Chapter 4

DESIGN PHASE

Table of Contents

4.1 – Chapter Introduction

Phase Overview

Synopsis

The second phase in the Instructional Systems Design (ISD) model, or A***D***DIE, is Design.

In the Design phase, the primary concern is to ensure the training we design is valid, reliable, and high-fidelity to the graduate's job. That concern is what the Design phase work is mostly about:

- Writing terminal performance objectives (TPO) that accurately portray the performance, conditions, and standards that students can complete for a task prior to graduating from a course.
- Choosing instructional activities and materials that have the greatest potential for developing task proficiency (validity and reliability) and ensuring transfer of the task proficiency to on-the-job performance (high-fidelity).
- Sketching, outlining, mapping, and blueprinting the instructor or student's use of those methods, strategies, activities, and training aids to promote optimum development of task proficiency and transfer of the task proficiency to on-the-job performance – creating your course "blueprint."

***Note**: Remember, although, course design and development is often portrayed consecutively as one phase then another. It isn't linear in process. Many development efforts may be ongoing or initiated while the developer is still in the Design phase.*

Phase Overview, Continued

Audience

Primary Audience: Coast Guard (CG) Training Center active duty course developers and instructional designers, as well as CG civilian course developers and instructional systems specialists.

Secondary Audience: CG Training Center Performance Systems branch managers supporting the instructional designers/course developers; the subject matter specialist, the project lead, project manager, school chief and/or others who have been identified as having some role in the ISD process. Additionally, the secondary audience may include instructional designers employed with contracted companies performing instructional design for the CG, or equivalent individuals who have curriculum/course development responsibilities, including instructors performing course maintenance with ISD oversight.

Note: *Due to the varying quality and types of data input sources, the requirement for comprehensive and accurate data, as well as the range of data details and considerations required when making instructional decisions, you may be advised throughout the chapter to consult with an ISD professional, or graduate of one of the following approved curriculums:*

- *Coast Guard Course Designer Course (CDC)*
- *SABA Knowledge Service Peak Performance System (previously known as Accomplishment-Based Curriculum Development, or ABCD) workshops) taught by staff at TRACEN Petaluma, TRACEN Yorktown and ATTC Elizabeth City.*

Purpose

The Design chapter of this SOP is composed of sections that are to be completed sequentially. Each section and its associated tasks (for development of that specific deliverable) will direct instructional developers to a specific job aid for detailed guidance on how to perform the task. Each section will provide guidance on the design of materials to support activities common to resident instruction.

The material in this chapter expands on the information that graduates of the Coast Guard's Course Developer Course (CDC) are taught. Much of it is the same; however, it has been expanded. Since technology will continue to supersede current methods and offer exciting possibilities to course developers, this chapter of the SOP has been crafted so it will provide the essentials you not only need today, but also position you to take advantage of tomorrow's design methodologies.

Phase Overview, Continued

Design Phase Deliverables

The outputs of the design phase are the plans you, the course developer, uses to create the instructional materials.

The key outputs of the Design phase are:

- Terminal Performance Objectives (TPOs)
- Evaluation criteria
- Lesson design plans
- Course blueprint (grouped tasks and sequenced objectives)

Validity and Reliability

In order for course developers to obtain valid and reliable instructional materials, these fundamental themes must be kept in mind while designing courses. You will know you are ready to move out of the Design phase and start developing instructional materials when:

- The TPO accurately portrays the performance, conditions, and standards that students will be able to complete for a task prior to graduating from a course, and the TPO is as close as possible to the task performance, conditions, and standards expected of the graduate on the job.
- The evaluation criteria shows the same criteria as stated in the objective.
- The selection of instructional activities is appropriate in light of the objective and the target audience profile.
- In general, the description of the instructional activities is detailed enough so that a developer could use the description to produce the actual instructional materials.
- The course blueprint shows the grouping and sequencing of units, lessons, and activities.

Phase Overview, Continued

Project Management

At this point in your project, it's a good time to verify the initial project schedule/timeline you proposed. Using the data collected, you can provide a more accurate estimate of time needed for Design and Development. A helpful tool to do this is using a worksheet for calculating Developmental Hours (*see Tip-L.1*).

Course Hierarchy

The table below shows the relationships for the levels you'll be working with during Design:

Element	Hierarchy
STEPS or SUB-STEPS to performing a particular TASK	TOPIC
TASK	TPO
1 or more TPOs	LESSON
1 or more LESSONS	UNIT[1]
1 or more UNITS	COURSE

[1] **NOTE:** For the sake of sequencing and grouping, you may need to add another level between Unit and Lesson.

Phase Overview, Continued

Process Overview

The key events in the Design phase of the course are outlined below. Note that we list these events in a sequence to serve as an aid to understanding the process. Recall the note that ADDIE is presented in a linear manner, but in effect many phase events are worked on simultaneously. In the second event shown in the table below, one such overlap between the Design and Development phase is addressed.

Event	Action
1.	Write a performance objective (PO) for each task.
2.	Determine evaluation criteria for each task. • Development phase tasks that may logically follow this event include developing Performance Tests (Chapter 5.3) and Job Aids (Chapter 5.2) – even if job aids are written initially at task level then revised as instructional objectives are finalized.
3.	Create a course blueprint.
4.	Select the instructional methods and strategies for each learning activity: • Detect potential learning problems • Select media for each activity • Determine content delivery method
5.	Design instructional materials for each lesson which consist of: • Introduction • Content Delivery • Demonstration • Practice and Feedback • Assessment • Summary and Review
6.	Sequence activities within each lesson.

A best practice for course developers at the end of Design would be to create a prototype of one lesson/unit as a snapshot of the final product for the stakeholders.

	OPTIONAL: Produce a prototype of one lesson/unit of instructional materials to include (as appropriate): • Advance assignments (i.e. "homework") • Glossary • FAQ's and answers • Handouts • Performance test • Instructional media • Training aids • Student guide • Instructor guide

This page intentionally left blank

4.2 – Terminal Performance Objectives

Introduction

Overview

Writing the terminal performance objective is the first step in the Design phase. Up until now, you gathered the task list and task performance details that outlined how a task is completed on-the-job; now that you are in the Design phase of ISD, you are writing how these tasks will be evaluated in an instructional setting which will assist in the later development of your TPOs.

In this volume of the SOP the Coast Guard wants the designer to go to great lengths to spell out what those standard tools are, which Commandant Instructions apply, and to actually determine the host of other tasks that determine the differences between acceptable and unacceptable job performance.

The two types of performance objectives are: terminal performance objectives (TPOs) and enabling objectives (EOs).

- **Terminal Performance Objectives** describe the task students will be required to do upon completion of the instruction and in order to graduate from the course, thus the word “terminal.”
- **Enabling Objectives** describe a physical or thinking (*i.e.*, discrimination or generalization) skill that describes in measurable and observable terms a necessary step to accomplish the related TPO.

The Coast Guard uses TPOs as the basic building block of a training program to ensure instruction and training are performance-based. You will use the task list and task performance details gathered during Analysis to develop TPOs for the course. You gain several benefits from writing performance objectives:

- Clear expectations of final performance for students, instructors, and stakeholders.
- A base from which to develop the evaluation criteria for the performance test
- Instructional activities and materials are designed and ready to be developed

Introduction, Continued

Purpose

The purpose of TPOs is to describe as precisely as possible the real world job performance expected of the graduate. They also serve to tell students what they need to perform (under what conditions and to what standard) to graduate from the course. They are the single most important facet of the Design phase as they will direct and guide the course developer in developing instructional materials for the course.

In the Coast Guard Training System, performance objectives serve the following purposes:

- Provide a basis for test item development
- Support selection of instructional strategies
- Structure events and activities to enable learning and skill acquisition
- Support selection of training methods and media
- Support sequencing of training
- Compel and direct attention to important content
- Communicate performance standards
- Provide a basis for measuring and evaluating student performance

Inputs

The following information is needed before entry into development of performance objectives:

- Task listing or RPQs
- Task details from the Analysis phase
- Design, development, and delivery constraints and parameters

Outputs

The outputs of this task are performance objectives which become the foundation of the training program (and framework for the curriculum outline). They help convert real world job performance into useful and transferable training—both for the instructor and the student.

How to Write Terminal Performance Objectives

Overview

The Analysis phase of the effort determined that there are tasks that have to be performed in the Coast Guard and there are students who can't yet do them. At this point, instructional designers should have enough understanding to be able to:

- Help the course developer in designing and developing the instruction
- Describe to program managers and training managers what will be trained and to what level of fidelity the students will be trained
- Describe to instructors what they need to test and to what standard, and under what conditions
- Describe to students where they should focus their efforts to pass the class

Steps

The process for writing TPOs has been summarized in the steps below. Additionally, a Job Aid has been included in *Appendix I* showing the specific steps in much greater detail, and *Appendix J* provides a worksheet (WS-J.1) to assist in drafting your TPO.

Step 1: Collect task list

IF	THEN
Task list has been provided	Go to Step 2.
No task list has been provided	Consult your ISD professional, as a task list (analysis) needs to be conducted.

Step 2: Ensure tasks are written in precise, observable actions that will produce the output required on the job.

***Note**: When writing your TPO, sometimes you may need to modify the performance word (i.e. verb) provided in the task list to more accurately reflect the action under which the students perform the task in an instructional setting.*

Step 3: List the conditions by which the performance must be completed.

Step 4: List the standards under which the performance will be completed.

Step 5: Compile all three elements and draft your TPO, starting with the conditions statement.

How to Write Performance Objectives, Continued

Example

The TPO development example below depicts all the essential performance, conditions, and standards:

WS-J.1	Terminal Performance Objective(s)		
Project	ET-A		
Designer	B. Wikle / ET1 Chang	**Date**	10/5/2011
Task Number	B.4.2	**Objective Number**	TBD
RPQ *(if applicable)*	4.C.04 **DEMONSTRATE** Lock-Out/Tag-Out procedures for electronics/electrical equipment for maintenance and/or repair IAW the Electronics Manual, COMDTINST M10550.25 (series), Ordnance Manual, COMDTINST M8000.2 (series) and Equipment Tag-Out Procedures, COMDTINST 9077.1 (series). **Sup Guide:** The technician must demonstrate the proper procedure for determining the need to tag-out and tag-in equipment or circuits and properly tag-out/tag-in as required. The technician must complete the process observing all safety and procedural requirements.		
Conditions *Cue that signal the performer to act / Stimulus* *Tools and equipment needed:* *References, job aids, and assistance needed:* *Physical Environment*	Conditions/Stimulus: • Scheduled planned maintenance • Abnormal system operation • Tagged-out equipment (Caution tag, Danger tag) Job Aids/References: • Electronics Manual, COMDTINST M1055025 (series) • Ordnance Manual, COMDTINST M8000.2 (series) • Equipment Tag-Out Procedures, COMDTINST 9077.1 (series) Work Equipment: • Caution Tags • Danger Tags • Tag out log Physical environment: • Locked space, cool temperature, hands & eyes occupied • Electrical shock • Performing daily with hazardous consequences		
Performance	**CLEAR** a caution / danger tag		
Standards *Time Accuracy Safety Security Process / Product*	100% accuracy as defined by: • Following the timeline of 10-15 minutes • Following all safety standards • Following the Tag out / lock out procedures per COMDTINST M10550.25B • Observing all safety and procedural requirements • Avoiding grounds and shorts • Equipment de-energized and unplugged		
TPO Statement	Given a locked-out / tagged (de-energized and unplugged) piece of equipment due to scheduled planned maintenance or abnormal system operation, properly CLEAR a caution/danger tag using appropriate equipment within 10-15 minutes while maintaining awareness of electrical shock and observing all safety and procedural requirements IAW the Electronics Manual, COMDTINS M10550.25 (series), Ordnance Manual, COMDTINST M8000.2 (series), Equipment Tag-Out Procedures, COMDTINST 9077.1 (series) and Job Aid(s).		

4.3 – Evaluation Criteria

Introduction

Overview

Where TPOs specify the goals that students need to strive towards, the evaluation criteria provide the boundaries or parameters inside which their performance is measured. Providing these parameters are the first two critical steps before moving forward with your course design.

Determining the evaluation criteria is a simple but extremely important step, because the evaluation criteria will be used by the developer to create the parameters for the performance test.

Criterion-Referenced Testing

"Tests" in Coast Guard resident instruction should always be *criterion-referenced*. That means the test should determine whether or not a student can meet a job-related standard without regard to the performance of the other students. The purpose of criterion tests is to determine whether the student can meet the performance expectations stated in the TPO.

For example, let's say a student's job will require him or her to file personnel documentation with 100 percent accuracy. To receive a *GO* on a performance test for this requirement, a student would have to file personnel documentation to Coast Guard standards each time. Anything less would receive a *NO GO*.

Why? Because the job standard requires 100 percent accuracy, and students must meet that criterion in order to be successful on the job.

Introduction, Continued

Purpose

The evaluation criteria of a performance test tells the real story of whether task proficiency was achieved and the student is ready for transfer that performance to the job in the operational Coast Guard.

The most obvious time for determining the evaluation criteria for a performance test is immediately after you have written the conditions and standards of your TPO. Evaluation criteria are used to measure and evaluate a student's proficiency to perform a task. Evaluation criteria are usually in a checklist format and include:

- Product evaluation
- Procedure evaluation

In the *product evaluation*, the evaluator uses a product checklist to rate the extent to which each key product characteristic meets specified acceptability standards or criteria.

The *procedure evaluation* checklist corresponds with the key steps, actions, or activities of the task as well as the applied knowledge and skill elements required for completely successful performance. During the performance test, an evaluator observes a student's step-by-step performance of the task. The evaluator rates each key step in the procedure against specified *GO* or *NO GO* criteria.

All Coast Guard performance tests must evaluate the quality of the output of the task performance. Many Coast Guard performance tests also evaluate the execution of the task procedure.

***Note**: The complete development of the performance test will be conducted as part of Development, but the front-matter (determining the evaluation criteria) is critical as part of design.*

If you have a poorly written TPO, this is when you realize it. If your standards for your TPO say "IAW Commandant Instructions," now is the time to go back and redefine what those specific, observable standards really are. This is why it is so important to determine your evaluation criteria immediately after you write your TPOs.

Introduction, Continued

Inputs

The following information is needed before you can begin the development of evaluation criteria:

- TPOs
- Task details (from the Analysis phase)
- Design, development, and delivery constraints and parameters analysis (from the Analysis phase)

Outputs

The output of this task is:

- Specific evaluation criteria (which can be inserted into the top portion of Performance Test Checklists)

How to Select Evaluation Criteria

Steps

The process for selecting evaluation criteria has been summarized in the steps below. Additionally, a Job Aid has been included in *Appendix I* which shows the specific steps in much greater detail, and *Appendix J* provides a worksheet (WS-J.2) to assist in capturing your decisions.

The basic steps for selecting evaluation criteria are:

Step 1: Ensure task details data and any parameters and constraints from Analysis match the conditions and standards written into the TPO (*starts at Step 11 in the job aid*).

Step 2: Modify the TPO as necessary based on requirements for task proficiency.

Step 3: Identify the criteria that are key in determining task proficiency, then describe those criteria.

How to Select Evaluation Criteria, Continued

Example

Below is an example of the data used from Analysis to select appropriate evaluation criteria that will then be used in the development of your Performance Test Checklists.

WS-J.2	Evaluation Criteria Selection Worksheet		
Project	ET "C" AN/SPS-50 Radar Maintenance		
Designer	W. Simington	Date	07/24/2012
Terminal Performance Objective		**TPO Number**	E.4
Given a Work order with a report of malfunctioning AN SPS-50 radar MPC G21012.0, all tools, equipment, and supplies required by the MPC **Replace** the pedestal following all safety procedures with no damage to the equipment and no operational parts replaced.			
Testing Parameters / Constraints (Conditions)	All tools and equipment as listed on the current MPC G21012.0.		
Standards NOT required for Task Proficiency	Time and rate of production not applicable to this task.		
Modifications to TPO (if applicable)			
none			
Student may use the following	Job Aid: √	Reference Materials: √	Other *(list)*
Evaluation Criteria *(correct performance will be based on this)*	Product Only:	Process and Product: ☑	
Accuracy *(list criteria as applicable)*	Malfunctioning component identified and replaced. No operational component replaced.		
Time *(list criteria as applicable)*	N/A		
Safety *(list criteria as applicable)*	All electronics safety procedures must be followed.		
Rate of Production *(list criteria as applicable)*	N/A		
Other Criteria: _____			

This page intentionally left blank

4.4 – Course Blueprint (Grouping and Sequencing)

Introduction

Overview

Once you have set the parameters from which your desired performance will occur (bound by your performance objectives and evaluation criteria), you can begin mapping out and designing the blueprint of your course. This is the next logical step because you need to identify from the task grouping that occurred in Analysis, what the foundational pieces of your course are, then what builds on the foundation, and so forth. This task of grouping and sequencing objectives creates your *course blueprint*.

Essentially, for resident course designers, creating a course blueprint means grouping training into course units or lessons, and then to determine the proper sequence for those units and lessons. A course blueprint provides the recommended course, unit, and lesson order for delivery of training that will result in optimum task proficiency for students.

Purpose

The purpose of this step is to put all of the components together into a logical design that instructors and students can easily follow and that the developer can use to develop course materials. Grouping (structure) is important because it provides a framework for learning: structured information helps you learn more quickly and allows you to remember what you have learned more efficiently. Grouping of tasks will have been provided to you as an output from the Analysis phase, or from the major outputs / major accomplishments in the front end analysis (FEA), or other analysis, provided to you.

Sequencing (order) is important because it impacts whether learning does or does not take place, and because learners cannot process and learn new information or skills unless they have previously learned the prerequisite physical and cognitive skills upon which the new tasks depend.

Introduction, Continued

Inputs

The following information is needed before you can begin grouping and sequencing tasks:

- Job and Task Inventory (from FEA/analysis)
- Terminal Performance Objectives
- Evaluation Criteria

Outputs

This task is critical to developing the appropriate instruction. Forming units of instruction typically produces an ordered list of terminal performance objectives that can be incorporated into the curriculum outline and course-level plan of instruction. A course map or flow diagram illustrates the relationships between units of instruction, instructional activities, and the evaluation strategy. The outputs you will receive from performing this task are:

- Appropriate course structure (e.g. skills, steps, task-centered, problem-solving, etc.).
- Properly sequenced objectives (i.e. the order in which objectives will be trained enhances and promotes task proficiency and the transfer of task proficiency).
- Course design plan that shows developers, instructors, and students how the student needs to proceed through the course.

How to Group and Sequence Objectives

Grouping Strategies

The purpose of grouping, or clustering, objectives is to organize training by units, lessons, or topics of instruction. Grouping of objectives provides a logical and meaningful structure for training. The following guidelines are provided:

- *Group prerequisite knowledge and skills into a core unit of instruction.* For example, basic electronic safety precautions common to a number of performance objectives for Electronics Technicians may be grouped in a common core training unit for all ratings requiring prerequisite knowledge of electronic safety precautions.
- *Group performance objectives that relate to a common system or require the same type of action.* For example, the tasks of reconciling different types of financial accounts with the same finance and procurement desktop application may be grouped into a single unit of instruction.
- *Group common knowledge and skills.* Some tasks, such as troubleshooting a computer problem, require core knowledge and skills which are transferable between systems or across functional areas.
- To construct an efficient structure for learning, *group performance objectives by learning type and level.* For example, group prerequisite or common objectives for efficient delivery of information by advance assignment.

Sequencing Strategies

Good instructional design sequences objectives within courses for safe, efficient, and effective instruction. When sequencing instruction, first seek to minimize safety risks. For example, in a boat coxswain course, avoid scheduling rescue swimmer events immediately after an all-night piloting exercise. When organizing instruction, you can apply single- or multiple-sequencing strategies.

Strategies for sequencing instruction include:

- Job performance order
- Chronological order
- Known to unknown
- Unknown to known
- Simple to complex
- Complex to simple
- Cause and effect order
- Critical order

How to Group and Sequence Objectives, Continued

Steps

The process for grouping and sequencing objectives has been summarized in the steps below. Additionally, a Job Aid has been included in *Appendix I* which shows the specific steps in much greater detail, and *Appendix J* provides a worksheet (WS-J.3.A) to assist in creating your course blueprint

Step 1: Group tasks (if not done in Analysis).

Step 2: List the foundational or introductory tasks.

***Note**: These sub-steps may be necessary when excessive pre-requisites or foundational skills / knowledge are identified for course – see Appendix K, for examples.*

a. Group any clusters of prerequisite knowledge and skills into a core unit of instruction.

***Prerequisites** are those skills or knowledge that a student's needs to know in order to begin practice of particular tasks*.

b. Group performance objectives that relate to a common system or require the same type of action.

c. Group common foundational skills and knowledge.

***Foundational** tasks are those skills are knowledge at the TASK-level (may be PO's themselves) that support the delivery of the curriculum at the course, unit or lesson level.*

Step 3: List the task groupings that logically follow in sequence following the foundational tasks.

Step 4: Once the tasks that follow a sequence have been identified, list those remaining tasks in logical order (*i.e. by TPOs that relate to a common system or require the same type of action, or common knowledge and skills*).

How to Group and Sequence Objectives, Continued

Example 1

Below is an example of a course blueprint from which you can develop a course map for visual representation of the curriculum.

WS-J.3.A	Design Worksheet – Course Blueprint		
Project	Bridgemaster E Radar		
Designer	ET1 Richey / ETC Odom	**Date**	03 Jan 2011
Course			
ET-C School: Bridgemaster E Radar			
	Unit	**Rationale**	
Final Culminating Event/Unit	☐ Capstone ☐ Multi-lesson scenario / Integrated Assessment Other / Describe: *NONE*	*No final or capstone event for this course.*	
Sequencing of Units (or *Chunks*)	*Repair Display Unit on BridgeMaster E Radar system.* *Repair the Scanner Unit on BridgeMaster E Radar system.* *Repair Ancillary Equipment for BridgeMaster E Radar system.* *Perform Preventative Maintenance on the BridgeMaster E Radar system.* *Utilize the support structure for the BridgeMaster E Radar system.*	☐ Simple to Complex or vice versa ☐ Known to unknown (building on pre-requisites) ☐ TPO's related to common systems ☐ TPO's with like performance ☐ Common knowledge and skills ☐ Job performance order ☐ Cause and effect order ✔ Other / Describe: *In analysis, it was determined that PM tasks will build on Repair tasks. Within Repair, "display" needs to be taught first, because display unit is key to fixing other radar problems.* *The final task, utilizing support structure makes for a nice "retention and transfer" module because it directs students where to go if additional assistance is required.*	
Foundational tasks / units ***Foundational** tasks are those skills are knowledge at the TASK-level (may be TPO's themselves) that support the delivery of the curriculum at the course, unit or lesson level.*	*Operate BridgeMaster E Radar System.* *Initialize the BridgeMaster E Radar System.*	*Successful execution of every higher level task requires the student to effectively distinguish between operator error and equipment failure.* *Initializing radar is most common task, and makes sense to be grouped with basic operation of the radar.*	
Prerequisites ***Prerequisites** are those skills or knowledge that a student's needs to know in order to begin practice of particular tasks.*	*BME Platforms* *System Components* *Platform Configurations*	*These introductory topics are required for students to have basic nomenclature and safety procedures prior to moving on in the course.*	

How to Group and Sequence Objectives, Continued

Example 2

Below is an example of a unit blueprint from which you can develop a unit map for visual representation of the curriculum (see the *IT-A: Premise* unit map that follows).

WS-J.3.B	Design Worksheet – Unit Blueprint		
Project	IT-A		
Designer	ITC Jackson / Pfeifer / Janes / Fluitt	**Date**	03 Jan 2011

Course	**Unit**
IT-A School	Premise

	Task	**Rationale**
Final Culminating Event/Unit	☒ Capstone ☐ Multi-lesson scenario / Integrated Assessment Other / Describe: Cable Install Project Main Troubleshooting Final Exercise	These lessons satisfy EPQ's 4.D.01 and 4.E.09.
Sequencing of Tasks / Lessons *(Order of Lesson Delivery)*	Recommended design order as follows: - Intra Bldg Backbone Cable - Horizontal Cable - Outside Plant - Cable Tracing - Shore Ties - Amphenol - Telecom Admin	☐ Simple to Complex or vice versa ☐ Known to unknown (building on pre-requisites) ☐ Job performance order ☐ Cause and effect order Other / Describe: Due to potential constraints (outdoor classes are weather dependent) , flexibility in sequencing can occur as follows: - Shore tie or Amphenol can occur before or after units: Intra, Horiz, Outside - Intra MUST come before Horizontal - Tele Admin can occur between Cable Tracing and Shore Ties - Outside Plant can be taught before Intra - Cable Tracing, Shore Ties and Amphenol are all interchangeable
Foundational Tasks ***Foundational** tasks are those skills are knowledge at the TASK-level (may be TPO's themselves) that support the delivery of the curriculum at the course, unit or lesson level.*	Cords Firestopping Grounding Pulling Standards	Firestopping must come before Grounding; other than that, all others are interchangeable.
Prerequisites ***Prerequisites** are those skills or knowledge that a student's needs to know in order to begin practice of particular tasks.*	Safety Tool Bag Standards / Codes Color Codes Binders	These blocks of instruction are all prerequisite to every other part of the unit.

Creating a Course Map

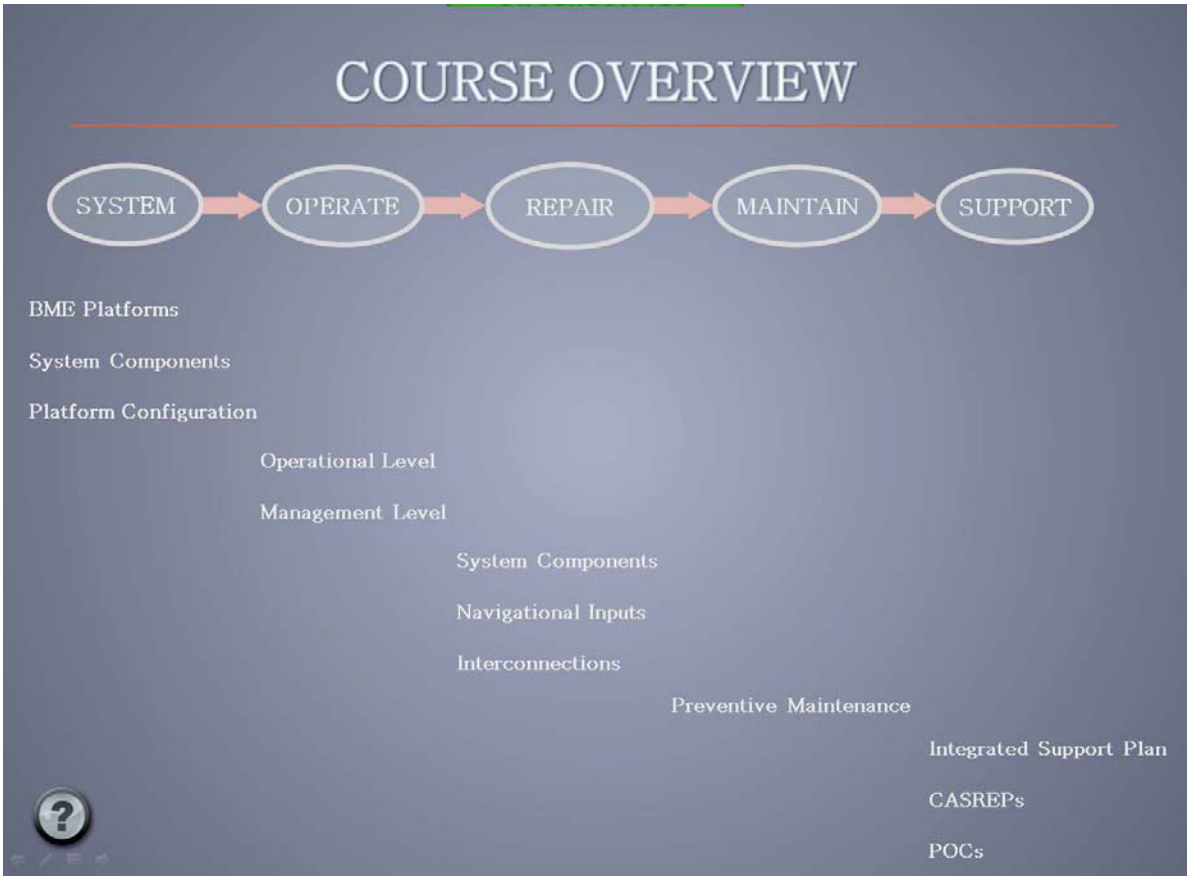
Course Map

Once you have the tasks and units group and sequenced, the next step is to produce a graphical representation of the course blueprint. They can be drawn for any number of instructional components including courses, units, and lessons. Course maps are important because they provide a visual element to the blueprint that allows training managers, school chiefs, and instructors a simplification of the course design. They also provide the basis for a course syllabus.

This SOP doesn't provide detailed guidance on how to create a course map from the course blueprint, but three examples are provided below to give developers a basic understanding of what they could look like at the course and unit level.

Example 1

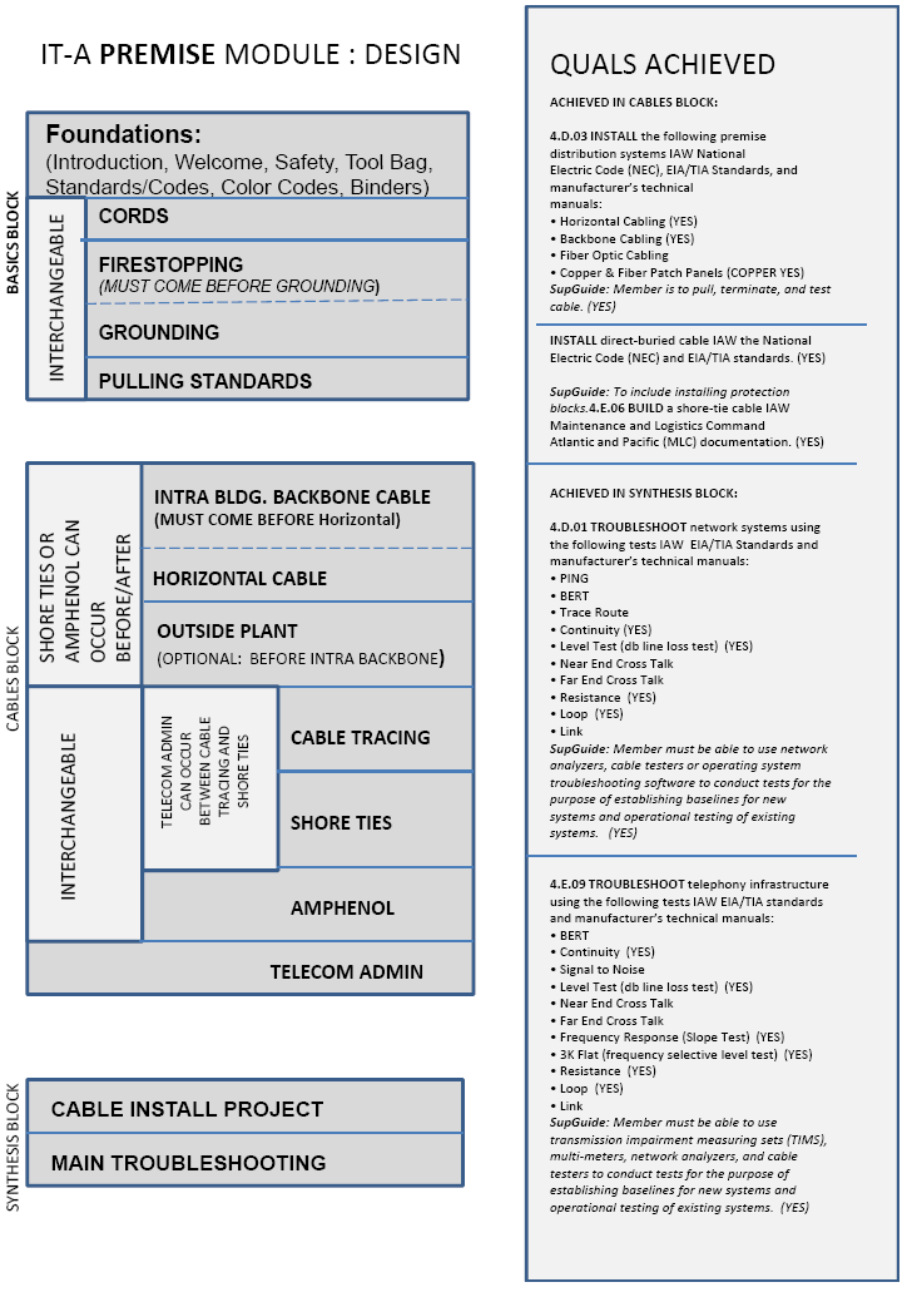
Following is an example of a course map that depicts the information shown in the previous course blueprint worksheet example from the ET-C: BridgeMaster E Radar course.



Creating a Course Map, Continued

Example 2

Following is an example of a unit map that depicts the information shown in the previous unit blueprint worksheet example from the IT-A School course.



Creating a Course Map, Continued

Example 3

Following is another example of a course map for ET-A School:

ET "A" School Course Map

5 days	22 days	47 days		14 days	25 days	11 days	10 days
ALDP	*Electronic Fundamentals**	*RF Principles*	*HF Transceiver (RT-9000)*	*VHF*	*SINS*	*Crypto*	*Soldering/ Connector*
	22 days (5/6/4/7)	*HF Receivers* 20 days (10/10)	27 days *82 TPOs*	14 days *47 TPOs*	*64 TPOs*	*31 TPOs*	*13 TPOs*
	Safety - Extinguish a Fire, Rescue an electric shock victim, test high voltage gloves, CPR *4 TPOs* Safety	Safety - Measure and Discharge *2 TPOs*		Safety Review	Safety Review	Safety Review	Safety Review
	Admin - Technical Manuals, EPQs (get signed off), Course Material Layout, Job Aids, PTs, SGs	Admin – DD-1149, Lock Out/Tag Out CMPlus *6 TPOs*		Admin –Man aloft chit, ALMIS *4 TPOs*	Admin -ALMIS	Admin	Admin
	Test Equip - FE1, FE2, FE4 *3 TPOs*	Test Equip - FE5 *1 TPO*	Test Equip - FE7, FE11 *2 TPOs*	Test Equip - FE8 – FE10 *3 TPOs*			
TPO TOTALS:	**7 TPOs**	**93 TPOs**		**54 TPOs**	**64 TPOs**	**31 TPOs**	**13 TPOs**

*Electronic Fundamentals include the necessary Pre-requisites tied to the TPO's (*previously within one of the following modules: AC, DC, Analog, Digital*)

TOTALS:
Days: 134 (-6 days) from current 140 days
TPOs: 262

ETA School Thursday, January 27, 2011

This page intentionally left blank.

4.5 – Lesson Design Plan

Introduction

Overview

An important task in the Design phase is to determine instructional activities and materials. In fact, you could say that all the tasks you've performed so far—identifying the target audience, conducting tasks analysis, writing performance objectives, and determining evaluation criteria set the foundation for this task. When you determine instructional activities and materials, you:

- Select appropriate activities for the kind of learning you want to take place (e.g. demonstration, case study, or practice).
- Sequence activities to help your students gain proficiency at performing the task as expected in the TPO.
- Select materials for delivering instruction.

Purpose

The purpose of determining the instructional activities and materials is to select those activities and materials that cause students to learn, retain, and apply what they need to gain proficiency in performing the tasks as expected. The right instructional activities and materials are those that effectively and efficiently lead to task proficiency and increase the likelihood of transfer to on-the-job performance.

Introduction, Continued

Inputs

The following information is needed before you can begin planning for instructional activities and materials:

- TPOs
- Evaluation criteria
- Task details
- Performance support decisions
- Target audience profile
- Parameters and constraints

Note: *At this phase, when you are deciding on instructional activities and necessary instruction materials, it is helpful to have your Performance Tests and Job Aids developed (as referenced earlier in this chapter).*

Outputs

The output of this section is a lesson design plan that includes:

- Brief descriptions of activities (instructional methods and strategies) that are recommended during each of the following activities throughout your lesson:
  - Introduction
  - Content delivery
  - Demonstration and examples
  - Practice activities and feedback
  - Assessment
  - Summary and review
- Media and material selection for delivering instruction
- Sequencing of instructional activities within a lesson

How to Create a Lesson Blueprint

Steps

There are seven steps to designing your lesson blueprint, described further on the following pages (JA – I.3.C: How to Create a Lesson Blueprint in *Appendix I* provides more details on each of these steps):

Step 1: Determine the levels of simulation.

Step 2: Select the instructional methods.

Step 3: Design an instructional strategy for teaching the task.

Step 4: Design the lesson introduction.

Step 5: Describe the content needed to support the practice / performance of task(s).

Step 6: Select the media.

Step 7: Determine student-instructor ratios.

Step 8: Sequence activities for a lesson.

Levels of Simulation

The first step is to determine the levels of simulation. The idea is to choose the highest level of simulation (that is practical within the parameters and constraints) that matches how the task is performed on the job.

After selecting the highest level, you will choose an appropriate first level of simulation. The first level of simulation should be as high as the students can handle without error.

If there is a wide range between the first and final levels of simulation, you will need to select one or more intermediate levels of simulation for student practice.

Learning Problems

If any learning problems are detected or suspected, consult with your supervisor or project manager for more detailed processes for handling them during your design.

How to Create a Lesson Blueprint, Continued

Instructional Methods

The second step is to select the primary instructional method or source of content delivery. This is how the students get new information about the task – such as names of parts, principles that affect performance of the task, safety or security issues, and especially how to perform the task.

Ideally, the primary method of instruction is self-instructional text of some kind (e.g. student guide, textbook, videos, or CBT) as a homework assignment. That way, the students arrive in class the following day at the discussion level of simulation, ready for a live demonstration of performance of the task, followed by practice and feedback at various levels of simulation. In such a situation, which should be the norm, the instructors are a secondary source of content delivery who reinforce important points as they give feedback during practice.

If a course will have a very small graduate population or will be short-lived, or changes to the procedures are imminent, then it makes sense for the instructors to be the primary source of content delivery. When in doubt, however, select self-instruction as the primary instructional method.

Instructional Strategy Design

The third step is to design an instructional strategy for teaching the task. The general methods of instruction are to present the content using the primary source of content from above (either self-instructional materials or lecture), demonstration, practice exercise, and then assessment (performance test).

Again, if learning problems exist, then contact your supervisor or project manager to determine additional methods of instruction tailored to the specific learning problem.

How to Create a Lesson Blueprint, Continued

Lesson Introduction Design

The fourth step is to design the introduction to the lesson. If the task is to be trained to memory, then see your supervisor or project manager to help you create an advanced organizer to help the students understand how they will learn the task. If the task is trained via job aids, then describe the value of learning the task, what the completed task product looks like, and how practice and testing will be conducted.

Designing the Content

The fifth step is to design the content for the lesson. This is where the content is presented either via self-instructional text (ideally as homework) or via lecture by instructors (avoid whenever possible). In the preparation, pre-requisite information (such as new terms and safety, security, or legal issues) is presented.

Selecting Media

The sixth step is to select the media for the lesson. If the task is trained via job aids, then obviously job aids are one medium. Depending on the parameters and constraints, you may also select CBT/WBT, paper-based information, graphics, video, or audio.

If you think special media (i.e. CBT, 3D Modeling, eLearning, etc.) may be needed, contact your supervisor to determine whether it is feasible.

How to Create a Lesson Blueprint, Continued

Determining Student-Instructor Ratios

The seventh step is to determine the student-instructor ratio for each instructional activity. It is recommended that any activity other than lecture or demonstration have a student-instructor ratio of not more than ten students to one instructor (including CBT/WBT). However, resourcing/staffing limitations, and algorithms used in determining the final instructor contact hours will be finalized during development of the curriculum outline.

As a course developer, you should propose the recommended ratios for making these decisions based on factors such as possible injury, damage to equipment, or difficult physical behavior; which can drive the ratio to as low as one to one (provided in JA – I.3.C).

You may wish to consult an ISD professional or graduate of the SABA Knowledge Service Peak Performance System (previously known as Accomplishment-Based Curriculum Development (ABCD) workshops) in order to reference SABA's Course Design Job Aid, Task N (page 24) flowchart, for another source in determining recommended student-instructor ratios.

Sequencing Activities for a Lesson

The last step required in designing a lesson is sequencing the activities you have designed. The list below is the typical sequence for performance-based delivery:

- Design the introduction
  - Gaining attention
  - Tell students what objective(s) are
  - Recall prerequisite learning
- Content delivery
- Demonstration and examples
- Practice activities and feedback
- Assessment
- Summary and review
  - Include any follow-through activities
  - Provide students with job aids or memory aids for retention
  - Allow instructors to provide students with last-minute considerations about newly learned tasks when they return to the field

How to Create a Lesson Blueprint, Continued

Example (Page 1)

Following is the first page of an example of a lesson blueprint.

WS-J.3.C	Design Worksheet – Lesson Blueprint		
Project	BridgeMaster E Radar		
Designer	ETC Odom / ET1 Richey	**Date**	03 Jan 2011

Course	**Unit**
ET-C: BridgeMaster E Radar	Operation

Terminal Performance Objective(s)

(*Performance Statement*): Initialize the BridgeMaster E Radar

Lesson Activity	**Description**
Summary and Review	When to perform the system initialization procedure Which steps to perform based on the specific system configuration How to perform the system initialization procedure
Assessment (WS-N.1)	See Performance Test BME-1.0 (Initialize the BridgeMaster E Radar) for greater details
☐ **Integrated PT** *List TPO's included:*	N/A
Practice Exercise (WS-N.2) ☐ **Integrated Practice** ☐ **Special Learning Tactics**	**Final Level of Simulation** Although most students complete this task after performing once, students are given an opportunity for further practice – all are at the same level of simulation as the PT for this task. **Intermediate Level of Simulation** N/A **First Level of Simulation** Students are guided through the initialization procedure, given an opportunity to ask questions, and reminded that this will be part of their final assessment.
Demonstration	None, due to task simplicity. First activity after content delivery will be a guided practice – walking the students through the steps of the task as they perform it.
Content (WS-N.3)	Discussion of cues to perform this task Locate Initialization and Commissioning Checklist in the Ship's Manual Access Initialization Mode Navigate Initialization Menu
Instructional Method(s)	☒ Instructor-led / Lecture for Content Delivery of topics listed above ☐ Self paced tutorial/exercise ☒ Guided Practice as noted in demonstration block above, due to simplicity of task ☐ Blended solution (describe)
Introductory Activity	☐ Questions (Poll audience) ☒ Story/Video related to task – Establish Relevance. ☒ Review / Recall -- Review of Objective and Agenda

WS-J.3.C – Design Worksheet Lesson Blueprint **1** of **2**

How to Create a Lesson Blueprint, Continued

Example (Page 2)

Following is the second page of an example of a lesson blueprint.

WS-J.3.C	Design Worksheet – Lesson Blueprint		
Project	BridgeMaster E Radar		
Designer	ETC Odom / ET1 Richey	**Date**	03 Jan 2011
Activity *Presentation / Demonstration / Practice / Lab / Assessment / Capstone*	**Media** *CBT / Paper-based / graphics / video / audio / Computer*	**Student-Instructor Ratio**	**Length of Time**
Introduction	Lecture – Presentation	6:1	30 Minutes
Discussion of cues to perform this task Locate initialization and Commissioning Checklist in the Ship's Manual Access Initialization Mode Navigate Initialization Menu	Lecture – Presentation	6:1	30 Minutes
Guided Practice	Lab – Practice Exercise	6:1	1 Hour
Student Practice	Lab – Practice Exercise	6:1	30 Minutes
Assessment	Lab (using PTC)	3:1	30 Minutes
Review	Lecture – Presentation	6:1	15 Minutes
Comments: Per Course Constraints: Classroom/Lab only accommodates 6 students / class (for 6:1 ratio) Additional instructor during assessment assists with 1 instructor per side of Lab (3:1 ratio)			

WS-J.3.C – Design Worksheet Lesson Blueprint 2 of 2