PHASE II: DESIGN

INTRODUCTION

The major tasks of the design phase are to establish the basic structure, scope, and sequence of training, develop learning objectives and test items, and complete the curriculum documentation for course approval. Figure 3-1 (next page) shows the steps in the design phase. Although the training program manager is responsible for coordinating design activities, the majority of the work in this phase is carried out by personnel at the training site.

STRUCTURE AND SCOPE (CURRICULUM ABSTRACT)

Units and Lesson Topics

Units are the broad divisions of the course. In technical training, most units reflect a job duty. For example, "Sterilization of Equipment and Supplies" might be a unit in the Surgical Technologist curriculum. Other units reflect cognitive, affective, or skill areas with broad application in the specialty. "Medicolegal and Ethical Responsibilities" is an example of a unit covering affective areas for specialties with extensive legal and/or ethical considerations.

Lesson topics are the divisions within each unit. A lesson topic has a single, finite outcome, expressed as a terminal objective. In technical training, most lesson topics are based on tasks or procedures. Other lesson topics may be based on procedural skills (e.g., equipment use), soft skills, cognitive requirements, or affective requirements.

Designate Units and Lesson Topics

This section applies to development of a new course or an addition to a course.

For technical training, usually each duty is covered by a unit in the course. Lesson topics within the unit cover individual items included under the

duty on the TRI. A separate lesson topic for each item is not necessary. Closely related items may be grouped together in a single lesson topic.

DESIGN PROCEDURES

Determine Unit/Lesson Topic Structure and Scope

Designate units/lesson topics (all new development)
Construct curriculum abstract (all new development)
Designate units/lesson topics (all new development)
Assign TRI items to lesson topics (all projects)
Assign/review estimated contact hours (all projects)
Estimate/review student-to-instructor ratios (all projects)

Conduct Learning Analysis (OPTIONAL)

Write/Revise Learning Objectives

Terminal objectives (all projects)
Enabling objectives (all projects)

Develop Draft Evaluation Tools/Items

Develop/revise grading policies (all projects)
Draft/revise written test items (as needed)
Draft/revise performance checklists (as needed)
Draft/revise product evaluation forms (as needed)

Complete Curriculum Documentation (all projects)

Curriculum Outline
Student Evaluation Plan
Course Schedule Summary

Figure 3-1: Overview of Design Procedures.

The placement of cognitive, affective, and skill elements depends on these considerations:

1. Does this element (for example, anatomy, professional ethics, or communication skills) support performance across many duties? If the element

supports at least two duties within the specialty, consider treating it in a separate unit (see Figure 3-2 on the following pages).

2. Are the items included in the area more closely related to each other or to specific applications? If they are related primarily to a specific duty or task, it may be better to place the items with the duties or individual tasks where they apply rather than establishing a separate unit.

3. How complex is the area? In general, the more complex the content of the area, the greater the justification for including it as a separate unit.

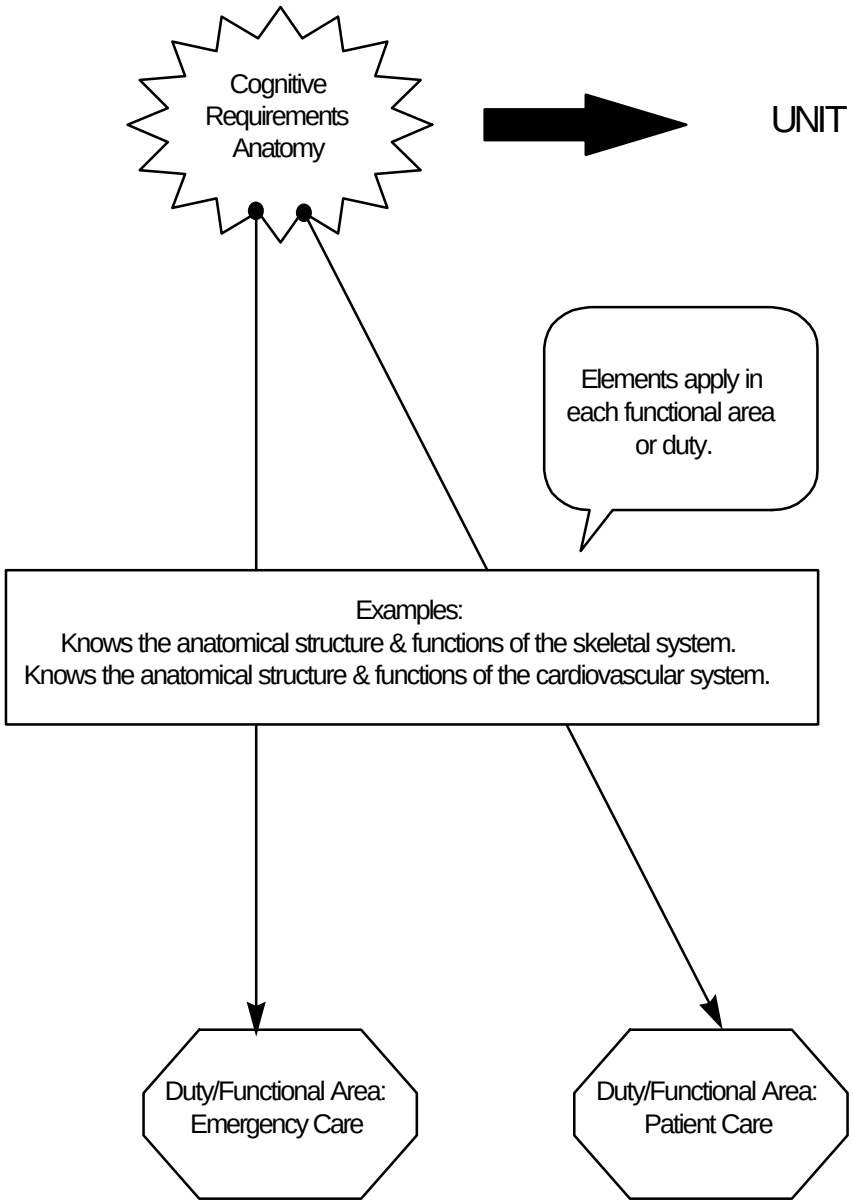

Figure 3.2: Unit, Lesson, or Learning Objective?
(Page 1 of 3)

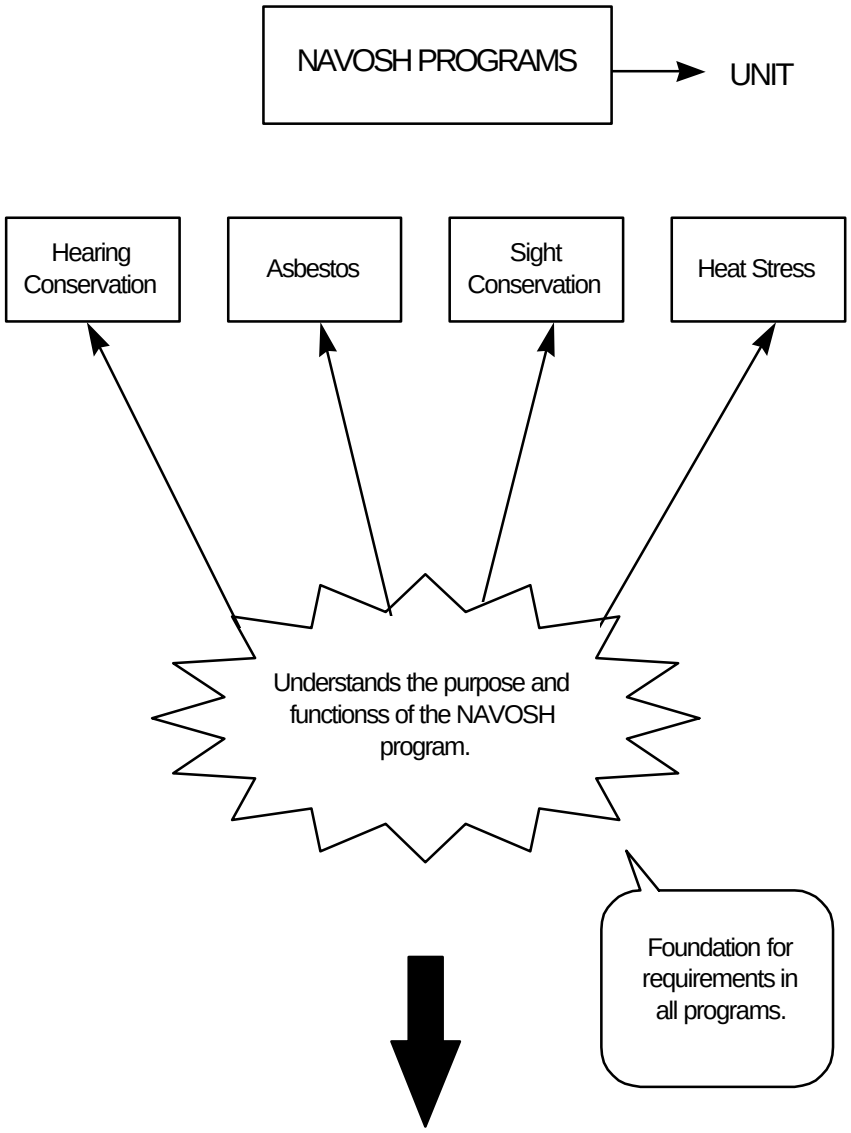

Figure 3.2: Unit, Lesson, or Learning Objective?
(Page 2 of 3)

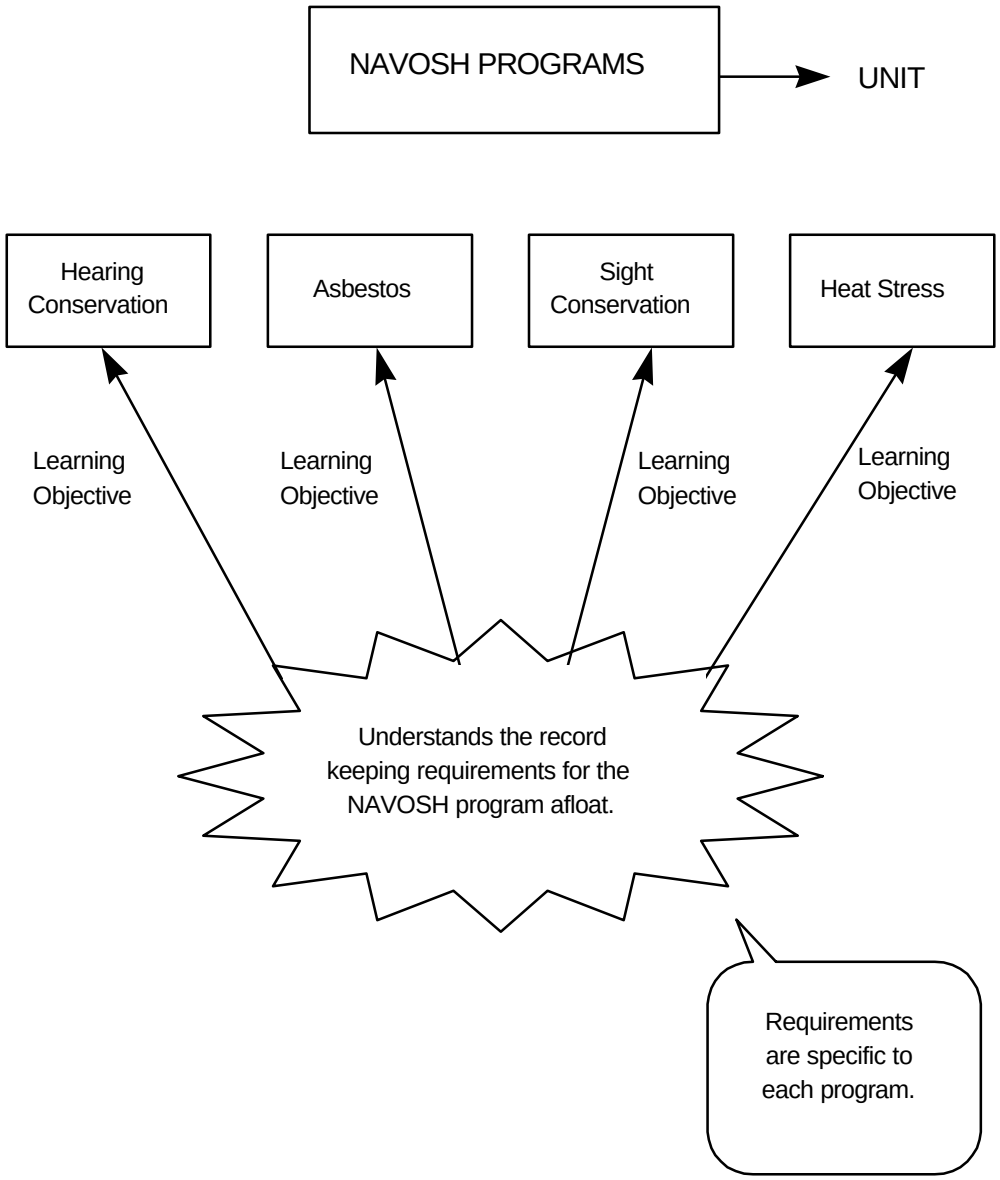

Figure 3.2: Unit, Lesson, or Learning Objective?
(Page 3 of 3)

Items that apply primarily to a single duty may be covered in a separate lesson topic (or lesson topics) within the unit covering the duty see Figure 3-2 on the preceding pages). The same factors again come into play. Does the area have a broad application within the duty? Are the items included in the area more closely related to each other or to specific applications? How complex is the content of the area?

Individual items must also be considered. Even though a particular cognitive, affective, or skill area is included as a separate unit or lesson topic, individual items within the area may be better placed at a lower level in the course structure.

The output of this step is a list of units and lesson topics that will be included in the course. For each lesson topic, list the applicable items from the validated TRI. Show the recommended learning and performance level for each item. Make sure that every item from the validated TRI is included in at least one lesson topic.

The list of units and lesson topics **does not** require approval by the training program manager. Retain the list until the curriculum outline is approved or until the curriculum abstract is completed.

Construct Curriculum Abstract

A curriculum abstract provides a framework for the development of learning objectives. It establishes the tentative scope and content for each segment (units and lesson topics) of the program or course.

Construct a curriculum abstract for all new development projects and for revision projects involving the addition of one or more units. In the latter case, the training program manager may waive the requirement for an abstract.

The training program manager is responsible for development of the curriculum abstract for a new course and may delegate to one of the training sites. For an existing program, the curriculum abstract is developed by the

training site(s). For multiple site programs, make sure that all sites are included in constructing the curriculum abstract, either in a workshop or by teleconference. The curriculum abstract **does not** require approval. Retain it until the curriculum outline is approved.

The core of the curriculum abstract consists of the list of units and lesson topics completed in the previous section, supplemented by unit synopses and lesson topic overviews. A sample format for the abstract is shown in Figure 3-3.

Unit Synopsis

The unit synopsis is a brief statement of the intent and scope of the unit, similar to a course description in a college catalog. The synopsis should be no longer than a single paragraph. An example, based on the Advanced X-ray Technician training program, is presented below.

> *Skeletal Anatomy and Radiographic Positioning: An overview of human skeletal anatomy (including recognition of anatomical structures, their relationships to other structures; bone and joint classifications; and joint movements) required by the technician to correctly position patients for X-ray examinations. Competency in positioning patients and equipment for X-ray examinations (including technical aspects such as central ray angle, film distance, and position of the tube head).*

Lesson Topic Overview

The lesson topic overview includes a list of the items in the validated TRI that will be covered in the lesson topic and an estimate of the number of didactic, laboratory/practical, and/or clinical contact hours required for the lesson (see page 3-25 for a discussion of contact hours). One or two sentences stating the purpose of the lesson may also be included.

Curriculum Abstract
<<Title of Program>>

Unit 1: <<Title>>
Unit Synopsis: <<Brief statement of the intent and scope of the unit.>>

Estimated Contact Hours: <<#>> Didactic
<<#>> Lab/Practical
<<#>> Clinical

1.1 <<Lesson Topic Title>>
Lesson Overview:
<<OPTIONAL: Brief statement of purpose or content of lesson.>>

Training Requirements Inventory References:
<<Item>>
<<(Include item #, statement, learning level, and performance level from inventory.)>>
<<Item>>
<<Item>>

Estimated Contact Hours: <<#>> Didactic
<<#>> Lab/Practical
<<# >> Clinical

1.2 <<Lesson Topic Title>>
Lesson Overview:
<<OPTIONAL: Brief statement of purpose or content of lesson.>>

Training Requirements Inventory References:
<<Item>>
<<(Include item #, statement, learning level, and performance level from inventory.)>>
<<Item>>
<<Item>>

Estimated Contact Hours: <<#>> Didactic
<<#>> Lab/Practical
<<# >> Clinical

<<Repeat for each unit and lesson topic for new programs, for each added unit and lesson for revisions to current programs.>>

Figure 3-3: Sample Format for Curriculum Abstract.

Sequence

List the units and lesson topics in the sequence in which they will be taught.

A prerequisite unit or lesson must always precede the dependent unit or lesson. Consider this situation. A course includes a unit on math and a unit on compounding medications. Before beginning the compounding unit, students need the skills from the math unit. The math unit is thus a prerequisite for the compounding unit and the compounding unit is dependent on the math unit. Place the math unit before the compounding unit.

Place related units or lessons near each other in the curriculum. For example, a unit on compounding medications should be placed near a unit on dispensing medications in Pharmacy Technician training.

Remember that units may overlap in the final teaching schedule.

LEARNING ANALYSIS (Optional)

No formal learning analysis is required in this curriculum development model. A learning analysis may be useful in some projects, particularly if new procedures or tasks are involved. Processes for conducting a learning analysis will have to be tailored to meet the needs of individual projects. Typically this will be the responsibility of an instructional systems specialist assigned to the project. Even if a decision is made to include a learning analysis, it **does not** require approval from the training program manager.

LEARNING OBJECTIVES

Learning objectives serve three complementary purposes:

1. Learning objectives state the outcome of training. They are written primarily to tell students what they must do to demonstrate mastery of each segment of the training; they state the specific requirements of the course.

2. Learning objectives serve to standardize courses throughout changes of instructional personnel.

3. Learning objectives provide a basis for accountability.

Each of the three parts of a learning objective--**behavior, conditions, and standards**--contributes to defining the performance required of students within a particular segment of training. The **behavior** is the core of the learning objective, telling the student what he or she must do to demonstrate achievement within the lesson. The **conditions** provide essential information about the circumstances that will apply when this achievement is evaluated. The **standards** define acceptable performance of the behavior required.

All learning objectives must state behavior, conditions, and standards; however, repetitive conditions and/or standards may be stated once at the beginning of a unit or lesson.

New curriculum writers may find it helpful to use a form such as that presented in Figure 3-4 until they are accustomed to the process of writing learning objectives.

LEARNING OBJECTIVE DEVELOPMENT WORKSHEET

Unit Number & Title:

Lesson Topic Number & Title:

Objective Number:

Training Requirements Inventory Item(s) covered:

Number	Item	Lrng Lev	Perf Lev

(continue on reverse if necessary)

Behavior:

Conditions:

Environment where evaluation will take place:

Equipment students will use:

Performance aids students may use during evaluation:

Standards:

Level of performance required:

Authority for correct performance:

Complete Learning Objective:

Figure 3-4: Optional Aid for Writing Learning Objectives.

Terminal and Enabling Objectives

There will be one and only one unique terminal objective for each lesson topic. The terminal objective for a lesson reflects a final outcome - some culminating performance that demonstrates mastery of the lesson. The required performance must be observable and measurable by the completion of the lesson.

Most terminal objectives reflect a performance or action that the graduate must perform on the job. Terminal objectives typically require demonstration of a procedure or technical skill; application of principles, theories, rules, concepts, or standards of conduct; demonstration or application of soft skills (e.g., patient contact management); demonstration of procedural skills (e.g., using a microscope); or some combination of skills. Cognitive terminal objectives are not precluded, but such objectives should require **application** of knowledge or concepts. Terminal objectives requiring no more than recall or recognition of facts **normally are precluded.**

For example, the following **would not be acceptable as a terminal objective:** "List three strategies for calming an angry patient and state the advantages and disadvantages of each." The following **would be acceptable as a terminal objective:** "Based on a brief videotape of a confrontational situation between a corpsman and a patient, describe the strategies you would use to calm the patient and explain why you selected those strategies." In the second objective, students are asked to make a decision based on their knowledge of the strategies; i.e., **apply** their knowledge to a specific situation.

The exception to this rule involves lessons that provide basic introductory information applied across a number of lessons. Anatomy and physiology lessons are frequently of this type. Students will apply knowledge of anatomy and physiology later in the training program, but application within the lesson may be difficult if not impossible. In such cases, focus performance on the enabling objectives rather than on the terminal objective, as in this example:

"Locate the structures of the respiratory system on a diagram and state the function and components of each as designated in the following enabling objectives..."

NOTE: This is a "last resort" option that may be used only if a terminal objective requiring some application of information cannot be written for the lesson.

Enabling objectives cover all of the cognitive, affective, and skill elements students need to master to reach the terminal objective in each lesson topic. Enabling objectives are so named because they enable the student to meet the terminal objective. Enabling objectives may require recall/recognition of facts, application of theory or concepts, demonstration of subordinate skills, problem-solving and/or decision-making, or any other performance required to support the terminal objective.

Behavior Statements

The **behavior** portion of the learning objective states what the student will do to demonstrate achievement within the lesson. It must designate an explicit, observable, measurable action that can be evaluated within the lesson. In the following examples of behavior statements, the behaviors are in **bold face type:**

Perform venipuncture

Identify the structures of the circulatory system on a diagram

State the meaning of medical abbreviations

Cite examples of breaks in aseptic technique occurring in a videotaped procedure

Because learning objectives are intended to tell students exactly what is expected of them in order to successfully complete a lesson, the behavior statement used in an objective must be clear, precise, and specific as possible. Do not use verbs that indicate an internal (and therefore unobservable) response. "Know," "understand," and "appreciate" are the usual examples of

verbs that indicate internal states rather than observable, measurable actions. "Recognize" is another example of an internal response. You cannot observe a student recognizing something. You must designate some action that will allow the student to demonstrate recognition, either directly or through some product.

Other verbs tend to be vague, even though they call for an overt action. Verbs such as explain, describe, and identify are not prohibited, but use them with care. Appendix 3A includes discussion of a number of verbs frequently misused in learning objectives.

In general, each objective requires one performance, and therefore one action verb per objective. Exceptions occur when two or more actions complete a performance or are complementary to each other. For example, it may be important for students to be able to describe the internal structure of a certain organ and be able to locate the organ on a diagram or anatomical model.

The following objective IS acceptable because the two behaviors complement each other: "Identify the kidney on an illustration and describe its internal structure."

The following objective IS acceptable because the two behaviors may be considered to represent the completion of one procedure (hence, one performance): "Take a blood pressure on a fellow student and record the results on the appropriate form."

The following objective IS NOT ACCEPTABLE because the two action verbs require separate and incompatible performance: "List or select the indications and contraindications for each of the following drugs..." (a list of drugs would follow). Listing the indications and contraindications requires the student to perform from memory without any prompt other than the name of a drug. Selecting only requires the student to recognize them on a list.

Conditions

The **conditions** state the environment in which the student performs the **behavior** (e.g., in a laboratory setting, in a simulated operating room), and the tools or aids the student uses (e.g., using a calculator, given a diagram of the respiratory system) during evaluation. The conditions may also **exclude** the use of aids (e.g., without using a calculator) during evaluation.

Remember that learning objectives specify performance **at the time of evaluation.** The most frequent problem with conditions is confusion between aids the student uses to learn material and those that he or she may use during evaluation. The conditions statement **DOES NOT** include learning aids provided during instruction. **The conditions statement in the following example is INAPPROPRIATE:** "Given the terminology handout, define 10 terms ..." As written, this simply requires the student to copy ten definitions from the terminology handout. Some students may learn from the experience of copying, but it's hardly an evaluation of how well students know the terms. **A more appropriate way of stating the requirement would be:** "Given 10 terms dealing with radiation safety from the terminology handout, define at least 8 of the 10 terms."

The conditions in a learning objective reflect the conditions that would exist on the job. If manuals are normally used as references on the job, then allow students to use the same manuals to complete the learning objectives.

In the following examples, the condition statements are in **bold face type:**

Compute means and standard deviations **using the survey data provided and a programmable calculator** ...

Draft a Navy letter **using the correspondence manual as a reference** ...

Given a list of brand name pharmaceuticals, state the generic name for each **using the Hospital Formulary as a reference** ...

Conditions that do not have to be explicitly stated in a learning objective are called **assumed** or **implied conditions**. If no conditions are explicitly stated in a didactic learning objective, the following assumed conditions apply:

1. Evaluation takes place in a normal classroom setting.
2. Students have normal student supplies (pen or pencil and paper) available.
3. Written response is required.
4. Evaluation takes place after instruction (omit "Upon completion of this lesson").
5. No references or aids are used during evaluation.

If the condition states that performance will be in a clinical or laboratory setting (real or simulated), it is presumed that the normal clinical or laboratory equipment and furnishings are available to the student.

Standards

The **standards** state the required level of performance and cite some authority that establishes the criteria for correct performance.

The **authority** for a learning objective must be readily available to students for reference. Whenever possible, use instructions, textbooks, student handouts, procedures manuals, or any other printed or repeatable source to define correct performance. Please note that "as presented in class" does not meet the requirement for citing an authority as students cannot readily refer to the presentation after the fact (unless it was videotaped).

When using publications (Navy or civilian) as the authority for correct performance, make sure that the publication reflects current policy and practice. As a general rule, your authorities should be no more than five years old, unless you are dealing with concepts or skills that do not change over time.

Avoid using multiple references. Multiple authorities may lead to situations where the authorities are contradictory. It may be necessary to use

multiple references for a unit or even a lesson topic, but individual learning objectives should be tied to a single authority.

Make the minimum level of performance specific to the action required and consistent with the level of performance expected after training. For example, if speed is essential on the job, then include a time limit in the level of performance. Similarly, if absolute accuracy is required in real-world performance, set high levels of performance in the learning objective.

When a learning objective requires students to demonstrate a procedure (e.g., perform venipuncture) or create some product (e.g., write a nursing note), a percentage standard is rarely appropriate. The set of criteria for each procedure or product is unique and frequently complex. An evaluation form is usually needed. Cite the form within the body of the learning objective, as in the following examples (standard is in bold face type):

Perform venipuncture **in accordance with Performance Checklist 2.1.**

Write a Nursing Note **as designated on the Nursing Note Evaluation Form.**

Note that you do not need to cite the reference used to develop the evaluation form in the learning objective. Instead, cite the reference on the form itself. Detailed criteria are also provided on the evaluation form.

For relatively simple products or procedures, it may be sufficient to designate the number and/or types of errors allowed or a range of accuracy as in these examples:

Draft a Navy letter **with no more than two format errors.**

Take the blood pressure of a fellow student; **reading must be +/- 2 Hg mm of a simultaneous reading taken by the instructor.**

When using percentage standards for cognitive learning objectives, make sure that the percentage makes sense in the context of the objective. For example, suppose students have to list the contraindications for a procedure that has three contraindications. A standard requiring a minimum of 70%

accuracy could only be met by listing all three contraindications. The true standard in this case is "without error." If some margin of error needs to be allowed, "list at least two of the three contraindications of ..." would provide a more appropriate standard.

Ideally, the criteria for acceptable performance for each learning objective are determined independently. Traditionally, each learning objective was a separate requirement and performance on each objective was measured against the criteria for that objective. Realistically, it is rarely feasible to adequately evaluate performance on every enabling objective in a training program (terminal objectives must be evaluated). **Overall standards may be set for cognitive learning objectives in a lesson that will be evaluated primarily by written test items**. The standard usually will be expressed as a passing score on a written test, e.g., 70% of test items answered correctly. However, remember that overall standards do not apply to learning objectives requiring the student to demonstrate a procedure or create some product.

A different level of performance may be specified for any learning objectives that cover requirements of particular importance within the lesson.

Learning Objectives and Training Levels

A learning objective must reflect the training level (learning and performance level) assigned to the item (or items) from the TRI that it covers. The behavior must be compatible with the assigned level, but there are no key verbs that tie an objective to a specific level. In some cases, the condition as well as the behavior will signify the training level for an objective.

Learning Levels

In the previous chapter, three general learning levels were defined: knowledge ("knows"), understanding ("understands"), and application

("applies"). With slight variations, these learning levels apply to cognitive, affective, skill, and task elements on the validated TRI.

Behavior statements for learning objectives at the three learning levels are shown on Figure 3-5 on the following page.

Knowledge level objectives normally require students to recall or recognize factual information previously covered in class and/or student assignments. Examples of knowledge level behaviors are:

Defining terms.

Listing steps in a procedure

Identifying structures on a diagram.

Paraphrasing a rule.

Objectives at the **understanding level** normally require students to integrate, generalize, or differentiate based on information previously presented. Essentially, understanding level objectives require students to put pieces of information together to meet the objective. Examples of understanding level behaviors are:

Comparing or contrasting similar items or concepts.

Classifying or categorizing items.

Explaining the function or rationale of something.

Objectives at the **application level** require students to use information previously presented to solve problems, determine causes, predict occurrences, or determine appropriate actions in new situations. "In new situations" is the distinguishing characteristic of objectives at the application level. Application level objectives almost always include a condition referring to some description of a situation (e.g., a scenario or case study) or a set of data. The student has to analyze the situation or data before completing the performance.

Define the term “homeostasis.”

I remember. The definition for homeostasis is . . .

Knows

Given descriptions of various vertebvates, classify each as a mammal or reptile.

I remember the distinguishing characteristics of mammals and reptiles. I can classify these creatures according to their characteristics.

Understands

Determine the shutter speed and apperture settings under various lighting conditions.

I remember the factors I need to consider to set shutter speed and aperture to take photographs under different lighting conditions. In this situation, the factors are a, b, g, z; which means I need to adjust for d, f, y to get the picture I need. My shutter speed and aperture setting will be . . . .

Applies

Figure 3-5:
Behavior Statements at Knows, Understands, and Applies Learning Levels.

Performance Levels

Performance levels apply when hands-on experience is required for tasks, procedures, or skills. Three performance levels were defined earlier: guided, standard, and adaptive performance.

Objectives at the **guided performance level** require students to demonstrate a task, procedure, or skill following a standard set of steps, without violating safety precautions. The distinguishing characteristic of this level is that students may use some performance guide (such as a job information sheet) or may be prompted by the instructor. Example: Write a learning objective using the Learning Objectives Worksheet.

Objectives at the **standard performance level** require students to safely perform the task, procedure, or skill following a standard set of steps, without assistance. Example: Write a learning objective (without references is an assumed condition).

Objectives at the **adaptive performance level** require students to modify standard procedures to meet the requirements of changing situations, without violating safety precautions. Objectives that require students to troubleshoot equipment or respond to an emergency (e.g., an allergic reaction) during a procedure would be at the adaptive performance level.

Sequence

Dependent Objectives: Two objectives have a dependent relationship when the knowledge, skill, or attitude covered by one objective is a prerequisite for the other objective. The objective covering the prerequisite will be presented before the second objective. In addition, the two objectives should be placed as close as possible in the curriculum. Example: In a math unit, an objective requiring the student to solve multiplication problems with whole numbers would precede one requiring the student to solve division problems with whole numbers. Usually, division will immediately follow multiplication.

Independent Objectives: Two objectives are independent of each other if they have little or no commonality. Mastering one objective will have little impact on mastering the other. Example: A math objective and an anatomy objective would be independent of each other.

The order of the enabling objectives within a lesson topic will normally reflect the general teaching order, going from the most basic to the most complex requirements in the lesson.

Reviewing Learning Objectives

Before being submitted for approval, make sure that the learning objectives are reviewed with at least one subject matter expert (SME) who is not connected to the education and training program. From the objectives, does the SME understand the requirements students must meet? Does he or she agree that a graduate of the program will meet entry level requirements if the learning objectives are met in training? Edit the learning objectives to correct any errors in grammar, spelling, punctuation, and usage.

Use the checklist shown in Figure 3-6 to review the learning objectives for a lesson topic prior to approval. The answer to each question on the checklist should be "yes."

CHECKLIST FOR REVIEWING LEARNING OBJECTIVES IN A LESSON TOPIC

The following questions should be considered in reviewing the learning objectives in any lesson topic submitted for approval. Attach recommendations for revision for any question marked "no." Remember that conditions and standards may be stated on the conventions page for the curriculum or unit.

Yes	No	
		Is each learning objective:
___	___	1. Pertinent to referenced TRI items?
___	___	2. A statement of student performance at time of evaluation?
___	___	3. At the appropriate learning/performance level?
___	___	4. Attainable within the lesson?
		Is the behavior in each objective:
___	___	1. Measurable?
___	___	2. Specific?
___	___	3. A single performance or acceptable multiple actions as described the Curriculum Development Guide?
___	___	4. Attainable within the lesson?
		Are the conditions in each objective:
___	___	1. Complete (environment, equipment, aids)?
___	___	2. Appropriate for the behavior?
		Are the standards in each objective:
___	___	1. Complete (level of performance and authority cited)?
___	___	2. Appropriate for the behavior?
___	___	**Does the terminal objective reflect a final outcome for the lesson?**
___	___	**Are the enabling objectives adequate to prepare students to meet the terminal objective?**
___	___	**Does each enabling objective support the terminal objective?**
___	___	**Are the enabling objectives presented in a logical teaching sequence (e.g., from most basic to most complex)?**

Figure 3-6: Checklist for Reviewing Learning Objectives.

CONTACT HOURS AND STUDENT-TO-INSTRUCTOR RATIOS

Contact hours reflect the time the students spend in class or clinical rotations to master a segment (i.e., unit, lesson topic, or learning objective) of the program or course. There are three types of contact hours. Laboratory/ practical and clinical/field contact hours reflect the time spent in "hands-on" training and performance testing. Didactic contact hours reflect the time spent in lecture, discussion, or demonstration periods and written testing.

It's important to note that the difference between didactic and laboratory/ practical contact hours is what students are doing, rather than where teaching takes place. A class period devoted to the demonstration of a procedure by the instructor counts as a didactic contact hour even if it takes place in a simulated or actual clinical setting. Conversely, a learning objective calling for students to demonstrate the use of a piece of equipment requires laboratory/practical contact hours even if the performance takes place in the classroom.

During clinical/field contact hours, students fulfill the duties of some position in the real world.

Contact hours include the time needed to teach and evaluate the learning objectives in a lesson topic. Written and oral examinations use didactic contact hours. Performance evaluations use either laboratory/practical or clinical/field contact hours depending on whether simulated or real-world performance is being evaluated.

Assigning Contact Hours

Contact hours are normally assigned to lesson topics rather than single learning objectives. The number of didactic, laboratory/practical, and clinical/field contact hours needed for each lesson topic must be specified.

Allow one contact hour for each 50 minute period for laboratory/practical and didactic contact hours. Allow 60 minutes for each clinical/field contact hour.

Contact hours required for evaluation (i.e., "test and review" contact hours) may be assigned to a unit as a whole or included in the contact hours for each lesson topic. Laboratory/practical and clinical/field contact hours for evaluation are usually included in the contact hours for individual lesson topics. Didactic contact hours for written or oral examinations may be assigned at the unit level if the examinations cover more then one lesson topic.

Student-to-Instructor Ratios

The ratio of students to instructors for each contact hour is set at the highest number of students that can be taught by one instructor without degradation to the quality of instruction and learning. There is only one standard ratio (for classroom lecture). All other ratios are determined in the best judgement of the schoolhouse staff, based upon spaces, equipment, and instructor span of control.

The standard student-to-instructor ratio for lectures and written tests is 25:1 (25 students per instructor). The ratio is unrelated to class size or planned student input. If the classroom is too small for 25 students, the lecture ratio may reflect the maximum number of students (less than 25) that can be convened. Even when more than 25 students are convened in a single room, the 25:1 didactic ratio should be used. For laboratory/practical periods, small group sessions, and clinical/field periods, use the largest ratio consistent with adequate instruction, evaluation, and safety considerations.

Bottleneck periods occur when space, instructor, or equipment limitations restrict the number of students who can be included in a given activity at one time or when close supervision or observation is required for safety and/or evaluation of student performance. During a bottleneck period, consider the class as a whole to determine the student-to-instructor ratio (see Figure 3-7 next page).

Most bottleneck periods occur during lab/practical evaluations. During the time that it takes to evaluate all students in the class, each student is involved in one of two or more concurrent activities. Prior to evaluation, students are engaged in supervised practice. Following evaluation they may return to supervised practice or be sent to a third activity (e.g., computer-assisted instruction). To compute the student-to-instructor ratio, count all of the instructors evaluating or supervising students during that period of time.
In the example illustrated on the left, five instructors work with a class of 25 students to complete a skills lab. Two instructors supervise students practicing the skill before evaluation (a ratio of 12 to 1) while two more instructors evaluate students. Each instructor can evaluate two students at a time. The fifth instructor supervises students who have completed the skill lab. The students move among the practice, evaluation and supervised study areas during the period. Although the student-to-instructor ratio is 2:1 for the actual time of evaluation, it takes five instructors to supervise the total class of 25 for the bottleneck period; therefore the student-to-instructor ratio is 5:1.

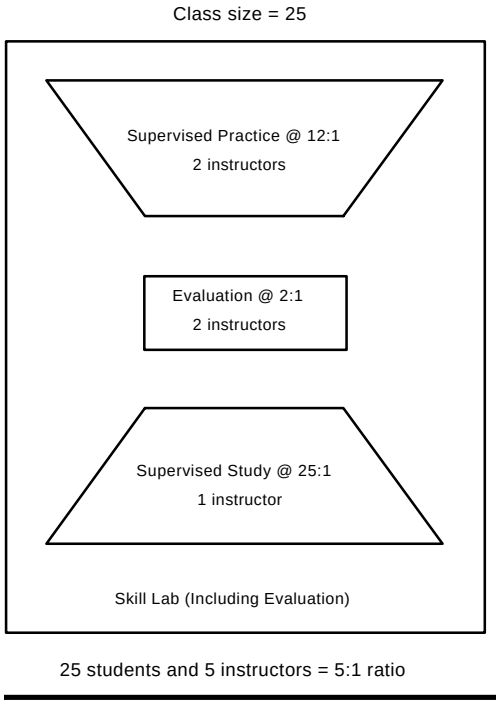

Figure 3-7: "Bottleneck" Periods.

EVALUATING STUDENT PERFORMANCE

Criterion-referenced testing will be used in all education and training programs and courses under BUMED cognizance. In criterion-referenced testing, student performance is evaluated against the criteria established by the learning objectives being tested.

Students must demonstrate achievement of all terminal objectives, but it is not always feasible to test all enabling objectives. When all enabling objectives cannot be tested, those within a specified section of the curriculum outline may be randomly selected for testing.

In some cases, achievement of didactic enabling objectives can be evaluated through performance on the terminal objective. Consider a lesson topic on Navy correspondence that has a terminal objective requiring students to determine the type of correspondence needed in a certain situation and then prepare it, and enabling objectives covering the purpose and format for several types of Navy correspondence. If a student correctly determines the type of correspondence and correctly prepares the correspondence, achievement of the enabling objectives is assumed.

The reverse may also be true for some didactic terminal objectives. For example, a pharmacology lesson topic may include a terminal objective that requires students to select the indications, contraindications, drug interactions, and so on for a class of drugs. Enabling objectives in the lesson topic may deal with individual medications, smaller groupings of medications, or individual factors (e.g., contraindications). The terminal objective may be met by satisfactory performance on the enabling objectives.

Make sure that the **objective** is tested, **not** the content. The behavior statement in the learning objective implies the method of evaluation. For example, if the objective requires the student to determine the blood type from a blood sample, student achievement cannot be evaluated by a paper and pencil test. The student may be able to answer any question posed on typing blood

and still not be able to do it. Thus, if an objective requires the student to perform a procedure, the only adequate evaluation is to have the student perform the procedure.

The same principle holds in evaluating didactic learning objectives. The behavior in the objective and the learning level targeted for the objective must be the basis for evaluation. If an objective says the student will define a term, the best evaluation is for the student to give the definition from memory.

Examples of the implied method of evaluation for a number of verbs frequently used in didactic learning objectives are shown in Figure 3-8.

Most systems of instructional development recommend developing evaluation items at the same time that learning objectives are written to make sure that the evaluation focuses on the learning objective and not on content. As a minimum, the type of instrument and items that will be used to evaluate student performance in each lesson topic will be determined as the objectives for the lesson topic are completed. Evaluation instruments and items may then be developed after the lesson topic guides (covered under Phase III) are completed.

Types of Evaluation Instruments

Most learning objectives will be evaluated by written tests, performance checklists, or product evaluation forms/guidelines. See Figure 3-8 for an overview of different types of evaluation instruments and items.

Written Tests

Written tests measure cognitive abilities and are appropriate for measuring student performance on most learning objectives written at the knowledge or understanding learning levels, as described in Chapter 2. Written tests may also be appropriate for learning objectives written at the application learning level.

	Selected Response	Constructed Response	Performance Checklist, Product Evaluation Form
Purpose	Sample knowledge with maximum efficiency and reliability.	Assess thinking skills and/or mastery of a body of knowledge.	Assess ability to translate knowledge and understanding into action.
Typical exercise	Multiple choice, true-false, matching.	Short answer, problem, essay.	Written prompt or an event frames and drives performance.
Student's response	Read, evaluate, select.	Read, evaluate, write.	Plan, perform procedure or construct product.
Scoring	Count correct answers.	Judge understanding.	Check rate or proficiency of performance; check attributes of product.
Major advantage	Efficiency - can administer many items per test period.	Can measure complex cognitive outcomes.	Provides evidence of performance skills.
Potential sources of inaccurate results (Test or test administration)	Poorly written items; over-emphasis on recall of facts; failure to sample content.	Poorly written exercises; poor scoring technique.	Poor exercise; too few samples of performance; vague criteria; poor test conditions; poor rating procedures.
Potential sources of inaccurate results (Student)	Test taking skills may inflate or deflate performance.	Writing skills (both verbal and mechanical) may influence grading.	Anxiety more likely to impact on performance.
Influence on learning	Over-emphasis on recall encourages memorization; well-constructed tests can encourage critical thinking skills.	Encourages critical thinking, development of writing skills.	Emphasizes use of available skills and knowledge in relevant situations.
Keys to success	Clear test blueprint or specifications that match instruction closely; skill in item writing.	Carefully prepared writing exercises; preparation of model answers; time to read and score.	Carefully prepared performance exercises; clear performance expectations; careful, thoughtful rating scale; instructor training on implementation.

Figure 3-8: Comparison of Types of Evaluation.

Written test items fall into two broad categories, selected-response and constructed-response items.

Selected-response Items. In selected-response items, alternatives are provided and students must select the correct alternative. Even though selected-response items may be used to evaluate understanding and application level objectives, students basically recognize (or fail to recognize) a correct response. **Selected-response items cannot be used to test recall**. Examples of selected-response items are matching, multiple-choice, and true-false items. See Appendix 3B for guidelines.

Matching test items are most appropriate for objectives requiring students to recognize information previously presented. An objective requiring students to select the correct definition for each term on a list could easily be evaluated with a matching test item.

Multiple-choice test items are equally appropriate for objectives requiring students to recognize information previously presented. They may also be used to evaluate higher-level abilities such as students' ability to discriminate among similar items, determine appropriate actions, recognize cause and effect relationships, or recognize probable consequences of an action. Frequently, multiple-choice test items intended to evaluate higher-level cognitive abilities are presented in conjunction with a short scenario or case study. Students must analyze the situation presented before they respond to the item or items that accompany it.

Multiple-choice items can be constructed to diagnose student difficulties. Diagnostic items use distracters (i.e., incorrect alternatives) that incorporate predictable errors. Consider the following multiple-choice item as an example:

In square feet, the surface area of a room measuring 6'L x 11'W x 18'H is:

a. 66
b. 372
c. 744
d. 1188

The correct response for this item is "c" (the sum of the square footage for each wall, the floor, and the ceiling). The first alternative is the area of the floor or ceiling. Students who are confused between surface area and floor area are likely to select this alternative. Students who are confused between surface area and volume are likely to select "d." Students who correctly determine they were dealing with three sets of dimensions, but overlooked the fact that they were dealing with six surfaces rather than three, are likely to select "b." Which wrong answer the student selects indicates where the student went wrong. This simplifies remediation.

True-false test items have limited utility because students can guess the correct answer 50 percent of the time. Use them rarely.

Selected-response items (e.g., multiple choice and matching items) have a number of advantages. First, they are easy to score. Each selection is simply right or wrong, with no questions about partial credit. A test made up of selected-response items can be automatically graded, an important consideration when large numbers of students are involved. Secondly, item validity and reliability are relatively easy to establish by statistical analysis. One disadvantage is that good selected-response items are difficult to write for testing learning at the higher levels (understands, applies).

Constructed-response Items. In constructed-response items (e.g., essay and completion items), students must compose an answer. The hints provided by the alternatives in selected-response items are not available. Constructed-response items are appropriate for knowledge level objectives that require students to recall information (e.g., name, state, list). They are also appropriate for understanding and application level objectives requiring students to put information together (e.g., explain, describe) or develop a response or analysis for a new situation.

Examples of constructed-response items are completion (also called fill-in-the-blank), listing, short-answer, and essay test items. See Appendix 3B for guidelines.

Completion and listing test items are most useful for testing recall of previously presented material. Short-answer test items may test recall, understanding, or application. Essay test items are normally used to test understanding or application level objectives requiring a more complex response from students.

One advantage of constructed-response items is that they minimize the effectiveness of guessing. They can also provide an indication of students' ability to communicate ideas in a coherent and logical manner. This is particularly true of essay test items.

The disadvantage of constructed-response items lies in grading. Scoring keys must be carefully prepared. Even with good scoring keys, grading takes longer and may be more subjective than with selected-response items. Again, this is particularly true of essay test items.

Performance Checklists

Performance checklists are used for most learning objectives that require students to demonstrate a skill, task, or procedure. A performance checklist evaluates performance of steps in a process. The student is evaluated on each step that must be performed to complete the demonstration.

Performance checklists serve a number of purposes. Prior to evaluation, they serve as performance guides for students. During evaluation, they minimize subjectivity in grading. After evaluation, they provide detailed feedback to students.

Most performance checklists use a pass/fail grading system. However, numeric grades may be constructed by assigning "all or none" point values to individual steps, or by constructing rating scales when levels of performance can be distinguished for individual steps. **Note:** All evaluation instruments should undergo pilot testing, but when numeric grades are used, the reliability of the grading system **MUST** be established through pilot testing. Use the grading

system with one or two classes without posting the numeric grades to make sure that the grading system is reliable and does not inflate the students' overall grades.

Critical elements may be designated, but are not required. A step may be considered a critical element if incorrect performance would cause harm to patients or staff or damage expensive equipment.

Clinical evaluation forms are a variation on performance checklists that are used to evaluate student performance in clinical situations. Clinical evaluation forms tend to be less detailed than performance checklists.

See Appendix 3B for guidelines.

Product Evaluation Forms

Product evaluation forms are similar to performance checklists except they focus on the characteristics of a product rather than steps in a process.

Product evaluation forms may be constructed so that one form is used to evaluate the product from each student. The form then serves the same purposes as a performance checklist. This type of product evaluation is used primarily when all students are producing the same product and the focus is on the physical characteristics of the product (e.g., a woodworking class where all students make a window box).

Alternatively, product evaluation forms may be constructed to serve as a grading key for instructors and guidelines for students. Such product guidelines are less cumbersome and usually sufficient for written products such as case worksheets, reports, or individual projects where the content is more important than the physical characteristics of the product.

Products may be evaluated using a pass/fail grading system. However, most product evaluation forms and guidelines incorporate rating scales or point values to construct a numeric or letter grade for the product. Keep a close eye

on the reliability of product evaluation forms to make sure that grades accurately reflect the quality of the product and do not inflate overall student grades.

See Appendix 3B for guidelines.

Rating Scales

Rating scales may be incorporated in performance checklists or product evaluation forms. They are usually constructed for individual elements (i.e., steps or characteristics) on the evaluation tool, not for the evaluation tool as a whole. Rating scales are used to provide more detailed feedback to the student on how well a step was performed or what could be improved in a product. They also serve to discriminate among students who perform at the minimum acceptable level and those who perform above the minimum requirement.

Reliable rating scales can be difficult and time consuming to construct. General categories such as "unsatisfactory", "satisfactory", and "outstanding" are not sufficient. Instead, criteria (sometimes called anchoring statements) for different levels of performance must be constructed, normally for each step or characteristic that will be rated with a scale. The anchoring statement for each level of the rating scale must clearly define the qualities that will be present or absent for the performance or product to receive that rating.

Rating scales that apply to a number of behaviors may be constructed to evaluate students on affective objectives dealing with professional and/or ethical standards. Typically, such rating scales are used during the clinical or field portion of a training program and focus on consistency (e.g., a student sometimes, usually, or always conforms to a particular standard). Such rating scales must be carefully constructed and used with caution.

Guidelines for constructing rating scales are provided in Appendix 3B.

Validity and Reliability

Validity and reliability are two overlapping measures of the quality of evaluation tools and items. For criteria-referenced evaluations, **content validity**

is essential. Content validity is established by reviews with experts in the specialty or subject matter and instructional systems specialists. Reliability is a statistical measure of the consistency of an evaluation tool or item. To be valid, an evaluation tool or item must be reliable (but beware; some items or tools may be reliable without being valid).

The next two sections deal with establishing initial validity and reliability for evaluation tools and items. It should be noted, however, that validity and reliability are continually open to question. Changes in a course or program may affect the validity and/or reliability of evaluation tools and items. The validity of evaluation tools and items must be monitored throughout the life of an education and training program or course.

Content Validity

An evaluation item or tool has content validity if it accurately measures what it purports to measure. Content validity for all student evaluation tools and items must be established prior to pilot implementation, by reviews with subject matter experts and education experts.

All evaluation items and tools should be reviewed by content subject matter experts who have not contributed to the development of the tool or item. In this review, the focus is on the technical accuracy of the tool or item in terms of content. The questions beginning on the following page should be considered during subject matter expert reviews.

Written Test Items:

1. Is the content of the item and the answer key technically accurate?

2. Does the item concern essential material? Does the expected response represent important learning?
3. For matching test items, are the entries in each column closely related? Are distracters plausible?
4. For multiple choice items, are the distracters plausible? Is each distracter demonstrably incorrect?
5. For completion items, can the item be completed to form a true statement without using the designated correct answer? Are all legitimate variations included on the answer key?
6. For short-answer and essay items, does the item clearly indicate the parameters of the expected response? Does the answer key include all legitimate variations?
7. For true-false items, are the items clearly true or false?

Performance Checklists:

1. Are all of the steps required to perform the skill, task, or procedure included?
2. Are the steps listed in the correct order?
3. Do critical elements need to be designated? If so, are all critical elements identified? Are all the steps designated as critical truly critical?
4. Are the pass/fail criteria adequate to ensure that students receiving a passing grade can adequately perform the skill, task, or procedure?
5. If rating scales are used, is each level in each rating scale described in sufficient detail to clearly distinguish the various levels of performance?
6. If point values are assigned to the steps, do the point values reflect the relative importance or difficulty of the steps?

Product Evaluation Forms:

CDG (TECH) - Design

1. Are all of the essential parts, elements, and/or characteristics of the desired product correctly and adequately designated?
2. Do critical elements need to be designated? If so, are all critical elements identified? Are all elements designated as critical truly critical?
3. Are the satisfactory and unsatisfactory criteria adequate to ensure that products rated satisfactory are acceptable?
4. If rating scales are used, is each level in each rating scale described in sufficient detail to clearly distinguish among levels of quality shown in the products of different students?
5. If point values are assigned to the characteristics, elements, or parts of the product, do the point values reflect the relative importance of the characteristics, elements, or parts of the product?

All student evaluation tools and items should also be reviewed by an instructional systems specialist, preferably one with a background in test and measurement. During this review, the focus is on educational concerns: the construction of the tool or item and the relationship between the tool or item and the learning objective(s) it covers.

The first concern is that the evaluation tool or item tests the performance required in the learning objective(s) it covers. In addition, the tool or item must reflect the learning level required in the objective(s).

The second consideration is that the tool or item is correctly constructed. It must be grammatically correct; follow established guidelines for the type of tool or item; include appropriate and complete directions for the students; and include all necessary scoring information for instructors.

Student performance can also be used as an indicator for content validity during field testing or during pilot implementation. This involves comparing the performance of the top half (or third) of the class on individual items against that of the bottom half (or third) of the class. When students in the top portion of the

class are unsuccessful on an item that students in the bottom portion of the class successfully complete, content validity is questionable.

Reliability

Reliability refers to how consistently an evaluation tool or item measures performance. For written tests, statistical measures can be used to establish the reliability of the test as a whole and of individual items on the test.

Reliability for performance checklists and product evaluation forms relies heavily on staff training. Instructors must be trained to use each checklist to be sure that the instrument is applied consistently by all instructors. See Appendix 3B for further information on reliability measures.

CURRICULUM DOCUMENTATION

All technical education and training programs under BUMED cognizance must have an approved curriculum outline and course schedule summary. Programs leading to a Navy Enlisted Classification (NEC), Navy Officer Billet Classification (NOBC), or subspecialty code must also have an approved student evaluation plan.

Curriculum Outline

The curriculum outline is a summary document, in outline form, for each course of instruction. The outline lists pertinent course and student data, units, lesson topics, learning objectives, evaluation methods, contact hours, and training materials. The curriculum outline is the primary document used to describe and catalog courses and programs under BUMED cognizance.

The curriculum outline consists of three major sections: the front matter, the outline of instruction, and the annexes. Use at least a 1.25" side margin to allow insertion into a three-ring binder. The samples included here use 1.25"

left and right margins and a 12-pitch/10-point font (the font used in the examples is Courier News).

Front Matter

The front matter for the curriculum outline includes the cover sheet, change record, course data, student data, foreword, unit synopses, contact hours outline, and table of contents. Figures 3-9 through 3-19 provide samples of the pages included in the front matter.

The **cover sheet** (Figure 3-9) includes:

1. Full course title (no abbreviations).
2. Course Identification Number (as shown in CANTRAC).
3. Name and address of command(s) developing the curriculum outline ("Prepared by:").
4. Name and address of command approving the curriculum outline ("Prepared for:").
5. Date of curriculum outline (month and year; entered upon approval).

The **change record** (Figures 3-10 and 3-11) lists all of the changes made to the Curriculum Outline (including changes to the training materials list and TRI) from the implementation date until the curriculum is no longer in use.

Course data (Figure 3-12) includes:

1. Course mission: A brief statement of the purpose or goal of the course or program.
2. Security classification: The security classification for the curriculum outline; normally unclassified. (Note: The curriculum outline may be unclassified even though some classified material is included in the course or program.)
3. Course length: The duration of the course is shown in training days and contact hours. In addition, the distribution of contact hours is shown. Both

must be consistent with the contact hours outline and the course schedule summary.

4. Locations at which taught: Name of each training site.

5. Class capacity and maximum number of convenings per year: The maximum number of students that can be accommodated in a class without degradation of training, and the maximum number of classes that can be convened within a fiscal year. For multiple-site programs, this information must be shown for each site.

6. Staffing requirements: Any qualifications needed for instructors, such as an NEC or NOBC; instructor training is required for all full-time instructors.

7. Curriculum approval authority: Command approving the course or program.

8. Quota control: Command responsible for assigning students to the course or program (normally BUPERS).

9. Planned implementation date: The projected starting date for the first class that will be taught using the curriculum.

10. Primary mode of instruction: Group-paced or self-paced.

11. Instruments and procedures for measuring student progress: A brief statement of the types of evaluations included (Note: You do not need to state the frequency or length of evaluations).

12. Date of preceding curriculum outline: The date shown on the cover sheet of the curriculum outline previously in use.

Student data (Figure 3-13) includes:

1. Personnel physical requirements: Any physical abilities that are required for the course, or any physical conditions that would make otherwise eligible personnel ineligible.

2. Security clearance required: Any security clearances required prior to reporting for the course or program.

3. Prerequisite training and/or test scores required: Any courses (including correspondence courses) that must be completed prior to reporting for

the course or program and any test scores (e.g., ASVAB) required for admission to the course.

4. Personnel and ratings eligible: The types of personnel who are eligible to take the course or program; usually described by NEC, NOBC, or subspecialty code, grade/rate, billet title, and/or pay grade.

5. Obligated service: The length of time graduates must remain in the Navy and/or a specialty as "payment" for the training; stated as number of months from convening date.

6. NEC/NOBC/Subspecialty code earned: The NEC, NOBC, or subspecialty code awarded upon successful completion of the course.

7. Related and follow-on training: Any courses required or recommended for graduates as additional training.

The **foreword** (Figure 3-14) includes a brief description of how the course or program was developed and the purpose of the curriculum outline.

The **unit synopses** (Figure 3-15) provide brief descriptions of the scope of each unit included in the course.

The **contact hours outline** (Figures 3-16 through 18) shows the contact hours assigned to each lesson topic and unit. Use the general format shown in Figures 3-16 through 3-18. The "Notes" at the top of each sample clarify the system used to account for test and review hours. Lab/practical testing time may be broken out separately if desired (a note to that effect should replace Note 1 if it is broken out).

Show didactic test and review time for all programs (didactic testing is counted separately when programs are evaluated for college credits; lab/practical testing is not). If didactic tests include material from more than one lesson, assign test and review hours for the unit as a whole, and show them as indicated on Figure 3-16. If all didactic tests are given within each lesson, include test and review time as part of the time assigned for the lesson, as in Figure 3-17. Using the same pattern for all units makes the outline easier to

follow. If any units include tests that cross lesson topics, follow the first sample for test and review time.

The first two samples show "Comprehensive Exams" within the clinical rotation unit for a hypothetical program. Please note that contact hours used for written exams within a clinical rotation are didactic periods. In Figure 3-16, the four hours of testing are in addition to the 15 training days devoted to clinical training. In Figure 3-17, the time is taken from the 15 clinical days. You may also show a comprehensive exam as a separate entry, as if it were a separate unit without a number, as illustrated in Figure 3-18.

Always include the three columns shown in Figures 3-16 and 3-17. You may add a fourth column for clinical contact hours, as shown in Figure 3-18. If clinical experience is within one unit only, use the three column format, with the "CL" column replacing the "Lab/Pr" column for clinical rotations. If clinical experience is incorporated throughout the curriculum, you may use the four-column format if you wish. You must use the four-column format if a single unit includes both lab/practical and clinical hours.

Include at least the six entries shown in Figures 3-16 through 3-18 in the contact hours summary. You may also show a total for didactic test and review in parentheses to the right of the subtotal for didactic hours if desired.

The **table of contents** (Figure 3-19) lists the sections of the curriculum outline and the units in the course with page numbers. The table of contents is optional; it may be combined with the contact hours outline or eliminated.

Outline of Instruction

The outline of instruction is the longest section of the curriculum outline. It includes all of the learning objectives for the course or program, arranged by units and lesson topics. The outline of instruction includes course and/or unit conventions pages (optional), unit pages, and lesson topic pages. Figures 3-20 through 3-24 are provided as samples.

The **course conventions page** (Figure 3-20) includes translations of abbreviations, implied or assumed conditions, and standards that apply throughout the outline of instruction. When used, the course conventions page is the first page in the outline of instruction.

A **unit conventions page** (Figure 3-21) includes any reference or authority for correct performance that applies to all or most of the objectives in a unit, the level of performance required for didactic objectives (if a single level applies for all or most of the objectives in the unit), and translations of abbreviations that are used frequently in the unit but are not covered in the course conventions page. Special conditions that apply to objectives throughout the unit may also be shown on the unit conventions page. When used, the unit conventions page is placed immediately before the unit page.

A **unit page** (Figure 3-22) shows the unit title; the didactic, laboratory/ practical, and/or clinical/field contact hours assigned for the unit; and the terminal objective for each lesson topic in the unit. If test and review hours are totalled separately for the unit, those contact hours should also be shown on the unit page. Omit the unit page for short courses with only one lesson topic.

Lesson topic pages (Figures 3-23 through 3-25) show the lesson topic title; the didactic, laboratory/practical, and/or clinical/field contact hours assigned to the lesson topic; the terminal and enabling objectives for the lesson topic; and a list of the items from the TRI covered in the lesson topic. Each lesson topic should start on a new page. The sample provided in Figure 3-23 is supported by a unit conventions page that establishes the authority for correct performance and the level of performance required for the didactic objectives. No conventions pages support the sample provided in Figure 3-24. It includes a student reference line to indicate the authority for correct performance in both terminal and enabling objectives and a header for the enabling objectives to indicate the level of performance required. If the level of performance required or the authority for correct performance varies, then individual objectives must

include a statement of the required standard, as shown in Figure 3-25. See Appendix 3C for the simplified format for learning objectives.

Annexes

There are two required annexes to the curriculum outline: a training materials list and the TRI.

The **training materials list** (Figure 3-26) includes all of the training materials (e.g., military publications or instructions, textbooks, audiovisual materials) used by all students. Supplemental materials, such audiovisual materials used to supplement primary references, do not need to be listed. Include the title (with edition where applicable), author, publisher, and publication date for each item.

The **TRI** acts as a cross-reference to the outline of instruction. Each item on the TRI must be referenced to at least one lesson topic in the outline of instruction. References to individual learning objectives are preferred. There is no established format for this cross-reference.

CURRICULUM OUTLINE

SURGICAL TECHNOLOGIST (HM-8483)
CLASS "C" SCHOOL

B-301-0033

PREPARED BY:

NAVAL SCHOOL OF HEALTH SCIENCES
BETHESDA, MARYLAND

AND

NAVAL SCHOOL OF HEALTH SCIENCES
SAN DIEGO, CALIFORNIA

PREPARED FOR:

BUREAU OF MEDICINE AND SURGERY
WASHINGTON, DC

Approved: May 1994

Figure 3-9: Curriculum Outline Cover Sheet.

CHANGE RECORD

SECTION	DESCRIPTION OF CHANGE	BUMED APPROVAL
LT 5.8	REVD ENABLING OBJECTIVES; ADDED 5.8.9	29 OCT 94
LT 6.5	INCREASED DID. STD TO 80% VICE 75%	15 JAN 95
UNIT 3	REWRITE OF UNIT; REORGANIZATION OF LTs; NEW TOs; NEW STUDENT REFERENCES	10 MAR 95
TRNG MAT.	REVISED TO REFLECT CHANGES IN UNIT 3	10 MAR 95

Figure 3-10: Change Record for a Single-Site Program.

CHANGE RECORD

SECTION	DESCRIPTION OF CHANGE	PROPOSED BY/ON	CONCURRENCE BY/ON	BUMED APPROVAL
LT 4.3	INSERT NEW EO 4.3.6; RENUMBER BALANCE	BETHESDA 11/15/94	SAN DIEGO 11/30/94	10 DEC 94
UNIT 13	INCREASE STANDARD FOR TOs 13.7 & 13.8 FROM 70% TO 75%	SAN DIEGO 01/17/95	BETHESDA 02/03/95	15 FEB 95

Figure 3-11: Change Record for a Multiple-Site Program.

COURSE DATA PAGE

1. **COURSE MISSION:** The mission of the Surgical Technologist School is to train selected Navy enlisted personnel in the fundamental skills and knowledge of basic surgical anatomy, sterilization procedures, aseptic technique, and instrument handling that will enable the graduate to prepare and maintain the operating room for surgery and perform the duties of scrub and circulating technician.

2. **SECURITY CLASSIFICATION:** Unclassified

3. **COURSE LENGTH:** 130 training days; 1,040 contact hours

DISTRIBUTION OF CONTACT HOURS:

Didactic	134.0	Required Training	13.0
Lab/Practical	238.0	Required Activities	55.0
Clinical	600.0		

4. **LOCATIONS AT WHICH TAUGHT:**

Naval School of Health Sciences (NSHS), Bethesda, Md
NSHS, San Diego, CA

5. **CLASS CAPACITY:**

BETHESDA	SAN DIEGO
20	25

Convening Frequency: 4 classes per year at each site

6. **STAFFING REQUIREMENTS:** HM-8483; instructor training equivalent to Chief, Naval Education and Training (CNET) instructor training course, or NEC 9502

7. **CURRICULUM APPROVAL AUTHORITY:** Bureau of Medicine and Surgery

8. **QUOTA CONTROL:** Bureau of Naval Personnel

9. **IMPLEMENTATION DATE:** July 1994

10. **PRIMARY MODE OF INSTRUCTION:** Group-paced

11. **INSTRUMENTS AND PROCEDURES FOR MEASURING STUDENT PERFORMANCE:** Written criterion-referenced tests, performance checklists, clinical evaluations

12. **DATE OF PRECEDING CURRICULUM OUTLINE:** July 1989

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Figure 3-12: Course Data.

STUDENT DATA

1. PERSONNEL PHYSICAL REQUIREMENTS: Must be physically qualified for transfer in accordance with Article 15-30 of the Manual of the Medical Department (MANMED) and Chapter 7.01 of the Enlisted Transfer Manual (ENLTRANSMAN). Must be medically qualified to work in the operating room. No dermatological disease of the hands or arms or recurrent infection. Members requiring medical attention, including pregnancy, shall not be transferred to this school.

2. SECURITY CLEARANCE REQUIRED: None

3. PREREQUISITE TRAINING: Selected Hospital Corpsmen in pay grades E-2 through E-4 with a BTB: GCT+ARI=105 or ASVAB (5/6/7): WK+ARI=105 or ASVAB (8/9/10/11/12/13/14/J1): VE+AR=105.

4. PERSONNEL AND RATING ELIGIBLE: Hospital Corpsmen E-2 through E-4.

5. OBLIGATED SERVICE: 36 months as an HM-8483 as required by Chapter 7, ENLTRANSMAN.

6. NEC EARNED: HM-8483

7. RELATED AND/OR FOLLOW-ON TRAINING: Interdepartmental continuing education.

Figure 3-13: Student Data.

FOREWORD

This curriculum outline is the result of a cooperative effort between Surgical Technologist School staff members and instructional systems specialists assigned to the Naval Schools of Health Sciences in Bethesda and San Diego.

Satisfactory completion of this course indicates the student has met the basic requirements to be a safe member of the surgical team. It should not be construed that the graduating student possesses any skills required to function in an area of advanced surgical technology, i.e., cardiovascular surgery. Final qualification of the individual with respect to job proficiency rests with the individual's commanding officer.

Figure 3-14: Foreword.

SURGICAL TECHNOLOGIST
UNIT SYNOPSES

UNIT 1: Introduction to the surgical environment, including the surgical team, surgical terminology, ethical and legal concerns, practical math applications, and practice in transporting and admitting surgical patients to the operating room suite.

UNIT 2: Introduction to basic microbiology and its effect on the surgical environment, theory and practice of aseptic technique, dress and hygiene requirements for the operating room, practice in donning surgical apparel, policies and procedures for maintaining operating room safety, and policies and procedures for emergencies in the operating room.

UNIT 3: In depth coverage of surgical instrumentation, equipment, and supplies; theory and practice in preparing surgical instruments and supplies for sterilization and methods of sterilization; basic pharmacology specific to the operating room, including drawing up medications and adding medications to the sterile field; introduction to anesthetic agents; and the role of the Operating Room Technician in assisting the anesthetist and/or anesthesiologist.

UNIT 4: Theory and practice in positioning the surgical patient; completing skin preparation; care and handling of surgical specimens; catheterization; preparation of the operating room; and carrying out the activities of the circulating technician, including the use of surgical forms and records for documentation.

UNIT 5: Theory and practice in gowning and gloving; sterile field/ instrument setup; preparation and handling of sutures; counts; surgical draping; carrying out the duties of the scrub technician, including use of surgical forms and records for documentation.

UNIT 6: Anatomical structure and function of the human body and how it is affected by surgical procedures in general and gynecologic, obstetric, orthopedic, plastic, peripheral, vascular, urologic, otorhinolaryngologic, thoracic, ophthalmic, and neurologic surgery. Includes considerations of wound healing.

****
*** Units 7 - 9 excluded from sample. ***
****

Figure 3-15: Unit Synopses.

CONTACT HOURS OUTLINE

Notes:

1. Evaluation of lab/practical or skills performance is an integral part of all lab/practical sessions and is not broken out separately.

2. Didactic test and review hours are in addition to hours shown for individual lesson topics.

	Did	Lab/Pr	Total
Unit 1.0 Unit 1 Title	**5.0**	**14.0**	**19.0**
1.1 Lesson 1 Title	1.0	0.0	1.0
1.2 Lesson 2 Title	2.0	1.0	3.0
1.3 Lesson 3 Title	1.0	3.0	4.0
1.4 Lesson 4 Title	0.0	10.0	10.0
Didactic Test & Review	1.0	0.0	1.0
Unit 2.0 Unit 2 Title	**22.0**	**0.0**	**22.0**
2.1 Lesson 1 Title	6.0	0.0	6.0
2.2 Lesson 2 Title	3.0	0.0	3.0
2.3 Lesson 3 Title	4.0	0.0	4.0
2.4 Lesson 4 Title	5.0	0.0	5.0
Didactic Test & Review	4.0	0.0	4.0

****
UNITS 3 - 10 NOT SHOWN IN SAMPLE
****

		Did	CL	Total
Unit 11.0 Clinical Rotations		**4.0**	**120.0**	**124.0**
11.1 Rotation #1		0.0	80.0	80.0
11.2 Rotation #2		0.0	40.0	40.0
Comprehensive Exams	4.0	0.0	4.0	

Contact Hours Summary

Curr. Hrs: Didactic		127.0
Lab/practical		82.0
Clinical		120.0
Other Required Training	15.0	
Other Required Activities	56.0	
	Total:	400.0

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Figure 3-16: Three Column Format Didactic Test and Review Added to Unit Total.

CDG (TECH) - Design

CONTACT HOURS OUTLINE

Notes:

1. Evaluation of lab/practical or skills performance is an integral part of all lab/practical sessions and is not broken out separately.

2. Total didactic test and review hours are shown at the end of each lesson topic list. These hours are included in the hours assigned for each lesson topic.

	Did	Lab/Pr	Total
Unit 1.0 Unit 1 Title	**15.0**	**14.0**	**29.0**
1.1 Lesson 1 Title	6.0	0.0	6.0
1.2 Lesson 2 Title	4.0	1.0	5.0
1.3 Lesson 3 Title	5.0	3.0	8.0
1.4 Lesson 4 Title	0.0	10.0	10.0
Didactic Test & Review: 3.0			
Unit 2.0 Unit 2 Title	**27.0**	**0.0**	**27.0**
2.1 Lesson 1 Title	6.0	0.0	6.0
2.2 Lesson 2 Title	8.0	0.0	8.0
2.3 Lesson 3 Title	5.0	0.0	5.0
2.4 Lesson 4 Title	8.0	0.0	8.0
Didactic Test & Review: 4.0			

****
UNITS 3 - 10 NOT SHOWN IN SAMPLE
****

		Did	CL	Total
Unit 11.0 Clinical Rotations		**4.0**	**116.0**	**120.0**
11.1 Rotation #1		0.0	78.0	78.0
11.2 Rotation #2		0.0	38.0	38.0
Comprehensive Exams	4.0	0.0	4.0	

Contact Hours Summary

Curr. Hrs: Didactic		131.0
Lab/practical		82.0
Clinical		116.0
Other Required Training	15.0	
Other Required Activities	56.0	
	Total:	**400.0**

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Figure 3-17: Three Column Format
Didactic Test and Review NOT Added to Unit Total.

CONTACT HOURS OUTLINE

Notes:

1. Evaluation of lab/practical or skills performance is an integral part of all lab/practical sessions and is not broken out separately; except for the skills test included as part of the comprehensive exam.

2. Total didactic test and review hours are shown at the end of each lesson topic list. These hours are included in the hours assigned for each lesson topic.

	Did	Lab/Pr	CL	Total
Unit 1.0 Unit 1 Title	**15.0**	**14.0**	**40.0**	**69.0**
1.1 Lesson 1 Title	6.0	0.0	0.0	6.0
1.2 Lesson 2 Title	4.0	1.0	0.0	5.0
1.3 Lesson 3 Title	5.0	3.0	16.0	24.0
1.4 Lesson 4 Title	0.0	10.0	24.0	34.0
Didactic Test & Review: 3.0				
Unit 2.0 Unit 2 Title	**30.0**	**12.0**	**64.0**	**106.0**
2.1 Lesson 1 Title	6.0	1.0	8.0	15.0
2.2 Lesson 2 Title	6.0	1.0	12.0	19.0
2.3 Lesson 3 Title	6.0	1.0	20.0	27.0
2.4 Lesson 4 Title	12.0	9.0	24.0	45.0
Didactic Test & Review: 3.0				

****
UNITS 3 - 11 NOT SHOWN IN SAMPLE
****

	Did	Lab/Pr	CL	Total
Comprehensive Exams	4.0	14.0	0.0	18.0

Contact Hours Summary		
Curr. Hrs: Didactic		127.0
Lab/practical		82.0
Clinical		120.0
Other Required Training	15.0	
Other Required Activities	56.0	
	Total:	**400.0**

Figure 3- 18: Four Column Format
Didactic Test and Review NOT Added to Unit Total.

CURRICULUM OUTLINE FOR SURGICAL TECHNOLOGIST (HM-8483)

TABLE OF CONTENTS

Front Matter

Outline of Instruction

Annexes

Figure 3-19: Table of Contents.

COURSE CONVENTIONS

The following conventions apply to learning objectives throughout the outline of instruction.

STANDARDS: Unless otherwise stated:

A minimum of 75% overall accuracy is required for didactic objectives.

Where a performance checklist is cited as the standard, the minimum level of performance required is detailed on the performance checklist, along with the references used to develop it.

ASSUMED CONDITIONS:

Performance is presumed to be in a normal classroom setting with all routine classroom supplies available for all didactic objectives.

When a real or simulated clinical/laboratory/practical setting is specified, it is presumed that all routine equipment and supplies for that setting are available.

Unless otherwise stated, reference materials are not used by the student during evaluations.

SPECIAL TERMS/PHRASES:

"Identify on (or from) an illustration": Illustrations include diagrams, drawings, photographs, models.

ABBREVIATIONS:

IAW = in accordance with
OR = operating room
PCL = Performance Checklist
SHO = Student Handout

Figure 3-20: Course Conventions Page.

UNIT 4 CONVENTIONS

The following conventions apply to learning objectives throughout Unit 4:

STANDARDS:

Unless otherwise stated, performance will be in accordance with the standards of the Association of Operating Room Nurses (AORN) and the Hospital Policies/Procedures Manual.

For objectives in a simulated operating room (OR):
Aseptic technique will be maintained at all times.
All critical steps will be completed without error.

CONDITIONS

"In a simulated OR setting...": Condition indicates a mock-up of the targeted procedure with a manikin or fellow student as the "patient" and an instructor as the "surgeon"; performance may take place in an actual or simulated OR

Figure 3-21: Unit Conventions Page.

UNIT 4 ACTIVITIES OF THE CIRCULATOR TECHNICIAN

CONTACT HOURS: 9.5 DIDACTIC 31.5 LAB/PRACTICAL

TERMINAL OBJECTIVES: Performance will be in a simulated OR setting for all terminal objectives.

4.1 Following the principles of aseptic technique, set up and prepare the OR for surgery IAW PCL 4.3.

4.2 Complete forms and records from the data provided during a mock procedure IAW PCL 4.2.

4.3 Transfer and position a surgical patient for various surgical procedures on an OR table IAW PCL 4.3.

4.4 Catheterize a simulated patient in preparation for surgery IAW PCL 4.4.

4.5 Prepare a simulated surgical patient's skin for surgery IAW PCL 4.5.

4.6 Following the principles of aseptic technique, prepare surgical specimens for pathology IAW PCL 4.6.

4.7 Following the principles of aseptic technique, perform the duties and skills required of a circulator technician IAW PCL 4.7.

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Figure 3-22: Unit Page Supported by Conventions Pages.

LESSON TOPIC 4.3: POSITIONING THE PATIENT

CONTACT HOURS: 2.0 Didactic 5.0 Lab/practical

TERMINAL OBJECTIVE: In a simulated operating room, transfer and position a surgical patient for various surgical procedures on an OR table IAW PCL 4.3.

ENABLING OBJECTIVES:

4.3.1 List the objectives for optimum patient positioning.

4.3.2 Given a list of surgical patient positions, list the equipment necessary for positioning the patient and state the correct placement of the safety belt.

4.3.3 List the safety checks that are performed after the patient is positioned for the surgical procedure.

4.3.4 Match the patient positions to the surgical procedure(s) where each is used.

IN A SIMULATED OR, AND IAW JOB SHEET 4.3.1 AND PCL 4.3:

4.3.5 Position a simulated patient in the supine, lithotomy, jackknife, and lateral positions.

TRI References:

101 Applies knowledge of safety precautions in positioning patients
102 Positions patient for surgical procedure

Figure 3-23: Lesson Topic Page Supported by Conventions Pages.

LESSON TOPIC 4.3: POSITIONING THE PATIENT

CONTACT HOURS: 2.0 Didactic 5.0 Lab/practical

STUDENT REFERENCE: Patient Positioning Workbook

TERMINAL OBJECTIVE: In a simulated operating room, transfer and position a surgical patient for various surgical procedures on an OR table in accordance with (IAW) Performance Checklist (PCL) 4.3.

ENABLING OBJECTIVES: Unless otherwise stated, a minimum of 75% overall accuracy is required for the didactic enabling objectives in this lesson.

4.3.1 List the objectives for optimum patient positioning.

4.3.2 Given a list of surgical patient positions, list the equipment necessary for positioning the patient and state the correct placement of the safety belt.

4.3.3 List the safety checks that are performed after the patient is positioned for the surgical procedure.

4.3.4 Match the patient positions to the surgical procedure(s) where each is used.

IN A SIMULATED OR, AND IAW JOB SHEET 4.3.1 AND PCL 4.3:

4.3.5 Position a simulated patient in the supine, lithotomy, jackknife, and lateral positions.

TRI References:

101 Applies knowledge of safety precautions in positioning patients
102 Positions patient for surgical procedure

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Figure 3-24: Lesson Topic Page from Curriculum Outline Without Conventions Pages (consistent level of performance and authority for correct performance).

LESSON TOPIC 4.3: POSITIONING THE PATIENT

CONTACT HOURS: 2.0 Didactic 5.0 Lab/practical

TERMINAL OBJECTIVE: In a simulated operating room, transfer and position a surgical patient for various surgical procedures on an OR table in accordance with (IAW) Performance Checklist (PCL) 4.3.

ENABLING OBJECTIVES:

4.3.1 List the objectives for optimum patient positioning in accordance with the Patient Positioning Handbook and with a minimum of 70% accuracy.

4.3.2 Given a list of surgical patient positions, list the equipment necessary for positioning the patient and state the correct placement of the safety belt in accordance with the standards of the Association of Operating Room Nurses (AORN) and without error.

4.3.3 List the safety checks that are performed after the patient is positioned for the surgical procedure in accordance with the standards of AORN and without error.

4.3.4 Match patient positions to the surgical procedure(s) where each is used in accordance with the Patient Positioning Handbook and with a minimum of 70% accuracy.

IN A SIMULATED OR, AND IAW JOB SHEET 4.3.1 AND PCL 4.3:

4.3.5 Position a simulated patient in the supine, lithotomy, jackknife, and lateral positions.

TRI References:

101 Applies knowledge of safety precautions in positioning patients
102 Positions patient for surgical procedure

Figure 3-25: Lesson Topic Page from Curriculum Outline Without Conventions Pages (variable level of performance and authority for correct performance).

TRAINING MATERIALS LIST

1. FULLERS, J. R., SURGICAL TECHNOLOGY, PRINCIPLES, AND PRACTICE, W. B., SAUNDERS CO., 1993.

2. GEUDMANN, B. J. AND MEEKER, M. H., ALEXANDER'S CARE OF THE PATIENT IN SURGERY, C. V. MOSBY CO., 1993.

3. TOTORA, GERARD J., AND ANAGNOSTAKOS, NICHOLAS P., PRINCIPLES OF ANATOMY AND PHYSIOLOGY, HARPER AND ROW, 1993.

4. ASSOCIATION OF OPERATING ROOM NURSES (AORN), STANDARDS AND RECOMMENDED PRACTICES FOR PERIOPERATIVE NURSING, (updated as new standards released). (REFERENCED AS AORN STANDARDS IN THE CURRICULUM OUTLINE)

6. KAPIT, W. AND ELSON, L. M., THE ANATOMY COLORING BOOK, HARPER AND ROW, 1993. (STUDY GUIDE FOR STUDENTS)

5. THE HOSPITAL POLICY/PROCEDURES MANUAL (SITE SPECIFIC).

Figure 3-26: Training Materials List.

Course Schedule Summary

The course schedule summary documents instructor requirements for each course. It includes course data such as convening schedules and summarizes the number of contact hours at each student-to-instructor ratio throughout the course. Please note that all of the samples shown use 1.25" left margins to allow placement in a three-ring binder. The samples also use a 12-pitch/10-point font to accommodate the utilization chart from the course schedule summary.

The course schedule summary is essentially the same as the course master schedule summary (which it replaces), with the addition of three items:

1. Number of classes convening per year in item 1.
2. Standard didactic and lab/practical ratios in item 2.
3. Instructor utilization in item 3, including the utilization chart illustrated in Figures 3-27 and 3-28.

Like its predecessor, the course schedule summary is used primarily to determine training days and instructor manpower requirements. The information on instructor utilization will also assist in programs being reviewed for accreditation, as it documents periods where small ratios are required. The overall student-to-instructor ratio is normally higher than the necessary 1:1 or 2:1 ratio for evaluation in critical skills performance during "bottleneck" periods.

Examples of two sets of bottleneck periods are included in Figures 3-27 and 3-27. One set of contact hours (most of the lab/practical periods) requires a 2:1 ratio for evaluation. One instructor does the evaluations, observing two students at a time. In the situation illustrated in Figure 3-27, two instructors are assisting the balance of the 25-member class in supervised practice. This results in a ratio of 8:1 (3 instructors for 25 students). In Figure 3-28, where the class is limited to 16 students, only two instructors are used for the same type of period. One conducts evaluations and the other conducts supervised practice. Two instructors for 16 students results in a ratio of 8:1.

The second set of contact hours, in Lesson Topic 8.1, requires close

supervision during practice as well as evaluation, so more instructors are involved, resulting in a 2:1 ratio in each case (a total of 12 instructors for 25 students in Figure 3-27 and 8 instructors for 16 students in Figure 3-28).

Figures 3-27 and 3-28 illustrate the format for the course schedule summary. The following information will be included:

Heading: Course title, centered with NEC/NOBC shown in parentheses.
Training activity preparing the summary, centered.

Course Data (section 1):

Course identification number (CIN) from CANTRAC/NITRAS.

Course data processing code (CDP) from CANTRAC/NITRAS.

Number of instructional days allotted for the course; does not include weekends or holidays.

Number of classes per year.

Number of periods per week (normally 40); includes all scheduled required training and required activities but excludes lunchtime.

Period length (normally 50 minutes): Actual instructional time scheduled per period, excluding break time

Instructor cross-utilization: Other courses that instructors of this course teach and instructors from other courses that assist with this course

Student-to-instructor Ratio Summary

Standard ratios: The maximum ratio set for didactic/ required training/required activities (normally 25:1) and for lab/practical periods.

Ratio-period summary: List each different ratio that you use in the course at your training activity and the number of periods at each ratio. This will be the source of data for the "Course Periods" section of the NITRAS Master Course Reference File. For clinical hours include the student to training staff ratio only.

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Include the total number of periods at the bottom of the second column.

Justification & Utilization for Ratios Other Than 25:1

List and provide a brief justification for each ratio that is less than 25:1; for example, "Laboratory facilities accommodate only 10 students at a time."

Utilization Chart: For each of the ratios listed, complete the entries under ratio, hours, lesson topic/type (e.g., "LT 2.1; Lab/P"), and instructor utilization (see examples).

COURSE SCHEDULE SUMMARY

TECH 1 COURSE (TT-9999)
NSHS SOMEWHERE

1. COURSE DATA
   CIN: B-XXX-0000 CDP: 9999
   INSTRUCTIONAL DAYS: 50 CLASSES PER YEAR: 4
   PERIODS PER WEEK: 40
   PERIOD LENGTH: 50 MIN
   INSTRUCTOR CROSS-UTILIZATION: Instructors from TECH 2 course assist with lab/practical sessions in LT 8.1.

2. STUDENT-TO-INSTRUCTOR RATIO SUMMARY
   Standard ratios:
   Didactic/req'd trng/other req'd activities = 25:1
   Practical = 8:1
   Ratio-period summary:

STUDENT-INSTRUCTOR RATIO	# PERIODS
25:1	269
8:1	113
5:1	7
2:1	11
TOTAL:	400

3. JUSTIFICATION & UTILIZATION FOR RATIOS OTHER THAN 25:1

8:1 Ratio: A student-to-instructor ratio of at least 8:1 is required during practical performance to maintain adequate supervision.

5:1 Ratio: A student-to-instructor ratio of 5:1 is required for small group exercises based on case studies to provide adequate supervision and individual interaction.

2:1 Ratio: Safety precautions require a student-to-instructor ratio of 2:1 during laboratory/practical sessions in LT 8.1.

Utilization Chart

Ratio	Hrs	LT/Type Period	Instructor Utilization
8:1	113	All Lab/P except as noted below	1 instr. - 2:1 evaluations 2 instrs - supervised practice
5:1	7	LT 3.1; Lab/p	5 instrs - 5.:1 small group exercise
2:1	11	LT 8.1; Lab/P	2 instrs - 1:1 evaluations 10 instrs - supervised practice

Figure 3-27: Course Schedule Summary (Class size = 25).

COURSE SCHEDULE SUMMARY
TECH 1 COURSE (TT-9999)
NSHS SOMEWHERE

1. COURSE DATA

CIN: B-XXX-0000 CDP: 9999
INSTRUCTIONAL DAYS: 50 CLASSES PER YEAR: 4
PERIODS PER WEEK: 40
PERIOD LENGTH: 50 MIN
INSTRUCTOR CROSS-UTILIZATION: Instructors from TECH 2 course assist with lab/practical sessions in LT 8.1

2. STUDENT-TO-INSTRUCTOR RATIO SUMMARY
Standard ratios:
Didactic/req'd trng/other req'd activities = 16:1
Practical = 8:1
Ratio-period summary:

STUDENT-INSTRUCTOR RATIO	# PERIODS
16:1	269
8:1	113
5:1	7
2:1	11
TOTAL:	400

3. JUSTIFICATION & UTILIZATION FOR RATIOS OTHER THAN 25:1 (see utilization chart on p.2)

16:1 Ratio: Facilities for clinical rotation and practical exercises will accommodate no more than 16 students.

8:1 Ratio: A student-to-instructor ratio of at least 8:1 is required during practical performance to maintain adequate supervision.

5:1 Ratio: A student-to-instructor ratio of 5:1 is required for small group exercises based on case studies to provide adequate supervision and individual interaction.

2:1 Ratio: Safety precautions require a student-to-instructor ratio of 2:1 during laboratory/practical sessions in LT 8.1.

Utilization Chart

Ratio	Hrs	LT/Type Period	Instructor Utilization
16:1	269	All didactic	1 instructor for the class
8:1	113	All Lab/P except as noted below	1 instr. - 2:1 evaluations 1 instr. - supervised practice
5:1	7	LT 3.1; Lab/P	3 instrs - 5:1 small group exercise
2:1	11	LT 8.1; Lab/P	2 instrs - 1:1 evaluations 6 instrs - supervised practice

Figure 3-28: Course Schedule Summary (Class size = 16).

Student Evaluation Plan

The student evaluation plan (SEP) defines how all students will be evaluated and graded and ensures that students at all training sites are evaluated in the same way in multiple-site programs. It details the number and types of evaluations for each unit in a program, the methods for computing unit and course grades, the policies for remediation and retesting, and information on college credits recommended for completing the course of instruction. A sample SEP is shown in Figure 3-29.

Section I: Course Title. State the course title as listed in CANTRAC, followed by the course identification number (CIN).

Section II: Approval Date. Enter the date the training program manager designated by BUMED approved the SEP (leave blank when submitting plan for approval).

Section III: Methods and Procedures for Determining Unit Grades. For each unit, list and describe the evaluation activities and the weight given to each in determining final unit grade.

Section IV: Methods and Procedures for Determining Clinical Grade. List and describe the evaluation activities and the weight given to each in determining clinical grade.

Section V: Methods and Procedures for Determining Final Course Grade. List the elements and the weight given to each in determining final course grade.

Section VI: Remediation and Retest Policy. State the criteria for permitting a retest, the number of retests permitted before referral to a student review board, and/or the total number of test failures permitted. State criteria for placing a student on academic probation and/or assigning mandatory study.

Section VII: College or University Affiliation. Name the college or university, if any, with which the course is affiliated and the credit hours awarded

by the college or university. Describe the method for determining letter grades submitted to the college or university.

Section VIII: American Council on Education (ACE) Recommendations for Credit. List the credits recommended by ACE in its most recent evaluation of this course, and state the level at which the credits are recommended. (i.e., vocational certificate, lower division baccalaureate, or upper division baccalaureate).

Section IX: Accreditation. List the agencies that have accredited the program and the years of accreditation.

Appendix: Performance Checklists/Product Evaluation Forms. Append copies of all performance checklists, product evaluation forms, and/or rating scales used to evaluate student performance.

STUDENT EVALUATION PLAN

I. Course Title: Something Technician B-308-9876

II. Approval Date: March 1995

III. Methods and Procedures for Determining Unit Grades

For units 1 through 4, the unit grade is the average of the written test scores for that unit. Performance checklists (PCLs) are scored on a pass/fail basis and all must be passed for the student to continue in the program. Units 5 and 6 are graded on a pass/fail basis determined by PCLs. Unit 7 is the clinical rotation, explained in section IV below.

Unit	Number of tests	Number of PCLs
1	5	1
2	6	3
3	7	6
4	5	5
5	0	4
6	0	5
7	See Section III	

IV. Methods and Procedures for Determining Clinical Grades

The components of the clinical grade (Unit 7) are as follows:

Case worksheets	25%
Senior Project	20%
Clinical competency exams	55%

V. Methods and Procedures for Determining Final Course Grade

Components of the final course grade are as follows:

Average of unit grades (units 1 - 4)	40%
Clinical grade	60%

VI. Remediation and Retest Policy

Any student who fails a test is counseled, given a remedial assignment and retested. Students who fail a retest are referred to a student review board. Students whose cumulative class average is below 75 are placed on academic probation and assigned to mandatory study until their average rises to 75 or above.

Figure 3-29: Student Evaluation Plan (Page 1 of 2).

VII. College or University Affiliation

None.

VIII. American Council on Education Recommendations for Credit

8 semester hours at the lower division baccalaureate level:

Principles of Something Technology	4 sem. hrs.
Clinical Application of Something Technology	4 sem. hrs.

IX. Accreditation

The program was accredited by the Association of Something Technologists in 1995 for a 5-year period.

Figure 3-29: Student Evaluation Plan (Page 2 of 2).

Approval Process

Submit completed curriculum documents through your chain of command to the training program manager designated by BUMED. Documents must be reviewed by an instructional systems specialist, if one is assigned to the training site, and carefully edited before being submitted for approval. All documents may be submitted in a single package. However, for new programs or when extensive revisions have been made to an existing program, you may wish to submit the curriculum outline first, then complete the remaining documents.

As a minimum, the curriculum outline must be submitted and approved for pilot implementation. For new courses and courses with substantial revisions, final approval is granted after pilot implementation.