demonstration/Example (optional): DP/TG Sheet
Table (optional): TG Sheet	Table (optional): TG Sheet	Example: DP/TG Sheet		Practice: DP/TG Sheet
Example (optional): DP/TG Sheet	Example: DP/TG Sheet	Non-example (optional): DP/TG Sheet		
Practice: DP/TG Sheet	Non-example (optional): DP/TG Sheet	Practice: DP/TG Sheet		
	Analogy (optional): DP/TG Sheet			
	Practice: DP/TG Sheet			

Trainee guide sheet types are: information, diagram, problem, job, assignment, or outline. **Table 19** provides suggestions for using trainee guide sheets based on content types. Outlines are not shown on the table because they consist of an outline of the section that mirrors the discussion points.

Table 19 Use of Trainee Guide Sheets

Fact	Concept	Principle	Process	Procedure
Facts: Information Sheet	Facts: Information Sheet	Facts (optional): Information Sheet	Facts (optional): Information Sheet	Facts (optional): Information Sheet
Graphic: Diagram Sheet	Define: Information Sheet	Principle statement: Information Sheet	Staged table/block diagrams/cycle charts (select one): Diagram Sheet	Procedure/Decision/ Combined table (select one): Diagram Sheet
List: Information Sheet	List (optional): Information Sheet	Guidelines: Information Sheet	Practice: Job Sheet	Demonstration/Example (optional): Job Sheet
Table: Diagram Sheet or Information Sheet	Table Diagram Sheet or Information Sheet	Example: Information Sheet or Diagram Sheet		Practice: Job Sheet

Fact	Concept	Principle	Process	Procedure
Example: Information Sheet or Diagram Sheet	Example: Information Sheet or Diagram Sheet	Non-example (optional): Information Sheet or Diagram Sheet		
Practice: Problem Sheet or Assignment Sheet	Non-example (optional): Information Sheet or Diagram Sheet	Practice: Problem Sheet or Assignment Sheet		
	Analogy (optional): Information Sheet			
	Practice: Problem Sheet or Assignment Sheet			

The trainee guide front matter should contain:

- Title Page: Identifies the title of the course, the course identification number, the revision or change number, the approving agency, and the promulgation date.
- Trainee Name Page: The trainee can enter their name and class number on this page to identify ownership.
- List of Effective Elements: Informs the reader of instruction sheets that have undergone a change. All front matter elements and instruction sheets are tracked by change level. In new development, such tracking is not necessary since all elements are new.
- Change Record Page: Records the entry of changes into the trainee guide.
- Safety/Hazard Awareness Notice: It is identical to the Safety/Hazard Awareness Notice in the lesson plan.
- Security Awareness Notice: Is identical to the Security Awareness Notice in the lesson plan. If you need to add any information, you should go to the lesson plan and edit the Security Awareness Notice there.
- Table of Contents: Lists the titles and the page numbers of all instruction sheets arranged by module, lesson, and section.
- How to Use Your Trainee Guide: Information for the trainee on the composition, function and use of instruction sheets and what the trainee can expect regarding examinations and quizzes in the course.
- TLOs identical to those found in the lesson plan.

Related Instructor Activities

The Related Instructor Activity (RIAs) column is used to give the instructor details and direction about what activities will occur with corresponding discussion points. The RIAs provide an opportunity to employ blended solutions in the classroom and lab environment, allowing the use of many instructional delivery methods, including self-paced courseware, simulations, software scenarios, and use of psychomotor skills with technical training equipment. RIAs should be numbered with the corresponding discussion point. There are many RIA action options available to developers and SMEs.

These provide the basis for activities in the classroom. To keep uniformity, the following RIA actions and their definitions are provided:

Reference: Used when the instructor needs to reference technical publications or other source material to prepare for instructing.

Refer to: Used when an instructor should refer to materials for use in the classroom without necessarily having the trainee go there.

Refer Trainee to: Used when the instructor wants the trainee to go to the material in the classroom.

Display: Used when the instructor needs to display instructional media materials to the class.

Direct Trainee to: Used when the instructor needs to have the trainee perform a particular task, including hands-on activity in a laboratory, discussions, and seminar activities.

Demonstrate, Show, Point to: Used to tell the instructor what actions are required and identify any unique approach that may be necessary to teach the lesson.

Prepare: Used to tell the instructor to prepare for an event.

Instructor Personalization

Personalization is information that draws on an instructor's unique experience with the subject matter. The structure of the lesson plan requires the instructor to personalize each section as a subject matter expert by reviewing each reference and adding content based on their knowledge of the subject. The final lesson plan, trainee guide and instructional media materials result in the approved materials for the course; however, instructors should add their own personalization to the lesson plan to provide amplifying information necessary to make the instruction uniquely theirs without deviating from the approved course of instruction.

Personalization includes adding subject matter detail needed to cover the topic discussion points to the required depth.

Subject Matter Detail: Use this type of information to provide technical details. Course reference materials provide this information and must be thoroughly reviewed by instructors while preparing to instruct the material.

Instructional Techniques: Use carefully written questions to check for knowledge, well-planned visual aids, and additional student/instructor activities to enhance the lesson.

Personal Experiences: The addition of on-the-job experiences increases student interest and understanding. Relating personal experiences has the positive effect of reinforcing the practical application of the material.

Examples and Analogies: Support main points of the lesson plan by examples and analogies to simplify the concepts or ideas being taught. For example, if the lesson is on the way sound waves travel through air, but the class has difficulty understanding that

concept, then perhaps an analogy such as “it is similar to the way ripples travel after a stone is dropped in water” will help them understand.

Discussions and Seminars: Engage the class in discussions to share and collaborate on key points. Seminar activities can also be used, such as brain-storming and role-playing.

Instructional Media Materials
Instructors may want to use graphic presentations to accentuate their materials. An example of this is the use of software presentation applications. Presentations should be well organized and color schemes should provide adequate contrast between backgrounds and text or graphics so they can be easily seen and read by the student.

Presentations should use one concept per slide to clearly illustrate a point. Slide titles should be in title case letters using 36 to 48-point font size. Bullets should be upper and lower case letters and between 24 and 32-point, with sub-bullets going down to no smaller than 16-point. Labels and captions should not be smaller than 14-point. Arial or Times New Roman fonts are the most appropriate formal font types for instructional presentations.

Animation should be used when it enhances a point or more clearly illustrates a concept. Sounds should be used in the same manner. It is always recommended that presentations be viewed in the classroom where they will be displayed to students before use. This allows a final look to ensure the display is clear and legible from the back of the room.

Presentations and slides should be numbered using locally approved conventions. It is important to identify presentations and slides so they can be called out appropriately in the related instructor activity column of the lesson plan.

The uses of dynamic instructional media materials that require the use of different senses (audio/visual) will reach the varying learning styles of students. Hearing and seeing audio/visual materials will also facilitate retention.

3.2. Evaluation of ILT

Phases 1 through 3 concern the analysis, design, and development of lesson plans and trainee guides. These phases have been previously described, using skill objects to derive learning objectives, discussion points, and job steps, and content types to create content. [16] Section 1 provides further information on content types that will aid the ISD, SME and content developer with determining appropriate content types and the elements that are required or optional for each.

Phase 4 concerns the implementation of materials, beginning with a pilot to validate instructional flow, sequence, time, and quality. Center Training Directorates should be consulted with regard to specific pilot policies on when to proceed with a formal pilot of the material, conduct a pilot for time only, or when to waive a pilot. Piloting of materials requires monitors who are subject matter experts, as well as familiar with content standards and guidelines. A pilot coordinator should be assigned and should meet with

[16] All existing AIM-based lesson plans, trainee guides, and supporting graphics and media shall be published from AIM I or AIM II software applications as browser friendly Extensible Markup Language (XML) data outputs, packaged in accordance with the requirements of either the Advanced Distributed Learning (ADL) SCORM 1.2 or 2004.

stakeholders to determine if the material is ready to pilot. The coordinator should also assign monitors, a timekeeper, and provide overall monitoring guidance. Every effort should be made to allow all sites teaching the materials to sit in on the pilot. Monitoring reports should be submitted to the chairperson on a regular basis. A final monitoring report should be submitted to provide details concerning additional work or materials required to promulgate the materials.

Pilot monitoring reports should include:

- Course Identification Number
- Location
- Course Title
- Period of the Report
- Course Convening Dates
- Monitors/Timekeeper
- Administration
    - Facilities
    - Safety
    - Security
    - Time Allocation
    - Summary of Student Critiques
- Curriculum Validation
    - Lesson Plan
    - Trainee Guide
    - Equipment/Tools
    - Instructional Media
    - Instruction Quality
    - Testing
- Overall Instructional Accuracy/Adequacy and determination of success or failure
- Minority Report, if applicable

Phase 5 is the constant monitoring of the materials to ensure they meet the training requirements. If a change occurs to a skill object, a change will most likely need to be made to curriculum materials. Additionally, instructors, course reviews, feedback from the fleet, assessments, and student critiques may lead to the need for content modifications.

ADDENDUM A

OutStart Evolution® Knowledge Developer: Development Guidelines

The developer of the IMI works closely with the instructional systems designer, storyboard author, and the graphic designer to create the lessons in OutStart Evolution® Knowledge Developer.

Importing Storyboards

There are two options for importing the storyboards:

- Using the Microsoft® Word Import option.
- Using the templates.

Word Import

You can import the Word documents into the OutStart Evolution® Knowledge Developer hierarchy. Make sure that the appropriate heading styles are selected for the various sections of the Word document so that the mapping to the OutStart Evolution® hierarchy is correct.

Using Templates

Templates may be developed within OutStart Evolution® Knowledge Developer environment that comprise the basic structure for sections. See Figure 14.

Figure 14 Example Templates

Aggregating Learning Objectives

Recall that the Aggregate element in OutStart Evolution® Knowledge Developer gathers existing information from designated fields of the Data tab. The aggregated information displays with a title and text in list format. Aggregated elements are commonly used to list objectives within the lesson.

Recall that on the Source tab of the Aggregate element, the level drop-down list provides you with a choice of the content levels available for aggregation.

The Group/Tag drop-down list provides you with a selection of the metadata tags made available for aggregation by the platform administrator.

Developers should aggregate learning objectives.

Hyperlinking Content

Hyperlinks may be used. However, they should only reference documents within the course. If you plan to link to content outside the course, consider how that content's lifecycle management may impact the course.

Working with Media

The Media Manager in OutStart Evolution® Knowledge Repository is the centralized location for handling graphic content.

Locate the "rough" graphics in the storyboards. The graphic designers work from these "rough" versions to develop the final versions. The filenames should be provided below the graphics and can be located in the Media Manager using search criteria.

File Management

You should export a copy of your lesson periodically, especially when you expect to make several changes that may impair the lesson. Recall that there is not a "save as…" capability in OutStart Evolution® Knowledge Developer.

Locking

Make sure that your lesson is locked. You do not want to lose your content in this collaborative working environment.

Metadata Tags

Default values are set where appropriate in OutStart Evolution® Knowledge Developer. The entries that must be entered by the developer are provided on the General Tab for each knowledge element in OutStart Evolution® Knowledge Developer. The platform administrator creates metadata groups and tags using the Metadata Manager in OutStart Evolution® Knowledge Developer.

ADDENDUM B

Publishing SCORM/XML Lesson Plan/Trainee Guide Data from Authoring Instructional Materials (AIM)

All existing lesson plan, trainee guide, and supporting graphics and media shall be published from AIM I or AIM II software applications as browser friendly Extensible Markup Language (XML) data outputs, packaged in accordance with the requirements of either the Advanced Distributed Learning (ADL) Sharable Content Object reference Model (SCORM) 1.2 or 2004. This output supports reuse of this learning content in several ways:

- As baseline learning content for delivery in the electronic classroom via the GD-AIS Elite classroom management software being implemented by the Submarine Learning Center and Center for Surface Combat Systems.
- Once imported into the Integrated Submarine Learning Environment (ISLE) OutStart Evolution® LCMS as external objects, it can be used for reuse in onboard instructor-facilitated training.
- Once imported into shore-based instances of the OutStart Evolution® LCMS, it can be used for reuse of media assets via the OutStart Evolution® Media Manager digital asset management system.
-

Creating SCORM/XML Lesson Plan/Trainee Guide Output

The SCORM Generated Data Output can be created for SCORM 2004.

To create AIM SCORM output, follow the steps provided in Table 20.

Table 20 Steps to Create AIM SCORM Output

Steps	Description
1	Log in to AIM.
2	From the AIM main menu click on the **Options** menu item and the **Preferences** option.
3	From the User Preferences window click on the **Advanced** tab.
4	Select the desired Metadata Specification by clicking on the down arrow in the **Metadata Spec** field.
5	Select either SCORM or ILE.
6	Select the desired version of SCORM by clicking on the down arrow in the **SCORM Version** field.
7	Select either 1.2 or 2004, whichever is appropriate if the SCORM Metadata Specification was selected in Step 5, or select 2004 if the ILE Metadata Specification was selected.
8	Click on the **Apply** button and then the **OK** button to close the User Preferences window.
9	Select the **Course** menu item and the **Select** sub-menu item.
10	From the Course Select menu: highlight the Approved course that you want to create the SCORM files for and click on the **Select** menu item.
11	Click on the Document menu item and the **SCORM Data** sub-menu

	item or click on the SCORM icon.
12	The SCORM output can be created for the entire course by opening the course folder in the browser and selecting the **File** menu item and the **Generate SCORM Output** sub-menu item. AIM will output the Topic SCOs to a directory titled by CIN, Rev and Change, which will contain a zip file. This zip file can be sent to NILARS to import the aggregation, SCOs, and assets. The key element is the Package Identification File (PIF) that enables the repository; e.g., Cybrarian, to understand the contents.
13	To view the Topic files (SCOs) created in the SCORM Output, extract the files contained in the zip file to a temporary directory and double click on the desired Topic XML files. The files will open in Windows Internet Explorer.

SCORM Data Tabs Content

The SCORM Data represent the information required for development of Metadata (data about data) files. Metadata files provide a common nomenclature enabling learning resources to be described in a common way. Metadata can be collected in a catalog, as well as directly packaged with the learning resource it describes. Learning resources that are described with Metadata can be systematically searched for and retrieved for use and reuse. Aggregation (course) and SCO (topic) have certain metadata fields that are required. Asset (TG graphic) has only a small subset of those same fields required. The following categories contain mandatory elements (identified with an asterisk by the data entry box) and optional information.

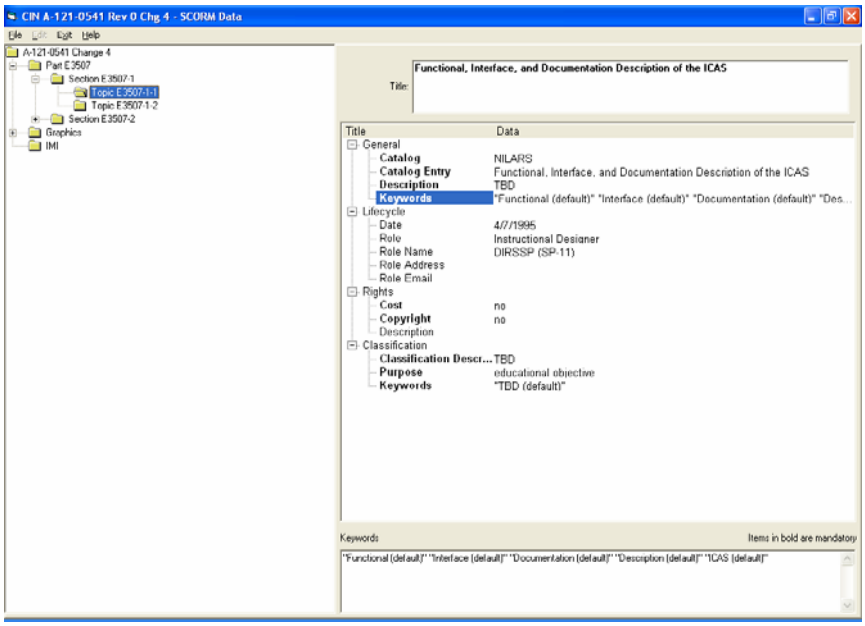

Figure 15 Example AIM Screen

AIM provides default information for the mandatory fields in the categories to develop Metadata files. When developing the course, the categories for the course, topics, and graphics can be edited by the developer from the SCORM Data window, which is accessible by selecting the desired course in the Course Select menu and selecting the **Document**

main menu item and the **SCORM Data** sub-menu item or by clicking on the SCORM icon. The browser in the left pane allows you to open the desired folder to edit the categories. The course information can also be edited from Lesson Plan window (Cover Page) by selecting the **Contents** menu item and the **SCORM Metadata** sub-item. The information for individual Topics (SCOs) can be edited from the Lesson Plan (LP) window (COI) by highlighting the desired Topic, selecting the **Contents** menu item and clicking on the **SCORM Metadata** sub-menu item.

The information required for metadata depends on the Metadata Specification (SCORM or ILE) and the SCORM version (V1.2 or 2004) selected. The metadata information is required if the metadata category is bolded.

Note: for more specific information about SCORM outputs from AIM, refer to the AIM I Rel 3.3 User's Manual Appendix F or AIM II Rel 3.3 User's Manual Appendix E.

- General – Groups the general information that describes the resource as a whole.
  - ***Catalog** – NILARS (listing identification system – should be based on SSIC)
  - ***Catalog Entry** – Describes the resource according to known cataloging system so that it may be externally searched for and located.
  - ***Description** – Textual description of the content of this resource.
  - ***Keywords** – Keywords or phrases describing the resource.

- Lifecycle – Groups the features related to the history and current state of this resource and those who have affected this resource during its evolution.
  - *Date – Date of Contribution (Promulgation)
  - *Role – Kind of Contribution
    - Author
    - Initiator
    - Instructional Designer
    - Publisher
    - Script Writer
    - Terminator
    - Unknown
    - Validator
  - *Role Name
  - Role Address
  - Role Email
- Rights – Groups the intellectual property rights and condition of use for the resource.
  - ***Cost**
    - Yes
    - No
  - ***Copyright**
    - Yes
    - No
  - Description
- Classification – Describes where this resource falls within a particular classification system.
  - ***Classification Description**
  - ***Purpose** – The purpose of classifying this resource.
    - Accessibility Restriction

- Discipline
- Educational Objective
- Idea
- Prerequisite
- Security Level
- Skill Level

- *__Keywords__ – Keywords and phrases descriptive of the resource relative to the slated classification.

* *Indicates that AIM provides Default Data. This is currently being scrutinized -- it may be affected by the work of the Navy metadata standards working group, which in turn will be integrated into the ILE content repository architecture. AIM will be updated to reflect the Navy metadata working group decisions as soon as approved.*

Detailed Contents of the AIM SCORM/XML Output Package

The files contained in the output package are generated to conform to SCORM 2004 and include:

- An imsmanifest file that contains the "structure" or organization of the course. The content of this file includes references and locations of all SCOs, raw media files, metadata files, and supporting files. It also lists dependencies between the files.
- The SCOs that are associated with each Topic of the course and are generated as XML content. The corresponding Extensible Stylesheet Language (XSL) is referenced in each SCO in order to have the XML rendered to HTML by the Internet Explorer 5.0 browser (with MSXML 3.0 installed in "replace" mode). (e.g., "A-121-0541 Change 4_E3507-1-1.xml") If Internet Explorer 6.0 is used, MSXML 3.0 is the default XML parser and does not have to be installed separately.
- The graphics files from the AIM Graphics Library for integration into the trainee guide. They are stored in the graphics directory of the package in .jpg format.
- The media files from the AIM IMI Library and linked to lesson plan or trainee guide content. They are stored in the Media directory of the package in their native format as loaded into the AIM IMI Library.
- The metadata files for the course, SCOs, graphics, and media files. (Ex. 1-1_meta.xml; 20000001_meta.xml).
- The API files that are necessary for communication with the LMS. These files are referenced in the rendered HTML files.
- Document Type Definition (DTD) and entity files that specifically relate to the SCOs. Because the SCO content is in XML format, there are corresponding DTD and entity files associated with the SCOs (e.g., Topic.dtd, TaskandMaterial.ent, TestInfo.ent, TextContent.ent)
- The XSL stylesheet (Topic.xsl) and Cascading Style Sheet (SCORMTopic.css), because the SCOs are generated as XML content, there is an XSL stylesheet referenced with the SCO in order to allow the XML content to be rendered as HTML and displayed in the Internet Explorer browser (as described previously). A Cascading Style Sheet (CSS) is associated with the rendered HTML document.

The AIM SCORM/XML output does validate against both the final SCORM 1.2 and SCORM 2004 Conformance Suite software posted at ADLnet.org, depending on which type output was selected in the AIM Preferences module as outlined earlier in this addendum.

ADDENDUM C

Re-authoring Legacy Lesson Plan/Trainee Guide Data from AIM for use with Self-paced IMI Authoring Tools

Over 300,000 hours of legacy AIM-based instructor-led training lesson plan/trainee guide-based learning content is available for re-authoring into IMI to support the Revolution in Training and the Integrated Learning Environment. The AIM team, led by the Program Manager at NAVAIR Orlando Training Systems Division (TSD), has been actively prototyping a tool to support the re-authoring of this current, configuration controlled content into IMI compliant with ILE architecture and guidelines.

This Learning Object Module is designed to produce digital learning content assets (text and media files) packaged in accordance with NETC/NPDC guidelines for input to both commercial off-the-shelf (COTS) and government off-the-shelf (GOTS) IMI authoring tools for production of final self-paced IMI content. One of the COTS IMI tool vendors with which the AIM team has been working is OutStart Evolution®, with their Evolution LCMS. When complete, the interface between the Learning Object Module and OutStart Evolution® should permit the re-authored AIM content to import into OutStart Evolution® as native content for complete production, testing, and deployment. This process will support the IMI guidelines in the body of this document as well as produce Evolution-compatible content in accordance with the OutStart Evolution®-specific guidelines in Addendum A.

The Learning Object Module has gone through many research and development builds and is now being used in several major prototype projects sponsored by the ILE Program Management Team and supporting Centers to re-author legacy lesson plan/trainee guide content into self-paced IMI. Once these prototype projects are complete, lessons learned documented, and software changes incorporated into the prototype Learning Object Module, the AIM governance organization consisting of the Configuration Control Board (CCB), Executive Steering Committee (ESC), and Functional Requirements Board (FRB) will deploy an operational version of the Learning Object Module to support NETC/NPDC goals of migrating major portions of legacy “C” School learning content to the ILE during FY06-11.

Details of this re-authoring process will be supplied in this Addendum as soon as they are finalized and the operational Learning Object Module available. In the meantime, an overview of the proposed re-authoring process and interface with the various COTS and GOTS IMI tools under consideration is available on Navy Knowledge Online (NKO) – NKO Library/Personal and Teams/AIM and ILE/AIM CCB Mtg - Feb 05. This is an open cabinet with automatic subscription.

ADDENDUM D

Developing and Maintaining ILE-compliant ILT Learning Content with the Electronic Linking and Integration of Navy Content (E-LINC) Tool

To support the requirements of ILE-compliant ILT learning content as defined in the body of this document, the AIM governance organization plans to develop and deploy a Web-based ILT content development and management tool to be known as E-LINC.

This tool will be based on the current prototype AIM Learning Object Module now being used in a number of ILE PMT-sponsored and Center-coordinated prototype projects. From an ILE ILT perspective, these projects will help to:

- Refine the requirements for and identify shortfalls in the prototype Learning Object Module functionality.
- Define required functionality and process improvements needed in the Learning Object Module process prior to deploying an operational E-LINC tool.

The AIM Program Manager at NAVAIR Orlando TSD will produce detailed System Subsystem Specification and Functional Requirements documents to support the design, development, and rollout of E-LINC. Once these documents are drafted, the AIM team will circulate them for review as directed by the ILE Implementation Team Lead. Once this revised ILT learning content development and maintenance process is proven and software tools are in place to support it, this addendum will be expanded to provide operational guidelines for:

- Migration of existing lesson plan/trainee guide AIM-based content to the new ILE standards.
- Development and maintenance of new ILE-compliant ILT learning content in E-LINC.

ADDENDUM E

Classification Markings in Navy ILE Courseware

Classification markings in Navy ILE Courseware will be stored as metadata entries. The metadata category will exist at all levels of the courseware, although the only level that should be marked by developers is at the asset level. The metadata category is called "securityclassification". The metadata tags within this category are called "overall classifications", "caveat", "dissemination" and "declassification". The "overall classifications" is a required metatag for all Navy ILE courseware. Valid values for this tag are UNCLASSIFIED, CONFIDENTIAL, SECRET or TOP SECRET. Only one entry is allowed for each asset.

Within the Navy ILE structure, metadata for classification markings should be entered by the developers at the asset level. The ILE system (currently OutStart's Evolution) will automatically "roll-up" the classification markings to display cumulative classification markings. This will allow developers to add or link a new classified asset to an existing course and not have to re-mark any of the cumulative classification levels of the course.

Portion marking choices will be automatically displayed by the system based on the metadata values chosen by the developers and associated with each asset. These markings will only be placed at the beginning of each asset. For example, if a developer adds a "description" asset and enters several paragraphs within that one asset, only the first paragraph will be automatically marked. The developer will be responsible for marking subsequent paragraphs within each asset.

The valid values for "caveat", "dissemination" and "declassification" are contained within the table provided. If other values are needed, please contact the ILE administration team to let them know of your needs. New entries must be consistent across the Navy servers and can only be entered by administrators.

Courseware should always be developed on the lowest classification level system so that it can be "reused" by the largest group of developers and Centers. Even though a course is considered classified, there are probably portions of it that may be classified at a lower level.

Although this is not a required metadata tagging schema for SCORM or AICC compliance, it will be considered required for all Navy ILE courseware submitted.

Courseware developed on the Navy ILE servers will be able to be marked within the system using the metadata tagging features available to developers. On the unclassified servers, the default (and only allowed) classification marking will be UNCLASSIFIED, so the developers will not need to do anything different. On the higher classification servers, there will be no default entries so the developers will have to enter the appropriate values from the available list for each asset.

Classification Markings Included on Navy ILE Servers

If other markings are needed, please contact the ILE administrators to discuss what is needed.
Not all markings can be used with one another. Please contact your local Staff Security Officer (SSO) for guidance.

Server/Network Level		overall classifications	caveat	dissemination	declassification
Unclassified/NIPRnet		UNCLASSIFIED			
Secret/SIPRnet		UNCLASSIFIED	FOR OFFICIAL USE ONLY		
		CONFIDENTIAL	COMINT	NOFORN	X1
		SECRET	COMINT	NOFORN	X1
				ORCON	
				REL TO USA, AUS, CAN, GBR and NZL	
				SETTEE	
Top Secret/NSAnet		UNCLASSIFIED	FOR OFFICIAL USE ONLY		
		CONFIDENTIAL	COMINT	NOFORN	X1
		SECRET	COMINT	NOFORN	X1
				ORCON	
				REL TO USA, AUS, CAN, GBR and NZL	
				SETTEE	
		TOP SECRET	COMINT	NOFORN	X1
			COMINT-GAMMA	ORCON, NOFORN	
			TALENT KEYHOLE	REL TO USA, AUS, CAN, GBR and NZL	
				LACONIC	
				SETTEE	
				SEABOOT	
				KEYRUT	
				KILT	
				FRONTO	

UNCLASSIFIED//FOR OFFICIAL USE ONLY

- The security classifications listed in the table above will be entered into The Navy ILE servers under The metadata category "securityclassifiaction". The associated metadata tags are "overall classifications", "caveat", "dissemination" and "declassification". The entries in the table above are case sensitive. The "overall classifications" metatag can only contain a single value, while the other metatags will support multiple values.

ADDENDUM F

The following table shows the hierarchical relationships of SCORM, Navy extensions to the SCORM, job tasks analysis data, and commonly used ILE development tools.

SCORM	Navy SCORM[17]	JTA[18]	IMI	OutStart Evolution®[19]	IMI Example	ILT	AIM	ILT Example
Root Aggregation	Learning Object Aggregation	Critical Work Function	Learning Event	Module	Section Tracking	Learning Event		Auxiliary Equipment Troubleshooting
		Skill Object			Target Motion Analysis			
		Task			Construct fire control plots			
		Use Case					PPP	
		Job Level (Apprentice, Journeyman, Master)						
Aggregation	Terminal Learning Object (TLO)	Task/Subtask	Lesson	Learning Object	Construction of the contact evaluation plot (CEP)	Lesson	Lesson	Maintaining Auxiliary Equipment
Sharable Content Object	Enabling Learning Object (ELO)	Subtask/Step /Sub Step or Specific knowledge	Section (knowledge associated with a subtask)	Topic	Given different steps within the CEP procedure, the learner will be …	Section	Section	Cleaning Auxiliary Equipment

17 This is the acronym for Navy Shareable Content Object Reference Model.
18 This is the acronym for Job Task Analysis.
19 This is an example of the OutStart Evolution® platform structure. This structure may vary based on the IMI authoring system that is employed.

SCORM	Navy SCORM[17]	JTA[18]	IMI	OutStart Evolution®[19]	IMI Example	ILT	AIM	ILT Example
Asset Aggregation			Learn, Explore, Practice	Groups	Learn, Explore, Practice			Direct trainee to practice the cleaning procedure
	Assets		Elements	Elements	Introduction			

References

The following documents were used in the development of this guide.

Documents

A Systematic Approach to Media Selection by William W. Lee and Diana Owens, an ASTD white paper.

Content Design, Development, and Deployment for the Navy Integrated Learning Environment. V 1.41 8 October 2004.

Implementing Instructions, 23 Mar 2001, IMI Implementing Instructions Version 1.0.

MIL-HDBK-29612-3 31 Aug 2001	Development of Interactive Multimedia Instruction (IMI) (Part 3 of 5).
MIL-HDBK-29612-4 31 August 2001	Glossary for Training.
MIL-HDBK-29612-5 31 Aug 2001	Advanced Distributed Learning (ADL) Products and Systems (Part 5 of 5).
MIL-PRF-29612B 31 Aug 2001	Military Performance Specifications Training Data Products.
SECNAVINST 5510.36	Department of the Navy (DON) Information Security Program (ISP) Regulation
TRADOC PAM 350-70-2 1	Training Multimedia Courseware Development Guide.
TRADOC Regulation 350-70 9 Mar 1999	Systems Approach to Training (SAT) Management Processes, and Products, Chapter VI-1 0, IMI.

Books

Anderson, Paul V. *Technical Writing: A Reader Centered Approach*, *3rd ed*. Harcourt Brace, 1995.

Bloom, B. S. (1984). Taxonomy of Educational Objectives, Handbook 1: Cognitive Domain, Addison-Wesley.

Clark, R.C. & R.E. Mayer. (2002). e-Learning and the Science of Instruction: Proven Guidelines for Consumers and Designers of Multimedia Learning. San Francisco, California: Jossey-Bass/Pfeiffer.

Clark, R.C. (1999). Developing Technical Training: A Structured Approach for Developing Classroom and Computer-Based Instructional Materials. 2nd Edition. Silver Spring, MD: International Society for Performance Improvement.

Dick, W. and Carey, L. (1996). The Systematic Design of Instruction (Fourth Edition). New York: HarperCollins College Publishers.

Donovan, M. S., Bransford, J. D., Pellegrino(Eds.) (2000). How People Learn: Bridging Research and Practice. The National Academy Press. Retrieved February 28, 2004, from http://www.nap.edu/openbook/0309065364/html/R1.copyright , 2000.

Gagne, R. M., Briggs, L. J., and Wager, W. W. (1988). Principles of Instructional Design (3rd ed.). Chicago: Holt, Rinehart and Winston, Inc.

Hackos, JoAnn T. *Managing Your Learning content Projects*. New York. Wiley Computer Publishing, 1994.

Hackos, JoAnn T. and Janice C. Redish. *Learner and Task Analysis for Interface Design.* New York. Wiley Computer Publishing, 1998.

Hairston, Maxine C. *Successful Writing, 3rd ed*. New York: W.W. Norton and Company, 1992.

Hassen, J.E., Wieckhorst, R.A., Madden, J.J., Franz, T.M, and Dunlap, S.W. (1996). The Navy Training Delivery Assessment Model (TRADAM). Technical Report 96-004. Naval Air Warfare Center Training Systems Division (Code 497). Available at: http://www.ott.navy.mil

Horton, William. *Designing and Writing Online Learning content, 2nd ed*. New York: Wiley, 1994.

Houp, Kenneth W. and Thomas C. Pearsall. *Reporting Technical Information, 7th ed*. New York: MacMillan, 1992.

Kirkpatrick, Donald L. Evaluation Training Programs: The Four Levels. San Francisco: Berret-Koehler, 1994.

Knowles, M.S., Holton III, E.F., and Swanson, R.A. (1998). The Adult Learner (5th ed.). Houston: Gulf Publishing Company.

Learning content Management and Associated Processes – Book 3. DRAFT: March 2001

Learning contents as Structured Information – A Guide to Writing Structured and Reusable Content for the Learning content Management Infrastructure using XML – Book 2. March 2001.

Mager, R. F. (1997). Preparing Instructional Objectives (3rd ed.). Atlanta: The Center for Effective Performance, Inc.

Markel, Mike. *Technical Communication: Situations and Strategies*, 4th ed. New York: St. Martin's Press, 1996.

Marx, Raymond J. (1999). *The ASTD Media Selection Tool for Workplace Learning*. Detroit, MI: Ford Motor Company.

Microsoft Word. Help file "Readability."

National Research Council (2003) Knowing what Students Know: The Science and Design of Educational Assessment. National Academy of Science.

Oliu, Walter E., Charles T. Brusaw, and Gerald J. Alred. *Writing That Works: Effective Communication in Business*. New York: St. Martin's Press, 1992.

Reigeluth, C.M. (1999). Instructional-Design Theories and Models: A New Paradigm of Instructional Theory, Volume II. Mahway, NJ: Lawrence Erlbaum Associates.

Schank, R. C., Fano, A., Bell, B., & Jona, M. (1993/1994). The Design of Goal-Based Scenarios. The Journal of the Learning Science, 3(4), 305-345.

Shenk, R. (1990). Guide to Naval Writing: A Practical Manual for U.S. Navy and Marine Corps Officers, Senior Enlisted Personnel, Civilians Associated with the Naval Services. Annapolis: Naval Institute Press.

Sun Technical Publications. *Read Me First! A Style Guide for the Computer Industry*. United States of America: Prentice Hall, 1996.

Tarutz, Judith A. *Technical Editing: The Practical Guide for Editors and Writers*. Reading, Massachusetts: Persues Books, 1992.

University of Chicago Press. (2003). The Chicago Manual of Style: The Essential Guide for Writers, Editors, and Publishers. (15th ed.). Chicago: The University of Chicago Press.

World Wide Web Links

Advanced Distributed Learning Initiative's Sharable Content Reference Model (SCORM) 2004 download from the Advanced Distributed Learning Network Home Page, http://www.adlnet.org/, v1.2, November 2004.

Advanced Distributed Learning. http://www.adlnet.org/

Cisco Systems (2003). Reusable Learning Object Authoring Guidelines: How to Build Modules, Lessons, and Topics. www.cisco.com/application/pdf/en/us/guest/netsol/ns460/c654/cdccont_0900aecd800eb905.pdf

Defense Training Standards Working Group (DTSWG) http://www.dtswg.org/

Section 508. http://www.section508.gov/

Web Accessibility Guidelines. http://www.w3.org/