DEPARTMENT OF THE NAVY
COMMANDER
NAVAL EDUCATION AND TRAINING COMMAND
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LETTER OF PROMULGATION FOR NAVEDTRA 132

1. The Navy School Testing Program Management Manual is created to provide NETC training activities with policy and guidance in establishing and maintaining a quality testing program. A quality testing program can only be achieved by the direct involvement of each Navy school training manager.

2. This manual provides the policy and guidance that will enable training managers to successfully design, development, implement, manage, sustain, and analyze testing programs and materials to support courses of instruction.

3. A quality testing program will effectively:

a. Measure the trainee's achievement of learning objectives.

b. Identify trainees who are having difficulty in attaining learning objectives and provide assistance to them.

c. Provide feedback to trainees on their achievement of learning objectives.

d. Motivate trainees for effective learning and reinforcement of skills and knowledge.

e. Provide feedback on instructor and curriculum effectiveness to improve the instructional program.

4. This publication is available electronically at: Navy Knowledge Online (NKO) - NETC N74 Learning Standards Homepage; and Navy Marine Corps Intranet's (NMCI) Total Records and Information Management (TRIM).

5. Corrections and comments concerning this manual are invited and should be addressed to the Naval Education and Training Command, attention: N7.

6. Reviewed and approved.

J. F. KILKENNY

Naval Education and Training Command

NAVEDTRA 132
March 2011

NAVY SCHOOL TESTING PROGRAM MANAGEMENT MANUAL

DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited.

NOTICE TO ONLINE USERS OF THIS MATERIAL

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RECORD OF CHANGES

Number and Description of Change:	Entered by:	Date:

FOREWARD

NAVEDTRA SERIES MANUAL:

- NAVEDTRA 130: Task Based Curriculum Development Manual
- NAVEDTRA 131: Personnel Performance Profile Based Curriculum Development Manual
- NAVEDTRA 132: Navy School Testing Program Management Manual
- NAVEDTRA 134: Navy Instructor Manual
- NAVEDTRA 135: Navy School Management Manual
- NAVEDTRA 136: Integrated Learning Environment Course Development and Life-Cycle Maintenance

The NAVEDTRA 130 series of manuals provide fundamental guidance, within the Naval Education and Training Command (NETC), for the development of curricula, the delivery of instruction, and the management and evaluation of training programs.

These manuals do not supersede the directive policy established by Commander, NETC in these subject areas. Rather, they supplement the instructions in two important ways. First, they reflect the philosophical principles underlying NETC policy for curriculum, instruction, and assessment. Secondly, they provide procedures and standards for carrying out that policy.

Each of the NAVEDTRA 130 series of manuals is designed as a stand-alone document to serve a specific user group such as curriculum developers, instructors, training managers, or evaluators of training. The manuals are, however, interrelated and cross-referenced to one another.

SCOPE:

NAVEDTRA 132, Navy School Testing Program Management Manual, outlines the NETC requirement for all training activities to conduct a quality testing program. The purpose of a Navy school testing program is to assess the trainee’s ability to perform and/or comprehend the objectives of a course. As set forth in this manual: a testing plan, test administrator’s guides, and a remediation program are required for each course of instruction.

The purpose of this manual is to provide information and guidance in the design, development, implementation, management, sustainment, and analysis of testing programs and materials throughout NETC. Concepts and guidelines pertaining to a quality testing program, outlined in this manual, are not necessarily the

ideas and opinions of the authors but are shared opinions of many authors of testing publications considered expert in evaluation strategies.

The guidelines set forth in this manual are not intended to conflict with any higher-level authority testing policies or procedures. In instances where there appears to be conflict or disagreement, please notify NETC N7. NETC N7 solicits any comments and recommendations to improve the NAVEDTRA 130 series of manuals.

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CHAPTER 1

NAVY SCHOOL TESTING PROGRAM

SECTION 1 – INTRODUCTION

The purpose of a Navy school testing program is to ensure a quality testing process is implemented to effectively assess the trainee's achievement of learning objectives.

SECTION 2 - TESTING PROGRAM

At a minimum, a Navy school testing program is designed to achieve the following goals:

- Measure the trainee's achievement of learning objectives.
    - Ability to perform (skill) learning objective(s)
    - Comprehension of (knowledge) learning objective(s)
- Identify trainees who are having trouble attaining learning objectives.
- Provide feedback to trainees on their achievement of learning objective(s).
- Motivate trainees for effective learning and reinforcement of skills and knowledge.
- Provide feedback on instructor and curriculum effectiveness to improve the instructional program.

This chapter provides a general overview of subsequent chapters that cumulatively contain the minimum information necessary to manage the establishment, implementation, and sustainment of a Navy school testing program. This document focuses on the components, processes, and tools available to curriculum developers to design and develop reliable and valid tests. Additionally, it provides information that will enable the identification of areas for improvement.

It also provides guidance on conducting a remediation program to help trainees who are having difficulty in achieving learning objectives.

SECTION 3 - TESTING PROGRAM ROLES AND RESPONSIBILITIES

Chapter 2 provides a description of testing program roles and responsibilities for Naval Education and Training Command (NETC) and training managers at NETC learning centers, learning sites, detachments, and participating activities. The roles discussed are those of: Commander NETC, Director Learning and Development Division (N7), and Learning Standards Branch Head (N74); learning center Commanding Officer, Director of Training,

Learning Standards Officer, Curriculum Control Model Manager, and Curriculum Developer; learning site and detachment Commanding Officer and/or Officer-in-Charge, Testing Officer, and Course Supervisor; and participating activity Curriculum Control Model Manager. Each person assigned to these roles has a significant impact on the effectiveness of testing programs within NETC.

SECTION 4 - TEST DEVELOPMENT PREPARATION

Chapter 3 deals with the threats to test reliability and validity. It provides guidance to curriculum developers and Testing Officers so that a standardized and repeatable process for test development is the Navy standard. A high-level overview of NETC’s Course Development and Revision End-to-End Process is described to provide readers with a comprehensive understanding of the disciplines that NETC has put in place to ensure that new and revised courses are based upon empirical data. The business decisions that involve the Requirement Sponsor and Resource Sponsor are addressed. This chapter describes how the empirical data is captured, where it is stored, and how it is used to support NETC’s testing programs. To ensure the correct level of training proficiency is provided and then assessed, NETC has established proficiency levels for skill (performance) and knowledge (comprehension) that are also discussed in this chapter. This chapter also discusses Computer Managed Instruction (CMI) and Interactive Courseware (ICW).

SECTION 5 - TEST CATEGORIES, TEST TYPES, AND TESTING METHODS

Chapter 4 provides a description of the five performances and knowledge test categories: pre-test, progress test, comprehensive test, oral test, and quiz. It also provides a description of performance test types: product, process, and combination (product and process); and knowledge test types: open book and closed book. Pilot testing of performance and knowledge tests is also described, as well as the testing methods of criterion-referenced and norm-referenced testing.

SECTION 6 - TEST INSTRUMENTS

Chapter 5 provides a description of test instruments that can be used to measure the trainee's ability to perform a specific skill and/or knowledge comprehension. Performance test instruments include job sheets and problem sheets. Knowledge test instruments include assignment sheets, problem sheets, and test items. Test items include multiple-choice, true or false, matching, completion, essay, and case study. Guidelines for the

development of test instruments are also provided, and include a discussion of validation procedures.

SECTION 7 - GRADING AND GRADING CRITEIA

Chapter 6 provides a description of grading and grading criteria for performance and knowledge tests. Grading is the backbone of assessing performance and provides a numerical value for achievement. To achieve reliable and valid grading, grading criteria (guidelines) are established. This chapter provides a discussion of grading scales, scoring guides, checklists, and rubrics. Additionally, guidelines for their development and formatting are also discussed.

SECTION 8 - PERFORMANCE TEST DESIGN AND DEVELOPMENT

Chapter 7 provides a detailed description of the six steps of performance test design and includes test design considerations and guidelines. Performance tests are sample work situations designed to assess a trainee's ability to perform a specific skill by using actual equipment or training devices. When the six steps of performance test design are completed, curriculum developers will have identified how each learning objective will be tested, the test category, test type, and the test instrument(s) and grading criteria. Performance test development and verifying performance test validity are also described.

SECTION 9 - PERFORMANCE TEST ADMINISTRATION

Chapter 8 describes how performance tests are administered, using a performance test administrator's guide. The layout of the administrator's guide is discussed and includes a description of each section of the guide. The chapter includes examples of "instruction to administrator," "grading criteria," and "instructions to the student."

SECTION 10 - KNOWLEDGE TEST DESIGN AND DEVELOPMENT

Chapter 9 provides a detailed description of the six steps of knowledge test design and includes test design considerations and guidelines. Knowledge tests have importance in technical training courses because they measure a student's ability to understand facts and concepts in support of the performance of a skill. When the six steps of knowledge test design are completed, curriculum developers will have identified how each learning objective will be tested, the test category, test type, and the test instrument(s) and grading criteria to use for each

test. The five steps of knowledge test development are discussed, and include: verify content validity of each test item, assemble the knowledge test, verify knowledge test validity, establish a grade for the knowledge test, and develop different and alternate knowledge tests.

SECTION 11 - KNOWLEDGE TEST ADMINISTRATION

Chapter 10 describes how knowledge tests are administered, using a knowledge test administrator's guide. The layout of the administrator's guide is discussed and includes a description of each section of the guide. The chapter includes examples of "instructions to administrator," and "instructions to the student."

SECTION 12 - TESTING PLAN AND TESTING PROGRAM ADMINISTRAITON

Chapter 11 provides a description of a course's testing plan, elements that need to be included, and administrative procedures. Testing program administration involves controlling, organizing, managing, and preserving test materials. Testing program administration consists, but is not limited to, the following: testing plan, testing constraints, test item bank, test security, test administration (giving and collecting tests), grading, test review, and pilot testing.

SECTION 13 - TEST AND TEST ITEM ANALYSIS

Chapter 12 describes the purpose and importance of test and test item analysis to a testing program. When tests and test items are developed, they are reviewed for content validity. In order to determine if they have statistical validity, test and test item analysis techniques are needed. The techniques discussed are widely accepted and generally used in test and test item analysis. The three types of analysis available to NETC training managers to identify (flag) tests and test items that are potentially flawed are: difficulty index, index of discrimination, and effectiveness of alternatives. Determining the reliability of grading scales, checklists, and rubrics is also discussed.

SECTION 14 - REMEDIATION PROGRAM

Chapter 13 provides a description of the components of a remediation program. Remediation is necessary because not all trainees will accomplish critical learning objectives or understand the material during normal classroom time. A remediation program's primary goal is to encourage and assist

trainees in achieving critical learning objectives. This chapter describes the methods of remediation: targeted, scalable, and iterative. It also discusses who can assign remediation, how much time should be spent in remediation, and how to determine when remediation should be assigned. The roles and responsibilities of the Academic Review Board are also discussed. Additionally, trainee counseling, retesting, setbacks, drop from training, and attrition are discussed.

SECTION 15 – SUMMARY

This chapter has provided a high-level overview of the contents of this document, that collectively comprise the elements necessary to build, implement, manage, and sustain a testing program within the NETC training organization.

CHAPTER 2

TESTING PROGRAM ROLES AND RESPONSIBILITIES

SECTION 1 – INTRODUCTION

This chapter delineates testing program roles and responsibilities for Naval Education and Training Command (NETC) headquarters and training managers at NETC Learning Centers (LCs), Learning Sites (LSs), Detachments (DETs), and participating activities. Each training manager has a critical role and responsibilities during the development, standup, implementation, and sustainment of an effective NETC testing program. The paragraphs below provide a description of NETC domain training manager's roles and responsibilities. These descriptions are intended to be guidelines and may be modified with approval from NETC N74. NETC roles and responsibilities for a remediation program are discussed in Chapter 13.

SECTION 2 – NAVAL EDUCATION AND TRAINING COMMAND HEADQUARTERS

The following are NETC headquarters' testing program roles and responsibilities:

- **Commander, Naval Education and Training Command (CNETC)**: Provides policy and guidance for NETC Navy School Testing Program.
- **Director, Learning and Development Division (N7)**:
    - Provides oversight for the policy and guidance of NETC Navy School Testing Program.
    - Monitors LC compliance with NETC Navy School Testing Program.
- **LEARNING STANDARDS BRANCH HEAD (N74):**
    - Ensures Navy School Testing Program policy and guidance are current.
    - Ensures NETC LCs and LSs, DETs, and participating activities are in compliance with Navy School Testing Program policy and guidance.

SECTION 3 – NETC LEARNING CENTERS

The following are NETC LC's testing program roles and responsibilities:

- **Commanding Officer (CO)**:
    - Serves as Curriculum Control Authority (CCA) unless otherwise designated (authority maybe delegated to

another training manager, i.e., Director of Training (DOT) and Learning Standards Officer (LSO)).
    - Manages LS, DET, and participating activity testing program(s).
    - Approves LS, DET, and participating activity testing program(s).
    - Resolves differences between the Course Curriculum Model Manager (CCMM) and participating activities.
    - Utilizes and incorporates Type Commander (TYCOM) test banks, as appropriate.

- **Director of Training (DOT)**:

    - Ensures testing program(s) are conducted.
    - Oversees development of testing plan(s).

- **Learning Standards Officer (LSO)**:

    - Provides guidance to curriculum developers during development or revision of testing program materials.
    - Monitors performance of NETC’s testing program Total Quality Indicators (TQIs) of test and test item analysis, and remediation programs.
    - Validates and verifies initial test item bank(s).
    - Reviews test items submitted by CCMM, and approves or rejects for possible inclusion into the master test item bank.
    - Reviews data from test and test item analysis to ensure validity.
    - Approves test administrator’s guide(s) and grading criteria.
    - Determines TQI trends and recommends corrective action to the CO, as per NAVEDTRA 135 (series).
    - Provides professional direction in:

        - Designing test(s) to assess trainee achievement of learning objectives
        - Reviewing testing plans
        - Developing test(s) and test items
        - Overseeing the testing process
        - Overseeing test and test item analysis

- **Curriculum Control Model Manager (CCMM)**:

    - Approves test design prepared during development.
    - Maintains master test item bank.

- Maintains test, test item analysis data, and TQI Report.
- Reviews proposed test item changes; forwards change proposals to LSO for possible inclusion in master test item bank.
- Provides DETs, participating activities with testing plan, test(s), scoring criteria, and test administrator’s guide(s).
- Provides DETs and participating activities with updated versions of testing program materials.

- **Curriculum Developer**:

  - Designs and develops testing plan, test administrator’s guide(s), and grading criteria.
  - Designs and develops tests.
  - Designs and develops test items.
  - Ensures that test items are developed in the appropriate software package, as applicable.

SECTION 4 – NETC LEARNING SITES AND DETACHMENTS

The following are NETC LC and DET testing program roles and responsibilities:

- **Commanding Officer (CO)/Officer-in-Charge (OIC)**:

  - Implements and ensures effectiveness of the testing program.
  - Designates Testing Officer(s).
  - Designates Course Supervisor(s).

- **Testing Officer**:

  - Provides test material(s).
  - Provides test administration.
  - Oversees the grading of tests.
  - Secures test material(s).
  - Maintains test bank(s).
  - Coordinates and manages test revisions.
  - Performs test and test item analysis.
  - Provides summary reports of testing information in the quarterly TQI Report to the course’s CCMM.
  - Conducts In-Service (IS) training in testing areas.

- **Course Supervisor (CS)**:

    - Ensures proper test administration.
    - Ensures security of test materials.
    - Monitors and validates test item bank currency.
    - Monitors, performs, and validates test and test item analysis, forwarding findings to the CCMM.

SECTION 5 – NETC PARTICIPATING ACTIVITIES

The following are NETC participating activities testing program responsibilities:

- Provides comments on the testing plan to CCMM.
- Provides feedback to CCMM on testing issues.
- Submits new test items to CCMM for review and approval.
- Maintains test and test item analysis data.

NOTE

Participating activities are defined as activities providing training that are not the CCMM.

SECTION 6 – SUMMARY

This chapter discussed roles and responsibilities of NETC's training managers at NETC Headquarters and LCs, LSs, DETs, and participating activities necessary to standup, implement, and sustain an effective NETC testing program. The roles and responsibilities delineated in this chapter are summarized in Table 1.

TABLE 1: TESTING PROGRAM ROLES AND RESPONSIBILITIES

Tasks	Responsibility
Provides policy and guidance to NETC School Testing Program	CNET
Provides oversight for the policy and guidance of NETC Navy School Testing Program	N7
Monitors LC compliance with NETC Navy School Testing Program	N7
Ensures Navy School Testing Program policy and guidance are current	N74
Ensures NETC LCs, LSs, DETs, and participating activities are in compliance with Navy School Testing Program policy and guidance	N74
Serves as CCA unless otherwise designated (authority maybe delegated to another training manager, i.e., DOT and LSO)	LC CO
Manages LS, DET, and participating activity testing program(s)	LC CO
Approves LS, DET, and participating activity testing program(s)	LC CO
Resolves differences between the CCMM and participating activities	LC CO
Utilizes and incorporates TYCOM test banks, as appropriate	LC CO
Ensures testing program(s) are conducted	DOT
Oversees development of testing plan(s)	DOT
Provides guidance to curriculum developers during development or revision of testing program materials	LSO
Monitors performance of NETC’s testing program TQIs of test and test item analysis, and remediation programs	LSO
Validates and verifies initial test item bank(s)	LSO
Reviews test items submitted by CCMM, and approves or rejects for possible inclusion into the master test item bank	LSO
Reviews data from test and test item analysis to ensure validity	LSO
Approves test administrator’s guide(s) and grading criteria	LSO
Determines TQI trends and recommends corrective action to the CO, as per NAVEDTRA 135 (series)	LSO
Provides professional direction (see pages 2-3 and 2-4 NAVEDTRA 132)	LSO
Approves test design prepared during development	CCMM
Maintains master test item bank	CCMM
Maintains test, test item analysis data, and TQI Report	CCMM
Reviews proposed test item changes; forwards change proposals to LSO for possible inclusion in master test item bank	CCMM

Provides DETs, participating activities with testing plan, test(s), scoring criteria, and test administrator's guide(s)	CCMM
Provides DETs and participating activities with updated versions of testing program materials	CCMM
Designs and develops testing plan, test administrator's guide(s), and grading criteria	Curriculum Developer
Designs and develops tests	Curriculum Developer
Designs and develops test items	Curriculum Developer
Ensures that test items are developed in the appropriate software package, as applicable	Curriculum Developer
Implements and ensures effectiveness of the testing program	LC/DET CO/OIC
Designates Testing Officer(s)	LC/DET CO/OIC
Designates CS(s)	LC/DET CO/OIC
Provides test material(s)	Testing Officer
Provides test administration	Testing Officer
Oversees the grading of tests	Testing Officer
Secures test material(s)	Testing Officer
Maintains test bank(s)	Testing Officer
Coordinates and manages test revisions	Testing Officer
Performs test and test item analysis	Testing Officer
Provides summary reports of testing information in the quarterly TQI Report to the course's CCMM	Testing Officer
Conducts IS training in testing areas	Testing Officer
Ensures proper test administration	CS
Ensures security of test materials	CS
Monitors and validates test item bank currency	CS
Monitors, performs, and validates test and test item analysis, forwarding findings to the CCMM	CS
Provide comments on the testing plan to CCMM	Participating Activity
Provides feedback to CCMM on testing issues	Participating Activity
Submits new test items to CCMM for review and approval	Participating Activity
Maintains test and test item analysis data	Participating Activity

CHAPTER 3

TEST DEVELOPMENT PREPARATION

SECTION 1 – INTRODUCTION

One of the most crucial events in training occurs when the trainee’s knowledge comprehension and/or ability to perform a skill is assessed. If the trainee is assessed as having successfully completed a course and is sent to the Fleet, there will be a strong performance expectation based on the school attended. Fleet performance expectations should never be assumed, but instead identified through the process as shown in Figure 1, page 3-6. If the school's assessment is either unreliable or invalid, it creates the possibility that a trainee that has completed training will not meet Fleet expectations. The result is the Fleet loses confidence in Naval Education and Training Command’s (NETC’s) training. Thus, the fulcrum that balances NETC’s credibility is test reliability and validity. Test reliability and validity are achieved by developing tests that are properly designed to measure the desired training skill and knowledge outcomes, and then monitoring them. If tests are improperly designed and/or improperly monitored the threats to test reliability and validity are real.

SECTION 2 – TESTING DOMAIN

There are three testing domains that are identified by the acronym KSA, which has two meanings in common use. Both usages identify K = knowledge and S = skill as the first two descriptors; the difference being some use A = ability and others use A = attitude. The use of “ability” is generally used when the purpose is the decomposition of work and the use of “attitude” is a learning interpretation. NETC sits astride both camps and believes that part of the training mission includes teaching knowledge, skills, and attitudes. Certainly the efforts toward “Sailorization” are an attempt to instill this latter component. For the purposes of this manual, the attitude domain will not be addressed. Presently, it would be very difficult to isolate the treatment effects and assess them in a valid and reliable manner. NETC has every intention to address this issue in more detail in subsequent versions of this manual.

SECTION 3 – TEST DEVELOPMENT PREPARATION PROCESS

This chapter deals with the threats to test reliability and validity. It provides guidance to curriculum developers so that a standardized and repeatable process for analyzing course source data to design and develop performance and knowledge tests is the NETC standard. NETC’s Course Development and Revision End-to-End Process, Figure 1 (page 3-6), provides a depiction of the disciplines that NETC has enacted to

effectively and efficiently respond to validated Fleet training requirements. The following paragraphs provide a high-level overview of the NETC processes that must be performed, in the order they are presented, prior to test design and development. Learning Center (LC) staffs are responsible for performing the steps of NETC’s End-to-End Process. The process steps are:

- **Conduct Job Duty Task Analysis (JDTA)**. Once a validated Fleet training requirement has been received by NETC, a JDTA will be conducted. The JDTA is a process to decompose and structure the work (job) into duties and tasks, and assign attributes to each task. During the JDTA, data is captured in the Authoring Instructional Material (AIM) Content Planning Module (CPM), a web-enabled tool that allows learning centers to access and share the data across the domain. In this process, the Requirement Sponsor(s) determine which tasks they want NETC to train to and which tasks they want included: in On-the-Job Training (OJT), a Personnel Qualification Standard (PQS), a Rate Training Manual (RTM), or some combination. During the JDTA, attributes are assigned to each task that will be used during NETC's Front End Analysis (FEA). The output of the JDTA is the input to the NETC's FEA.
- **Perform Front End Analysis (FEA)**. The purpose of the FEA is to compare the as-is to the to-be training state, that will result in a training requirement delta. The output of the FEA will contain a detailed description of the gap in training, recommended training solutions (delivery methods), and any options to close the training gap. Additionally, the Re-use, Re-purpose, and/or Reference (R3) of existing content, to close the training requirement delta, will be explored. The output of the FEA is the input to NETC's Business Case Analysis (BCA).
- **Develop Business Case Analysis (BCA)**. The purpose of the BCA is to take the proposed training solutions from the FEA and assign a cost to each. The BCA also captures any risk associated with each option. NETC will propose training solutions, as a Course of Action (COA) for each training solution, to the Requirement Sponsor and Resource Sponsor. Collectively, these entities will select one of the training solutions (COA) that NETC can then use to develop or revise a course to satisfy the training requirement. It is the output of the BCA (decisions by the Requirement Sponsor and Resource Sponsor) that will determine the skill and knowledge outcomes that the course will be developed to achieve and tests built to assess. The output of the BCA is the input to NETC's Training Project Plan (TPP).

- **Develop Training Project Plan (TPP)**. A TPP is used to articulate the plan (best faith estimate) to implement a new or revised course. The TPP has been adopted as OPNAV N15's vehicle to broker training requirements that require Fleet resources. The final page of a TPP contains a milestone chart that leadership can use to track the build, proposed implementation sequence and timeline of a new or revised course. Once a TPP is approved for implementation, course development or revision, and test and test item development or revision can begin. These development efforts begin with the collection of course data from sources that may include JDTA data, a Course Training Task List (CTTL) and/or Personnel Performance Profile (PPP) Table, and Curriculum Outline of Instruction (COI), discussed below.

SECTION 4 – COLLECTION OF COURSE SOURCE DATA

To ensure that a test is both reliable and valid, curriculum developers must be fully informed by all course source data. The first step in collecting data is to check CPM for JDTA data. If JDTA data is not available then curriculum developers will bridge the absence of JDTA data using data elements from a combination of: Occupational Standards (OCCSTDs), CTTL, PPP Table, and a COI. The risk in using this bridge is that there is no empirical linkage between all data elements. This is an acceptable practice while JDTA databases mature. Whenever new training requirements are identified, a JDTA will be conducted using AIM CPM. The following is a brief discussion of each data source:

- **JDTA Data**. When a JDTA has been performed, work is decomposed to the task level (may be further decomposed to the sub-task and step level, if required), this is the starting point for developing courses and tests. Data associated with the task include: (1) the verb, which provides context for the task and specifies the nature of behavior required; (2) the condition, which describes the circumstances under which the behavior will be performed; and (3) the standard, that is the criteria to which the behavior will be performed. Additionally, JDTA Training Task Analysis (TTA) data further contextualizes circumstances that directly relate to training and assessment. The JDTA process is relatively new, and only a limited amount of data has been entered into CPM. When fully mature, this tool will vastly enhance curriculum developers’ ability to construct reliable and valid tests.

- **OCCSTDs.** OCCSTDs are the minimum capabilities that the Navy expects and requires of individuals within each rating. Standards are generally expressed in terms of task statements and they represent the knowledge, skills, and abilities needed to accomplish those tasks. A list of OCCSTDs is published quarterly by the Navy Manpower Analysis Center (NAVMAC), NAVPERS 18068F, Volume 1. OCCSTDs form the foundation for the training of all Navy enlisted personnel. NETC develops the delivery method for approved OCCSTDs, in the form of: "A" School – selected E-4 OCCSTDs, PQS, and RTM - rating specific.
- **CTTL/PPP Table**. JDTA data is the source of data used to develop CTTLs and PPP Tables. CTTLs and PPP Tables are outputs of the analyze phase of NETC's Plan, Analyze, Design, Develop, Implement and Evaluate (PADDIE) Model and are used to create Learning Objectives (LOs). These documents contain the mission statement and a list of duties and tasks that will be used to build the course. Each duty and task is listed with its source document, and is identified as either a knowledge or skill level.
- **COI**. The COI is found in the Training Course Control Document (TCCD). The COI contains a course's terminal and enabling learning objectives, derived from the job's duties and tasks, respectively. The COI also provides the course's sequence (order in which learning objectives are taught). LOs are arranged in a logical teaching sequence to produce the most effective learning in the shortest time possible.

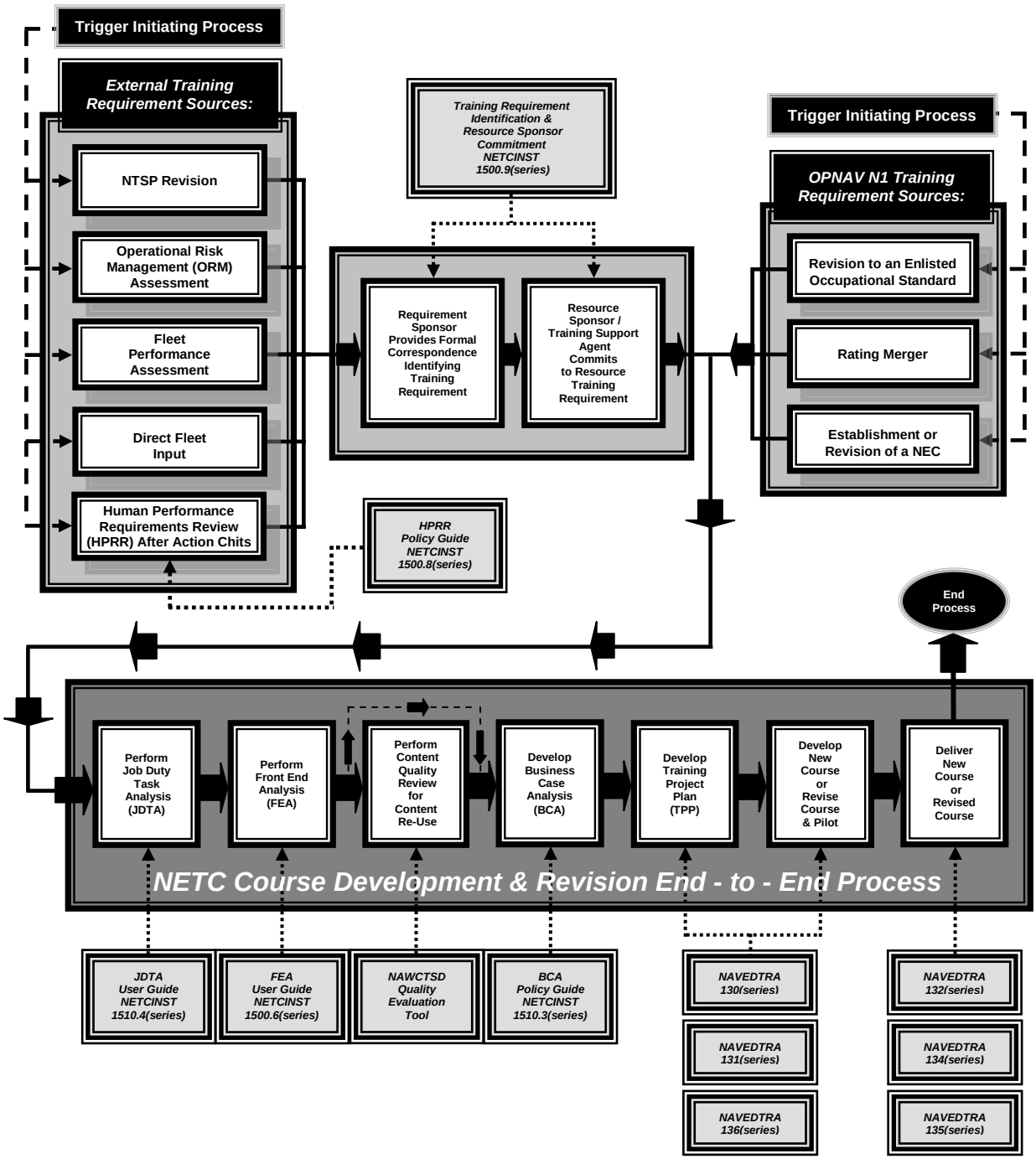


FIGURE 1: NETC COURSE DEVELOPMENT AND REVISION END-TO-END PROCESS

SECTION 5 – COURSE SOURCE DATA

Once the course's source data is collected; the data elements are in place, with analysis by curriculum developers, to design and develop tests to assess the trainee's achievement of desired training outcomes. The minimum source data necessary to design and develop tests, is described below:

- **Duty and Task Statements**. Duty and task statements specify the work to be performed at the duty and task level. Duty and task statements may be found in one of two locations. If a JDTA has been performed, the duty and task statements will be found in CPM. If no JDTA data exists, refer to a CTTL, PPP table, or COI for these statements.
- **Task Category**. Task category is used to identify a task as either a knowledge or skill. These categories are listed in a CTTL and PPP Table and are currently referred to as “levels.”
- **Terminal Objective (TO)**. TOs describe what the trainee must achieve to successfully complete the course of instruction. These learning objectives are derived from one or more duties, from a CTTL or PPP table. Terminal objectives will be the same as those contained in the TCCD’s curriculum outline of instruction.
- **Enabling Objective (EO)**. EOs describe what the trainee may accomplish at any point in the course, after receiving the appropriate training. These learning objectives are derived from one or more tasks, from a CTTL or PPP table. One or more enabling objectives are associated with a terminal objective in a COI.
- **Knowledge**. Knowledge refers to an understanding of facts or principles relating to a particular subject area and applied directly to the performance of a function. The required knowledge for each task is captured in the task's Knowledge, Skill, Ability, Tools, and Resources (KSATR) Tab in CPM.
- **Skill**. Skill refers to the ability to perform a job-related activity that contributes to the effective performance of a task. Skills are the proficiencies needed to perform a task, and describe what the trainee must do. The required skill for each task is captured in the task's KSATR Tab in CPM.
- **Ability**. Ability refers to an enduring attribute of the individual that influences performance and enables the performance of tasks. The required ability for each task is captured in the task's KSATR Tab in CPM.

- **Behavior (verb)**. A behavior is a knowledge, skill, or ability (KSA) that is observable and measurable. When stating the behavior in a LO, action verbs will be used to reduce ambiguity. Action verbs are observable and measurable. The behavior part of the LO states what a trainee will do to demonstrate that they learned a specific skill or knowledge. The verb (behavior) for each task is captured in the task's Skill Tab in CPM.
- **Condition**. A condition identifies the circumstances under which the behavior is demonstrated. When determining the condition(s), consider specifying the objects, events, or behavior. Conditions should be written to include, in sufficient detail, any safety, environmental, or related conditions which apply to the action. The condition defines aiding and limiting factors imposed upon the trainee. The training should also contain the conditions as realistic as possible, replicating the working environment. Conditions are found in the COI or under a task’s Task Tab in CPM. The authoritative source for task conditions is CPM.
- **Standard**. A standard measures a training output. A standard defines the criteria for acceptable performance in terms of time, quantity, quality, and accuracy. Standards are found in a COI or under a task’s Task Tab in CPM. The authoritative source for task standards is CPM.
- **Training Task Analysis (TTA) Data**. TTA data is a ten item detailed description of important task elements identified during a JDTA and recorded in CPM. TTA data includes:

    - Safety Hazard Severity. This is a qualitative measure of the potential consequences resulting from item failure.
    - Criticality of Performance. Criticality of performance points to the need for selecting tasks for training that are essential to job performance, even though the tasks may not be performed frequently.
    - Task Delay Tolerance. Task delay tolerance is a measure of how much time can elapse between the time the need for task performance becomes evident and the time actual performance must begin.
    - Frequency of Performance. This is a measure of how often the task is performed.
    - Probability of Inadequate Performance. This is a measure of how often a task is performed in a non-acceptable manner. The criterion for probability of inadequate performance is used to ensure that training is given to those essential tasks that job incumbents frequently perform poorly.

- Difficulty of Performance. The difficulty of performance of a task refers to the time, effort, and assistance required achieving performance proficiency.
- Task Learning Difficulty. This refers to the difficulty of performing the task. Some tasks are so easy that they can be readily learned on the job. At the other extreme, some tasks are so complicated that a Sailor can perform them adequately only after lengthy, formal training. Other tasks lie somewhere in between these two extremes and require different levels of training.
- Percent Performing. This is the percentage of Sailors who perform the task, points to the need for training tasks that are most often performed on the job.
- Percent of Time Spent on Performance. This refers to the percentage of time spent performing a task. It is a criterion that points to a need for providing training to assist job incumbents in efficient performance of those tasks on which they spend the most time.
- Immediacy of Performance for the Task. Immediacy of performance refers to the time interval between completion of training and performance of the task on the job and has some significance in selecting tasks for training. A factor for selecting tasks for training is whether or not there is a high probability of the graduate encountering the task on the job fairly soon after completing training. Consider the predicted or measured amount of decay of the skill that will take place during the time interval.

SECTION 6 – UTILIZATION OF COURSE SOURCE DATA

The course's source data will be the foundation for every decision associated with a course, from its design and development to every resource required to deliver the training.

Curriculum developers must begin thinking about test design and development as learning objectives are being written. Development of the course's Lesson Plan (LP), Trainee Guide (TG) and tests, to a large extent, occur simultaneously. Thus, developing a test requires a great deal of thought and consideration, during course development.

The source data will be used to develop duty and task statements, LOs (terminal and enabling), and the sequence in which the LOs for the new or revised course will be taught and tested.

Not all of the data elements listed above will be used in test design, but they will play a part in the course's design. The minimum data elements used in test design are identified in chapter's 7 and 9, and will be used to determine LO criticality and to determine the level of proficiency that each LO needs to be tested to (this will match the level of proficiency that the LO is taught). Additional data elements will most likely be used to determine LO criticality, this determination will be made by the curriculum developers. LO criticality will be used by curriculum developers to help determine which LOs are formally tested and which are informally tested (see note below). Determining the level of proficiency that each test needs to be designed to assess will enable curriculum developers to determine the best test instrument(s) and grading criteria to use.

NOTE

The terms "formal testing" and "informal testing" are defined as: Formal testing is a test that is graded and is used in the calculation of the trainee's final grade; informal testing may or may not be graded - regardless, the grade will not be used in the calculation of the trainee's final grade. All formal and informal testing will be identified in the course's testing plan. Additionally, a copy of all tests and any test revision will also be included in the testing plan.

SECTION 7 – SKILL AND KNOWLEDGE PROFICIENCY LEVELS

The BCA provides an array of training solutions with associated cost that allow the Requirement Sponsor and Resource Sponsor to make an informed decision. The decision made, that finalizes the BCA, will be used for course and test development. To ensure that the correct level of proficiency is trained to and then assessed, NETC has established the following proficiency levels for skill and knowledge:

- **Skill Proficiency Levels (SPLs)**. There have been many descriptions (theories) developed to describe the teaching of skills (psychomotor domain). After careful consideration, NETC has adopted a three level instructional model: imitation, repetition, and habit. The model provides a learning schema where basic skills start low and progressively advance to more sophisticated skills. The following is a description of NETC's three SPLs:

- Skill Proficiency Level 1 (SPL1) - (Imitation). During training, the instructor shares essential information about the skill, such as facts, background information, safety considerations, etc. Then the instructor breaks the skills into small steps, demonstrates the skill and allows the trainee to reenact or copy the skill. The skill expectation for imitation is: can perform a task but is not proficient. This level of proficiency requires the condition of supervision. This level's attributes are: work will require corrective action, and excessive time will be required to complete the task. An example of SPL1 test item is: a job sheet that requires the trainee to replicate the instructor's demonstrated use of a multi-meter.
- Skill Proficiency Level 2 (SPL2) - (Repetition). During training, the trainee repeatedly practices the task with the instructor. The trainee is able to ask questions, receive feedback, and practice in a safe environment. The skill expectation for repetition is: can perform tasks, but has not had enough repetitions to achieve expert proficiency. This level of proficiency requires the condition of minimal supervision. This level's attributes are: work may (but generally will not) require corrective action, and time on task will be within established standards. An example of SPL2 test item is: a job sheet that requires the trainee to perform difficult corrective maintenance on complex surface radar using approved technical publications, procedures, tools, and test equipment.
- Skill Proficiency Level 3 (SPL3) - (Habit). During training, the trainee develops such proficiency that they are able to perform the skill in half the time or at an expert level. Performance of the skill becomes second nature. When the trainees reach this level, they are able to create their own versions of the skill and teach others. The skill expectation for habit is: can perform any task with an expert's proficiency. This level of proficiency requires the condition of no supervision. This level's attributes are "speed, accuracy, and precision." An example of SPL3 test item is: a job sheet that requires the trainee to perform a sequence of steps (sequence is critical) in a very confined time period - Perform Cardiopulmonary Resuscitation (CPR) on an electrical shock victim, (dummy).

- **Knowledge Proficiency Levels (KPLs)**. Knowledge proficiency in the NETC training organization is scaled to three levels. The three levels are based upon Bloom’s taxonomy of the cognitive domain (which are collapsed from six to three). The three groupings (levels of proficiency) from Bloom's six categories are: (1) knowledge and comprehension, (2) application and analysis, and (3) synthesis and evaluation. These three levels of proficiency can be thought of as degrees of difficulty that are progressively mastered (in sequence). The following is a description of NETC's three KPLs:

    - Knowledge Proficiency Level 1 (KPL1) - (Knowledge/ Comprehension). Knowledge proficiency expectations are: knowledge - can recall data or information; comprehension - understands the meaning, translation, interpolation, and interpretation of instructions and problems (can state a problem in one's own words). Knowledge is a fact, process or procedure. It lacks ambiguity; there is only one correct answer. Generally, there are rules and documentation for correct answers. An example of a KPL1 "knowledge" test item is: Provide the missing information in the following statement - A M60 Machine Gun on full auto, is capable of firing ... rounds a minute. An example of a KPL1 "comprehension" test item is: State the number of sustained firing rounds that a M60 Machine Gun can support?
    - Knowledge Proficiency Level 2 (KPL2) - (Application/ Analysis). Knowledge proficiency expectations are: application - can use a concept in a new situation or unprompted use of an abstraction (applies what was learned in the classroom into novel work situations); analysis - can separate material or concepts into component parts so that its organizational structure may be understood (distinguishes between facts and inferences). Principles and concepts are added to processes and procedures. There is some ambiguity, but there is always a “best answer.” An example of a KPL2 "application" test item is: A visual inspection of a M60 Machine Gun reveals rust on non-critical components. Two alternatives for this test item are (1) no action required to maintain functionality, (2) “best answer,” despite the low threat of rust on non-critical parts, the best course of action would be to remove the rust with a solvent. An example of a KPL2 "analysis" test item is: In a combat situation when sustained firing is required, explain what problems

you will experience with the M60 Machine Gun and how you will mitigate them? In this test item, there are two possible courses of action (1) continue firing the weapon and risk malfunction (hot barrel) culminating in a loss of life, (2) “best answer,” replace barrel at first opportunity to ensure weapon functionality and force security.

- Knowledge Proficiency Level 3 (KPL3) - (Synthesis/ Evaluation). Knowledge proficiency expectations are: synthesis - builds a structure or pattern from diverse elements (put parts together to form a whole, with emphasis on creating a new meaning or structure); evaluation - makes judgments about the value of ideas or materials. This level of proficiency requires the performance of prediction, demonstration of concept mastery, and implementation of principles in accomplishing a task. Key skills are troubleshooting and problem solving. In this situation, opinion lines up with theory. An example of a KPL3 "synthesis" test item is: While at sea-and-anchor detail, standing security watch, armed with a M60 Machine Gun, a small boat has disregarded 3 warnings, describe and defend your course of action. An example of a KPL3 "evaluation" test item is: Compare and contrast the strengths and weaknesses of a ship's import watch standing policies.

SECTION 8 – COMPUTER MANAGED INSTRUCTION

Computer Managed Instruction (CMI) is the function of the Interactive Courseware (ICW) authoring software related to trainee test and measurement data collection. An important aspect of CMI development is test and test item design, and the management of assessment functions and records. The following is a description of CMI functions and capabilities.

- **CMI Functions** generally includes the following functions:

  - Administrative:

    - Registration of the trainee in an assessment.
    - Point-of-entry for the trainee into the assessment often based on a pre-test performance or previously completed training content.
    - Trainees should be able to leave an assessment (if appropriate for the assessment type) and return to the same point at a later time.

    - Documentation of the trainee responses through the assessment, and the time spent on specific items (if appropriate for the assessment type).
    - Control of remediation, feedback and number of times an assessment can be taken.
    - Disenrollment of trainees from the course.

  - Performance Tracking:

    - Employment of different types of test items (e.g., digitized video, graphic, animated images, and simulations).
    - Collection of data regarding the trainee's performance on tests and practice exercises.
    - Use of error performance and time performance metrics for test items and test segments.
    - Provision of immediate feedback to the trainee for test questions on the pre-test, embedded tests, lesson or segment tests and post-tests.
    - Determination of trainee mastery of objectives.
    - Reporting of trainee performance information.

- **Computer Managed Instruction Capabilities**. Prior to designing the CMI for an ICW course, review the selected authoring software to determine the extent of data collection and analysis that is possible.

SECTION 9 – DESIGN AND DEVELOP INTERACTIVE COURSEWARE ASSESSMENTS

Design and develop ICW tests to measure the knowledge and skills associated with each hands-on task or instructional objective. The following are types of ICW assessments and guidelines for designing them.

- **Formative Assessments**

  - Pre-test
  - Survey or polls
  - Quiz and knowledge checks
  - Diagnostic
  - Norm-referenced
  - Criterion-referenced
  - Observations

- **Summative Assessments**

  - Criterion-referenced

- Performance assessment

- **Guidelines for Designing ICW Assessments**. Guidelines for designing ICW assessments are provided in Table 2, page 3-16.

TABLE 2: GUIDELINES FOR DESIGNING INTERACTIVE COURSEWARE ASSESSMENTS

#	Guideline Description:	Rationale:
1	Use a trainee's pre-test score to branch the trainee to "need to know" information.	Reduces trainee boredom by not forcing them to review things they already know.
2	Use the trainee's pre-test score to gauge deficiencies in entry-level prerequisite skills and knowledge.	Stimulates recall of relevant prior knowledge (one of the "events" of instruction).
3	For pre-tests, explain that trainees are not expected to know all the answers.	Puts trainees "at ease" with the instruction.
4	Introduce the test by telling trainees how many questions they will see and how long it should take them to complete the test.	Helps trainees gauge how extensive the test is.
5	Let trainees "back out" of taking a pretest if they know they do not know the content.	Forcing trainees to take a test when they know they don't know the content can introduce unnecessary stress into a learning situation.
6	Provide clear instructions for taking the test, including how to change answers.	Reduces the possibility of trainees making errors when they actually have mastered the objective.
7	Provide a method for trainees to review their completed test.	If trainees responded with a wrong answer and subsequently realize it, they should be able to correct the answer, just as they can in a paper & pencil testing situation.
8	Provide immediate feedback to trainee answers in the same order that they answered the questions.	Reduces confusion and increases the learning value of a test.
9	Design the program such that the computer "works through" a problem (provides real-time help) interactively for trainees instead of just giving the correct answer.	Reduces learning time because a trainee may have a partially correct answer. The computer should identify the point where the trainee is in error and invite them to go on from there.
10	If questions are drawn from a "pool of questions," remove correctly answered questions from the pool for subsequent iterations of test items to the trainee.	Learning criterion has been achieved and trainees should not be required to answer these questions again.

SECTION 10 – SUMMARY

This chapter established the requirement that curriculum developers use the empirical data gathered during NETC's Course Development and Revision End-to-End Process, so that they are fully informed about the nature of the work, the relationship of the learning objectives to the work, and the Navy's training expectations based upon validated Fleet requirements. When fully informed by these data, curriculum developers will be able to develop reliable and valid tests to assess achievement of desired skill and knowledge training outcomes. Additionally, computer managed instruction and interactive courseware assessments were also discussed.

CHAPTER 4

TEST CATEGORIES, TEST TYPES, AND TESTING METHODS

SECTION 1 – INTRODUCTION

When there is a need to measure the trainee's ability to perform a specific skill or knowledge comprehension, it is important to use the right test category and best test type. The determination of what category of test and what would be the best test type to use for each test is made during the test design phase (Chapters 7 and 9). Once tests are assembled, they must be piloted before they are used in a course. This chapter provides a description of each performance and knowledge test category and test type. Additionally, criterion-referenced and norm-referenced testing methods are discussed.

SECTION 2 – PERFORMANCE AND KNOWLEDGE TEST CATEGORIES

Test selection begins with gathering course source data (Chapter 3) and ends following the analysis of that data. The analysis will enable curriculum developers to select the correct test category to use for an assessment. There are five categories of tests: pre-test, progress test, comprehensive test, oral test, and quiz, as depicted in Figure 2, page 4-5. Each category of test has a different purpose and is discussed in the following paragraphs below:

- **Pre-Test**. A pre-test is a test that is administered at the beginning of a course and prior to instruction. Pre-tests may be used in the following ways:

    - Validation of Material. When a test is administered at the beginning of a course and again at the end it is normally being used to validate a new course of instruction. A comparison of the results of the two tests helps determine the effectiveness of instruction. For example, two tests are administered: the first test prior to instruction, and the second after completing two weeks of instruction. The results of the first test indicate trainees do not understand the theory of operations for transistors (50 of the 60 trainees answered items on transistors incorrectly). After two weeks of instruction, the same test is administered. The results indicate that 50 of the 60 trainees answered the items on transistor theory correctly. Based on these results, the assumption is that learning took place. This type of testing may also be used anytime new material is introduced into a course.

NOTE

When using a pre-test for post-test comparison, do not review the pre-test results with the trainees. Reviewing the pre-test will compromise the ability to assess the improvement in skill or knowledge provided by training.

- Acceleration. Pre-tests may be used to determine a trainee's potential for acceleration through a course or unit of instruction. The pre-test is similar to the existing course or unit test and is designed to assess mastery of the learning objectives. For example, trainees that took a pre-test answered 24 of 25 algebra items correctly, it may be cost effective to accelerate the trainees through this portion of training and move them on to the next unit or module.
- Prerequisite. This type of pre-test assesses prerequisite skills and/or knowledge necessary to meet entry-level requirements. For example, if a trainee is required to have knowledge of electricity and electronics prior to attending Fire Control Technician "A" School, a pre-test may be administered to determine if the trainee possesses the prerequisite knowledge. If the trainee does not demonstrate the required knowledge, instruction shall be provided to prevent difficulties in training. This type of pre-test should not be used to "weed out" trainees prior to training.
- Advanced Organizer. This type of pre-test can help trainees gain an understanding of material that they will be exposed to in subsequent lessons.

- **Progress Test**. A progress test assesses skill and/or knowledge learning objectives. A progress test is normally administered for every 40-50 periods of instructional material. How often a test is given may vary based on complexity of the material. For example, it may be necessary to assess complex material in small blocks of instruction. In this case, progress tests may be administered more frequently than once a week. Administering tests too frequently may cause the trainee to rely on short-term memorization and not comprehension.

- **Comprehensive Test**. A comprehensive test is normally given at the end of instruction or after large blocks of instruction to measure mastery of the critical objectives in the course or to measure retention of previously tested

material. The two types of comprehensive tests are discussed below:

- Within-Course Comprehensive Test. This type of test may be administered for a course that is complex; where it may not be practical to administer a single final comprehensive test. For example, if a course is 10 weeks long, it may be appropriate to administer two within-course comprehensive tests rather than one final comprehensive test.
- Final Comprehensive Test. A final comprehensive test is a test given at the end of a course. This category of test will be cumulative, and is used to measure mastery of learning objectives, particularly critical learning objectives.

NOTE

If unable to administer comprehensive test(s), justification should be outlined in the testing plan.

- **Oral Test**. An oral test is normally administered by a board (panel of evaluators). This means the trainee is asked to respond to questions orally in front of the board. Oral tests are best used to assess the trainee's comprehensive understanding of the skills necessary to perform a job, duty, or task; and the ability to correctly state that understanding is required. If an oral test is administered, a rubric shall be developed and used to ensure that all trainees are assessed to the same standards (see discussion on rubrics, Chapter 6). The following guidelines should be considered when determining the need for an oral test.

  - Trainee Instructor Ratio/Class Size. If the trainee to instructor ratio is greater than 10:1 or if the class size is greater than 20, an oral test may not be feasible due to time constraints. Ideally, oral tests should only be used with small groups of trainees.
  - Environmental Limitations. If space limitations prohibit testing where other trainees can overhear questions and answers, then oral tests should not be used. In environments where distractions exist, that interfere with an oral test, written tests should be administered.

- **Quiz**. A Quiz is a short test used by instructors to assess achievement of recently taught material. The quiz may be

given often as a tool to focus trainees on the material, and may or may not be a part of the trainee's grade. If used in determining a trainee's grade, quizzes and testing procedures must be standardized. If not, the instructor may prepare and administer the quiz within guidelines established by Course Supervisors. If quizzes are used for grading purposes, they will be considered a part of the practical work grade. A quiz is normally not retested.

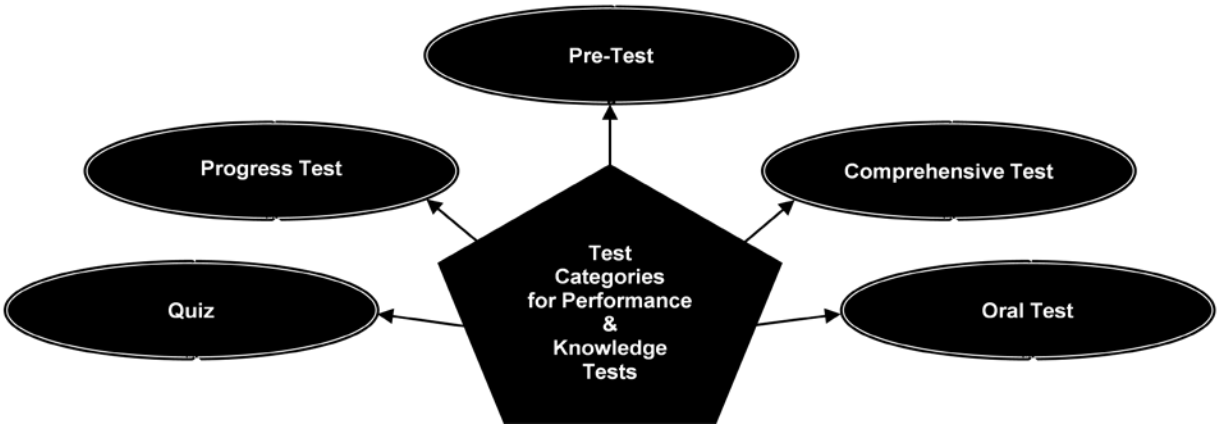


FIGURE 2: PERFORMANCE AND KNOWLEDGE TEST CATEGORIES

SECTION 3 – PERFORMANCE TEST TYPES

There are three types of tests that can be used by curriculum developers to assess the trainee's performance of learning objectives: product, process, and combination of product and process. Each test type has a different purpose and is discussed in the following paragraphs.

- **Product - Performance Test**. A product is an observable result (something you can see, hear, or touch). A solder joint is a product because it can be seen and touched. A completed form is a product because, like a solder joint, it is tangible.

  - Product performance tests place importance on the final product or result. They also require the trainees to use a job sheet, and to:

    - Comply with safety precautions.
    - Complete a form to be compared to a completed document.
    - Build or make an item, the dimensions of which will be measured against a standard or tolerance.

    - Build or make an item to perform a certain function.
    - Assemble or connect equipment to perform a certain function.
    - Finish the task within a given time.
    - Perform under the direct supervision of the instructor or assessor.

  - Product performance testing is possible when:

    - The learning objective specifies a product.
    - The product can be assessed as to the presence or absence of certain characteristics, e.g., does it look right, have the right texture, sound the way that it should?
    - Procedural steps may be performed in a different order or sequence without affecting the product.

  - An example of a product performance test is:

    - Construct a box sill floor frame to within 1/8-inch of required dimensions (The final product will be graded for conformity to the specifications).

- **Process - Performance Test**. A process consists of step-by-step procedures required to produce a product or complete a task.

  - Process performance tests measure well-defined steps that the trainee must integrate or sequentially perform for the process to be done correctly. They require the trainee to use a Job Sheet, and:

- Demonstrate all important and essential steps and factors required for successful performance of the behavior.
- Comply with safety precautions.
- Utilize the correct tools and equipment correctly.
- Perform all steps within a given time frame.
- Perform all steps while under the direct observation of the instructor or assessor.

- Process testing is appropriate when:

  - The product and the process are the same thing — such as teaching a lesson.

- There is a product, but safety, high cost, or other constraints prevent the product from being measured.
- It is necessary to examine each step of the process in order to diagnose the reason for performance failure.
- There may be a product, but there are critical points in the process which must be performed correctly because of the possibility of damage (safety) to personnel or equipment.
- The learning objective specifies a sequence of steps that can be observed.
- The process does not result in a product.
- Interest is in the actual behavior itself.

- An example of a process - performance test is: Measure a crankshaft journal for wear, taper, and out-of-roundness (exact measurements require that the measuring process is followed precisely).

- **Combination (Product and Process) - Performance Test**. This performance test is concerned with both an observable result, and the step-by-step process leading to the result. Combination product and process tests—incorporate the requirements of each of the two types of tests described above. Combination testing is appropriate when:

  - Both product and process are equally important to the final result, or it is required so as to avoid hazards to personnel or equipment.
  - Safety considerations almost always dictate that the operation or maintenance of a device, i.e., the process, be done in a certain way. However, the outcome, i.e., the product, is just as important to successful job performance.
  - An example of a combination (product and process) - performance test is: Perform a Daily System Operating Test (DSOT) on the Close-In-Weapons-System (CIWS) (A systematic, step-by-step process must be followed to ensure a fully operational CIWS, or product).

SECTION 4 – KNOWLEDGE TEST TYPES

Knowledge tests can take the form of two types of written tests: open book or closed book. The following is a description of each:

- **Open Book Test**. An open book test evaluates the trainee's ability to locate and record information using technical

documentation. Open book tests are used whenever the on-the-job situation requires the use of technical documentation.

- **Closed Book Test**. A closed book test is used when the knowledge being tested for is normally required on-the-job without reference to the technical documentation.

SECTION 5 – PILOT TESTING PERFORMANCE AND KNOWLEDGE TESTS

Pilot tests provide an initial assessment of test reliability and validity. This effort allows programs to make corrective adjustments before actually collecting data from the target population. Once a performance or knowledge test has been assembled a review process (pilot test) should be performed. The review process is outlined below:

- The test will be reviewed by Subject Matter Experts (SMEs) to ensure the proper assessment of learning objectives. They should provide a general review on test instructions, content, technical accuracy, test instrument clarity, differentiation of response set, direct relation to objective, and grammar. The curriculum developer will develop an SME test critique form, to capture their assessment.
- Once a test is developed it shall be reviewed and approved for piloting by the CCMM and then forwarded to the LSO for final pilot approval.
- Begin by identifying a group of trainees who are in the end stages of completing instruction in the same or very similar material. Test this group under actual test conditions with the caveat that their test results will not be used in their final grade or course standings.
- Curriculum developers will develop a trainee test critique form, and once the test is completed, have the trainees critique the assessment they have just taken.
- The final step is to review each trainee’s results or performance of the test. Are the results similar? Look at test items missed or steps that were not performed correctly. Look at the test items answered correctly and the steps that were performed correctly. Are there patterns of behavior? For example, do all trainees miss or answer the same test item correctly or does every trainee perform or fail to perform the steps correctly? What can be concluded from the patterns of the trainees’ responses? As an example, if a pattern is observed of responses where a majority (90%+) answer a test item correctly, this test item is not useful in discriminating among trainees.

Conversely, if a significant majority fail to answer a test item correctly, this test item needs to be examined for flaws (poor wording, ambiguity, etc.), and if none are identified consider deleting the test item. Additionally, in performance tests, where safety is an issue, every step must be performed correctly. Thus, examine each test to ensure that 100 percent of the trainees performed these steps correctly. If there are any instances where the trainee did not perform the steps correctly, there could be an issue with the test instrument, test administrator's guide, or both.

SECTION 6 – TESTING METHODS

Testing methods provide the framework to interpret the results of the trainee's performance and/or knowledge test. There are numerous testing methods, but NETC has adopted the use of two: criterion-referenced and norm-referenced testing. The curriculum developer will decide which testing method is appropriate for each test. The following is a description of each testing method:

- **Criterion-Referenced Test**. A criterion-referenced test assesses trainees on a required level of knowledge or skill (cut score). Most tests and quizzes written are criterion-referenced tests. The objective is simply to see whether the trainee has learned a specified amount of the material. This test works best when assessing knowledge. It has a standard, typically a score, which must be attained for a successful outcome. An example of a criterion-referenced test would be a test that establishes a minimum passing score (no curve).
- **Norm-Referenced Test**. A norm-referenced test is a type of test that yields an estimate of the position of the tested trainee in a predefined population (a curve), with respect to the trait being measured. The importance is the relation to the group as much as the score achieved. In effect, it sorts trainees in relation to knowledge of material measured by the test or the skill being assessed. An example of a norm-referenced test is the Navy’s advancement exams.

SECTION 7 – SUMMARY

This chapter described the test categories and test types for performance and knowledge tests that are available to curriculum developers during the test design and development process, to assess the trainee's performance of a skill and/or

knowledge comprehension. Pilot testing a test before it is introduced into a course and the two testing methods available to curriculum developers, was also discussed. The roles and responsibilities delineated in this chapter are summarized in Table 3.

TABLE 3: TEST CATEGORY ROLES AND RESPONSIBILITIES

Task	Responsibility
Approves to proceed with pilot testing	LSO
Approves test for piloting	CCMM
Approves quizzes used for grading purposes	CS
Develops SME test critique form	Curriculum Developer
Develops Trainee test critique form	Curriculum Developer
Reviews test in Pilot phase to ensure proper assessment of Learning Objectives	SME
Reviews test for content validity	SME
Takes tests as part of test review process	SME
Participates in test and test item construction	SME
Reviews test for spelling and grammar	SME
Reviews test for direct relation to Learning Objectives	SME
Reviews test for differentiation of response set	SME
Reviews test for clarity of test instructions	SME
Reviews test for technical accuracy	SME
Prepares and administers quizzes not used for grading	Instructor

CHAPTER 5

TEST INSTRUMENTS

SECTION 1 - INTRODUCTION

This chapter describes the test instruments that will be used by curriculum developers to build tests to measure the trainee's ability to perform a specific skill and/or demonstrate knowledge. The analysis of the course source data, discussed in Chapter 3, enables determination of the best test instrument(s) to use to assess the desired skill and knowledge training outcomes. A list of the best test instruments to use for each skill and knowledge proficiency level is provided in Chapter 7 and Chapter 9, respectively. The following paragraphs provide a description of the test instruments used in knowledge and performance tests.

- **Performance Test - Test Instruments**. Performance tests will be developed using job sheets. Problem sheets are normally not used as a means of performance assessment, but may be used to evaluate achievement of less critical learning objectives.
- **Knowledge Test - Test Instruments**. Knowledge tests will be developed using test items. Test items include: multiple-choice, true or false, matching, completion, labeling, essay, and case study. Assignment sheets and problem sheets are normally not used as a means of knowledge assessment, but maybe used to evaluate achievement of less critical learning objectives.

SECTION 2 – JOB SHEET

Job sheets direct the trainees in the step-by-step performance of a practical task they will encounter in their job assignment. Job sheets provide a means for trainees to apply the knowledge they obtain during instruction, to perform a task. Job sheets will be developed and used as the basis for measuring the trainee's ability to perform duties or tasks. Job sheets support product, process, and combination (product and process) performance tests. Each job sheet has seven sections, described below:

- **Title**. This section provides a description of the subject matter of the sheet.

NOTE

At the top of the first page of each instruction sheet used in testing, (job, assignment, and problem sheets), is the type of sheet. Each sheet is identified with a three-element number (example: 7-3-1) which relates the

instruction sheet to the unit-lesson topic in the lesson plan it supports or supplements.

- First element - unit number
- Second element - lesson topic number
- Third element - sequence number within the lesson topic sheets

- **Introduction**. In this section, the purpose of the job sheet will be clearly described with an explanation of the benefits for the trainee.
- **Equipment**. In this section, list the equipment required for use by the trainee to accomplish the job. Reference to official documentation which lists the equipment that may be substituted.
- **References**. List publications required to perform the task. Each reference will be fully identified by title, number, volume, and part, etc., as applicable.
- **Safety Precautions**. List safety precautions that apply to the overall job. For example, in NAVEDTRA 130, Volume II, sample trainee guide job sheets, training time out procedures are reviewed. If there are no safety precautions related to the overall job, enter "Not Applicable" or "None."
- **Job Steps**. List step-by-step procedures for performing an operation, maintenance, troubleshooting, or repair of equipment. Provide specific safety precautions in the job steps unless they are called out in the supporting technical manuals or references and cited in the step. Provide either general or discrete step-by-step procedures for performing the task(s). Provide sufficient space under each job step to record information.
- **Self-Test Questions**. In this section, or after individual job steps, provide self-test questions that:

  - Are easily understood, grammatically correct, and easily graded by the instructor.
  - Are technically correct and have direct application to the task being performed.
  - Require analysis and thought similar to that required in the actual job situation.

NOTE

If the test material is classified, the security classification must appear (centered) on the top and bottom of each page.

SECTION 3 – PROBLEM SHEET

Problem sheets present practical problems requiring analysis and decision making similar to those encountered on the job. The problem sheet is an effective means of emphasizing the fundamentals of logical thinking. It is also an effective way to help trainees learn to problem solve and to help them gain practice in applying their knowledge to practical situations. Each problem sheet provides a clear statement of the problem, the conditions and parameters affecting the problem, and the directions and procedures for the solution to the problem. Problem sheets are normally not used as a means of testing, but can be used for paperwork troubleshooting when the equipment is not available and can be used to assess achievement of less critical knowledge and skill learning objectives. If a drawing and/or diagram are required, include them as part of the problem sheet; do not use a diagram sheet. Each problem sheet has five sections, described below:

- **Title**. This section provides a description of the subject matter of the sheet.
- **Introduction**. This section consists of a narrative statement describing the purpose and intent of the problem sheet.
- **References**. List reference publications required to perform the task.
- **Problems**. Present problems that provide a clear statement of the problem(s), and the conditions and parameters affecting the problem(s). Problems must be organized in a reasonable manner to promote problem-solving skills.
- **Directions**. Provide directions and/or procedures to solve the problem.

SECTION 4 – ASSIGNMENT SHEET

Assignment sheets are designed to direct the study or homework efforts of trainees. Assignment sheets are normally used to prepare the trainee for lesson topics and laboratory or practical exercises before they are presented by the instructor or occur in the course. They are normally not used for assessment. However, assignment sheets may be used to test less critical knowledge learning objectives. Assignment sheets simplify the trainee's search for relevant data and direct their efforts to the proper source. The sheets may direct trainees to information contained in various manuals, reference documents,

or other instruction sheets. Each assignment sheet has five sections, described below:

- **Title**. This section provides a description of the subject matter of the sheet.
- **Introduction**. This section consists of a narrative statement describing the purpose and intent of the assignment sheet. The statement should include how and why the assignment benefits the trainee.
- **Topic Learning Objective(s)**. This section lists the topic learning objective(s), which are identical to the objectives in the corresponding lesson plan.
- **Study Assignment**. This section defines what must be done by the trainee to complete the assignment. If the assignment requires trainees to read the reference material, it identifies the paragraph, page, figure, and diagram numbers. If it requires some other activity, it gives trainees directions for completing the activity.
- **Study Questions**. This section provides study questions to help trainees comprehend their assignment and check their ability to apply the information learned in the lesson. Study questions will be written at the same learning level as the related enabling objective.

SECTION 5 – MULTIPLE-CHOICE TEST ITEM

The multiple-choice test item is the most versatile of all knowledge test item formats. A cardinal rule in test item development is to communicate effectively. Otherwise, the trainee must guess at what the curriculum developer is asking. The following guidelines for multiple-choice test item writing will help ensure effective communications between the trainee and the curriculum developer.

Multiple-Choice Test Item Composition. The following is a description of the composition of a multiple-choice test item:

- A stem containing the problem statement.
- A list of possible answers.
- Generally, there are four possible answers, the correct answer and three distracters. Depending upon the nature of the content being tested, there can be more than or fewer than three possible distracters.
- **Guidelines for Stem Construction**. Use the following guidelines for stem construction:

- The stem must include all information, conditions, assumptions, and details required to correctly answer the question.
- The stem should be phrased positively instead of negatively. If a negative must be used, it should be highlighted (in caps or underlined) so that the trainee will notice it and interpret the test item correctly.
- Wording in the stem should be clear and unambiguous, so that only one answer is correct.
- Words, phrases, etc., that pertain to all possible answers must be included in the stem, rather than being repeated in each answer.
- Information not essential to the interpretation of the test item must be omitted.
- If the test item uses an illustration on a separate sheet of paper, that illustration must be referenced in the stem by figure number.
- Test items in the form of questions must be complete sentences ending with a question mark.
- The completion position (blank) of an incomplete statement test item must be near or at the end of the stem.
- There should be only one completion position (blank) in a stem.
- Stems prepared in question forms are preferred over the incomplete statement form except when it would make the test item grammatically clumsy or difficult to understand.
- Test only one idea or central thought in a test item.

- **Guidelines for Constructing Distracters**. Use the following guidelines when constructing distracters:

  - The test item developer must exercise care when designing distracters for test items.
  - Distracters must be plausible but clearly incorrect and should fit well with the stem.
  - The difficulty of the test item will depend largely upon the distracters.
  - The more closely related the distracters are, the more difficult it is for trainee to select the correct answer.
  - A good rule is to develop distracters based upon common misconceptions by trainees and inexperienced job incumbents.
  - Distracters may be prepared based on how trainees might incorrectly manipulate terms, symbols, etc.

- An additional rule is to look at the correct answer and determine how it may be made incorrect.

- **Guidelines for Constructing Answers**. Use the following guidelines when constructing answers:

  - The test item must have only “one” correct answer.
  - Distracters should be closely related.
  - Distracters must be meaningful and not subject to automatic elimination by the trainee because they are irrelevant or unrelated to the question.
  - Do not use interrelated answers, such as C is true if A and B are false.
  - Use a vocabulary that is familiar or can be explained within the limits of the test item.
  - All answers must be of approximately the same length and complexity.
  - Do not use specific determiners such as always, never, etc.
  - Avoid the use of “all of the above,” and “none of the above.”
  - Express all possible answers in similar form.
  - Avoid using negative wording. If used however, highlight negative wording by capitalizing, underlining or italicizing.
  - Punctuation of answers must conform grammatically with the structure of the stem.
  - When the stem is a question and answers are a complete sentence, begin the answer with a capital letter and end it with a period.
  - When the stem is a question and the answers are an incomplete sentence, begin the answer with a capital letter and end without a punctuation mark.
  - When the stem is an incomplete sentence, with the response (blank) position at the end of the stem, begin the answer with lower case letters (except for proper nouns) and end with a period.
  - When the stem is an incomplete sentence, each of the answers should be worded so that it forms a logical sentence when written into the incomplete position (blank).
  - The position of the correct answer among all answers must be determined by a random selection process to avoid any patterns which may bias the test.
  - For multiple-choice test items that involve numerical answers, arranged in ascending or descending order.

Multiple-Choice Stem Formats. It is important to standardize how stems and answers are written. There are two different acceptable formats for multiple-choice test items: closed stem and open stem.

Closed Stem Format. Closed stem begin with a capital letter and end with a period or question mark. Closed stem test items may take the form of: a question or incomplete statement. The following is an example of a multiple-choice closed stem test item as a question:

EXAMPLE

Question:

1. What action is required to remove a hinged type 2 module on the MTRE Mk 7 Mod 2/4?

   a. Disconnect plates from the type 2 module.
   b. Insert "T" handles into quick release fasteners.
   c. Remove all Type 3 modules and connectors.
   d. Rotate hold down clamps to vertical position.

Advantages and disadvantages to a multiple-choice closed stem test item as a question are:

- The stem must clearly state the problem.
- The possibility of giving trainees grammatical clues is reduced.
- However, lengthier answers may be required.

The following is an example of a multiple-choice closed stem test item as an incomplete statement:

EXAMPLE

Question

1. The setting of the AN/ABC-3Q flip-flop _____ indicates that intent-to-fire has been energized.

   a. B43
   b. C2l
   c. C24
   d. D32

Advantages and disadvantages to a multiple-choice closed stem test item as an incomplete statement are:

- The completion position appears within the stem and not at the end of the stem. Seven ellipses (periods) are used to indicate where the incomplete portion of the stem lies.
- This type of test item is easier to write than the multiple-choice closed stem as a question format.
- This type of test item encourages memorization and the taking of test items verbatim from the material. Hence, use them sparingly.

Open Stem Format. Open stem—so-called because the stem is in the form of an incomplete statement with no ending punctuation (until the stem is completed by the answer, which has the correct ending punctuation). Each choice provides a seemingly logical conclusion to the stem. Although incomplete statement stems are typically easier to write than complete statement stems, they may cause the curriculum developer to avoid thinking about the question before they develop the answers. That may result in illogical and unrelated choices. Generally, the less similar choices are in content, the easier it is for trainees to select the correct choice.

The following is an example of a multiple-choice open stem test item as an incomplete statement:

EXAMPLE

Question:

1. When crimping both a stranded and a solid wire in the same contact, the solid wire’s position in relation to the stranded wire is _____.

a. above it
b. below it
c. beside it
d. diagonal to it

Advantages and disadvantages to a multiple-choice open stem test item as an incomplete statement are:

- The response position is always at the end of the statement, and that each answer provides a logical conclusion to the stem.
- Open stem items are easier to write than closed stem test items.

- There is a tendency to avoid thinking about the question before the answers are developed, resulting in illogical and unrelated answers.
- The less similar answers that are in the content, the easier it becomes for trainees to select the correct answer.

Multiple-Choice Test Item Formats. Curriculum developers may construct multiple-choice test items either as questions or incomplete statements using the standard or except formats.

Standard Format. This particular format is straightforward and the easiest to develop. Use the standard format when the desire is to have trainees select the correct answer from the distracters.

EXAMPLE

Question:

1. Which one of the following choices supplies voltages for TVC position sensor tracking, during a system verification test?

a. Minus 20 VDC precision power supply
b. Self-test DC reference power supply
c. TVC position sensor AC/DC converter
d. Missile command module

Except Format. Use the except format when there are three or more equally correct answers. This format requires trainees to recognize which answers are correct and select the one that is incorrect. Always capitalize and bold or underline the word “EXCEPT” in the stem. Use the “EXCEPT” format sparingly. Refer to the example below:

EXAMPLE

Question:

1. A specific torquing pattern and associated torque values can be found in the Ships Inertial Navigation System (SINS) Technical Manual for all of the following assemblies or components EXCEPT:

a. An azimuth synchro assembly mounted to the stem
b. A velocity meter mounted to the platform
c. A replacement gyroscope mounted to the stable platform
d. A platform stem mounted to the bedplate

Common Errors in Multiple-Choice Test Item Development. There are several common errors that curriculum developers need to avoid when developing multiple-choice test items. Listed below are four examples of common errors:

NOTE

Do not use similar wording in both the stem and only the correct answer; it suggests the correct answer.

EXAMPLE

Question (error underlined):

1. What is the purpose of the MARDAN maintenance test set?

   a. Monitors the C.P. operations
   b. Furnishes power to MARDAN
   c. Functions as a running time meter
   d. Provides static testing of MARDAN

NOTE

Do not state the correct answer in greater detail than the distracters. This practice often cues the correct answer.

2. When all weapon power is removed from the PIP, which of the following statements is true?

   a. All power is lost to the MCC equipment
   b. The MCC equipment is furnished power from NAV via the MSR
   c. The DCCs have heater power applied
   d. Power from the ship control center may be present in MCC since it only goes through the SHIP JP

NOTE

Do not use two or more distracters that have the same meaning. It eliminates them as useful answers and simplifies the correct answer. In the following example, answers (a) and (b) have the same meaning. Thus, they reduce the number of realistic answers from three to one.

3. What is the final step in performing post maintenance checks?

a. Secure the front panel to the chassis
b. Make sure the front panel is secure
c. Set manual test switch to “OFF”
d. Rerun the diagnostic tests

NOTE

Do not use answers that are included in other answers. In the following example, answer (b) includes answer (a). If answer (b) is correct, then so is answer (a).

4. What is the operating time, in seconds, for the pressurization and compensation blow valve to roll from shut to open?

a. 1 to 3
b. 1 to 4
c. 4 to 6
d. 9 to 11

SECTION 6 – TRUE OR FALSE TEST ITEMS

True or false test items provide only two answers. Use true or false test items when only one plausible answer to a test item exists. A major drawback to true or false test items is that they are more susceptible to guessing. A trainee who does not know the correct answer has a 50 percent chance of responding correctly to a true or false test item. Use true or false test items to assess trainee recognition, comprehension, application, or evaluation.

- **True or False Test Item Development Guidelines**. Observe the following guidelines when developing true or false test item stems:

  - Include all relevant information and conditions required for the trainees to correctly answer the test item in the descriptive statement.
  - Make the statement concise and clear. Make sure the proposition that makes the statement true or false is evident.
  - Make sure the statement is clearly true or false.
  - Place the (TRUE/FALSE) identification before the test item stem.
  - When possible, make a false statement consistent with a typical misconception.
  - Do not use specific determiners (e.g., always, never, none, all, may, sometimes) unless knowledge of the

applicability or inapplicability of these absolutes is part of what is being tested.
    - Keep test items short. Long test items are harder to read and more difficult to judge as true or false.
    - When possible, use positive statements to minimize confusion and reinforce key learning.
    - Do not lift test items verbatim from the curriculum or authoritative source.
    - True or false test items should be used sparingly and carefully constructed.

- **True or False Test Item Format**. The True or false test item format is straightforward. Write the stem as a direct statement and label the two answers below it as “True” and “False.” The words (TRUE/FALSE) will be placed at the beginning of the test item and the choices always arranged so that “True” is always the first choice and “False” is the second choice.

EXAMPLE

Question:

1. (TRUE/FALSE) When placing the cathode array in stowage, you must make sure the cathode array temperature is normal before securing heater power.

    a. True
    b. False

SECTION 7 – MATCHING TEST ITEM

Matching test items are generally the hardest to construct. Matching test items are defined as two lists of connected words, phrases, pictures, or symbols. Every item in one list is paired with at least one item in the other list. Trainees must match elements on one list with associated elements from the other list based upon specific instructions. Trainees pair the elements from each list and record the answer. Matching test items are ideally suited for testing recognition but, if written correctly, may also test comprehension and application.

- **Matching Test Item Development Guidelines**. Observe the following guidelines when developing matching test items:

    - When feasible, use single words, numbers, codes, symbols, short phrases, and the like in the answer list.

- When feasible, make all answers relate to the question, this helps to prevent elimination of unrelated answers.
- Specify in the directions how often trainees may use the answers as the correct answer. If possible, avoid a one to one correlation between the questions and the answers; it increases the test item's degree of difficulty.
- Place both columns entirely on the same page. Trainees should not have to turn pages to see the question and answers.
- Arrange the answers in a logical order.

- **Matching Test Item Format**. The matching test item format consists of a stem and two columns listed below the stem. The stem provides direction as to how the trainee must match the items in the two columns. One column contains the questions or problems to be answered and the other column consists of the answers. Questions are always placed in the left-hand column—answers are always placed in the right-hand column. The columns cannot be the same length. One column must have more or less items than the other column.

EXAMPLE

Question:

1. Using the appropriate Navy technical manual, match the circuit element listed in Column B to the signal it generates in Column A. Write the letter representing your answer in the blank to the left of each signal in Column A. You may use a letter from Column B once, more than once, or not at all.

Column A	Column B
1._____DATA CHK NOT OK	a. B10
2._____DATA CHK OK	b. B13
3._____DRY RUN	c. B46
4._____EQ CONT RST 2	d. B47
5._____DATA CHK REQ	e. B49
6._____DATA CHK ALM	f. C30
	g. D56

SECTION 8 – COMPLETION TEST ITEM

Completion test items are free response test items in which the trainees must supply the missing information from memory.

For completion test items, trainees must provide required answers such as part names, procedural steps, etc. The advantage of completion test items over multiple-choice, or true or false test items is that they require more than simple recognition of information. Completion test items eliminate the possibility of guessing. Completion test items are easy to construct and they are useful in situations in which trainees must write a computational equation, define terms, list part names and functions, etc. The disadvantage to completion test items is that they are more difficult to score and must be justified by grading criteria.

- **Completion Test Item Development Guidelines**. Observe the following guidelines when developing completion test items:

    - Word the test item clearly and comprehensively enough to allow the trainee, knowledgeable in the subject area, to answer correctly.
    - Make sure the missing segment of the test item is important, such as a key element of a process, parts of an assembly, or a method of repairing equipment.
    - Do not omit too many words, or the test item will become unclear and force trainees to guess.
    - Make sure the response position appears near or at the end of the stem. Test items with the response position near the beginning are harder to read, and generally take longer to answer.
    - Provide sufficient space on the answer sheet for trainees to enter their entire response.
    - Use a direct question to test for comprehension of technical terms or knowledge of definitions.
    - Do not make the correct answer a “give-away” word that could be guessed by trainees that do not really know the information. Additionally, avoid giving grammatical cues or other cues to the correct answer.
    - Avoid using stems as test items taken directly from the curriculum.
    - Develop grading criteria that lists all acceptable answers to the test item. Have Subject Matter Experts (SMEs) determine the acceptable answers.

- **Completion Test Item Format**. Curriculum Developers can develop completion test items using three basic formats:

    - Trainees supply the word or phrase that completes the statement.

EXAMPLE

The station clock and time display are used to check the performance of _____ of the designated register. (The trainee provides the phrase “the individual stages” to complete the sentence.)

- Trainees provide a definition, term, formula, or similar response to a specific question.

EXAMPLE

What is the name of the unit that detects angular motion and supplies an output through precession?

- Trainees supply a list of procedures, steps, parts, and so forth, from memory. This type of test item may be expressed in question or statement form. See below:

EXAMPLE (QUESTION FORM)

What are the steps, in order, for performing a test sample on the hydraulic servicing unit?

EXAMPLE (STATEMENT FORM)

In the space below, list in order the steps for placing the Chemical Warfare Directional Detector (CWDD) in stowage.

SECTION 9 – LABELING TEST ITEM

Labeling or identification test items are used to measure the trainee’s ability to recall facts and label parts in pictures, schematics, diagrams, or drawings. This form of test item is most often used to measure recognition of equipment components or other concrete objects.

- **Labeling Test Item Construction Guidelines**. Use the following guidelines to develop labeling test items:

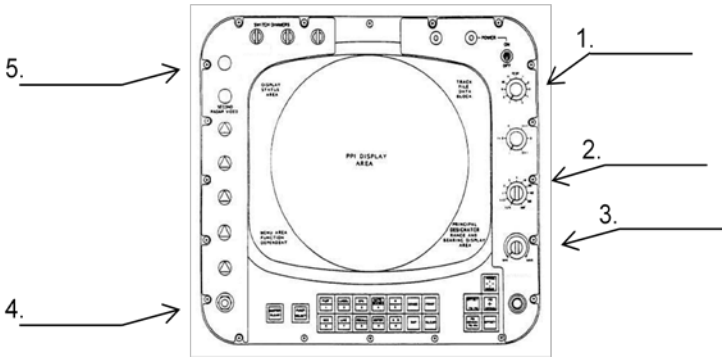
  - Make all sketches, drawings, or illustrations clear and of sufficient size; using actual unit parts is possible.
  - Provide sufficient information to indicate what the equipment is and which part is to be labeled.

- The parts to be labeled or identified should be clearly pointed out by using lines or arrows.
- Ensure that only one definite answer is possible.

- **Labeling Test Item Example**. The following is an example of a labeling test item.

EXAMPLE

"Directions: identify the five numbered control items of the AN/SPA-25G radar indicator's top panel."



SECTION 10 – ESSAY TEST ITEM

Essay test items require trainees to answer a question with a written response. Use essays to test the trainee's ability to organize data and express thoughts clearly in writing. Do not use them to test recall. Essays can involve a relatively subjective grading process since many factors may enter into the correctness of a response. Thus, it is required that a rubric or model be developed to objectively assess the trainee's written response. The disadvantage to essay test items is that they are time consuming and difficult to grade. The essay must be graded by an individual knowledgeable in the subject area using a model developed by SMEs, unless one basic response is possible to a given question.

- **Essay Test Item Format**. Use essay questions to assess learning of a comparatively large body of information, as well as individual elements within that body. Use the following guidelines for formatting essay test items:

  - State clearly and precisely what type of response is required.
  - Limits for the response must be identified by specifying the points to be addressed by identifying the major points the trainees should address. Limits

include length of response and time allowed to respond.

EXAMPLE

Compare the gas turbine and the 600-PSI steam propulsion plants. Your discussion should include descriptions of the major components of each system. Partial credit will be given.

- **Essay Test Item Categories**. The following are categories of responses for an essay test item that a curriculum developer may want to use:

  - Compare or contrast items and/or procedures.
  - A decision for or against system or equipment operation.
  - Relationship such as cause and effect.
  - Illustration (sketch) of principles learned.
  - Statement of purpose in the selection of a method or technique.
  - Criticism of the adequacy or correctness of a diagram or procedure.
  - Discussion of primary, alternate, or emergency procedures.
  - Explanation or definition of tasks.
  - Observation from illustration or operation.
  - Evaluation of the appropriateness of a process or procedure.

SECTION 11 – CASE STUDY TEST ITEM

Case studies should be used when posing a complex issue, when a comprehensive understanding of material is required. The trainee’s analysis of the question must use higher order intellectual skills (synthesis/evaluation) to provide an answer that is observable and measurable in meeting the learning objective. One unique advantage of case studies is they reinforce learning. The problem with case studies is development and assessment requires great care. Additionally, if the required response is a written paper, they are labor intensive to assess.

- **Case Study Test Item Response Alternative**. An alternative approach to written responses for a case study test item is to have trainees respond to multiple-choice test items. This approach is viable even when testing for synthesis and evaluation. If the alternative approach is not adopted,

then a rubric will be required to objectively assess the trainee's written response.

- **Case Study Test Item Format**. Case studies should be based on real world practical scenarios. Case studies can deal with very complex issues and weave in numerous points requiring consideration and analysis. There is no single best format for a case study. Most commonly it is a narrative requiring analysis. The following is an example of a case study narrative and a multiple-choice test item that could be used to achieve "synthesis or evaluation" assessment in place of a written response.

EXAMPLE

You are a Chief Petty Officer recently assigned to a ship. A young Sailor you supervise, who is obviously very upset, approaches and requests your advice. The Sailor does not want to discuss the matter publicly and suggests that you meet privately. You ask the nature of the problem and the young Sailor seems extremely embarrassed and refuses to tell you about their problem (You have heard rumors that the Sailor has had extreme financial problems in the past).

If the response is open ended, a rubric and grading scale is required. It will be difficult and time consuming to grade an involved written response to the ambiguous situation posed above. However, it is still possible to tap into synthesis and evaluation using an easy to grade format such as multiple-choice test item, as previously discussed. The following is an example of a multiple-choice test item constructed to evaluate below:

EXAMPLE (MULTIPLE-CHOICE TEST ITEM)

Select the best response to the young Sailor from the choices below.

a. “All young Sailors go through times like this.”
b. “You should go see the Chaplain.”
c. “I understand what you are saying. How can I help?”
d. Offer to make arrangements for the Sailor to receive counseling.
e. Offer to counsel the Sailor that afternoon after normal working hours.

SECTION 12 – VALIDATION OF TEST INSTRUMENTS

After test instruments have been constructed, and before they are actually assembled into a test, the content must be validated.

- Make sure that each test instrument is technically and grammatically accurate, that they assess the learning objective, and that the test instruments adhere to the guidelines presented in the preceding paragraphs. Have technically qualified SMEs perform the validation process. The individuals validating the test instruments should answer the following questions:

    - Is the test instrument technically accurate?
    - Is the test instrument written to assess the learning objective?
    - Does the test instrument assess knowledge critical to the task associated with the learning objective?
    - Is the test instrument written to the appropriate learning level?
    - If recognition, recall, or comprehension of the knowledge being tested is required for competent performance on the job, is the test instrument a closed-book test item?
    - If the knowledge being tested is normally looked up during or before performance of on-the-job task(s), is the test item an open-book test item and is the essential reference material supplied?
    - Are all words in the test instrument spelled correctly?
    - Is the test instrument's grammar correct?
    - Is the information desired by the test instrument directly addressed in the course's material?
    - Does the test instrument meet format construction guidelines?

- If the answer to any of the preceding validation criteria is no, correct the discrepancy and revalidate the test instrument. If the test instrument meets the validation criteria, then it should be approved for use.

SECTION 13 – SUMMARY

This chapter provided a description of the test instruments that will be used to build performance and knowledge tests. Test instruments are items that will be used by curriculum

developers, with some precision depending on relationship of learning objectives to the desired proficiency level, to assess the trainee's achievement of learning objectives. Additionally, guidelines to assess the validity of test instruments were discussed.

CHAPTER 6

GRADING AND GRADING CRITERIA

SECTION 1 – INTRODUCTION

Grading is a critical element in test design. When grading most knowledge tests (except essay and case study) it is possible to objectively assess trainee answers using a scoring guide. Performance assessments however, have a subjective component that must be addressed. To overcome this subjectivity, it is necessary to develop grading criteria (guidelines) that can be used to assess the trainee's performance.

SECTION 2 – GRADING

The purpose of a grading system is to measure the trainee's achievement of the learning objective(s). It also provides a qualitative measure of achievement.

- **Determining Course Grades**. Previous NAVEDTRA's have discussed a variety of grading calculations and grading options for determining a course grade. These have included pass/fail, SAT/UNSAT, percentage scores, category grades (e.g., letter grades, quality grades, etc.), and raw scores. In order to standardize grading and enable reasonable comparisons about training outcomes, NETC is directing the use only two course grading systems, outlined below:

    - Dichotomous Grading. Dichotomous grading with the designations SAT/UNSAT. This system, also termed pass/fail, makes no distinction between trainees nor indicates a level of achievement or quality. Ideally this grading system should only be used when appropriate to the desired performance outcome. This grading system should not be used for highly critical learning objectives.
    - Percentage Grading. Percentage grading will be used for all other grading systems when reporting course grades. This does not mean that this score must be used for all within course scoring. It may not be appropriate for homework grades, and must be adjusted for other within course measures such as quizzes. The final course grade shall be reported as a percentage of 100 reflecting the amount of material successfully mastered. If there are multiple components that make up the course grade they should be weighted appropriately, included in the computation of final grade, and described in the testing plan. Learning

centers will make the final determination about grade computations toward final grade.

- **Minimum Passing Grade for a Course**. The minimum passing grade for a course is established after SMEs have reviewed the test for validity. Based on the percentage score, the minimum passing grade for a Naval Education and Training Command (NETC) course will not be lower than 63 percent. The minimum passing score for a course should be agreed upon by the course's Requirement Sponsor(s).
- **Minimum Passing Grade for a Knowledge Test**. While the minimum passing grade for a course is based on the grading scale, the minimum passing grade for a knowledge test is determined by a panel of Subject Matter Experts (SMEs) and is established after the test is designed, and test items are developed. SMEs that determine the minimum passing grade for a test should be different from the SMEs that designed the test and developed the test items.

    - The curriculum developer is responsible for test design and test item development, which occur during a course development or revision project.
    - To determine a minimum passing grade for a test, SMEs decide which test items the trainee must answer correctly to indicate minimum acceptable skill. This number is called the minimum passing raw score.
    - The minimum passing raw score will vary based on the content of the material. Example, material that is most critical may have a higher raw score than less critical material.
    - If the minimum passing grade for a course is established at a grade higher than the minimum, such as 70 percent, the minimum acceptable grade must still be determined first by SMEs and then the grade translated up to 70 percent. The Curriculum Control Authority (CCA) may establish a higher minimum score.
    - Many computer-grading systems are available to do these computations.

- **Minimum Passing Grade for a Performance Test**. The minimum passing grade for a performance test is determined like a knowledge test. The curriculum developer prepares the grading criteria at the time the performance test is developed.

    - If a numerical grading system is used, maximum point values should be assigned for each task on the job sheet. The total number of points will equal 100.

- To determine the minimum passing grade, SMEs should review the job sheet, and/or rubric and grading criteria to identify the minimum acceptable skill, expressed as a number, for each task. The total of these point values represents the minimum passing grade for the test. It is not necessary to determine a raw score and then translate it to a grade, as with knowledge tests.
- If the grading system is SAT/UNSAT, minimum acceptable skill must still be determined. For example, a performance test has seven tasks graded SAT/UNSAT. How many of these steps must be completed for minimum acceptable skill?
- Care must be taken when using SAT/UNSAT grades for performance tests if numerical grades are assigned to knowledge tests. If this occurs, the trainee's grade for the course may be based solely on knowledge. This may not provide a realistic picture of the graduate.

- **Practical Work Grades**. Practical work grades are grades derived from day-to-day assignments. Practical work may be in the form of labs, homework assignments, and/or in-class assignments. While practical work grades may be used in calculating the trainee's grade, they are normally limited to 10 percent of the overall course grade.

SECTION 3 – GRADING SCALES

Grading scales are used to translate points from grading criteria into a final grade. The use of a grading scale applies only to courses using a percentage grading system. Grading scales are designed to provide a uniform understanding of the grades a trainee is assigned. Grading scales apply to both knowledge and performance tests. These grades do not represent a percentage, but rather a placement on the scale. Grading scales maybe included with grading criteria or maybe provided separately. The following is an interpretation of a grading scale:

- 90-100: Superior understanding or performance. Graduates in this category are able to perform quickly and efficiently with little or no supervision.
- 80-89: Above average understanding or performance. Graduates are able to perform efficiently with little supervision.
- 70-79: Acceptable understanding or performance. Graduates complete assignments with minor errors. Supervision is required.

- 63-69: Minimally acceptable understanding or performance. Additional instruction is normally required along with close supervision.
- 0-62: Unsatisfactory understanding or performance. Trainees are unable to meet minimum standards.

SECTION 4 – GRADING CRITERIA

Grading criteria describes the standards by which the trainees will be measured and the factors that will be considered in determining the trainee’s grade. Grading criteria enables the determination of trainee success. The goal of grading criteria is to provide an unbiased and non-subjective evaluation of the trainee’s ability with respect to skill or knowledge. Grading criteria coupled with a grading scale are used to determine the trainee's grade for a test. A grading scale may be included with grading criteria, or provided separately.

- Establishing grading criteria for a performance test can be achieved by developing: a simple form that outlines the grading criteria, a checklist (SAT/UNSAT, that should contain the weight (value) for each step or group of steps), or a rubric.
- To assess the results of knowledge tests, consisting of essay and/or case study test items, a rubric will be developed to provide grading criteria (description of how each question or group of questions is assessed). If the rubric does not contain a grading scale a scoring guide must be developed. A scoring guide will be used to establish a grade for knowledge tests that do not contain essay and/or case study test items. Checklists may be used in knowledge tests (oral test) to determine the trainee's level of knowledge. If the checklist does not contain a grading scale, a scoring guide must be developed.

SECTION 5 – PERFORMANCE TEST GRADING CITERIA CONSIDERATIONS AND GUIDELINES

The following are some considerations and guidelines that curriculum developers should take into account when developing grading criteria for performance tests.

- **Product Performance Tests**:

  - When a product trait is either present or absent and can be measured by checking SAT or UNSAT (yes or no) a checklist may be the best to use.
  - When product quality can vary from high to low, adequate to inadequate, good to bad, or some other range; a rubric, should be used.
  - Whether a checklist or rubric is chosen will depend upon the particular situation and the developer's discretion. For some situations, curriculum developers might use a checklist; others might use a rubric; sometimes using a combination of them might seem the most appropriate thing to do.

- **Process Performance Tests**:

  - When a step is either done or not done and can be measured by checking SAT or UNSAT (yes or no), a checklist may be the best to use.
  - When performance of a step can vary in quality from high to low, best to worst, good to bad, or some other range, a rubric should be used.
  - A rubric may also be the best to use when a step has more than two possible outcomes.
  - Whether a checklist or rubric is chosen will depend upon the particular situation and the curriculum developer's discretion. As with product performance tests, in some situations curriculum developers might use a checklist; others might use a rubric; sometimes using a combination of them might seem the most appropriate thing to do.

NOTE

It is important to define checklist steps and rubric decisions as precisely as possible. The more precisely the behaviors are described the more effective the job sheet will be. Properly constructed grading criteria provide the means to ensure success, by helping to remove instructor subjectivity from the grading process.

- **Use of Knowledge Test Items in a Performance Test**. When using knowledge test items in a performance test indicate the correct response and how many points will be deducted for an incorrect response. If knowledge test items are included as part of a performance test they will not constitute a major portion of the trainee's overall grade.

- **Performance Test Grading Criteria Factors**. The following is a list of important grading criteria, that need to be considered for performance tests:

    - Compliance with required safety precautions
    - Correct operation of equipment after completed assembly
    - Physical testing of the finished job
    - Time required completing the job
    - Skill in using tools
    - Care and use of the equipment

SECTION 6 – KNOWLEDGE TEST GRADING CRITERIA CONSIDERATIONS AND GUIDELINES

When grading knowledge tests, (unless they contain essay and/or case study test items), a scoring guide will be developed to determine the trainee's grade. If a knowledge test contains or consists of essay and/or case study test items, a rubric is required to objectively assess the trainee's response(s). The following are grading criteria guidelines that will be useful in developing a rubric.

- Ensure the rubric identifies all of the essential information knowledgeable trainees should provide in their essay or case study.
- Ensure the rubric promotes objective scoring of the test item by establishing a standard or model answer or parameters from which to judge all others.
- Ensure the grading criteria provide the information to identify how much each test item or part of each test item is worth. For example, a total essay may receive ten points. Five points for identifying the correct steps in a process and five points for listing the steps in the correct order. List common misconceptions and/or errors that could be reflected in answers and indicate how many points should be lost for making those errors.

SECTION 7 – CHECKLISTS

Checklists are used in performance tests and maybe used in knowledge tests (oral tests) to determine how well the trainee performs or comprehends the learning objective(s) being assessed. Checklists describe in detail what constitutes satisfactory and unsatisfactory skill or knowledge. Figure 3, page 6-10, is an example of a performance test checklist.

- **Checklist Design Guidelines**. The following are guidelines to help in designing checklists to measure skill and knowledge:

  - Process Tests. Describe the correct procedure, including the following:

    - Number of points each step or group of steps is worth.
    - Number of points to be deducted for specific errors.
    - Number of trials allowed per step or group of steps.
    - Procedural steps that, if performed improperly, cause trainee failure and test stoppage.

  - Product Tests. Describe the characteristics of a good product, including:

    - Point value assigned each characteristic.
    - Number of points to be deducted for specific errors.
    - Number of trials allowed for each product.
    - Any omitted characteristic that is cause for failure.

  - Knowledge Tests. Describe the expectations of the knowledge comprehension assessment, to include:

    - Number of points for each knowledge check.
    - Any specific identified critical item or area, critical sub item or area, or safety item missed will result in a failure.

- **Checklist Layout**. Each checklist should include, as appropriate:

  - A list of steps or knowledge checks to be evaluated.
  - When impossible to evaluate each step separately, review the job sheet and, where possible, group individual steps into like areas and evaluate them as one step.
  - Each step or group of steps will be numbered.
  - Briefly describe the evaluation procedures.
  - Indicate critical steps or knowledge checks.
  - Provide space for comments or description of errors.

- Include space for required administrative information (e.g., name, abbreviated social security number, class, beginning and ending time, score, etc.).
- Personal information consistent with Personally
- Identifiable Information (PII) directives.

Performance Test
Job Sheet X-X-X Checklist

Title: Measuring a Crankshaft Journal
Trainee Name and Rate_____
Instructor/Evaluator_____
Date_____ Time Started_____Time Completed_____

Test instructions: This test evaluates procedures and use of measuring tools. Observe trainee taking measurements indicated. Watch for correct application of tools, and ability to interpret/ record tool readings. Observe that trainee uses correct methods to move heavy parts. If unsafe practices are observed, STOP THE TEST.

All recorded measurements for this Job Sheet must be +/- .0001" of journal proof dimensions. Mark each measurement as SAT or UNSAT. If UNSAT, comment as to why.

1. Measure and record outer end of journal.
   a. Vertical dimension (SAT) (UNSAT)
   b. Horizontal dimension (SAT) (UNSAT)

Comment:_____
_____
_____

2. Measure and record center of journal.
   a. Vertical dimension (SAT) (UNSAT)
   b. Horizontal dimension (SAT) (UNSAT)

Comment:_____
_____
_____

3. Measure and record inner end of journal.
   a. Vertical dimension (SAT) (UNSAT)
   b. Horizontal dimension (SAT) (UNSAT)

Comment:_____
_____
_____

FIGURE 3: PERFORMANCE TEST CHECKLIST (EXAMPLE)

SECTION 8 – RUBRICS

Rubrics are used to reduce scoring ambiguity. They list a set of criteria and standards linked to the learning

objective(s) that is used to assess a trainee's performance on papers, projects, essays, labs, and other assignments. Rubrics can be used to assess a trainee's ability to perform a skill or be used in conjunction with a job sheet. Rubrics are most commonly used to assess skill performance, but are also recommended for essay and case study knowledge test items. The basic model for a rubric is illustrated in Figure 4, below. Rubrics have great utility in subjective testing as they are designed to provide objective guidelines to assess the trainee's skill or knowledge comprehension. The following paragraphs provide examples of a few ways that rubrics can be used to assess trainee skill and knowledge, there are many.

	Lowest Quality	**Low Quality**	**Average Quality**	**High Quality**	**Highest Quality**
Task					
Task					
Task					
Task					

FIGURE 4: FORMAT FOR A BASIC RUBRIC (EXAMPLE)

- **Performance Rubrics**. Performance rubrics will specify the level of skill (using the three levels of proficiency previously discussed: imitation, practice, and habit). Rubrics will specify the conditions and standards for performance and note the simulation or replication of those conditions. All skills subjected to formal assessment (graded activity) must have rubrics developed and included in the testing plan. An example of a performance rubric is illustrated in Figure 5, below.

	Imitation 1	Practice 2	Habit 3	Score
Objective	Description of identifiable performance characteristics reflecting development and movement toward mastery of performance.	Description of identifiable performance characteristics reflecting mastery of performance.	Description of identifiable performance characteristics reflecting the highest possible level of performance.	
Objective				
Objective				

FIGURE 5: FORMAT FOR A PERFORMANCE RUBRIC (EXAMPLE)

- **Observation Rubric**. The top row of the rubric contains the quality measures of: Well below the Standard, Working towards the Standard, At the Standard, and Working beyond the Standard. In the left hand column are the learning objectives of: Listening to others, Generating/sharing ideas, remaining on task, Role & Responsibility, and assisting others. Each cell in the table contains the quality standard for the measurement of the learning objective. A typical observation rubric is provided in Example Figure 6, page 6-13. The source of Figure 6 is http://vels.vcaa.vic.edu.au (web site for rubric examples). The observation rubric example does not include a grading scale, thus one would be required to determine the trainee's grade.

Level Three *Rubric for Assessment*	1 *Well below the Standard*	2 *Working towards the Standard*	3 *At the Standard*	4 *Working beyond the Standard*
Listening to others	• Focuses on own ideas or task without attending to others suggestions	• Sometimes acknowledges others by taking turns to listen and speak.	• Acknowledges others by taking turns to listen and speak.	• Acknowledges others ideas and suggestions and asks follow up questions
Generating/ sharing ideas	• Offers no ideas to team	• Has difficulty adding ideas	• Contributes a range of ideas.	• Contributes a range of ideas and is able to discuss these with the teams.
Remaining on task	• Needs to be redirected to the task by teacher or other members of the team.	• Requires some assistance to complete the task.	• Completes the task within the expected timeframe	• Completes works with the expected timeframe. • Manages time effectively.
Role & Responsibility	• With teacher guidance students understand and perform various roles within the team • With teacher guidance students can explain and evaluate their individual contribution to the team.	• With teacher guidance students understand and perform various roles within the team • With some teacher guidance students can explain and evaluate their individual contribution to the team.	• Understands and performs various roles within the team. • Students can explain and evaluate their individual contribution to the team. • Students can describe and evaluate the team progress towards the goals.	• Students work effectively in teams to take on a variety of roles to work towards a common goal. • Students can explain and evaluate their individual contribution. • Students can explain the team's progress.
Assisting others	• Shows no evidence of helping others • Doesn't acknowledge others contributions. • Focuses only on their own task • Requires teacher intervention when encountering difficulty.	• At times shows evidence of helping others • At times acknowledge others contributions. • Seeks assistance when encountering difficulty.	• Assists others within the group • Is positive in their interactions within the group. • Perseveres when encountering difficulty but seeks advice to resolve ongoing problems.	• Is able to offer and receive support and assistances from others. • Uses strategies and perseveres when encountering difficulties.

Students	Student A				Student B				Student C							
Listening to others	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Generating/ sharing ideas	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Remaining on task	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Roles & Responsibilities	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Assists and encourages others	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

FIGURE 6: FORMAT FOR AN OBSERVATION RUBRIC (EXAMPLE)

- **Grading Rubric**. A typical grading rubric format would, as in the example provided in Figure 7, below, list the learning objectives being assessed in the left column as

"Completed Paper," "Quality of Information," and "Bibliography." The top row of the rubric contains the quality measures of "Excellent," "Passable," and "Incomplete." Each cell in the table contains the quality standard for the measurement of the learning objective. The source of Figure 8 is www.bandnotes.info. The test's grade is determined by totaling the grade assigned for the level of skill achieved by the trainee for each learning objective. In this instance, a grading scale would not be required, as it is included as part of the rubric.

	Excellent	Passable	Incomplete
Completed Paper	Has complete sentences, all questions answered, 3 interesting facts as well as basic info, & personal thoughts. Two sources used.	All questions answered, three interesting facts & basic info, but may be missing some of own thoughts. Two sources used.	Missing information -OR- Not all questions answered -OR- Only one source used.
Quality of Information	Thoughtful answers that show interesting information & your thoughts about what you learned. Presented in your own words & in complete sentences.	Info presented in own words & in complete sentences. Basic info given, but without thoughtful comments. OR - some information misunderstood.	Skimpy answers & may look like student only read a small amount of info. -OR- Incorrect information. -OR- Handwriting such that information can't be read. -OR- Info copied from source or not in own words.
Bibliography	Contains all bibliographic information and it is in the correct order and form	Contains all bibliographic information, but not in correct form.	Bibliography missing information.

Grading:

3 Excellents: 100
2 Excellents & 1 Passable: 90
1 Excellent & 2 Passables: 80
3 Passables: 70
1 Incomplete: 63
2 Incompletes: Not Passing

FIGURE 7: FORMAT FOR A GRADING RUBRIC (EXAMPLE)

SECTION 9 – SCORING GUIDE

A scoring guide establishes the grading criteria for each knowledge test question or group of questions, to determine a trainee's grade. A scoring guide is required for knowledge tests that contain only: multiple-choice, true-false, matching, and/or completion test items. If a knowledge test contains only essay and/or case study test items, use a rubric and a scoring guide, unless the rubric contains a scoring guide. If the knowledge test contains: multiple-choice, true-false, matching, or completion test items and either an essay or case study test item, both a scoring guide and rubric(s) are required.

SECTION 10 – SUMMARY

The tools and guidelines to establish grading criteria and assign grades, to objectively measure the trainee's achievement of skill or knowledge was discussed in this chapter. This included descriptions of: grading criteria, checklists, rubrics and scoring guides. Additionally, guidelines and considerations for determining which tool(s) to use given the type of test being developed were discussed. Grading scales and grading of NETC courses and tests was also discussed. The roles and responsibilities delineated in this chapter are summarized in Table 4.

TABLE 4: GRADING ROLES AND RESPONSIBILITIES

Task	Responsibility
Establishes higher passing scores than minimum	CCA
Determines minimum passing score for a course	Requirements Sponsor
Determines whether to use a checklist or rubric	Curriculum Developer
Determines minimum passing grade for knowledge test	SME
Reviews test for validity	SME

CHAPTER 7

PERFORMANCE TEST DESIGN AND DEVELOPMENT

SECTION 1 – INTRODUCTION

Curriculum developers must begin thinking about test design as learning objectives are being written. Development of the lesson plan (LP), trainee guide (TG), and tests, to a large extent, occur simultaneously. Thus, test design requires a great deal of thought and consideration during course development. Testing programs cannot overcome poorly written learning objectives. Therefore, as learning objectives are being written, it is important to consider what information will be tested, when it will be tested, and how it will be tested — this is test design.

- Performance tests are sample work situations designed to assess a trainee's knowledge and skill to perform a task by using actual equipment or training devices. To achieve this, test instruments (job sheets) and grading criteria tools (checklists, rubrics, and grading scales) need to be designed and developed. A reliable and valid test can only be achieved through good test design, piloting, and test and test item analysis. Performance tests are designed and developed before knowledge tests so the knowledge components of performance tests are known when preparing knowledge tests.
- Performance test design, within NETC, requires that the curriculum developer use the skill proficiency levels of "imitation," "repetition," and "habit," (discussed in Chapter 3) to define the desired skill outcome. The benefit of "proficiency level" identification is that it will enable the curriculum developer to target the training intervention and assessment strategy.

SECTION 2 – PERFORMANCE TEST DESIGN CONSTRAINT CONSIDERATIONS

The risk to safety of personnel and the risk of damage to equipment are two constraints that must be weighed and addressed by curriculum developers in performance test design. Time constraints must also be considered. Additionally, the following constraints will make it impossible to test the task as it is performed on the job.

- **Non-Availability of Equipment and Training Devices**. Performance tests may be impossible because the equipment, or a training device, is not available. Try to construct, on paper, test situations that allow a judgment to be made as to the trainee's ability to perform the objective. Paper troubleshooting problems and scenarios requiring

written responses may be adequate, but should be used sparingly. A better solution would be to devise a proxy (substitution) to simulate the desired performance. The number of training devices or equipment may be insufficient to allow for adequate practice, remediation, or testing. If this is the case, accurate assessment of the trainee's ability may be difficult to achieve.

- **Limited Space Availability**. If available space for performance testing is limited, it may not be possible to conduct as many performance tests as desired. Simulation or pencil and paper performance tests can alleviate this situation to some degree, although this is not desirable.

SECTION 3 – PERFORMANCE TEST DESIGN GUIDELINES

The following are guidelines that need to be considered by curriculum developers before and during the process of performance test design:

- Operational Risk Management (ORM) is a critical facet of performance test design.
- More frequent testing is warranted if critical skills must be assessed before new skills are taught.
- Frequent testing is appropriate when the trainee must be given the time to develop skills which can only be attained by laboratory practice sessions, or if significant preparation outside the classroom is required.
- All tests should be sequenced so that the trainee has sufficient time to practice the skill.
- When designing performance tests consider maximum trainee loading.
- Performance tests should constitute the "major portion" of testing time, in the absence of any of the above constraints. Major portion means that the time devoted to performance testing falls within a range of 51 percent to 100 percent of testing time. Time required to set-up the test scenario (lab, practical, etc.), time allocated for taking the test, reviewing and grading, should also be considered. However, the course master schedule reflects only the time allocated for the trainee's to take a test and review the test's results. Performance tests should be managed to prevent bottlenecks.
- There must be a valid reason for giving a test. Valid reasons for giving a test include:

- To reduce the possibility of trainee injury and/or equipment damage. A knowledge test allows a judgment to be made that the trainee is adequately prepared for equipment performance.
- To determine if the trainee has achieved the required level of proficiency.
- For grading purposes, either within-the-course or final comprehension.
- To assign rank-order to a class of trainees.
- For motivational purposes.
- To ensure that trainees are doing or continue to do homework assignments.

- All technical documentation must be reviewed by a group of at least three (3) Subject Matter Experts (SMEs) to determine if it is adequate to support desired skill outcomes. Additionally, periodic reviews should be conducted by the Instructor(s), Course Supervisor, and applicable Systems Command (SYSCOM), supporting agent, with the Technical Training Equipment (TTE).

NOTE

A summary of technical documentation reviews and changes will be included in the testing plan.

- Analysis of each task’s condition will determine if technical documentation must be available during the test. Technical documentation should be provided if it will also be used during on-the-job performance, as defined in task’s condition. When on-the-job performance of a task is without reference to technical documentation, the test must do likewise, with the following provision regarding safety:

  - When trainee injury or equipment damage is a test possibility then prior to the test, a knowledge test should be given to ensure the procedural steps and safety precautions are known and understood by the trainee.

- When the trainee is assessed in team performance, they may be assessed individually or assessed as a team using job sheets, checklist, and/or rubrics to ensure objectivity.

SECTION 4 – ACTUAL EQUIPMENT OR SIMULATED EQUIPMENT

Determination of whether actual equipment or simulated equipment will be used to practice and demonstrate a skill will be determined before test design begins. The determination is based upon the training solution approved by the Requirement Sponsor.

SECTION 5 – PERFORMANCE TEST DESIGN PROCESS

The performance test design process consists of six steps that need to be performed in the sequence listed below to properly and consistently, design and develop, reliable and valid performance tests to measure the trainee's achievement of the desired training outcome.

- The six performance test design steps are discussed in Sections 6 through 11. The six steps are:

    - Determine skill learning objective criticality.
    - Verify performance test placement.
    - Determine performance test category.
    - Determine performance test type.
    - Assign performance test proficiency level.
    - Determine test instrument and grading criteria.

- After completing the test design steps, displayed in Figure 8 (page 7-6), job sheets and performance test administrator's guides can be developed. A testing plan can also be developed (once knowledge test design has been completed). Developing a performance test administrator’s guide is discussed in Chapter 8, and a course's testing plan is discussed in Chapter 11.

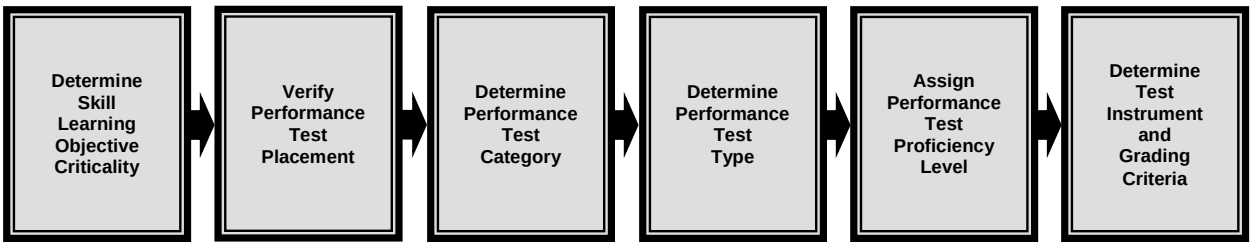


FIGURE 8: PERFORMANCE TEST DESIGN PROCESS

SECTION 6 – DETERMINE SKILL LEARNING OBJECTIVE CRITICALITY

Performance test design begins with determining the criticality of each (skill) learning objective. This process determines which learning objectives to assess through formal testing and which learning objectives should be assessed by informal testing. At the completion of this step, how each learning objective will be assessed is determined. Analysis of task data (discussed in Chapter 3) provides the information for determining learning objective criticality. The following elements of course source data will be required, at a minimum: criticality of performance and frequency of performance. Additional fields may be considered if deemed necessary by curriculum developers. The factors used to determine the criticality of each learning objective will be listed in the testing plan. The following is a recommended process to determine learning objective criticality:

- **Learning Objective Criticality**. The criticality factors listed below represent the minimum requirement to determine learning objective criticality. It is recommended that 1 of 3 levels be assigned to critical factors (a) and (b) (below), a high, moderate and low level. Assign a numerical value to each level (i.e., high = 3, moderate = 2, and low = 1).

    - Criticality of Performance. Criticality of performance points to the need for selecting tasks for training that are essential to job performance, even though the tasks may not be performed frequently. The following levels of criticality (high = 3, moderate = 2, and low = 1) will be useful when determining criticality of performance:

        - **High - value of 3**. Skill is used during job performance.
        - **Moderate - value 2**. Skill influences job performance.
        - **Low - value 1**. Skill has little influence on job performance.

    - Frequency of Performance. This is a measure of how often the task is performed during job performance. The more often a task is performed the more critical it becomes. The following is an example of assigning parameters to three levels of frequency of performance

(high = 3, moderate = 2, and low = 1) that could be useful when determining frequency of performance:

- **High - value of 3**. Task is performed frequently, normally required for job performance.
- **Moderate - value of 2**. Task is performed infrequently, not routinely performed during job performance.
- **Low - value of 1**. Task is rarely performed during job performance.

- Total the Criticality Factor Scores. Total the values assigned to each factor to determine a final score. The score will be used to rank order or group the learning objectives, described below.
- Safety is a criticality factor and learning objectives that contain "safety" concerns (tasks that are considered high risk or dangerous to personnel and/or equipment) will always be ranked or grouped in the upper third of criticality.

- **Rank Order or Group Learning Objectives**. After determining the learning objectives' criticality, rank order or group the learning objectives.

  - Rank order learning objectives by placing them in a list ranging from most critical to least critical (highest score to lowest score). If a course has 20 learning objectives, rank them from 20 (highest criticality) to 1 (lowest criticality).
  - Group learning objectives by categories of criticality. Establish 3 categories: most critical, critical, and least critical. Most critical learning objectives must be formally tested. Least critical learning objectives may be informally tested by other means, such as practical work.

- **Learning Objective Criticality Testing Guidelines**. Apply the following guidelines after rank ordering or grouping the learning objectives to determine how each learning objective will be tested. As a rule:

  - Learning objectives analyzed to rank in the upper third of criticality or in the group of highly critical should be tested by a progress or comprehensive performance test.

- Learning objectives analyzed to rank in the middle third of criticality or in the group of critical should be tested by having the trainee complete job sheets in a laboratory as part of the application section of a lesson topic.
- Learning objectives analyzed to rank in the lower third of criticality or in the group of least critical may need to be tested to ensure the logic of the learning process. This can be achieved by an informal quiz or assigning problem sheets for evaluation.

NOTE

The above guidelines are suggested. The number of learning objectives formally tested, and how they will be tested will be determined by the curriculum developers. It is possible that all learning objectives will need to be formally tested.

- Testing of learning objectives may be achieved by:

  - Testing enabling objectives which, as a group, equal a terminal objective.
  - Testing one or more enabling objective in a test.

SECTION 7 – VERIFY PERFORMANCE TEST PLACEMENT

During development of the Course Master Schedule (CMS) a decision is made about test placement in the course. Verify that no additional tests are required by answering the following questions. Answering a question "yes" means a test is possible.

- Is there a need to determine what the trainee knows before presenting additional instruction?
- Is there a need to determine how well the trainee has learned the material just taught?
- Is there a need to determine if the trainee has acquired certain prerequisite skills or knowledge before being allowed to progress further in the course — particularly to the next lesson topic or go into a performance lab?
- Is there a need to determine if the trainee requires remedial instruction before being allowed to progress further in the course, or go to the laboratory?
- Is there a need to determine whether the material taught matches the learning objectives, especially the skill ones?

SECTION 8 – DETERMINE PERFORMANCE TEST CATEGORY

After verifying test placement, as described above, it is now possible to determine the category for each performance test. Based upon the placement of the desired performance test and the purpose of the performance test choose the correct category of test from the list below. Categories of tests are discussed in Chapter 4. However, a brief description of each test category follows:

- **Pre-Test**. A test given at the beginning of the course or unit of instruction.
- **Progress Test**. A test given at different points within the course to assess trainee progress.
- **Quiz**. A short test often devised by the instructor and used to assess understanding of recently taught material. Quizzes used in computing the trainee’s final grade shall be included in the testing plan.
- **Within-Course Comprehensive Test**. A test administered for longer courses when it is not practical to administer one final test.
- **Final Comprehensive Test**. A test given at the end of the course. This category of test maybe cumulative, and is used to measure mastery of learning objectives, particularly critical learning objectives
- **Oral Test**. A test is normally administered by a board (panel of evaluators). Oral tests are best used to assess the trainee's comprehensive understanding of the skills necessary to perform a job, duty, or task; and the ability to correctly state that understanding is required.

SECTION 9 – DETERMINE PERFORMANCE TEST TYPE

Deciding the performance test type is the next step. Chapter 4 discussed the 3 types of performance tests: product, process, and combination (product and process). Use the following concepts, in addition to the information contained in Chapter 4, to determine the best performance test type.

- **Product Performance Test**. When there are specific standards that the product must meet and the process is not important, then a product test is recommended. Examples of this are: Yeoman and Personnel Specialist complete many different forms (products) and Construction Electricians install electrical wiring and fixtures (products).

- **Process Performance Test**. If operation or maintenance is taught, most tests will be the process type, as operation and maintenance revolves around the performance of step-by-step procedures. An example of this is: troubleshooting a high-voltage power supply.
- **Combination (Product and Process) Performance Tests**. When there are specific standards that the product must meet and the process is important, then a combination performance test would be best. An example of this is: a Construction Mechanic overhauls an engine, the engine is the product but it is critical that an exacting process be followed in overhauling the engine.
- **Performance Test Type Selection Guidelines**. The following are guidelines to consider when selecting performance test type:

    - Test for the product if the objective contains specific standards that the product must meet.
    - Test for the process if the objective has specific standards that must be adhered to, including:

        - Safety procedures
        - Time standards
        - Requirements that the steps be performed in a certain order
        - When diagnosis is important, i. e., if it is important to know when or where errors occur

    - If either process or product can be measured, select the one that is easiest to measure, using the following guidelines:

        - Time or number of personnel required to conduct the performance test.
        - Can the product be tested without examining the process?
        - Can errors be made early in the process which might be costly or dangerous?

NOTE

It may be useful to administer a knowledge test that replicates on paper performance of the process or construction of the product before the trainee actually performs the task.

SECTION 10 – ASSIGN PERFORMANCE TEST PROFICIENCY LEVEL

Following test type determination, it is necessary to assign the level of skill proficiency that each learning objective will be tested to, as determined by the Requirement Sponsor. This should be the same level that the learning objective is taught to.

- The skill proficiency level is assigned by using course source data elements, from the JDTA: verb, (behavior), condition, and standard.

    - Behavior, (verb). A behavior is a Knowledge, Skill, or Ability (KSA) that is observable and measurable.
    - Condition. A condition identifies the situation under which the trainee is expected to demonstrate a behavior.
    - Standard. A standard defines the criteria for acceptable performance in terms of time, quantity, quality, and accuracy.

- These three attributes provide the data necessary for curriculum developers to assign the level of skill proficiency that the course will be trained to and each learning objective tested to. The goal is to match what is done on the job as closely as possible; allow technical documentation use if done on the job; test for knowledge of safety by recall or observance; and test for time if it is important on the job. Align each learning objective to be tested to the appropriate level of proficiency, listed below.

    - Skill Proficiency Level 1 (SPL1) - (Imitation). During this level of training, the instructor shares essential information about the skill, such as facts, background information, safety considerations, etc. Then the instructor breaks the skills into small steps, demonstrates the skill and allows the trainee to reenact or copy the skill. The skill expectation for imitation is: can perform a task but is not proficient. This level of proficiency requires the condition of supervision. This level’s attributes are: work will require corrective action, and excessive time will be required to complete the task.
    - Skill Proficiency Level 2 (SPL2) - (Repetition). During this level of training, the trainee repeatedly practices the task with the instructor. The trainee

is able to ask questions, receive feedback, and practice in a safe environment. The skill expectation for repetition is: can perform tasks, but has not had enough repetitions to achieve expert proficiency. This level of proficiency requires the condition of minimal supervision. This level's attributes are: work may (but generally will not) require corrective action, and time on task will be within established standards.

- Skill Proficiency Level 3 (SPL3) - (Habit). The last level is when the trainee develops such proficiency that they are able to perform the skill in half the time or at an expert level. Performance of the skill becomes second nature. When the trainees reach this level, they are able to create their own versions of the skill and teach others. The skill expectation for habit is: can perform any task with an expert's proficiency. This level of proficiency requires the condition of no supervision. This level's attributes are "speed, accuracy, and precision."

SECTION 11 – DETERMINE TEST INSTRUMENT AND GRADING CRITERIA

The final step in performance test design is to identify the best test instrument and grading criteria (scoring tools) to use for each performance test (formal and informal). The desired level of skill proficiency for the learning objectives will be used to identify the best test instrument and grading criteria. Tests may be constructed using one or more test instrument and grading criteria listed below. If the grading criteria do not contain a grading scale, one must be developed.

NOTE

In extreme situations, a knowledge test may be used in place of a product, process, or combination (proficiency level 1) performance test. This is permissible only when facilities, equipment, or material do not support a performance test. Any substitution of a knowledge test for a performance test must be noted in the testing plan, with an explanation.

- **Skill Proficiency Level 1 - Imitation**.

  - Test instruments include: knowledge test, job sheet, and problem sheet. Knowledge test, test items most suitable for this level of assessment include:

multiple-choice, true or false, completion, and matching.
    - Tools to establish grading criteria include: scoring guide, checklist, and rubric.

- **Skill Proficiency Level 2 - Practice**.

    - Test instrument is a job sheet.
    - Tools to establish grading criteria include: checklist and rubric.

- **Skill Proficiency Level 3 - Habit**.

    - Test instrument is a job sheet.
    - Tools to establish grading criteria include: checklist and rubric.

NOTE

Through the process of performance test design, curriculum developers have determined how each learning objective will be tested and whether actual or simulated performance is most desirable. Some of what will be tested will likely be knowledge focused, whether the trainee has acquired the necessary knowledge to produce the product or perform the process, understands the associated safety or hazard precautions, and can use the technical documentation.

SECTION 12 – PERFORMANCE TEST DEVELOPMENT

Once performance test design is complete, performance test development can begin. Using the decisions made in the design process, develop test instruments (job sheet, knowledge test, or problem sheet) and grading criteria (checklist, rubric, or scoring guide) to administer and grade each performance test (based upon learning objective criticality) identified for the course. When developing the test instrument and the grading criteria for each test, reference the appropriate chapters in this document for development guidelines and the correct layout and format for each item. When developing a test instrument, ensure the following items are addressed within them, as appropriate:

- **Product Performance Tests**. This test type places importance on the final product or result. They require the trainee to:

- Complete a form to be compared to a completed document.
- Build or make an item, the dimensions of which will be measured against a standard or tolerance.
- Build or make an item to perform a certain function.
- Assemble or connect equipment to perform a certain function.
- Finish the task within a given time.

- **Process Performance Tests**. This test type is developed to measure well-defined steps which the trainee must integrate or sequentially perform for the process to be done correctly. They require the trainee to:

  - Demonstrate all important and essential steps and factors required for successful performance of the behavior.
  - Comply with safety precautions.
  - Utilize tools and equipment correctly.
  - Perform all steps within a given time frame.
  - Perform all steps while under the direct observation of the instructor.

- **Combination (Product and Process Performance Tests)**. This performance test is concerned with both an observable result, and the step-by-step process leading to the result. Use the appropriate items listed above, with the guidelines and layout for job sheets (tests) and problem sheets (evaluations), discussed in Chapter 5, to build job sheets and problem sheets.

SECTION 13 – VERIFY PERFORMANCE TEST VALIDITY

If the test has not actually been administered it must be piloted. This effort allows programs to make corrective adjustments before actually collecting data from the target population. Determining the validity of the test is a two-step process. First, at least three SMEs must review the test as a whole to verify content validity. The next step is to administer the test and examine the results (test and test item analysis). The test should be administered to two groups, SMEs and trainees.

- Have at least three SMEs review the test. Select SMEs that did not participate in constructing the test. The test must be reviewed by at least three SMEs to ensure a proper assessment of the learning objective(s). Develop a SME

test critique form, and include completed critiques in the testing plan. The SME critique form must include at a minimum, the following data and questions:

- Cover sheet: test title, date of the review, name of the reviewer (SME), rate and rank of reviewer, and SME years of experience in subject matter.
- Were test instructions clear and easy to understand?
- Was the test technically accurate?
- Were the job steps complete and easy to understand?
- Did the test provide a good assessment of achievement of the learning objective(s)?
- Was the test level of difficulty appropriate?
- Was the test's grammar correct?
- Do you have suggestions to improve the test?

- Begin by identifying a cohort of trainees who are in the end stages of completing instruction in the same or very similar material. Test this group under actual test conditions with the caveat that their test results will not be used in their final grade or course standings. Develop a trainee test critique form, and have them complete it after they take the test. When performing the critique, trainees should be given a copy of the test they took in order to recall test items. Summarize the critique information and include it in the testing plan. The trainee test critique form must include at a minimum, the following data and questions:

  - Cover page: test title, trainee name, and date.
  - Were test instructions clear and easy to understand?
  - Was the test reflective of the material taught?
  - Was the test level of difficulty appropriate?
  - Do you have suggestions to improve the test?

- The final step is to review each trainee's results of the test. Are the results similar? Look at test steps that were not performed correctly. Look at steps that were performed correctly. Do you see patterns of behavior? For example, does everyone perform or fail to perform the steps correctly? What do patterns of trainees responses lead you to conclude? In performance tests, where safety is an issue, every step must be performed correctly. Thus, examine each test to ensure that 100 percent of the trainees performed these steps correctly. If there are any instances where the trainee did not perform the steps

correctly, there could be an issue with the test instrument, test administrator's guide, or both.

- Pilot testing will provide feedback on corrections that must be made to the test before administering it to a class for grading purposes. If there is a great deal of negative feedback, it may be necessary to reevaluate the test. If this is the case, administer another pilot to a sample group of trainees. The process of validation is an iterative process and continues after the test moves from the pilot phase to actual testing. Test analysis will provide continuous feedback on test performance. It is critical that Course Supervisors monitor tests for any indicators that suggest compromises to test reliability or validity.

SECTION 14 – SUMMARY

This chapter described the six steps of performance test design and then performance test development that curriculum developers need to perform to produce reliable and valid performance tests. The description of the steps included identification of the source data and analysis required to complete each step. Additionally, a list of test design considerations and possible test constraints was provided that have to be weighed when designing performance tests. The roles and responsibilities delineated in this chapter are summarized in Table 5.

TABLE 5: PERFORMANCE TEST DEVELOPMENT ROLES AND RESPONSIBILITIES

Task	Responsibility
Creates SME test critique form	Curriculum Developer
Reviews technical documentation for training adequacy	SME
Verifies content validity	SME
Takes newly created tests (in Pilot Phase and for item analysis)	SME
Acts as outside readers for test	SME
Assists with test item development and review	SME

CHAPTER 8

PERFORMANCE TEST ADMINISTRATION

SECTION 1 – INTRODUCTION

To administer a performance test to trainees, a performance test administrator's guide is required. The purpose of this guide is to provide detailed instructions of how each test is to be administered. Each administrator's guide provides detailed procedures for establishing test conditions. The guide also provides instructions for both the administrator and trainee.

SECTION 2 – PERFORMANCE TEST ADMINISTRATOR'S GUIDE

The test administrator's guide provides administrators (proctors) of tests with the guidance for preparing the test area, administering the test, and then securing the test and the test area. An example of a performance test administrator's guide is located in Appendix A. A test administrator's guide may consist of the following elements: cover page, instructions to the administrator, test instrument, grading criteria, instructions to the trainee, and performance record sheet. The preceding list of elements is comprehensive, and may not be necessary for every performance test. The following is a description of each element:

- **Cover Page**. The cover page must include:

    - Course title, followed on the next line by: course identification number (CIN).
    - The phrase "Performance Test Administrator's Guide."
    - Performance test's test number followed on the next line by: the name of the task to be performed.
    - Month and year the performance test administrator's guide is developed.
    - Security classification, if applicable, must appear on each page of the test administrator's guide, including the cover page.

- **Instructions to the Administrator**. The following are guidelines and information, if pertinent to the performance test that should be included in the instructions to the administrator. An example of an instruction to the administrator is provided in Figure 9, page 8-4.

    - Consecutive page numbering beginning with instructions to the administrator.
    - A brief description of the task to be performed.
    - Instructions on any safety and other special precautions or procedures that may be applicable.

- Required tools, test equipment, and training material including the job sheets by title and number.
- Specific instructions describing how to set up the equipment or laboratory configuration.
- Specific instructions on what assistance the administrator may provide or any special tasks, steps, or actions the administrator is to perform and when.
- Instructions on the use of knowledge test items (written and/or oral), if applicable.
- Guidance on the actions to be taken in the event that the trainee does not perform as required.
- The allocated time limit for individual trainee tests and any effect time spent on the test has on the grade.
- Directions on when to present instructions to the trainee.

Instructions to the Administrator

1. The trainee will be performing the _____ task(s). The following tools and test equipment are required:

   a.
   b.
   c.
   d.

2. Preset the following controls on the _____.

   a.
   b.
   c.
   e.
   f. Remove part no.___ from the____ and replace with faulted part.

3. State the following special procedures to the trainee:

   a. Briefly describe the task and its relationship to the objective.

   b. State any special safety precautions/procedures that may be applicable.

   c. Provide additional information specific to the test.

4. Orally quiz trainee on applicable safety precautions using questions from the evaluation checklist.

5. If the trainee fails a critical step remediate by _____.

FIGURE 9: INSTRUCTIONS TO THE ADMINISTRATOR (EXAMPLE)

- **Test Instrument**. Test instrument must include:

  - List the job sheet(s) or knowledge test.
  - List and number of steps, or groups of steps, to be evaluated. This list will be consistent with the job sheet.
  - Step description describing the type of instrument—checklist or grading and which steps are critical.
  - Description of errors describing the most common errors trainees might make in completing the step(s).

- **Grading Criteria**. Provide grading criteria and a scoring guide to describe how each step or group of steps is to be graded and how the final grade is determined. Grading criteria may be provided by a checklist or rubric and will be included in the guide. Examples of various ways that grading criteria maybe provided are shown in Figures 10 through 13.

Performance Test
Job Sheet 10-3-2 Grading Criteria

Title: Construct a Box Sill Floor Frame

Grading Criteria is **SAT/UNSAT**, based on a numerical threshold. A numeric value must be assigned to each evaluated step.

*A safety violation will stop the performance test and the Administrator will immediately provide remediation. Safety violations which may have led to injury or damage to equipment will result in an UNSAT performance and failure of the Test.

Any product dimension within 1/8" of specification	= -0 points
Any product dimension 3/16" out of specification	= -5 points
Any product dimension more than 3/16" out of specification	= -10 points
Each noted occurrence of improper tool usage	= -5 points.

* = Critical step.

All trainees start with 100 points. Minimum passing score is 75 points.

FIGURE 10: PERFORMANCE TEST GRADING CRITERIA (EXAMPLE)

Performance Test
Job Sheet X-X-X Checklist
Grading Criteria

Title: Measuring a Crankshaft Journal
Trainee Name and Rate_____
Instructor/Evaluator_____
Date_____ Time Started_____Time Completed_____

Test instructions: This test evaluates procedures and use of measuring tools. Observe trainee taking measurements indicated. Watch for correct application of tools, and ability to interpret/ record tool readings. Observe that trainee uses correct methods to move heavy parts. If unsafe practices are observed, STOP THE TEST.

All recorded measurements for this Job Sheet must be +/- .0001" of journal proof dimensions. Mark each measurement as SAT or UNSAT. If UNSAT, comment as to why.

1. Measure and record outer end of journal.
   a. Vertical dimension (SAT) (UNSAT)
   b. Horizontal dimension (SAT) (UNSAT)

Comment:_____
_____
_____

2. Measure and record center of journal.
   a. Vertical dimension (SAT) (UNSAT)
   b. Horizontal dimension (SAT) (UNSAT)

Comment:_____
_____
_____

3. Measure and record inner end of journal.
   a. Vertical dimension (SAT) (UNSAT)
   b. Horizontal dimension (SAT) (UNSAT)

Comment:_____
_____

Final Grade: SAT UNSAT (circle one)

FIGURE 11: PERFORMANCE TEST CHECKLIST GRADING CRITERIA (EXAMPLE)

Performance Test
Job Sheet X-X-X Grading Criteria

Title: Measuring a Crankshaft Journal

Grading Criteria for Job Sheet X-X-X is SAT/UNSAT. There is no Product created by the trainee during this performance test. The sequence in which measurements are taken during the test is not as important as the correct use of measuring tools, accuracy of the measurements and interpretation of tool readings.

A numeric score is derived from the following:

All trainees start the test with 100 points.

Ten (10) points are deducted for any recorded measurement that exceeds Journal proof dimensions by +/- .0001" and results in an UNSAT for that measurement. Comments to aid remediation are required for each UNSAT marked.

A score of 80 points or above is SATISFACTORY completion of the test. Procedures: Steps 1, 2, and 3 relate to measurement techniques, tool reading, and safe practices. Three or more incorrect readings results in failure of the test. Safe practices are mandated. If unsafe practices are observed, the instructor has two options:

1. Interrupt the test and correct the trainee. Make appropriate comment on Job Sheet check list.

2. If a safety violation warrants; STOP THE TEST, AND PROCEED IN ACCORDANCE WITH SCHOOL DIRECTIVES. This results in immediate test failure.

FIGURE 12: PERFORMANCE TEST JOB SHEET GRADING CRITERIA (EXAMPLE)

Performance Test
Job Sheet X-X-X Grading Criteria
Title: Construct a Box Sill Floor Frame

Trainee Name and Rate_____
Instructor/Evaluator_____
Date_____ Time Started_____Time Completed_____

Item No.	Step/Description/Observation	Deduct
1.	Marked and cut all sill plates squarely to proper length within 1/8".	0, -5, -10
2.	Installed sill plates within 1/8" of specified location, ensuring they are square and level.	0, -5, -10
3.	Laid out header joists for floor joists 16" on center, within 1/8".	0, -5, -10
4.	Measured, marked, and squarely cut each joist to specified length, within 1/8”	0, -5, -10
5.	Aligned header and floor joists (Crown up) within 1/8" of specified location and height	0, -5, -10
6.	Snapped chalk line across floor joists on centerline of building, within 1/8”	0, -5, -10
7.	Placed and secured bridging staggered 1 1/2" off center, within 1/8”	0, -5, -10
8.	Installed subfloor with joists staggered and butted tightly on center of the joists driven flush with the surface.	0, -5, -10
9.	Subfloor nailed 8" on center, with nails driven flush with the surface.	0, -5, -10
10.	Used all tools and materials properly.	0, -5, -10
Critical	OBSERVED ALL SAFETY PRECAUTIONS	-10

Test Procedure: Observe trainee during construction. Comment on safety observance and use of tools, as appropriate. Take measurements upon completion of project, and grade in accordance with Job Sheet X-X-X Grading Criteria.

FIGURE 13: PERFORMANCE TEST GRADING CRITERIA (EXAMPLE)

- **Instructions to the Trainee**. Instructions to the trainee will include any of the following, as they pertain. An example of instructions to the trainee is provided in Figure 14, page 8-10.

    - Safety precautions that must be observed, with specific warnings about any unusual conditions that exist.
    - An explanation of the job tasks to be performed and exactly what the trainee is required to do.
    - List of tools, test equipment, and materials required for performing the test.
    - Special precautions or procedures.
    - Performance considerations, such as instructor check points throughout the test, and any other considerations.
    - The level of assistance permitted.
    - Information on how the grade will be determined, including critical steps which may result in mandatory test failure.
    - Allocated time for the test and its importance to the trainee's test grade.
    - Relationship of the test to the skill objective being tested.
    - The consequences of cheating.

Instructions to the Trainee

1. Present the following to the trainee:

a. This is a performance test for the _____. The test will consist of _____ tasks, and you will have _____ amount of time to complete the test. Prior to the beginning of each task, you will be given an explanation of the task, what to do and the time limit for each.

b. All test equipment, tools, and materials are available to you. You must determine what is needed for each task.

c. You may be required to leave the area after each task if additional preparation is required for the next task.

d. You will be evaluated on your performance and your practice of safety precautions. The administrator will intervene to prevent or correct a violation of any safety precaution.

e. You will not be assisted with your performance. The administrator may intervene after a task begins in order to correct a critical procedural error.

f. The requirements may be restated or explained at your request. Do your best. If you cannot perform the task, inform the administrator.

g. You will be observed closely. Try not to let this interfere with performance. All critical steps must be performed correctly. Some steps will be scored on a "Yes/No" basis and some will be scored with a grading.

h. Cheating is never acceptable. If you are caught cheating, you will be given a zero on the test and will be recommended for disciplinary action.

2. Ensure that the trainee understands all of the above items before proceeding to the first problem.

FIGURE 14: INSTRUCTIONS TO THE TRAINEE (EXAMPLE)

- **Performance Record Sheet**. A performance record sheet is used for administrative information, (name, rate, class number, beginning and ending test times, score, etc.). If automated record keeping support is provided this sheet may not be required.

NOTE

Ensure the appropriate controls and administrative requirements for Personally Identifiable Information (PII) are exercised in accordance with NETCINST 5211.2 (series).

SECTION 3 – SUMMARY

This chapter provided a description of the performance test administrator's guide. The description included the layout of the document, a list of elements, and the contents of each element.

CHAPTER 9

KNOWLEDGE TEST DESIGN AND DEVELOPMENT

SECTION 1 – INTRODUCTION

Knowledge tests are needed to assess the trainee's ability to recognize, recall, or comprehend facts, procedures, rules, principles, theories, or concepts that are required to perform a skill. Knowledge tests have importance because they measure a student's ability to understand knowledge components that support performance of a skill. Knowledge tests should be designed during a course development or a revision process. Trainee knowledge assessments may consist of oral or written tests.

- Knowledge tests use the following test items: multiple-choice, true-false, matching, completion, essay, and case study. Problem sheets and assignment sheets can also be used. Knowledge test items are assembled into a test item bank.
- Knowledge tests are developed after performance tests, so that the knowledge components required by the (skill) are known before designing and developing knowledge tests. Knowledge test design consists of determining what information will be tested, when it will be tested, and how it will be tested.

SECTION 2 – KNOWLEDGE TEST DESIGN CONSIDERATIONS

There must be a valid reason for giving a knowledge test. Valid reasons for giving a knowledge test include:

- To reduce the possibility of trainee injury and/or equipment damage, a knowledge test allows a judgment to be made that the trainee is adequately prepared for equipment performance.
- To make a judgment about trainee preparation.
- For grading purposes.
- To assign rank-order to a class of trainees.
- For motivational purposes.
- To ensure that trainees are doing homework assignments.

SECTION 3 – KNOWLEDGE TEST DESIGN GUIDELINES

The following guidelines should be considered by curriculum developers when designing knowledge tests. These guidelines will help curriculum developers in deciding what information to test, how much time to devote to knowledge testing, where to

locate each test within the course, and the purpose of each test.

- There is no established formula for determining the most appropriate number of test items required to test any given learning objective. However, the below-listed guidelines are factors to consider:

    - When both critical and less critical learning objectives are measured on the same test the critical learning objective(s) should have more test items to ensure the test reflects the critical aspects of the course.
    - If the majority of the material covers one learning objective, then the majority of the tests items should cover that learning objective. This ensures that the emphasis on the test is the same as the emphasis in the classroom.
    - The more complex the material, the more test items are required to ensure understanding.

- The following are some additional guidelines that need to be considered in test design:

    - Identify what knowledge is critical to on-the-job performance, and build the tests around this knowledge.
    - Attempt to use a form of knowledge test that closely matches how the knowledge is used on the job
    - Some type of test will be administered about every 40-50 periods of instruction, at a minimum.
    - More frequent testing is warranted if critical knowledge must be assessed before new knowledge is taught.
    - Tests are usually developed to assess mastery of a group of lesson topics, but may cover a single lesson topic, especially if the topic is a lengthy one.
    - Time allowed for the administration of knowledge tests is usually limited to 10 percent of total instructional time.
    - All tests should be sequenced so that the trainee has sufficient time to study the material before the test. As a rule, the minimum time provided should be at least one overnight period.
    - Technical documentation must be reviewed by a group of at least three Subject Matter Experts (SMEs), to determine if it is adequate to support desired skill

outcomes. When technical documentation is inadequate (missing information or incomplete steps) then it must be corrected, properly prepared and incorporated into the job sheets, evaluation guide, as well as an information sheet.

- When analyzing each task, determine if the technical documentation must be available during the test. Technical documentation should be provided if it will also be used during on-the-job performance of the task. Most learning objectives will require the use of technical documentation, during a test. When on-the-job performance of a task is without reference to technical documentation, the test must do likewise, with the following provision regarding safety:

  - When trainee injury or equipment damage is a test possibility then prior to the test, a knowledge test must be given to ensure the procedural steps and safety precautions are known and understood by the trainee.

SECTION 4 – KNOWLEDGE TEST DESIGN

The knowledge test design process consists of six steps that need to be performed in the sequence listed below to properly and consistently design and develop tests.

- The six knowledge test design steps are discussed in the following paragraphs. The six steps are:

  - Determine knowledge learning objective criticality.
  - Verify knowledge test placement.
  - Determine knowledge test category.
  - Determine knowledge test type.
  - Assign knowledge test proficiency level.
  - Determine test instrument and grading criteria.

- After completing the test design steps listed above, and as shown in Figure 15 (page 9-5), knowledge test administrator guides and a testing plan can be developed for the course. These items are discussed in Chapter 10 and Chapter 11, respectively.

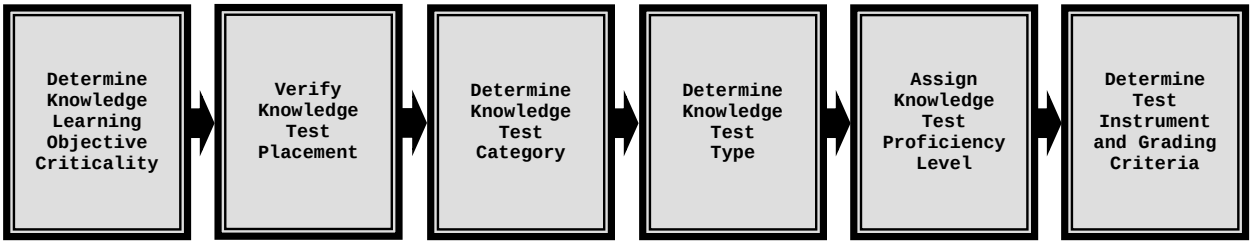


FIGURE 15: KNOWLEDGE TEST DESIGN PROCESS

SECTION 5 – DETERMINE KNOWLEDGE LEARNING OBJECTIVE CRITICALITY

Knowledge test design begins with determining the criticality of each learning objective. This process determines which learning objectives to assess through formal testing and which learning objectives should be assessed by informal testing. At the completion of this step, the assessment of each learning objective is determined. Analysis of task data (discussed in Chapter 3) provides the information for determining learning objective criticality. To determine criticality refer to the following elements of course source data, at a minimum: criticality of performance, and frequency of performance. Additional fields may be considered if deemed necessary by curriculum developers. The factors used to determine the criticality of each learning objective will be listed in the testing plan. The following is a recommended process to determine learning objective criticality:

- **Learning Objective Criticality**. The criticality factors listed below will be used, at a minimum, to determine learning objective criticality. It is recommended that 1 of 3 levels be assigned to critical factors a. and b., a high, moderate, and low level. Assign a numerical value to each level (i.e., high = 3, moderate = 2, and low = 1). Analyze each learning objective's criticality factor, and assign a value to it. Total the factor values to determine a final score. The score will be used to rank order or group the learning objectives.

    - Criticality of Performance. The criticality of performance points to the need for selecting tasks for training that are essential to job performance, when required, even though the tasks may not be performed frequently. For (knowledge) learning objectives, this translates to how important the knowledge is to the performance of the task. The following levels of

criticality (high = 3, moderate = 2, and low = 3) will be useful when determining criticality of performance:

- **High - value of 3.** Knowledge is used during job performance.
- **Moderate - value of 2**. Knowledge influences job performance.
- **Low - value of 1**. Knowledge has little influence on job performance.

- Frequency of Performance. This is a measure of how often the task is performed during job performance. The more often a task is performed the more critical it becomes. For (knowledge) learning objectives, this translates to how frequently the knowledge is used during job performance. The following is an example of assigning parameters to three levels of frequency of performance (high = 3, moderate = 2, and low = 1) that could be useful when determining frequency of performance:

  - **High - value of 3**. Knowledge is used frequently, normally required for job performance.
  - **Moderate - value of 2**. Knowledge is used infrequently, not routinely used during job performance.
  - **Low - value of 1**. Knowledge is rarely used during job performance.

- Total the Criticality Factor Scores. After assigning a value to each learning objectives' criticality factors, total the score for each learning objective. Use these scores to rank order or group the learning objectives. Safety is a criticality factor and learning objectives that contain "safety" concerns (tasks that are considered high risk or dangerous to personnel and/or equipment) will always be ranked or grouped in the upper third of criticality.

- **Rank Order or Group Learning Objectives**. To rank order or group learning objectives use the following guidance.

  - Rank ordering of learning objectives consists of placing them in a list ranging from most critical to least critical (highest score to lowest score). If a course has 20 learning objectives, rank them from 20 (highest criticality) to 1 (lowest criticality).

- Group learning objectives by categories of criticality. Establish 3 categories: highly critical, critical, and least critical. Highly critical learning objectives must be formally tested. Least critical learning objectives may be informally tested by other means, such as practical work.

- **Learning Objective Criticality Testing Guidelines**. Apply the following guidelines after rank ordering or grouping the learning objectives to determine how each learning objective will be tested. As a rule:

  - Learning objectives analyzed to rank in the upper third of criticality or in the group of highly critical should be tested by a progress or comprehensive knowledge test.
  - Learning objectives analyzed to rank in the middle third of criticality or in the group of critical should be tested by having the trainee answer questions on a job sheet or an assignment sheet.
  - Learning objectives analyzed to rank in the lower third of criticality or in the group of least critical may need to be tested to ensure the logic of the learning process. This can be achieved by an informal quiz or assigning problem sheets for evaluation.

NOTE

The above guidelines are simply a demonstration of how curriculum developers may determine which learning objectives are formally and informally tested. The number of learning objectives formally tested, and how they will be tested will determined by the curriculum developers; dependent upon what is necessary to achieve as assessment of the desired training outcome. It is possible that all learning objectives will need to be formally tested.

- Testing of learning objectives may be achieved by:

  - Testing enabling objectives which, as a group, equal a terminal objective.
  - Testing part of a terminal objective, by testing some of its supporting enabling objectives.
  - Any combination of the above during the course.

- Enabling objectives will be assessed as necessary to ensure that the prerequisite knowledge supporting the terminal objectives have been acquired.

SECTION 6 – VERIFY KNOWLEDGE TEST PLACEMENT

During development of the Course Master Schedule (CMS) a decision is made about test placement in the course. Verify that no additional tests are required by answering the following questions. Answering a question "yes" means a test is possible.

- Is there a need to determine what the trainee knows before presenting additional instruction?
- Is there a need to determine how well the trainee has learned the material just taught?
- Is there a need to determine if the trainee has acquired certain prerequisite skills or knowledge before being allowed to progress further in the course—particularly to the next lesson topic or go into a performance lab?
- Is there a need to determine if the trainee requires remedial instruction before being allowed to progress further in the course?

SECTION 7 – DETERMINE KNOWLEDGE TEST CATEGORY

After determining test placement, it is now possible to determine the category for each knowledge test. Based upon the placement of the desired knowledge test and the purpose of the knowledge test, choose the correct category of test from the list below. Test categories are discussed in Chapter 4, and therefore will not be repeated here. However, a brief description of each test categories follows:

- **Pre-Test**. A test given at the beginning of the course or unit of instruction.
- **Progress Test**. A test given at different points within the course to assess trainee progress.
- **Quiz**. A short test often devised by the instructor and used to assess understanding of recently taught material. Quizzes devised by the instructor and used in computation of the trainee’s final grade shall be included in the testing plan.
- **Within-Course Comprehensive Test**. A test administered for longer courses when it is not practical to administer one final test.

- **Final Comprehensive Test**. A test administered at the end of a course. This type of test should be cumulative, and is used to measure mastery of the learning objectives, particularly the critical learning objectives.
- **Oral Test**. A test is normally administered by a board (panel of evaluators). Oral tests are best used to assess the trainee's comprehensive understanding of the skills necessary to perform a job, duty or task; and the ability to correctly state that understanding is required.

SECTION 8 – DETERMINE KNOWLEDGE TEST TYPE

Deciding the knowledge test type is the next step. The two types of knowledge tests are: open book tests and closed book tests. Use the following concepts to help determine the knowledge test type to use:

- Open book tests evaluate a trainee's ability to locate and record information using technical documentation. Open book tests are used whenever the on-the-job situation requires the use of technical documentation.
- Closed book tests are used when the knowledge being tested for is normally required on the job without reference to the technical documentation.

SECTION 9 – ASSIGN KNOWLEDGE TEST PROFICIENCY LEVEL

Following test type identification, it is necessary to assign the level of knowledge proficiency that each learning objective will be tested to, as determined by the Requirement Sponsor. This should be the same level that the learning objective is taught to.

- To assign the correct level of knowledge proficiency use the course source data elements, from the Job Duty Task Analysis (JDTA):
    - Behavior, (verb). A behavior is a Knowledge, Skill, or Ability (KSA) that is observable and measurable.
    - Condition. A condition identifies the situation under which the trainee is expected to demonstrate a behavior.
    - Standard. A standard defines the criteria for acceptable performance in terms of time, quantity, quality, and accuracy.

- These three attributes provide the data necessary for curriculum developers to assign the level of knowledge proficiency that the course will be trained to and each learning objective tested to. The goal is to match what is done on-the-job, as closely as possible. Use the following guidelines for knowledge proficiency levels to assign the correct level of proficiency to each learning objective. Align each learning objective to be tested to the appropriate level of proficiency, listed below.

    - Knowledge Proficiency Level 1 (KPL1) - Knowledge/ Comprehension. The level 1 proficiency expectations are: knowledge - can recall data or information; comprehension - understands the meaning, translation, interpolation, and interpretation of instructions and problems (can state a problem in one's own words).
    - Knowledge Proficiency Level 2 (KPL2) - Application/ Analysis. The level 2 proficiency expectations are: application - can use a concept in a new situation or unprompted use of an abstraction (applies what was learned in the classroom into novel situations in the work place); analysis - can separate material or concepts into component parts so that its organizational structure may be understood (distinguishes between facts and inferences).

- Knowledge Proficiency Level 3 (KPL3) - Synthesis/ Evaluation. The level 3 proficiency expectations are: synthesis - builds a structure or pattern from diverse elements (put parts together to form a whole, with emphasis on creating a new meaning or structure); evaluation - makes judgments about the value of ideas or materials.

Once each learning objective has been aligned to a level of knowledge proficiency, the curriculum developer will be able to identify the best test instrument and grading criteria to use.

SECTION 10 – DETERMINE TEST INSTRUMENT AND GRADING CRITERIA

The final step in knowledge test design is to identify the best test instrument and grading criteria to use for each knowledge test, to create a reliable and valid test. The desired level of knowledge proficiency for the learning objectives, determined in the previous step, will be used to identify the best test instrument and grading criteria. Tests may be constructed using one or more of the test instruments and grading criteria listed below, for each proficiency level. If

the grading criteria do not contain a grading scale, one will need to be developed. Figure 16, page 9-12, provides a visual representation of the test items that will be used to determine achievement of a given knowledge proficiency level.

- **Knowledge Proficiency Level 1 - Knowledge/Comprehension**
    - Test instruments include: multiple-choice, true or false, matching, completion and labeling test items; assignment sheet and problem sheet.
    - Tools to establish grading criteria include: scoring guide, checklist (oral test).

- **Knowledge Proficiency Level 2 - Application/Analysis**
    - Test instruments include: multiple-choice, matching, completion, and essay test items.
    - Tools to establish grading criteria include: scoring guide, checklist, and rubric.

- **Knowledge Proficiency Level 3 - Synthesis/Evaluation**
    - Test instruments include: multiple-choice, essay, and case study test items.
    - Tools to establish grading criteria include: scoring guide and rubric.

Knowledge Proficiency Levels:	Test Items:						
	Multiple Choice	True-False	Matching	Completion	Labeling	Essay	Case Study
Knowledge & Comprehension	X	X	X	X	X		
Application & Analysis	X		X	X		X	
Synthesis & Evaluation	X					X	X

FIGURE 16: TEST ITEM ALIGNED TO KNOWLEDGE PROFICIENCY LEVEL

SECTION 11 – KNOWLEDGE TEST DEVELOPMENT

Once knowledge test design is complete, test development can begin. Knowledge tests are administered to the trainee using test booklets. Using the decisions made in the design process,

develop test instruments (multiple-choice, true or false, completion, matching, essay, and case study test items; assignment sheet and problem sheet) and grading criteria (scoring guide, checklist, and rubric) to administer and grade each knowledge test. When developing test instrument(s) and grading criteria refer to Chapters 5 and 6, respectively.

SECTION 12 – KNOWLEDGE TEST DEVELOPMENT GUIDELINES

There is no established formula for determining the most appropriate number of test items required to test any given learning objective. The guidelines below are factors to consider.

- **Criticality of the Objective**. When both critical and less critical learning objectives are measured on the same test, the critical learning objective(s) should have more items to ensure the test reflects the critical aspects of the course.
- **Instructional Time Allotted to Present Material**. If more than one learning objective is tested in the same test, the number of test items should be reflective of the amount of instructional time that was devoted to each. For example, if the majority of the material covers one objective, then the majority of the tests items should cover that objective. This ensures that the emphasis on the test is the same as the emphasis in the classroom.
- **Complexity of Material**. As the complexity of the material increases, the number of test items used to test the material should also increase to ensure understanding.

SECTION 13 – KNOWLEDGE TEST DEVELOPMENT PROCESS

After the test items are written, perform the steps listed below, in the sequence provided, to development knowledge tests, refer to Figure 17. Each of these steps is described in subsequent paragraphs.

- Verify content validity of each test item.
- Assemble the knowledge test.
- Verify knowledge test validity.
- Establish a grade for the knowledge test.
- Develop different and alternate knowledge tests.

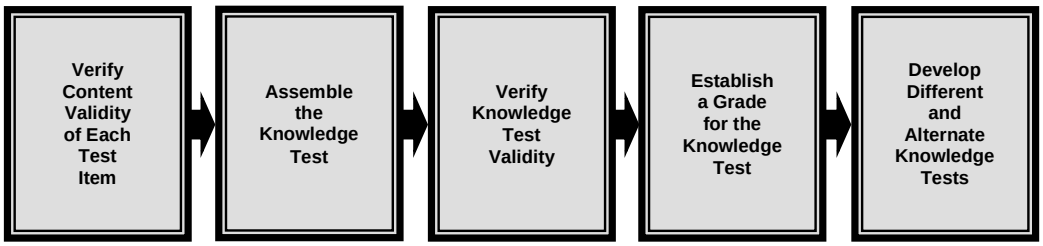


FIGURE 17: KNOWLEDGE TEST DEVELOPMENT PROCESS

SECTION 14 – VERIFY CONTENT VALIDITY OF TEST ITEMS

Content validity means that knowledgeable reviewers agree to the test item validity. For a test item to have content validity (also termed face validity), and be technically correct, it must measure the appropriate learning objective at the appropriate proficiency level. In order to establish the validity of an item, three SMEs shall review each test item. It is a requirement that the test item be reviewed for content and clarity by at least two and ideally three outside readers. In addition to the SMEs, it is also recommended that training managers review each test item to detect errors other than those technical in nature. Before a test item is placed in the test item bank, it must be reviewed for content validity. To conduct this item review, the following shall be satisfactorily addressed and noted in the testing plan:

- A SME check of all instructional materials to ensure that the test items are correctly written shall be conducted.
- A test key must be developed upon completion of the test development and reference(s) shall be made to sources for the correct answers.
- Linkage between the learning objective, the instructional activity, and the test.
- The test item must target knowledge level components of the learning objective.
- Test items should target critical elements, as determined by three or more SMEs.
- Each test item must meet test item construction guidelines.

SECTION 15 – ASSEMBLE THE KNOWLEDGE TEST

Once content validity of the test items is established, the next step is to select test items from the test item bank that fit the desired test design.

- If the test item bank does not contain an adequate number of test items, more test items that match the test design shall be generated.
- If there are not an adequate number of test items, re-evaluate test design. It is important to get the collective ideas of a minimum of three SMEs when preparing this design. This will improve the chances of developing a reliable and valid test. If the re-evaluation results in a new test version then a pilot test of the new test shall be conducted (if a pilot test is created, it must follow the test piloting rules discussed in Section 16.
- As test items are selected, group them according to learning objectives and place them in the test based upon the sequence of instruction. Grouping by learning objectives becomes important during the grading process while listing based on teaching sequence helps trainees perform better. The next step is to review the test for validity.
- Arrange test items by difficulty, from easy to hard, and group by test item type (e.g., multiple choice, matching etc.).

SECTION 16 – VERIFY KNOWLEDGE TEST VALIDITY

Establishing test item validity does not assure test validity. Establishing test validity requires test item analysis, discussed in Chapter 12. If the test has not actually been administered it must be piloted. This effort allows programs to make corrective adjustments before actually collecting data from the target population. Determining the validity of the test is a two-step process. First, at least three SMEs should review the test as a whole to verify content validity. The next step is to administer the test and examine the results (test and test item analysis). The test should be administered to two groups, SMEs and trainees.

- Have at least three SMEs review the test. Select SMEs that did not participate in constructing the test. The test should be reviewed by at least three SMEs to ensure a proper assessment of the learning objective(s). Develop a SME test critique form, and include completed critiques in the testing plan. The SME critique form must include at a minimum, the following data and questions

- Cover sheet: test title, date of the review, name of the reviewer (SME), rate and rank of reviewer, and SME years of experience in subject matter.
- Were test instructions clear?
- Were test instructions easy to understand?
- Was the test technically accurate?
- Were test items clear?
- Were test items easy to understand?
- Did the test provide a good assessment of achievement of the learning objective(s)?
- Was the test level of difficulty appropriate?
- Was the test's grammar correct?
- Do you have suggestions to improve the test?

- Next, administer the test to a group of trainees. The trainees should be at a point in training when the test would be used for assessment purposes. When trainees participate in pilot testing, results may not be used in their grading or assessment. Develop a trainee test critique form. Trainees completing the critique should be given a copy of the pilot test as a reference. Summarize the critique information and include it in the testing plan. The trainee test critique form must include at a minimum, the following data and questions:

  - Cover sheet: test title, trainee name, and date.
  - Were test instructions clear?
  - Were test instructions easy to understand?
  - Were test questions clear?
  - Were test questions easy to understand?
  - Did test questions contain cues that helped you answer them?
  - Were there test questions that aided you in answering other test questions?
  - Was the test reflective of the material taught?
  - Was the test level of difficulty appropriate?
  - Do you have suggestions to improve the test?

- Pilot testing will provide feedback on corrections that must be made to the test before administering it to a class for grading purposes. If there is a great deal of negative feedback, it may be necessary to reevaluate the test or change test items. If this is the case, administer another pilot to a sample group of trainees. The process of validation is an iterative process and continues after the test moves from the pilot phase to actual testing. Test and test item analysis will provide continuous feedback on

test performance. It is critical that Course Supervisors monitor tests and test items for any indicators that suggest compromises to test reliability or validity.

- Once a test and test items have been validated, the process of generating new test items continues. To accomplish this, ensure that each test item has content validity, as discussed in this chapter prior to being administered to the trainees. A good method of administering new test items is to systematically include them in an existing version of a test, not to exceed 10 to 15 percent of the actual test item count. If this is done, the new test items must not be used in the calculation of a grade or score. Rather the new test items along with the other test items should be subjected to test item analysis to ensure new test items correlate positively with test items already proven valid for the domain of knowledge being tested.

NOTE

Test item analysis is collected through enough administrations of the test item to provide sufficient confidence to include the test item in the test item bank. A considerable bank of new test items of proven value can be developed in this manner in a relatively short time.

SECTION 17 – ESTABLISH A GRADE FOR THE KNOWLEDGE TEST

While the minimum passing grade for a course is based on the grading percentage, the minimum passing grade for a knowledge test is determined by a panel of at least three SMEs and is established after the test is designed, and test items are developed. SMEs that determine the minimum passing grade for a test should be different from the SMEs that designed the test and developed the test items. Refer to the process to establish a grade for a knowledge test described in Chapter 6.

SECTION 18 – DEVELOP DIFFERENT AND ALTERNATIVE KNOWLEDGE TEST VERSIONS

The test’s design is important when constructing additional versions of a test. Each version of a test must measure the same learning objectives at same proficiency level, to be considered valid.

- A different version of a test is often used for retesting purposes. To be considered different, it must contain no

test items from the original test but must cover the same material at an equal degree of difficulty.

- Alternate versions of a test are used when more than one class is onboard at the same time. Alternate versions may use some of the same test items as the original test, but no more than 25 percent of the same test items will be used. While previous NAVEDTRAs have suggested grouping test items by learning objectives, this may provide the trainees with cues to answer test items. Consider arranging test items randomly.
- The minimum number of required versions of a knowledge test is the original and a different version for retesting. The number of alternate versions of a test will depend upon the number of classes convening at the same time each year.

SECTION 19 – KNOWLEDGE TEST BOOKLET

Test booklets are provided to the test administrator (proctor) designated to have responsibility for the test. The test booklet contains test items and a test answer key. The booklet is constructed from the test item bank and serves as a guide for development of later alternate versions of the test. The test booklet includes: cover page, test questions, and answer sheet(s). All pages of the booklet are numbered consecutively, following the front cover.

- **Cover Page**. The security classification if applicable—must appear on the page.
- **Test Questions**. All test questions should be numbered.
- **Answer Sheet**. Not required if the trainees are to enter their answers in the test booklet.

SECTION 20 – SUMMARY

Knowledge tests are needed to assess the trainee's ability to recognize, recall, or comprehend facts, procedures, rules, principles, theories, or concepts that are required to perform a skill. This chapter described the NETC processes of knowledge test design and development. These processes should be used by curriculum developers when knowledge tests are needed to test the trainee's achievement of learning objectives. The roles and responsibilities delineated in this chapter are summarized in Table 6.

TABLE 6: KNOWLEDGE TEST DEVELOPMENT ROLES AND RESPONSIBILITIES

Task	Responsibility
Reviews test for errors of a non-technical nature	Training Managers
Develops a SME test critique form	Curriculum Developers
Reviews technical documentation to determine if it is adequate to support desired skill outcomes	SME
Reviews test for content validity	SME
Reviews test by taking and scoring the test	SME
Ensures that the test items are correctly written	SME
Assists in test item preparation	SME
Determines that test items target critical elements	SME
Determines minimum passing grade	SME(panel $\geq$ 3)

CHAPTER 10

KNOWLEDGE TEST ADMINISTRATION

SECTION 1 – INTRODUCTION

Knowledge test administration requires strict adherence to test administration, addressed in a knowledge test administrator’s guide. The purpose of this guide is to provide written guidelines of how each test is to be administered for instructors (proctors). The instructions provide detailed procedures for preparing the test area, administering the test, and then securing the test. They also include directions on grading and provide specific directions to the trainee. If different tests are administered exactly the same, they may be covered by one administrator's guide. There are a number of different elements that should be included in an administrator's guide, but the determination of what needs to be included will be determined by the curriculum developer. To administer knowledge tests, test booklets containing test questions and answer sheets, are also required. The development of a test booklet, to include a description of the format and elements that compose the booklet, is provided in Chapter 9.

SECTION 2 – KNOWLEDGE TEST ADMINISTRATION GUIDELINES

The following guidelines are provided to help training managers ensure that the process of administering knowledge tests is properly and consistently performed.

- Test administrators (proctors) will administer tests in compliance with the test administrator's guides, discussed in Section 3. The administration of the test can be achieved through two different methods:
    - The preferred method, whenever practicable, is to have an instructor, other than the instructor assigned to the class administer (proctor) the test. Test administration is generally considered a component of the instructor’s duties. The instructor is more familiar with the course’s material and can best answer questions relative to the test. One disadvantage is the instructor may be needed to teach other classes or prepare to teach other lessons. Another disadvantage is the possibility that the instructor becomes familiar with the test items and is tempted to teach to the test.
    - Another method is to have a test administered (proctored) by someone other than the instructor. Course Supervisors can use personnel other than instructors to administrator a test. If an

administrator (proctor) is familiar with course material and can answer course relevant questions, this is an effective alternative. However, if instructors are not used, it is important to involve them in the grading and review of material in order to provide them with feedback on trainee progress.

- During the administration of the test, precautions should be taken to minimize the possibility of test compromise. Tests should never leave the custody of the test administrator.
- After the test has been given and graded, the test is reviewed. The review is necessary to correct misunderstandings the trainees may have. The following guidelines apply:

  - After the test is graded, review the test in general with the class. Accomplish this by discussing the areas of a learning objective(s) most frequently missed by the trainees. When reviewing the test, refrain from reviewing specific test items and answers.
  - When only one or two trainees miss an item, the learning objective associated with the missed item(s) may be reviewed in class or individually depending on the situation and time available.

- Training activities will develop alternate versions of each test. Alternate versions of a test will follow the original test design. Using several versions of a test requires the course to have a larger test item bank. The rule of thumb for determining if an adequate number of test versions is available is to have enough versions to prevent two classes that are on board at the same time from being administered the same test version.

SECTION 3 – KNOWLEDGE TEST ADMINISTRATOR'S GUIDE

A test administrator's guide may consist of the following elements: cover page, instructions to the administrator, test instrument, grading criteria, and instructions to the trainee. The preceding list of elements is comprehensive, and may not be necessary for every knowledge test. An example of a knowledge test administrator's guide is located in Appendix B. The following is a description of each element.

- **Cover Page**. The cover page should include:

- Course title, followed on the next line by: Course Identification Number (CIN).
- The phrase "Knowledge Test Administrator's Guide."
- Knowledge test's test number, followed on the next line by: the unit numbers to be tested.
- Month and year the guide is developed.
- Security classification,, if applicable, must appear on each page of the guide, including the cover page.

- **Instructions to the Administrator**. The following list of topics, if pertinent to the knowledge test, should be included in the instructions to the administrator. An example of instructions to the administrator is provided in Figure 18, page 10-5.

  - How to prepare the test area.
  - Special instructions to give trainees.
  - Time allotted for the test.
  - What to do upon completion of the test.
  - How to secure the test and testing material.
  - How to review the test with trainees.
  - How to evaluate or critique the test (test item analysis).
  - How to record the test results.
  - How to secure the test area.

Instructions for the Administrator

1. Prior to the start of testing:

    a. Cover or remove all training aids that could assist the trainee in answering test items.

    b. Have trainees clear their desks of all unrelated testing material.

    c. Inform the trainees of the test time limit(s), if any.

    d. Provide pencils and scratch paper as necessary.

    e. Read the test instructions to the trainees.

    f. Provide reference documentation, if applicable, and any instructions for its use.

    g. Carry out any other local instructions as necessary.

2. At the completion of testing:

    a. Collect and inventory all testing material.

    b. Check test for marks made by the trainees.

    c. Review the test with the trainees.

    d. Evaluate any test items challenged by the trainees.

    e. Carry out any other local instructions as necessary.

FIGURE 18: INSTRUCTIONS FOR THE ADMINISTRATOR (EXAMPLE)

- **Test Instrument**. The test instrument(s) that will be used for the test should be identified in this element. Identification means the type of test items used for the knowledge test. The test instrument(s) for a knowledge test include: multiple choice, true or false, completion, matching, essay, case, problem sheet, and assignment sheet test items. These test instruments will be part of the test booklet that will accompany each administrator's guide, unless the test is electronically administered. If the answer key is developed when the test is built, the answer key will be included in this element of the administrator's guide. However, if a test is generated by randomly selecting test items from a test bank immediately

prior to testing, the answer key will be prepared at the same time and will accompany the guide.

- **Grading Criteria**. The grading criteria will describe how each question or group of questions is graded. Grading criteria can be established using a checklist or scoring guide. If the knowledge test contains essay or case study test items, a rubric will be included to establish guidelines for scoring the trainee's response.
- **Instructions to the Trainee**. This element of the guide provides trainees with information about the test and how to take the test. Figure 19, page 10-7, is an example of Instructions to the Trainee. Instructions to the trainee should include:

    - A description of the test.
    - Directions on how to fill out answer sheet's administrative data.
    - Correct handling of test answer sheets and test support materials.
    - Time allocated for the test and its importance to the test grade.
    - The level of assistance permitted.
    - The consequences of cheating.

NOTE

Ensure the appropriate controls and administrative requirements for Personally Identifiable Information (PII) are exercised in accordance with NETCINST 5211.2 (series).

Instructions to the Trainee

1. Print name, rating, rate, class number, and the date at the top of the answer sheet.

2. There will be no talking during the test nor are you permitted to leave your seat without permission. If you have a question, raise your hand and the administrator will come to you.

3. If you cheat during a test, your test booklet, answer sheet and all scratch paper will be confiscated. You will receive a zero as your grade. Disciplinary action will be recommended.

4. Read each test item carefully. Choose the answer you believe to be correct. There is only one correct answer to every test item.

5. Darken the appropriate box on your answer sheet for each test item. If you wish to change your answer, circle the unwanted answer and darken in the appropriate box. (This instruction is included only when matching readable scoring sheets are used with true or false, multiple-choice, and matching test items).

6. When you have finished the test, turn in the test booklet, answer sheet, and all scratch paper to the instructor. You may then quietly leave the room or remain at your seat while the proctor scores your answer sheet (if the test is not machine scored). There will be a complete review of the test.

7. If you have any questions regarding these instructions, notify the administrator immediately.

DO NOT WRITE OR MAKE ANY STRAY MARKS IN YOUR TEST BOOKLET.

FIGURE 19: INSTRUCTIONS TO THE TRAINEE (EXAMPLE)

SECTION 4 – SUMMARY

This chapter provided guidelines for knowledge test administration and a description of the knowledge test administrator's guide - the document that is required to administer knowledge tests. The guidelines for administering knowledge tests are extremely important to ensure that tests are properly and consistently administered. The description of the administrator's guide included the layout of the document, and the elements and contents of each element. To administer knowledge tests, test booklets containing test questions and answer sheets, are also required. The development of a test booklet, to include a description of the format and elements

that compose the booklet, is provided in Chapter 9. The roles and responsibilities delineated in this chapter are summarized in Table 7.

TABLE 7: KNOWLEDGE TEST ADMINISTRATION ROLES AND RESPONSIBILITIES

Task	Responsibility
Determines proctor if instructor not available	Course Supervisors
Grades tests whenever practicable	Instructor
Provides post-test trainee feedback	Instructor
Proctors test whenever practicable	Instructor

CHAPTER 11

TESTING PLAN
AND
TESTING PROGRAM ADMINISTRATION

SECTION 1 – INTRODUCTION

This chapter describes the testing plan for a course of instruction and the administrative processes and procedures required to ensure a reliable and valid testing program.

SECTION 2 – TESTING PLAN

Testing Plan. The testing program will be outlined in a course-testing plan. The testing plan provides documentation of the test procedures for a course. A course testing plan will be maintained current and approved by the Curriculum Control Authority (CCA). A testing plan is required for each course. Each testing plan will include the following sections and content, at a minimum:

- **Section 1, Course Data**:
    - Course letter of promulgation
    - Course Master Schedule (CMS)
    - Completed Formal Course Review (FCR) testing program checklist
- **Section 2, Course Roles and Responsibilities**:
    - Course Curriculum Control Model Manger (CCMM) letter of designation
    - Course Supervisor (CS) letter of designation
- **Section 3, Course Waivers**:
    - NETC N74 authorized waivers
    - Waivers for change in role assignments
    - Site augmentation plan, if applicable
- **Section 4, Test Development**: List the source data used to develop the tests.
- **Section 5, Test Administration**:
    - Testing constraints
    - Performance test procedures
    - Knowledge test procedures
    - Test proctor procedures

- **Section 6**, **Course Tests and Test Types**:

    - Test schedule.
    - Copy of each test (formal and informal).
    - Copy of instructional sheet(s).
    - Statement of logic for test type selection.

- **Section 7**, **Grading Criteria**:

    - Identify minimum passing grade for the course.
    - If a comprehensive test is not used in the computation of the final grade; provide a rationale.
    - Copy of grading checklists, scoring guides.
    - Copy of answer keys.
    - Rubrics, with discussion of rationale.
    - Grading and weighting criteria to determine final grade.
    - If course is SAT/UNSAT; provide rationale to determine successful course completion.

- **Section 8**, **Remediation**:

    - Description of course remediation process.
    - Academic Review Board (ARB) procedures.

- **Section 9**, **Test and Test Item Analysis**:

    - Test and test item analysis results.
    - Test item bank maintenance procedures.
    - Copy of Subject Matter Expert (SME) test critique forms.
    - Summation of trainee test critique forms.
    - Copies of trainee course critique forms.

- **Section 10**, **Documentation**: Summary of technical documentation reviews and changes.

SECTION 3 – TESTING PROGRAM ADMINISTRATION

The administration of a testing program includes organizing, controlling, managing, and preserving test materials. Testing program administration includes the following: testing plan, testing constraints, test item bank, test security, test administration (giving and collecting tests), grading, test review, and pilot testing. It is the Testing Officer's responsibility to ensure oversight of each element listed above.

- **Testing Constraints**. Testing constraints are any situation that compromises testing of the learning objectives. Training managers must immediately address each constraint and develop a course of action to mitigate the constraint, lessen the constraint, or eliminate it. Testing constraints can take many forms, which include: manpower, equipment, space, facilities, etc. If a course of instruction has a testing constraint(s), they should be recorded in the course's testing plan.
- **Test Item Bank**. The test item bank is an electronic repository of test items. The master test item bank contains knowledge test items approved by the CCMM for use in a course. The test item bank is prepared and validated during a course development or revision process. The items in the test item bank are used to prepare various versions of a test. The number of items contained in the test item bank will be based on test design and number of alternate (versions) tests required. Determination of the number of alternate versions required will be dependent upon the number of test administrations and number of classes onboard at any one time. The test item bank may have items added, deleted, or revised after original material has been validated. Any such change to the test item bank shall be approved by the Learning Standards Officer (LSO).

    - Test item banks may be maintained in the form of test item cards, copies of versions of a test, or computer-stored test items. Test items in the bank should contain:

        - The number of the learning objective the test item supports.
        - The proficiency level of the test item.
        - The location of the supporting material in the curriculum.
        - Test item analysis data.
        - The number of the test(s) on which the test item is located.

    - The number of test items contained in the test bank is based on the learning objectives and the need for additional test versions. SMEs should evaluate the learning objectives and determine the number of test items required to ensure the measurement of acceptable trainee performance. The criticality or importance of the learning objectives to overall performance, the

complexity of the material and/or the amount of time devoted to teaching the learning objectives are all factors to be considered when determining the right number of test items.

- **Test Material Security.** Test materials shall be accounted for at all times. Test materials include test item banks, copies of the tests, answer keys, computers containing testing materials and any diagram, formula sheet, etc., used by the trainee when taking a test. Test materials must be controlled in the following manner:

  - Test materials should be stored in a locked container in an area accessible to staff personnel only. When test materials are removed, an accountability system will be established so that an accurate, enduring inventory system of all tests can be maintained.
  - Test materials maintained in word processing centers on tapes or disks and those in draft stages will be secured in the same manner as finalized tests. A computer having test items stored on a hard drive will be in an area accessible to designated testing personnel only and password protected.
  - Digital test materials on a network need to be secured via permissions and/or passwords. A computer having test items stored on a hard drive should be in an area accessible to staff only.
  - Tests are normally unclassified, but are to be handled in an accountable manner. If the test contains classified material, the test will be classified and the material handled in accordance with the applicable security classification.
  - Performance tests and material should be controlled only when they contain information that could cause a test compromise. A duplicate set of testing materials should be maintained in a separate location in the same manner as described above.
  - If test compromise does occur, the compromised test will not be used again until all classes onboard at the time of the test compromise have graduated.
  - When mailing testing materials, a record of receipts, OPNAV Form 5511/10, S/N 0107-LF-008-8000, will be included. The receiving activity will sign and return the form to the sender.

- **Test Administration**. Written guidelines are developed for the administration of both performance and knowledge tests.

The written guidelines are in the form of test administrator's guides. Performance test administrator's guides are described in Chapter 8 and knowledge test administrator's guides are described in Chapter 10. Proper test administration is the responsibility of every individual that has any role in the administration of performance and knowledge tests. Under no circumstances should any guidelines established for test administration be changed without the approval of the LSO. During the administration of a test, every precaution should be taken to minimize the possibility of test compromise.

- **Grading**. Grading of performance tests and knowledge tests maybe the most important element of a testing program. Thus, it is not only extremely important that a testing program's tests be reliable and valid, but it is equally important that the grading criteria and way of grading be standardized, repeatable, and fair (objective). Grading of tests should occur immediately following a test.
- **Test Review**. A test review, with the trainees, should take place immediately following each performance and knowledge test. It is important to provide the trainees with immediate feedback after a test, to give them their grade and review the test. Accomplish this by discussing the areas of a learning objective(s) most frequently missed by the trainees. When reviewing the test, refrain from reviewing specific test items and answers. The review is also an opportunity for the trainees to ask questions about items or steps (procedures) of a performance test that they did not understand.
- **Pilot Testing**. Pilot testing will provide feedback on corrections that must be made to the test before administering it to a class for grading purposes. If there is a great deal of negative feedback, it may be necessary to re-evaluate the test or change test items. If this is the case, administer another pilot to a sample group of trainees. The process of validation is an iterative process and continues after the test moves from the pilot phase to actual testing. Test and test item analysis will provide continuous feedback on test performance. It is critical that CSs monitor tests and test items for any indicators that suggest compromises to test reliability or validity.
- **Electronic Testing**. While electronic testing is currently not a mature process in all NETC training activities, some activities have already migrated to this technology. NETC is currently reviewing testing software to be incorporated into all future testing programs. Those activities already

using electronic testing will still maintain a hard copy record of all testing plan components, identified in Section 2.

- **Course Critiques**. An end of course critique will be completed by every trainee that attends or completes a NETC Course of Instruction (COI), regardless of delivery method. Course critiques are an assessment tool used to improve curriculum and presentation. Course critique submission is required to award course completion certificates.

SECTION 4 – SUMMARY

This chapter described the testing plan for a course of instruction and testing program administration. The testing plan documents the test procedures for the course. Testing program administration involves controlling, organizing, managing, and preserving test materials. Testing program administration consists of the following: testing plan, testing constraints, test item bank, test security, test administration (giving and collecting tests), grading, test review, and pilot testing. The importance of these elements cannot be over-stated, as collectively they are the foundation for a reliable and valid testing program. The roles and responsibilities delineated in this chapter are summarized in Table 8.

TABLE 8: TESTING PLAN AND TESTING ADMINISTRATION ROLES AND RESPONSIBILITIES

Task	Responsibility
Controls, administers, and approves the testing plan	CCA
Approves test items in master test item bank	CCMM
Approves changes (revisions) in test item bank	LSO
Oversees test administration elements	Testing Officer
Determines the number of test items required to ensure LOs are met	SME

CHAPTER 12

TEST AND TEST ITEM ANALYSIS

SECTION 1- INTRODUCTION

In Chapters 3 through 11, the concepts, guidelines, considerations, tools, and formats for designing and developing performance and knowledge tests have been described. Tests and test items are prepared during course development and revision projects. Before tests and test items are implemented into a course, they are reviewed for content validity. However, to determine statistical validity, test and test item analysis techniques are required. The techniques discussed in this chapter are widely accepted and generally used in test and test item analysis. Other forms of test and test item analysis are available depending upon the application used or the sophistication of the analyst. The three types of analysis discussed and required for use are: difficulty index, index of discrimination, and effectiveness of alternatives. Each analysis technique will be discussed in the paragraphs that follow. Additional means to identify flawed tests and test items are also discussed in this chapter. Test item analysis will be documented in the course's testing plan.

SECTION 2 – TEST AND TEST ITEM ANALYSIS GUIDELINES

While test and test item analysis procedures may vary between courses, the following general guidelines apply.

- Analyses are conducted from trainee answer sheets. The recommended sample size is 100. Smaller sample sizes will be necessary when class size and number of course convening's dictate. When the answer sheets have been collected, conduct the analysis manually or with computer assistance utilizing the NETC's Corporate enterprise Training Activity Resource System (CeTARS) or other analysis tools with prior NETC approval.
- Record the date that the test was administered. This information may be maintained manually or using an automated program. Historical data is used to study trends in order to make decisions about test items over time. For example, if the difficulty index of the test item suddenly changes, testing personnel should investigate possible causes for the change. If the difficulty index of a test item has changed to indicate diminished difficulty, it may have been compromised. If an easy item suddenly becomes very difficult, it may mean instructors are not teaching effectively or the trainee's prerequisite knowledge is not sufficient.

- The frequency with which analysis is conducted may vary. While 100 answer sheets is the recommended number to use for analysis, this may not always be possible or practical.

    - If a course has a high trainee throughput, conducting an analysis for every 100 answer sheets may be too time consuming. If this occurs, testing personnel may be able to conduct a monthly analysis until the items are considered stable. Once stable, the analysis can be conducted on a quarterly basis. The use of automated analysis will reduce workload for courses with high throughput.
    - If a course has a low trainee throughput, it may take several years to collect 100 answer sheets. For courses with low trainee throughput, the entire sample may be used to calculate the effectiveness of the alternatives and the index of discriminating power.

        - These courses may also use the 50 percent missed rule. With this method, each test item that is missed by 50 percent of the trainees is reviewed for possible problem areas.
        - If 100 answer sheets can be accumulated in a year's time, then a complete analysis, using all three indexes will be conducted. If not, then a complete analysis may not be required.
        - If a complete analysis is not required, the 50 percent missed rule will apply and will be noted in the testing plan.

    - It is both important and a NETC requirement than analysis is conducted. This analysis serves as a feedback loop for training managers to monitor test performance over time. If a change in a trend is identified, then training managers can take action(s) as required.

- If a test item is revised, analysis of that test item must be performed as if it is a new test item. It is important to record the date a test item is revised in the testing plan. Future analysis of the revised test item, will allow adjustments as necessary.
- After the test items are analyzed, the next step is to make decisions based on the data.

    - First, determine which items do not fall into the acceptable ranges of the indexes discussed earlier.

Each item is then reviewed by asking several questions:

- Is the answer incorrectly keyed?
- Is there no correct answer or more than one correct answer?
- Is the question clear to the trainee?

- If the test item is determined to be sound, the next step is to review the instructional material.

  - Is the information correct?
  - Does the material in the trainee guide support the information in the lesson plan?
  - Does the information in the technical manual support the material in the lesson plan?

- If the instructional material is correct, next evaluate the classroom instruction.

  - Was the material taught correctly?
  - Did the trainee receive practice prior to testing?
  - Was there adequate time allowed for review and summary of the material?
  - How effective was the instructor in the delivery?
  - Can the poor performance of the test item be tracked to a specific instructor?

- Once all the information has been reviewed, three possible actions may occur.

  - The test, instructional materials, and/or master schedule may require a change.
  - Some areas may be corrected through instructor In-Service (IS) training. This can be technical or technique in nature.
  - The final possible action is to make no change until further data is collected.

SECTION 3 – TECHNIQUES FOR TEST ITEM ANALYSIS

There are three techniques recommended for test item analysis, they are: difficulty index, index of discrimination, and effectiveness of alternatives. The following paragraphs provide a description of each technique.

- **Difficulty Index**. The difficulty index is a calculation of the difficulty of the test item. If the item does not have the correct degree of difficulty, then it will not effectively discriminate. The acceptable range of difficulty for technical training is .50 to .90.

  - To calculate the difficulty index (P), take the complete sample and use the following guidelines:

    - Count the total number of correct answers (Nc) and divide by the total number of students taking the test (N).
    - The formula P = Nc ÷ N results in a proportion or decimal (P) that becomes the index of item difficulty.
    - The larger the index, the easier the item. If the item is answered correctly by everyone, the index would be 1.00. If no one answered it correctly, the index would be 0.00. For 150 answer sheets, where 100 answers were correct, the difficulty index would be as follows:

      P = 100/150 = .66

    - Based on the limits, this item would be considered acceptable.

  - Sometimes a difficulty of 1.00 may be desirable. This normally occurs in the area of safety where the goal is for everyone to answer the item correctly.

- **Index of Discrimination**. Index of discrimination is useful when the test is used to spread scores to highlight differences in trainee achievement. Typically this index is associated with norm-referenced testing, discussed in Chapter 4. Test designers try to create a hierarchy of item difficulty so that trainee scores are spread. The discrimination index is the difference between the percentage of high achieving trainees who got an item right and low achieving trainees who got an item right. High and low achievement is generally defined on the upper and lower 27 percent based upon test score. When half or less of the sum of the upper group plus the lower group answered the item correctly the maximum discrimination is the sum of the proportions of the upper and lower groups. For example: if 20 percent of the upper group and 5 percent of the lower

group answer the item correctly the maximum discrimination possible is 25 percent.

- **Effectiveness of Alternatives**. Effectiveness of alternatives is used for multiple-choice test items.

  - The multiple-choice test item is only as good as its alternatives. If the incorrect alternatives are illogical, not plausible or absurd, the trainee may be able to select the correct response without knowing the material.
  - This index calculates the number of trainees selecting each alternative within the high and low groups. The steps are as follows:

    - After sorting the answer sheets from highest to lowest, select the highest and lowest 27 percent of trainees.
    - Count the number of trainees in each group that selected each alternative. For example, refer to Figure 20, below.

Item 1	(a)	(b)	(c)	(d)	Total
High 27%	2	15	17	7	41
Low 27%	1	12	15	13	41

FIGURE 20: EFFECTIVENESS OF ALTERNATIVES FOR A TEST ITEM

  - Alternative "a" may need to be improved. It is ineffective as an alternative since it was selected by only 3 of 82 trainees.
  - Alternative "c" is more deceiving to the high group than to the low group. This item can be improved by making this response less plausible to the high group.

SECTION 4 – ANALYZING PROCEDURES FOR JOB SHEET, ESSAY AND CASE STUDY TEST INSTRUMENTS

Job sheet and essay and case study test instruments almost always require a checklist, grading scale, and/or rubric. First, check the reliability of the grading scale. Once it is determined that the checklist, grading scale, and/or rubric is reliable, trainee responses can be analyzed. One problem with checklist, grading scales, and rubrics is that different raters often make different judgments about the same performance.

These differences or grading errors can be classified into four categories:

- **Error of Standards**. Errors are sometimes made because of differences in different raters' standards. If rating is done without any specified standards, there may be as many different standards as there are observers. This is why it is important that grading scales, checklists, and rubrics be "anchored" with descriptions of the behaviors for each value on the grading scale. The more complete these descriptions, the better the inter-rater reliability.
- **Error of Halo**. A rater’s ratings may be biased because they allow their general impression of a trainee to influence their judgment. This results in a shift of the rating and is known as a "halo" effect. If a rater is favorably impressed, the shift is toward the high end of the scale. If the rater is unfavorably impressed, the shift is toward the low end. This type of error frequently goes undetected unless it is extreme. It is therefore a difficult error to overcome. Error of halo is reduced by reminding each rater that they are judging specific performances and should not take into consideration their overall impression of the trainee.
- **Logical Error**. A logical error may occur when a rater uses a series of grading scales. When a rater tends to give similar grades on scales that are not necessarily related, they are making a logical error. The way to minimize logical errors is to make clear the distinctions among different performances or aspects of a product that are to be measured. Again, behavioral "anchors" help.
- **Error of Central Tendency**. An error of central tendency is demonstrated when different raters tend to rate most trainees near the middle of a scale. If a scale has seven points and there are a large number of "4s" from the raters, they may be making this error. One way to counter this is to use scales with an even number of points (so there is no middle point). Also, behavioral "anchors" help.

SECTION 5 – DETERMINING RELIABILITY OF GRADING SCALES, CHECKLIST AND RUBRICS

Grading scales and rubrics are used in tests that involve decisions more complicated than "SAT/UNSAT." It is important that different raters use the scale in the same way.

- To determine how well different raters agree, construct a chart similar to the one in Figure 21, below. The chart should show the score that each rater gave to each trainee on each item. In the example below, three raters rated five trainees on five items. The grading scale for each item was 1 to 5.

R1=Rater 1, R2=Rater 2, R3=Rater 3

	Trainee 1			Trainee 2			Trainee 3			Trainee 4			Trainee 5		
Item No.	R1	R2	R3	R1	R2	R3	R1	R2	R3	R1	R2	R3	R1	R2	R3
1	5	5	5	3	3	3	4	4	4	2	2	2	1	1	1
2	5	4	4	4	4	4	3	4	3	1	2	2	2	3	2
3	5	4	5	4	3	3	3	3	3	3	2	2	4	4	4
4	3	5	2	3	1	4	2	4	3	1	2	4	3	2	1
5	4	4	3	3	2	3	4	3	4	3	2	2	3	3	3

FIGURE 21: SAMPLE GRADING SCALE DATA FOR FIVE TEST ITEMS

- By looking across a row, the scores that the different raters gave each trainee can be compared. In the example above, for item 1, there is perfect agreement among raters. For items 2, 3, and 5, there is some disagreement and for item 4, there is considerable disagreement. A good guideline is that, if the majority of raters agree and the raters disagreeing are only off by one point on a scale, the grading scale is reliable. If, however, there is no majority agreement or if raters differ by 2 or more points on the scale, a review is necessary. The grading scale or rubric should be checked to make sure that the "anchoring" statements are as clear as possible, and the instructions to scorers should be checked to make sure they are not misleading some of the raters. It is best to do this with the raters, because they can tell what they thought they were doing.
- Checklists should be treated in the same way as grading scales and rubrics, except there are only two possible scores, SAT/UNSAT. Again, different raters should be compared with each other to determine if there is substantial disagreement. If so, the checklist and instructions to scorers should be reviewed.
- Since essay and case study test instruments (test items) are best scored using checklists, grading scales and/or rubrics for major points in the answers, the procedures described above are applicable.

SECTION 6 – TEST ANALYSIS FOR SELECTED – RESPONSE ITEMS

Analyzing the individual test item is only part of the analysis process. Individual test items may appear acceptable, but when placed together on the test, may not accomplish what the test was intended to do. This section provides some guidelines to consider when conducting test analysis.

- Content validity is achieved when a test measures the achievement of objectives. Tests must have content validity prior to conducting test item analysis.
- Validation requires a list of the number, type, and knowledge levels for all test items in a course. If a test was designed properly, there is a greater chance that the test has content validity and is therefore measuring the objectives of the course to the level identified. Reviewing the test design periodically is another method to evaluate the effectiveness of the test.

SECTION 7 – METHODS FOR REVIEWING TEST ITEMS

So far, statistical methods for "flagging" items that may be flawed have been described. There are other, less formal, follow-up methods for reviewing items, which should be used to correct these flaws. These methods are discussed below.

- **Feedback from Trainees**. Feedback from individuals during pilot testing can be extremely useful in identifying flaws. Interviews with trainees and trainee critique forms after the pilot test may be illuminating. When interviewing have them "walk through" their thinking as they respond to items. Note difficulties with instructions or with particular test items, time pressures, problems with equipment or facilities, misunderstandings of standards or scoring, and other points of confusion. It is best to conduct this review orally with individual trainees, because it is possible to ask follow-up questions to pinpoint the source of problems. Trainee critique forms must be a standard procedure in the pilot test process.
- **Peer Review**. Another useful technique is to have experienced curriculum developers review the test items.
- **Review by Test Evaluator**. The Learning Site (LS) or Detachment (DET) Learning Standards Officer (LSO), and/or a Testing Officer are responsible for quality control. They will have their own procedures for review and revision of

tests and their own sets of criteria that tests should meet.

- **Review by Subject Matter Experts (SMEs)**. Always obtain and retain reviews of your test items by SMEs. They should be asked to check the items for technical accuracy and to note items that are confusing or misleading.
- **Review of Practice Test Items**. If practice test items completed by instructed trainees are available, they can be used to help review test items. Since practice test items should be similar or identical to the test items, performance on practice test items can be compared to performance on related test items. If there are major differences between performance on practice and related test items, the items should be reviewed using the procedures described in this section.
- **Additional Considerations**. Some additional things to look for are inadequate instruction, long delays between initial training and testing (which could result in forgetting), practice items, and test items that are inconsistent, and inappropriate sequencing of instruction, such that practice items occur before a proper instructional foundation has been laid.

SECTION 8 TEST AND TEST ITEM TRAINING QUALITY INDICATORS (TQIs)

The following is a list of test and test item TQIs that should be recorded for each course’s testing program to help determine trends, per NAVEDTRA 135 (series):

- Number of attempts.
- Number of trainees with passing score.
- Average score.
- Number of retakes.
- Number of trainees successful on the first attempt.
- Summary of the results of the test item analysis. Summary may include the frequency of the analysis, problems encountered of a general nature, and actions taken.

SECTION 9 – AUTOMATED TEST AND TEST ITEM ANALYSIS

It is the Naval Education and Training Command’s (NETC's) goal that test and test item analysis be an automated process. Automation will greatly improve NETC's current test and test item analysis process. Currently, there are two systems available to NETC training managers that can provide automation: CeTARS and Question Mark Perception. NETC's trigger for the

migration of course testing data is a course revision. When this trigger occurs strong consideration shall be given to migrating testing data to either CeTARS or Question Mark Perception.

SECTION 10 – SUMMARY

This chapter has discussed the various test and test item analysis techniques and practices that are available to NETC training managers. Test and test item analysis “flags” potentially flawed tests and test items and “suggests” the nature of the problem or the part of the test or test item that is flawed. Once identified, these areas can be examined and needed changes made. The roles and responsibilities delineated in this chapter are summarized in Table 9.

TABLE 9: TEST AND TEST ITEM ANALYSIS ROLES AND RESPONSIBILITIES

Task	Responsibility
Controls, administers, and approves the testing plan	CCA
Approves items in master test item bank	CCMM
Approves changes (revisions) in test item bank	LSO
Oversees test administration elements	Testing Officer
Determines the number of test items required to ensure LOs are met	SME

CHAPTER 13

REMEDIATION PROGRAM

SECTION 1 – INTRODUCTION

Remediation is necessary because not all trainees will accomplish critical learning objectives or understand the material during normal classroom time. A remediation program's primary goal is to motivate and assist trainees in achieving the critical learning objectives of a course by providing additional instructional study time. A second goal of remediation is to remove barriers to learning. Because trainees learn in different ways, it may be necessary to use different methods of remediation to realize the most effective results.

SECTION 2 – REMEDIATION PROGRAM ROLES AND RESPONSIBILITIES

The following is a list of Naval Education and Training Command (NETC) learning site (LS), detachment (DET), and participating activity training manager's remediation program roles and responsibilities.

- **Commanding Officer (CO)**:
  - Approves trainee attrites.
- **Commanding Officer (CO)/Officer in Charge (OIC)**:
  - Manages remediation programs.
  - Provides remediation guidance as required to Course Supervisors; instructors and Academic Review Boards (ARBs).
  - Approves trainee drops from training.
  - Approves trainee setbacks.
  - Approves ARB recommendations.
- **Course Supervisor (CS)**:
  - Implements and sustains remediation program(s).
  - Approves instructor remediation recommendations.
  - Convenes ARBs.
  - Forwards ARB recommendations to the CO/OIC.
  - Ensures that a Subject Matter Expert (SME), in the subject area that is causing the trainee problems, is available during remediation.
  - Schedules and assigns ARB membership and roles.

- **Academic Review Board (ARB)**:

    - Determines the method of remediation necessary for the trainee to successfully complete the learning objective.
    - Provides recommendations for trainee remediation, retest and continue with class, setback, and academic drop and re-classification.

- **Instructor**:

    - Recommends trainee remediation to CS.
    - Serves as an SME during remediation, as determined by CS.
    - Serves as an ARB member, if designated by CS.

SECTION 3 – REMEDIATION PROGRAM GUIDELINES

The following guidelines apply to the development and implementation of a remediation program.

- Remediation will be used to assist and motivate the trainee in the learning process.
- Remediation will not be conducted in a manner that can be perceived as discipline. When trainees placed in remediation are made to feel like failures or see remediation as a form of punishment, remediation may become ineffective. Remediation should be presented in a positive manner. Instructors should approach remediation as a means to provide additional help for those Sailors that need it.
- Remediation can be an important part of a trainee’s success. Therefore, instructors trained and certified as (SMEs in the subject area that a trainee is having difficulty will be present during remediation.
- Remediation and retesting procedures will be described in each course’s test plan.

SECTION 4 – REMEDIATION METHODS

There are three (3) methods of remediation available to instructors, ARBs, and CSs: targeted remediation, scalable remediation, and iterative remediation. The method of remediation is determined by the level of assistance the trainee needs. Learning Centers (LCs), LSs, and participating activities may add additional terms to those provided below,

given the degree of assistance a trainee may need. The following is a description of the three methods of remediation:

- **Targeted Remediation**. Targeted remediation is designed to assist the trainee who is having difficulty in accomplishing an objective(s) and/or understanding the material during normal classroom time. Targeted remediation involves limited one-on-one mentorship or SME engagement of the objective(s) area that the trainee is having difficulty with, using text and/or lab material. To complete targeted remediation the trainee must successfully answer a minimum of 10 questions per each objective area with a minimum score of 80 percent and/or successfully complete a practice exercise or scenario per each objective area.
- **Scalable Remediation**. Scalable remediation is designed to assist the trainee who is having difficulty in accomplishing objectives or understanding the material for a major portion of a course, during normal classroom time.
    - Scalable remediation involves one-on-one mentorship or SME engagement of each major objective area that the trainee is having difficulty with using a total recall approach using one or a combination of:
        - text
        - lab material
        - flashcards
        - mentor question and answer sessions
    - To complete scalable remediation the trainee must successfully answer a minimum of 10 questions per each objective area with a minimum score of 80 percent and/or successfully complete a practice exercise or scenario per each objective area.
- **Iterative Remediation**. Iterative remediation is designed to assist the trainee who is in jeopardy of not completing a course because they are having extreme difficulty in accomplishing objectives or understanding the material for a major portion of a course.
    - Iterative remediation involves one-on-one mentorship or SME engagement of each major objective area that the trainee is having difficulty with using a total recall approach using one or a combination of:

    - text
    - lab material
    - flashcards
    - mentor question and answer sessions

- To complete iterative remediation the trainee must complete a minimum of 20 questions per each objective area with a minimum score of 80 percent and/or successfully complete two practice exercises or scenarios per each objective area. It is recommended that the trainee be required to repeat the review process for each of the major objective areas they are having difficulty with and answer an additional 10 questions and/or complete an additional practice exercise or scenario to complete iterative remediation.

SECTION 5 – REMEDIATION

Remediation is not voluntary. Remediation may be recommended by an instructor but must be approved by the CS. ARBs can assign remediation. When assigned remediation, trainees will attend remediation outside the normal training day. A trainee may be assigned remediation in the following situations:

- **Remediation Recommended by Instructor**. An instructor may recommend remediation as the result of a performance counseling session. This occurs if the instructor believes the trainee may be lagging behind or needs some clarification of material just taught. The instructor makes the recommendation to the CS who is responsible for deciding what action to take.
- **Remediation Assigned by an Academic Review Board (ARB)**. Remediation may be assigned to the trainee by an ARB. Care must be taken to keep the concept of remediation positive. Since ARBs are convened for academic reasons only, discipline should not be an issue. Some of the considerations for remediation include:

    - When the trainee performs poorly on tests, homework, etc.
    - When the trainee does not achieve the minimum passing grade on a progress or within a course comprehensive test.
    - When the trainee does not achieve a learning objective.

- **Time Spent in Remediation**. The method of remediation, based upon the trainee's needs, will determine the length of time spent in remediation. Trainees may spend anywhere from one hour to several hours in remediation. One factor to consider is the introduction of new material while the trainee is remediating on the old material. Because this is not conducive to an effective learning environment, consider remediating the trainee on the same day as a test failure with retesting following that night or the next day.
- **Remediation Environment**. The structure of the remediation environment should be formal according to pre-established, written guidelines for a trainee on specific areas of study. Quizzes may be administered during remediation and instructors should evaluate trainee performance. Grades on quizzes are recorded in the trainee's record. Remediation requires instructor involvement. A SME, in the subject area that the trainee is having difficulty, must be available to the trainee during remediation.
- **Determining When to Assign Remediation**. Determining when the trainee should be assigned remediation is the responsibility of the LS's and participating activity's training managers. Before assigning remediation, the type of difficulty the trainee is experiencing must be determined to select the right method of remediation. Trainee difficulty can range from not passing a test to not being able to achieve a learning objective. Consideration must be given to the degree of difficulty the trainee is having. The following are some examples of situations that would require remediation:

    - For tests not passed, trainees may receive remediation on the entire test or targeted at only the portion of the test that they had difficulty with.
    - For tests that are passed, but the trainee had difficulty with a learning objective, the remediation may take one of the following approaches depending on the criticality of the learning objective and the degree of difficulty:

        - If the learning objective is a critical objective, remediation is recommended.
        - If the learning objective is not critical, remediation may not be required. An instructor may be able to help with the trainee informally.

- Regardless of the learning objective's criticality, when the trainee clearly does not understand the objective, remediation is needed. For example, there are ten items on a test to measure the trainee's understanding of a learning objective. A standard may be that the trainee must answer 7 of 10 test items correctly. If the trainee passes the test but only answers 1 test item of the 10 correctly, remediation is required. If another trainee passes the test but answers 6 of 10 test items correctly, one-on-one assistance by the instructor may be appropriate. The trainee may also be allowed to complete additional assignments to aid their understanding of the learning objective. The instructor will determine when and what type of assistance to provide.

- Trainees whose unit or course average falls below a predetermined grade may be assigned remediation. This policy can help to identify trainees with potential problems before they experience difficulty. For example, a course may have a minimum passing grade of 63. Historically, the trainee who does not maintain an average of 70 has difficulty in the course. If the trainee's average falls below 70, it may be appropriate to place the trainee on remediation.
- Trainees whose test grade falls below a predetermined grade may also be assigned remediation. This technique has the same purpose as the previous one but differs in that it is used only when the trainee's test grade does not fall within the predetermined grade range. For example, the minimum passing grade for a test is 70. Trainees who do not achieve a 75 or higher on that particular test are assigned remediation. If the trainee scores 75 or higher on the next test, the requirement should be removed.

- **Teaching Techniques for Remediation**. Because trainees and situations are unique, LC and participating activity training managers must be creative in providing remediation. The following are examples of different teaching techniques that may be used during remediation.

  - Self-study remediation packages may be developed that would contain additional problems, readings, or questions for the trainee to answer. This type of

remediation material should be developed for areas that have historically exhibited a high failure rate. For example, if trainees normally have difficulty with transistor theory, additional remedial materials should be developed to provide specific areas of study for the trainees.

- Mini-lectures delivered to a small group of trainees. These lectures are prepared for the areas of the course with high failure rates. They are not a re-teach of the lesson but rather short lessons on very specific subject matter presented by instructors certified to teach the material.
- Videotaped lessons may be created for use by trainees during remediation. This does not mean that an entire course can be placed on videotape. Lessons that are videotaped should be those that historically cause the trainees difficulty. When this method is used, the tapes should be cataloged so trainees can find the specific area needed for remediation.
- Flashcards may be created for use by trainees during remediation. Flashcards are useful when trying to learn the meaning of terms, facts, and mnemonics (a device used to assist in memorization of strings of information {i.e., PADDIE = Plan, Analyze, Design, Develop, Implement and Evaluate}).
- Quiet study is best suited for trainees with good study habits who have little difficulty in attaining the learning objectives. Normally this type of remediation is used for trainees that are capable of self-directed study and will need little help from the instructor.
- Computers may be used to provide additional instruction and/or practice. Computers do not replace an instructor in the remediation process. Instructors must be available to make decisions on what materials should be used for remediation and to clarify or augment the computer delivered remediation.

SECTION 6 – RETESTING

To complete remediation, trainees must successfully complete a retest. As with remediation, retesting procedures are also affected by criticality of the objectives. The following are guidelines to assist curriculum developers in preparing retests targeted to the area(s) where the trainee is having difficulty to ensure that they understand the material before proceeding with a course.

- When the trainee does not achieve a test's minimum passing grade, the retest may cover the portion of the test the trainee had difficulty with or the entire test. This decision should be based on the degree of difficulty the trainee had with the test. For example, if the minimum passing grade is 70 and a trainee made 68, retesting on the entire test may not be necessary provided the trainee passed some of the learning objectives. If another trainee makes 68, but had difficulty with all the learning objectives on the test, a retest on the entire test would be appropriate.

NOTE

If the trainee passes the material retested, the grade assigned to the retest will be the minimum passing grade for the test. For example, if the trainee scores 90 on a retest, and minimum passing grade is 63, then the grade assigned for the record would be 63. This policy applies whether the trainee is retested on the entire test or the portion of the test failed.

- When a test is passed but the trainee fails a critical learning objective, the trainee should be retested only on the learning objective failed. Performance tests may provide an exception to this rule. If performance cannot be measured by retesting only the failed learning objective(s), a complete retest may be administered.
- When a test is passed but a learning objective is failed, regardless of criticality, and it is clear that the trainee does not understand the learning objective, a retest of the learning objective is required. For example, the trainee scores an 85 on a test but fails to answer any items on one of the learning objectives. In this case, it is clear the trainee does not understand the material; therefore a retest on that learning objective should be administered.
- An instructor may give an "informal" retest (orally) when the trainee passes the test but does not pass a critical learning objective, missing by only one test item. Additionally, an informal retest may be given when the trainee passes the test but does not pass a less critical learning objective by two test items.
- Retesting will occur as soon as possible after remediation. Prolonging the completion of remediation and retesting may cause the trainee unnecessary difficulties with the new lesson material. Retesting may take the form of a written

retest or an oral retest. The decision is based on the individual situation and is at the discretion of the CS.

- When a test falls on the last day of training, and remediation is not possible, trainees will be administered a retest of the material either orally or by written exam. If the test is failed, the "A" or "C" School trainee will be referred to an ARB. For all other types of courses, supervisory personnel above the immediate instructor will make the recommendation to dismiss, set-back, or graduate the trainee.

    - If it is determined that the trainee has failed to achieve the course objectives, the trainee will not be given credit for completion of the course and will be considered an academic drop.
    - Documentation must be made in the service record indicating the trainee either attended training and did not graduate or did graduate. Guidelines for both circumstances will be detailed in the testing plan for the course.

- Commanding Officers and Officers in Charge of NETC training sites are responsible for the development of procedures for remediation and retesting. All remediation and retesting procedures will be described in the testing plan for the course.

SECTION 7 – SETBACKS

A setback occurs when the trainee is unable to complete the training in the designated time allotted for a course. Setbacks are classified as either academic or non-academic. Because setbacks are costly, they should be granted only after all methods of remediation have been exhausted and/or there is an indication that a setback is in the best interest of the Navy and trainee.

- Academic setbacks for "A" and ”C” School trainees will be approved by the CO/OIC as a result of a preventative counseling session and only after all methods of remediation and retesting have been used with inadequate results. Subsequent academic setbacks will occur only because of an ARB recommendation, approved by the LS's Director of Training (DOT). All decisions to academically setback the trainee from other type courses (i.e., “D” and “G”) will be based on a decision by the LS's DOT. Schoolhouse administrative procedures resulting in

automatic academic setbacks are not authorized. Trainees designated as academic setbacks will be allowed to repeat only that portion of a course for which they have not achieved the learning objective(s).

- Non-academic setbacks may occur when the trainee is unable to complete the material due to illness or special circumstances outside the control of the course or trainee. The decision to set back non-academically is a DOT decision.
- Directors of Training and CSs are responsible for evaluating the causes for setbacks and taking action to lower this rate without lowering training standards.
- When the trainee is setback, the Course Supervisor should inform trainee control so the appropriate Personnel Event (PEVT) code can be found or used to support the TSC or DET Student Control Office (SCO) for input into Corporate enterprise Training Activity Resource System (CeTARS).
- If the trainee, in a high-risk course, is setback due to a medical problem, which may result in future problems while in training, procedures will be in place to notify the instructor(s) of the medical problem.

SECTION 8 – DROP FROM TRAINING AND ATTRITES

Every effort will be made to help trainees succeed. However, there are times when the trainee is clearly unsuited, unable, and/or unwilling to complete the course. If this occurs, the trainee is dropped from training. Trainees dropped from training may be classified as an academic drop, non-academic drop, or disenrollment. Trainees who are discharged from the Navy will be classified as attrites.

- Academic drops or non-graduates occur when the trainee is unable to achieve the learning objectives because of an academic problem, such as lack of classroom ability or lack of laboratory ability. Decisions to academically drop an "A" or "C" School trainee will be because of an ARB action, approved by the LS DOT. All decisions for academically dropping the trainee from other courses will be based on a decision by supervisory personnel above the level of the immediate instructor.
- Non-academic drops or non-graduates are based on administrative decisions that are not a result of academic performance. Examples of non-academic drops include administrative, disciplinary, motivational, medical, death, physical, fraudulent enlistment, and convenience of the

government. For some nonacademic drops, higher authority directs the action. For non-academic drops, the convening of an ARB is not required.

- Disenrollment is based on administrative decisions beyond the control of the training activity that are a result of higher authority direction or pre-service condition. Examples of disenrollment include cancellation of a class or course, rating or program conversion, incomplete training as requested by member's command or higher authority, inability to meet prerequisites (medical, physical, academic, and/or security).
- Attrition is defined as a loss to the Navy. Sailors who are disenrolled, re-classified, or reassigned are not considered attrites. A Sailor will be coded as “attrite” only after official notification is received to that effect.

NOTE

NETCINST 5100.1 (series) provides specific guidance concerning Page 13 entries for trainees dropped from high-risk training and provides guidelines concerning trainee monitoring criteria following drop on request (DOR).

- When a trainee is dropped from training or attrited from the Navy, the appropriate CS should inform trainee control so the appropriate PEVT code can be used to support the Training Support Center (TSC)/DET SCO for input into CeTARS. The TSC, DET SCO is responsible for ensuring timely update to the disposition codes when final disposition becomes known.
- As with setbacks, drop from training and attrition is costly. Every effort will be made to maintain each as low as possible without lowering training standards. NETC (N7) will monitor drop from training and attrition trends, both academic and non-academic.
- Training managers and CSs are responsible for tracking and evaluating the causes for drop from training and attrition from the Navy. If through the monitoring process, it is determined that drop from training or attrition is a problem, a training analysis will be conducted by designated LS/LC personnel. Elements to be considered during training analysis are described in NAVEDTRA 135 (series), Appendix B. The list of elements will help Course Supervisors evaluate the possible causes for high drops from training, high attrition, or a high number of

setbacks. This checklist may be used to pinpoint areas within the specific course that may cause the rates to increase. LC or NETC training managers may also direct a training analysis.

- Total drop from training, attrition, and setback rates for a course will be analyzed and summarized as training quality indicators. Refer to NAVEDTRA 135 (series) Chapter 5, Section 4, for additional information.

SECTION 9 – TRAINEE COUNSELING

Preventive counseling will be instituted in "A" and "C" Schools and should include counseling for performance and personal problems.

- Preventive counseling is designed to provide help to solve a problem before it results in reduced learning capacity or course failure. One of the options of preventive counseling is to recommend remediation and in some cases, an initial academic setback for the trainee who is having difficulty achieving the learning objectives. CSs have the authority to approve an initial academic setback if deemed necessary from a counseling session with the trainee. An ARB must recommend subsequent academic setbacks, approved by the LS DOT.
- Preventive counseling requires early identification of personal and performance problems and the instructor's awareness of available resources. During the trainee's training, the instructor should be proactive in the identification of trainee problems. Every effort should be made to:

    - Review Armed Services Vocational Aptitude Battery (ASVAB) test scores.
    - Review records for previous training difficulties.
    - Determine level of prerequisite knowledge and evaluate the trainee's ability in note-taking, study habits, and testing skills.

- As the course progresses, performance counseling may be required in order to prevent difficulties that could lead to being dropped from the course. The instructor must be aware of such things as:

    - Inconsistent study habits.
    - Poor performance on tests.
    - Declining grades.

    - Lack of motivation.
    - Inappropriate conduct (i.e., sleeping in class, excessive tardiness, failure to complete assignments, and lack of attention to classroom or lab activities).

- Each LS, DET, and participating activity shall establish guidelines for the identification and resolution of trainee difficulties. The other aspect of preventive counseling is the counseling of personal problems that impair the trainee's ability to concentrate on the job of learning. When a personal problem is suspected, the instructor should:

    - Talk to the trainee in an effort to identify the specifics of the problem.
    - If unable to assist the trainee, refer the trainee to another agency via the chain of command.
    - Follow-up on the trainee's status.

- Instructors are not trained to counsel trainees on serious personal problems. Problems of a serious nature should be referred to special counseling programs such as Navy Chaplain, Navy Fleet and Family Support Center, Drug and Alcohol Counselors, Red Cross, or Navy and Marine Corps Relief Society.
- In any type of counseling situation, instructors must establish an atmosphere that encourages the trainee to seek out help when problems occur.
- The instructor must make the trainees aware of the proper chain of command when seeking assistance to their problems.
- Instructors should conduct counseling sessions with the trainees as soon as problems or potential problems occur. Often trainees will respond favorably to an encouraging word or a clarification of training materials.
- Each counseling session will be recorded in the trainee's record.

SECTION 10 – ACADEMIC REVIEW BOARDS (ARBS)

The ARB process provides for formalized procedures in handling non-disciplinary problems related to the trainee's academic progress. The ARB is an integral part of the trainee-counseling program. It is based upon the philosophy that decisions concerning the trainee's disposition in training are better arrived at by group acting together as a board rather

than by an individual acting alone. The following guidelines will be followed for ARBs:

- ARBs will be established at all training activities that conduct Class "A" or "C" School training. Training activities that provide other types of training will establish ARBs as directed by the CO or OIC.
- ARBs will be convened when other means of academic counseling, remediation, and an initial academic setback have failed to improve trainee performance. The initial academic setback may result from an academic counseling session and be directed by the CS. Additional academic setbacks must be recommended by the ARB and approved by the DOT. Examples of when an ARB may be necessary include the following:

    - Trainee’s course average falls below minimum passing grade.
    - Trainee is unable to achieve the objectives after counseling, remediation, retesting, and an initial academic setback.
    - Trainee's performance is below expected academic progress.
    - Trainee fails to achieve the objectives after an academic setback on those same objectives.

- Trainees will continue with class until an ARB decision has been made or recommendation approved.
- Trainees enrolled in Class "A" and "C" Schools will be academically dropped from training only because of an ARB recommendation.
- Administrative procedures resulting in automatic drops or setback are not authorized. If an ARB is convened for test failure, the trainee will be remediated and retested on failed material prior to the convening of an ARB.
- Possible ARB decisions include:

    - Continue with Class (CWC) - allows a continuation of training in the present class with or without remediation:

        - A CWC recommendation requires that the test records and the interview show clear evidence that the trainee can pass the course if allowed to continue.

    - The ARB should decide if remediation is necessary for the trainee to continue and determine the best method of remediation based upon the information received from the instructor and CS, and interview with the trainee.
    - The remediation method will include identification of specific areas of study and indicate the time the trainee is assigned to remediation.

- Setback allows an extension of training with or without remediation. When an ARB recommends a setback, the records should indicate the trainee is motivated to remain in training. The test scores and interviews should indicate an ability to achieve the learning objectives after repeating the portion of the training that was not successfully completed. Trainees will be setback only over the material they have not successfully completed. Exceptions will be noted in the testing plan. If remediation can be achieved in any way other than setback, it shall be considered first.
- Drop from training - results in a recommendation for disposition.

    - When recommending a drop from training, the trainee must demonstrate unwillingness or an inability to continue the training.
    - Attention should be given to the trainee's desire and eligibility for reclassification when the board makes the decision to recommend drop from training.
    - All ARB recommendations for reclassification or attrite must be forwarded to the CO or OIC for final approval.

- All ARB recommendations for international military trainees will be referred to the International Military Student Officer (IMSO).

SECTION 11 – ACADEMIC REVIEW BOARD PROCEDURES

Standardized procedures for conducting ARBs are essential to protect individual rights of privacy and fundamental fairness, to ensure accurate and complete records are kept, and to ensure that the best decisions concerning a trainee's academic progress in a training program are made.

- The goals of an ARB include:

    - Help trainees solve problems that may prevent successful completion of training.
    - Determine which trainees are able to complete training.
    - Determine which trainees are unable and/or unwilling to complete training.
    - Make recommendations concerning their findings.

- ARB is a group action, the following composition and structure is required.
- All ARBs shall be composed of a chairman and at least two additional members. All persons serving on the ARB will be required to reach a consensus on the board's recommendation.
- The chairperson will appoint one of the members to serve as recorder. The recorder will be responsible for completing the necessary paperwork.
- For international trainees the IMSO shall be a member of the board.
- Other ARB members may be chosen from instructional personnel. This includes officer and enlisted instructional and supervisory personnel, classroom and laboratory instructors, and instructional and training specialists.
- At least one ARB member is a certified instructor in the area in which the trainee is having difficulty.
- Supervisory personnel who have command designated authority for approval or disapproval of ARB recommendations may not sit as members of the ARB.
- Membership need not be permanent, but all members must meet the following qualifications:

    - Understand the CeTARS schoolhouse disposition codes and reporting procedures.

    - Understand the activity's policy for drop from training, attrition, and pipeline management.
    - Receive training in counseling, CeTARS schoolhouse trainee tracking, and the purpose, policy, and procedures of an ARB.

- Duties of an ARB include:

- Review information contained in the trainee's performance records prior to the ARB (i.e., ASVAB scores, course test records, counseling sheets, previous Navy training records and Navy military training records).
- Conduct an ARB interview with the trainee.
- Make recommendations for disposition and any necessary corrective action based on group consensus.
- Complete the required paperwork.

- When conducting an ARB, the following procedures will be adhered to:

  - All procedures will be conducted with respect for the privacy of the trainees.
  - While the ARB is a serious, official board, the members shall exhibit a presence that is cordial and supportive.
  - All participants will be seated and the proceedings will be conducted in an open and professional manner. The board chairman will explain to the trainee that the board has been convened to help the trainee determine why the trainee is having difficulty. Once the cause has been identified, the board and the trainee, working together, will develop a plan for success.
  - The chairman will also inform the trainee that they have the right and duty to speak.
  - Before a decision concerning the trainee can be made, the ARB should review records and interview the trainee to find such information as: area of difficulty, type and result of remediation applied, trainee attitude and personal problems.
  - To avoid excessive note taking by the recorder, the trainee may provide written responses to typical questions asked during an ARB (e.g., Why are you having difficulty? Where are you having problems? Are there any personal problems that are preventing you from doing your job? Do you want to remain in this course?) Prior to convening the board, the board may then discuss these with the trainee. The board is not limited to these questions.
  - In addition to questions of a personal nature, the board should assess the trainee's academic performance by asking questions specifically related to the course material. Since the board is tasked with looking at academic issues, it is important to know just how much

difficulty the trainee is having and where that difficulty is occurring. Test scores do not always indicate the trainee's level of expertise.
    - The chairman will make clear to the trainee what the recommendation is, what consequences may result from the approval of that recommendation, and what actions are expected of the trainee.
    - The trainee will be given the opportunity to make a written statement. If the trainee does not wish to make a written statement, the trainee will sign a statement to that effect.

- For “A” School trainees, Navy military training personnel will be notified prior to convening the ARB. This allows Navy military training personnel time to provide input to the board.
- When an ARB is convened, all proceedings will be documented. Documentation will include an ARB Record and, if appropriate, a Trainee Drop Record. The ARB Record is a locally developed form that contains the following minimum information:

    - Trainee data (name and rate)
    - Course data
    - Board action data (CWC with or without remediation, set back, drop from training)
    - Signatures of board members
    - Final action taken with signature of authority
    - Title and date of final approving officer
    - Trainee signature line

NOTE

Ensure the appropriate controls and administrative requirements for Personally Identifiable Information (PII) are exercised in accordance with NETCINST 5211.2 (series).

- The Trainee Drop Record is a locally developed form used by the LS, DET, or participating activity and TSC, or DET SCO to record trainee information and track the disposition of the trainee. When the trainee is being dropped from training, a Trainee Drop Record will be completed. Both the CS and the TSC, or Training Support Detachment (TSD) are responsible for completing the required information of a Trainee Drop Record and the record is provided to TSC, DET SCO for appropriate PEVT code entry into CeTARS.

- The following information on the Trainee Drop Record will be completed at the course or department level.

    - Trainee data (name and rate), type of trainee (United States Navy (USN), United States Marine Corps (USMC), etc.).
    - Course data required includes: (title, Course Identification Number (CIN), Course Data Processing (CDP), class number, date convened, date dropped (last day in class), total time in training in calendar days).
    - If previously set back, original class number, date convened, total number of setback (list academic and non-academic separately), weeks lost due to academic setback, class standing and final course grade.
    - Drop code.
    - Signature and date of approving authority. The elapsed time from the date of the ARB to the date the disenrollment is approved on the Trainee Drop Record should be the next working day.

- Once the trainee has been dropped from training, the Trainee Drop Record will be forwarded to the TSC or DET SCO. The TSC or TSD SCO will ensure the following:

    - Trainees dropped from training for academic reasons are reclassified expeditiously. The trainee will report to the classifier on the date of disenrollment. The classifier will document on a Trainee Drop Record, the date the Sailor reported for the interview and the date reclassification was completed. The classifier will retain a copy of the Trainee Drop Record. The elapsed time from the date the Sailor reports to the classifier to the date reclassification is completed should be the next working day.
    - Sailors recommended for assignment to general detail, during classification re-interview, will be made available for transfer orders on that date. Document the date drop information was forwarded to the Personnel Support Activity (PSA) or Personnel Support Detachment (PSD) for availability submission to indicate the timeliness of the audit trail.
    - Sailors who do not require a classification re-interview will be made available for general detail on the date of disenrollment. Document the date drop information is forwarded to the PSD for availability

submission to indicate the timeliness of the audit trail.

- Reports of non-completion of required training and requests to modify orders for Sailors previously ordered to an ultimate assignment shall be forwarded to the detailers and assignment control authority on the date disenrolled. When applicable, submit rating conversion requests to the Bureau of Naval Personnel (BUPERS) on the date disenrolled. Retain copies of modifications and rating conversion requests with a Trainee Drop Record.
- TSCs and TSDs will advise the PSD of disciplinary or medical drops upon occurrence to allow for timely submission of accounting category code changes. Immediately upon completion of disciplinary action, refer these Sailors to the PSD for availability processing. TSCs and TSDs will track Sailors, dropped or held for medical reasons, to ensure timely completion of medical board process or return to full duty.

SECTION 12 – TRAINEE RECORD KEEPING

Trainee records serve as a basis for training management decisions, historical reference, and inspections and audits. All records will be retained by the training activity for at least two years and are subject to review during Human Performance Requirements Reviews (HPRRs).

- Specific content of a trainee record and the procedures for maintaining those records will vary between training activities due to the type of training provided and the method used to store the records. “A” School courses for example, may require different trainee information than “F” School courses. Method of storage may vary based on the information technology equipment and software programs available to a command.
- The intent of this section is to standardize the general information contained in trainee records. For this purpose, all records will contain background data and trainee progress data appropriate to the type of training provided.

    - Background data is normally available in the trainee’s service record and includes trainee name, age, social security number, highest educational level attained,

ASVAB scores, test version, and list of technical schools previously completed.

- Trainee progress data may include test scores, acceleration data, remediation data, setback data, counseling data, ARB actions, disenrollment disposition, and graduation date or drop date. This information may be used to assess the needs of individual trainees by identifying trainees for possible advanced placement, assisting instructional personnel in solving individual learning problems, and determining if course prerequisites have been met.

- If trainees do not meet course prerequisites, a message will be forwarded to the losing command and NETC describing the reason the trainee did not meet the prerequisite.
- Access to a trainee record is restricted to the trainee, those who maintain trainee records and those who are directly involved with the trainee's training or evaluation.

  - A record may be disclosed to other Department of Defense (DoD) personnel, who have a need for the record in the performance of their duties, provided this use is compatible with the purpose for which the record is maintained. It is the responsibility of all personnel with access to a trainee record to prevent the unauthorized disclosure of personal information contained within it.

- All required data will be recorded in the trainee's service record upon completion of training, transfer, or discharge. All trainee enrollment and progress records may be disposed of after two years provided the information have been recorded as required in the service record. Trainee test answer sheets will be destroyed when they have been graded and grades have been recorded on the trainee's official progress records and all data for test analysis has been recorded.

SECTION 13 – REMEDIATION TRAINING QUALITY INDICATORS (TQIS)

The following is a list of TQIs that should be recorded for each course's remediation program, to help determine trends, per NAVEDTRA 135 (series):

- Automated Electronic Classroom (AEC) or Electronic Classroom (ECR) utilization metrics.

- Average number of trainees assigned remediation, what area do the trainees most frequently have difficulty in, what actions have been taken to improve the remediation program.

SECTION 14 – SUMMARY

An effective remediation program will be essential to the success of trainees that are unable to accomplish critical learning objectives or understand material during normal classroom time. This chapter described NETC training manager's remediation program roles and responsibilities. Additionally, the minimum policies and guidelines that are necessary to establish, implement, manage, and sustain an effective remediation program, to assist trainees attending their courses that may need additional training assistance, were discussed. The roles and responsibilities delineated in this chapter are summarized in Table 10.

TABLE 10: REMEDIATION PROGRAM ROLES AND RESPONSIBILITES

Task	Responsibility
Approves trainee attrites	CO
Manages remediation programs	CO/OIC
Provides remediation guidance as required to CS, instructors, and ARBs	CO/OIC
Approves trainee drops from training	CO/OIC
Approves trainee setbacks	CO/OIC
Approves ARB recommendations	CO/OIC
Implements and sustains remediation program(s)	CS
Approves instructor remediation recommendations	CS
Convenes ARBs	CS
Forwards ARB recommendations to the CO/OIC	CS
Ensures that a SME, in the subject area that is causing the trainee problems, is available during remediation	CS
Schedules and assigns ARB membership and roles	CS
Determines the method of remediation necessary for the trainee to successfully complete the learning objective	ARB
Provides recommendations for trainee remediation, retest and continue with class, setback, and academic drop and re-classification	ARB
Recommends trainee remediation to CS	Instructor
Serves as an SME during remediation, as determined by CS	Instructor
Serves as an ARB member, if designated by CS	Instructor

APPENDIX A

PERFORMANCE TEST ADMINISTRATOR'S GUIDE
(EXAMPLE)

Navy Scuba Diver
A-433-0023A

Performance Test Administrator’s Guide

Performance Test 2-1-1
Life Preserver Familiarization, Mask and Snorkel
And Drown Proofing

November 2008

Instructions to the Administrator.

General Description of Performance Test:

Trainees will be evaluated on their ability to:

1. Maintain buoyancy control.
2. Clear mask utilizing using two methods.
3. Demonstrate proper usage of snorkel both with and without a mask.
4. Stay on the surface while participating in drown proofing.

Safety Precautions:

1. When hands are joined together with line, do not tie the line in a knot.
2. When feet are secured with line, do not tie a knot in such a fashion that it cannot be readily untied.
3. NEVER have both hands AND feet tied at one time.
4. Only put as many trainees in the water as can be safely monitored by the number of instructors present. 25:4 ratio.
5. Instructors refer to Job Sheet 2-1-1 for safety precautions pertaining to the area of which the diving will be conducted.

Environment: Swimming Pool

Equipment per Trainee: Mask, Fins, Life Preserver, Snorkel, Wet Suit (as required), short piece of Line

Special Instructions:

Trainees may voluntarily request termination of training. Any time the trainee makes such a statement such as “I Quit,” or “DOR,” (Drop on Request), they shall be immediately removed from the training environment and referred to the appropriate division or training officer for administrative action. The trainee must then make a written statement, clearly indicating the desire to DOR.

Any time a trainee or instructor has apprehension concerning their personal safety or that of another, they shall signal for a “Training Time Out” to clarify the situation as appropriate. “Training Time Out” signals shall be

appropriate to the training environment. “Training Time Out” signals for this unit are a verbal “HELP”, or the hand signals for “HOLD” (Clinched fist), “4 FINGERS HELD UP”, or the “T SIGNAL” (one hand laid across the end of the other).

Instructors are responsible for maintaining situational awareness and shall remain alert to signs of trainee panic, fear, extreme fatigue or exhaustion, or lack of confidence that may impair safe completion of the training exercise. Instructors shall immediately stop training, identify the problem, and make a determination whether to continue or discontinue training. Instructors shall be constantly alert to any unusual behavior which may indicate the trainee is experiencing difficulty, and shall immediately take appropriate action to ensure the trainee’s safety.

Test Instrument.

Job Sheet Number: Job Sheet 2-1-1

Steps:

Life Preserver

1. Swim to deep end of pool.
*2. Inflate Life Preserver with oral inflator until positive buoyancy is achieved.
3. Swim circles on back until told otherwise by instructor.

Mask/Snorkel

4. In shallow end of pool, take a breath and submerge until snorkel fills with water.
5. Surface and exhale through snorkel, blowing water out while keeping face in water.
6. Continue to breathe through snorkel until comfortable.
7. Don mask.
8. Fill mask with water.
*9. Demonstrate two methods of clearing mask.

a. Push with palm of hand on top front of mask and exhale through nose with head titled back.
b. Tilt head to one side, push in on high side of mask and exhale through nose.

*10. Using snorkel, trainee should sit in shallow end of pool without mask and breathe through snorkel for a minimum of 3 minutes.
*11. Using snorkel and fins, swim circles around the pool with face in the water for two laps without lifting head out of water.
*12. Throw mask in water and let it sink to the bottom. Swim underwater, retrieve mask, and don and clear mask of water prior to surfacing.

Drown Proofing

*13. Enter water and use basic survival stroke for 5 minutes.
*14. Enter water with ankles tied and use modified basic survival stroke for 5 minutes.
*15. Enter water, holding a line in both hands. With hands touching behind back, use the modified basic survival stroke for 5 minutes.
* = Critical Step

Step Description:

1. A checklist will be used to evaluate trainee performance.
2. Steps 2 and 9 through 15 are critical.
3. A counseling sheet will be filled out, concerning areas of deficiency and ways of improvement, each time trainee fails to meet the objectives of this job sheet.
4. Mandatory night study will be conducted in the form of practice during evening pool hours.
5. Failure to meet the objectives of this job sheet three times will institute a counseling sheet being filled out on the trainee recommending an Academic Review Board (ARB).

Common Errors:

1. Failure to maintain positive buoyancy.
2. Failure to successfully clear mask.
3. Failure to swim while breathing through a snorkel.
4. Failure to maintain composure while drown proofing.

Grading Criteria.

1. Satisfactory: A grade of 80 or more and completion of all critical items.
2. Unsatisfactory: A grade of less than 80 or failure to complete any critical item.
3. There are eight critical steps associated with this job sheet. All eight critical steps, when successfully completed, equate to a passing score of 80.
4. The remaining seven steps are not individually evaluated, but collectively, their successful performance in accordance with instructions is assigned a value of 0 to 20 points.

Instructions to the Trainee.

1. Use of Job Sheet 2-1-1 is not feasible in the pool environment. Prior to allowing any trainee to enter the pool, review with the trainees as a group, all The tasks they are to demonstrate. After the trainee enters the water, the instructor will pace the trainee through each step using the Job Sheet as a guide.
2. Review DOR and Training Time Out (TTO) procedures with trainees.
3. Point out time requirements for Steps 1, 13, 14, and 15.
4. Successful completion of this Job Sheet is mandatory prior to breathing compressed air during pool phase of SCUBA.

Job Sheet 2-1-1

Life Preserver Familiarization, Mask and Snorkel Technique and Drown Proofing

Introduction: The purpose of the performance test is to assess your skill at maintaining buoyancy control; clearing your mask utilizing both head tilt methods; using a snorkel both with and without a mask; and staying on the surface while participating in drown proofing.

Equipment: Mask, Fins, Life Preserver, Snorkel, Wet-Suit (as required), short piece of Line

References: NA.

Safety Precautions: A rescue swimmer will be on station during the performance of this exercise.

Job Steps:

Life Preserver

1. Swim to deep end of pool.

2. Inflate life preserver with oral inflator until positive buoyancy is achieved.

3. Swim circles on back until told otherwise by instructor.

Mask/Snorkel

4. In shallow end of pool, take a breath and submerge until snorkel fills with water.

5. Surface and exhale through snorkel, blowing water out while keeping face in water.

6. Continue to breathe through snorkel until comfortable.

7. Don mask.

8. Fill mask with water.

9. Demonstrate two methods of clearing mask.

10. Using snorkel, trainee should sit in shallow end of pool without mask and breathe through snorkel for a minimum of 3 minutes.

11. Using snorkel and fins, swim circles around the pool with face in the water for two laps without lifting head out of water.

12. Throw mask in water and let it sink to the bottom. Swim underwater, retrieve mask, and don and clear mask of water prior to surfacing.

Drown Proofing

13. Enter water and use basic survival stroke for 5 minutes.

14. Enter water with ankles tied and use modified basic survival stroke for 5 minutes.

15. Enter water, holding a line in both hands. With hands touching behind back, use the modified basic survival stroke for 5 minutes.

Self-Test Questions: None.

Job sheet 2-1-1 Checklist

Life Preserver Familiarization, Mask and Snorkel Technique and Drown Proofing

Trainee Name and Rate_____
Instructor/Evaluator_____ Date_____

Evaluation Instructions Critical Steps: Observe trainee performing each step. Watch for correct use of equipment and adherence to safety regulations. Indicate trainee's performance by circling either SAT or UNSAT. Ten points will be awarded for each step performed satisfactorily. _____

SAFETY – Failure to adhere to all SAFETY requirements will result in automatic failure of this Performance test.

Life Preserver

2. Inflate Life Preserver with oral inflator until positive buoyancy is achieved. SAT UNSAT

Mask/Snorkel

9. Demonstrate two methods of clearing mask. SAT UNSAT

10. Using snorkel, trainee should sit in shallow end of pool without mask and breathe through snorkel for a minimum of 3 minutes. SAT UNSAT

11. Using snorkel and fins, swim circles around the pool with face in the water for two laps without lifting head out of water. SAT UNSAT

12. Throw mask in water and let it sink to bottom. Swim underwater, retrieve mask, and don and clear mask of water prior to surfacing. SAT UNSAT

Drown Proof

13. Enter water and use basic survival stroke for 5 minutes. SAT UNSAT

14. Enter water with ankles tied and use modified basic survival stroke for 5 minutes. SAT UNSAT

15. Enter water, holding a line in both hands. With hands touching behind back use the modified basic survival stroke for 5 minutes. SAT UNSAT

Evaluation Instructions for Non-Critical Steps: Observe overall trainee performing and composure when executing each step. Assign an overall rating of 0 to 20 points. _____

Life Preserver

1. Swim to deep end of pool.

2. Swim circles on back until told otherwise by instructor.

Mask/Snorkel

3. In shallow end of pool, take a breath and submerge until snorkel fills with water.

4. Surface and exhale through snorkel, blowing water out while keeping face in water.

5. Continue to breathe through snorkel until comfortable.

6. Don mask.

7. Fill mask with water.

Comments:

APPENDIX B

KNOWLEDGE TEST ADMINISTRATOR'S GUIDE
(EXAMPLE)

Navy SCUBA Diver
A-433-0023A

Knowledge Test Administrator’s Guide

Test for Units 1 through 9

May 2009

Instructions to the Administrator.

Prior to the Start of Testing:

1. Cover or remove all training aids that could assist the trainees in answering test items.

2. Have trainees clear their desks of all unrelated testing material.

3. Inform trainees that they have 50 minutes for the test.

4. Provide pencils and scratch paper as necessary.

5. Read the test instructions to the trainees.

6. Provide pertinent diving reference documentation.

7. Comply with local instruction pertinent to testing as applicable.

After Completing the Test:

1. Collect and inventory all testing material.

2. Check test for marks made by trainees.

3. Review test with trainees.

4. Evaluate any test challenged by trainees.

5. Apply local instructions as necessary.

Instructions to the Trainee.

1. Complete the administrative section of the answer sheet by entering your name and class number.

2. Trainees caught cheating will be given a zero on the test and remanded to the Training Officer for disciplinary action.

3. The test booklet and answer sheet will be turned in to the administrator at the completion of the test.

NOTE

The following test items have been compiled for illustrative purposes to assess trainee knowledge of Units 2 and 3 of the

SCUBA Course:

Unit 2: **Charge Open Circuit Scuba Equipment**

Lesson Topic 2.1: SCUBA Charging

SCUBA Charging

EO9.1 1. While charging SCUBA cylinders with high pressure air, the cylinders become hot to the touch. The cause of the increase in temperature is explained by the ….....
Answer: General Gas Law.

(CTTL #62) (U.S. Navy Diving Manual, Volume 1, paragraph 2-5.2.4)

EO9.2 2. (True/False) When charging SCUBA cylinders you should place your face close to the gage to avoid getting a false reading. Answer: False.

(CTTL #63) (U.S. Navy Diving Manual, Volume 1, Table 5-4, #3)

EO9.3 3. Name the two accepted methods of charging SCUBA cylinders …..... and ….....
Answer: Cascading & High Pressure Air Compressor.

(CTTL #64) (U.S. Navy Diving Manual, Volume 1, paragraph 5-3.4)

Unit 3: **Conduct Inspection of Major Hull Components**

Lesson Topic 3.1: Underwater Hull Inspection

E10.1 1. On an illustration of a typical SSBN underwater hull, label each of the indicated components.

(CTTL #66) (Underwater Work Techniques Manual, Volume 2, Figure 4-1.)

E10.2 2. Name four factors that determine the amount of sea growth a ship will have: Answer: Ship Location, Duration of Ship's Movement, Hull Protection, and Hull Cleaning Periodicity.

(CTTL #68) (NAVSHIPS Technical Manual, Waterborne Underwater Hull Cleaning of Navy Ships, Volume 2, paragraph 081-2.1.1)

E10.4 3. Name three possible effects on a propeller which can be caused by use of improper cleaning tools: Answer: Change Acoustic Signature, Induce Singing, and Induce Cavitation.

(CTTL #67) (NAVSHIPS Technical Manual, Waterborne Underwater Hull Cleaning of Navy Ships, Volume 2, paragraph 081-3.7.2.1)

E10.2 4. Of the four stages of sea growth, which of the following would be the first stage?

a. Grass
b. Tubeworms
c. Slime
d. Barnacles

(CTTL #68) (NAVSHIPS Technical Manual, Waterborne Underwater Hull Cleaning of Navy Ships, Volume 2, paragraph 081-1.2.1)

E10.2 5. What stage of sea growth is common on the docking block bearing surface areas of a ship? Answer: Stage 3.

(CTTL #68) (NAVSHIPS Technical Manual, Waterborne Underwater Hull Cleaning of Navy Ships, Volume 2, paragraph 081-1.3.4)

E10.2 6. Barnacles and tubeworms would identify which of the following stages of sea growth?

a. Slime
b. Grass
c. Hard fouling
d. Composite

(CTTL #68) (NAVSHIPS Technical Manual, Waterborne Underwater Hull Cleaning of Navy Ships, Volume 2, paragraph 081-1.2.4)

E10.2 7. Which of the following stages of sea growth is most likely to be found inside a sea chest of a ship taken from dry dock and then set in port for a year?

a. One
b. Two
c. Three
d. Four

(CTTL #68) (NAVSHIPS Technical Manual, Waterborne Underwater Hull Cleaning of Navy Ships, Volume 2, paragraph 081-1.2.5)

E10.4 8. Why is the docking block bearing surface area of a ship's hull considered to be more susceptible to fouling? Answer: Unpainted in Dry Dock.

(CTTL #68) (NAVSHIPS Technical Manual, Waterborne Underwater Hull Cleaning of Navy Ships, Volume 2, paragraph 081-1.3.4)

E10.3 9. On the Fouling Rating Scale, the lowest number represents …....? Answer: A Clean Hull.
(CTTL #69) (NAVSHIPS Technical Manual, Waterborne Underwater Hull Cleaning of Navy Ships, Volume 2, paragraph 081-1.2.7)

E10.3 10. On the Paint Deterioration Rating Scale, the first three ratings represent:

a. the highest level of paint deterioration
b. appearance associated with normal wear
c. blistering, due to paint system failure
d. cavitation scouring

(CTTL #69) (NAVSHIPS Technical Manual, Waterborne Underwater Hull Cleaning of Navy Ships, Volume 2, paragraph 081-1.4)

E10.13 11. Name the manual and chapter in the manual where the procedures for diving operations planning are found? Answer: U.S. Navy Diving Manual, Volume 1, Chapter 4.

(CTTL #31) (U.S. Navy Diving Manual, Volume 1, Chapter 4)

Note: For the purposes of this sample, questions for Eos 10.5, 10.6, and 10.7 are omitted.

APPENDIX C

ACRONYMS AND UNIFORM RESOURCE LOCATOR ADDRESSES

AEC	Automated Electronic Classroom
AIM	Authoring Instructional Material
ARB	Academic Review Board
ASVAB	Armed Services Vocational Aptitude Battery
BCA	Business Case Analysis
BUPERS	Bureau of Naval Personnel
CeTARS	Corporate enterprise Training Activity Resource System
CDP	Course Data Processing
CO	Commanding Officer
CCA	Curriculum Control Authority
CIN	Course Identification Number
CIWS	Close-In-Weapons-System
CCMM	Course Curriculum Model Manager
CMI	Computer Managed Instruction
CMS	Course Master Schedule
CNETC	Commander, Naval Education and Training Command
COA	Course of Action
COI	Curriculum Outline of Instruction
CPM	Content Planning Module
CPR	Cardiopulmonary Resuscitation
CS	Course Supervisor
CTTL	Course Training Task List
CWC	Continue with Class
CWDD	Chemical Warfare Directional Detector
DET	Detachment
DoD	Department of Defense
DOR	Drop on Request
DOT	Director of Training
DSOT	Daily System Operability Test
ECR	Electronic Classroom
EO	Enabling Objective
FCR	Formal Course Review
FEA	Front End Analysis
HPRR	Human Performance Requirements Review
ICW	Interactive Courseware
IMSO	International Military Student Officer
IS	In-Service
JDTA	Job Duty Task Analysis
KPL	Knowledge Proficiency Level
KSA	Knowledge, Skills, or Ability
KSATR	Knowledge, Skills, Ability, Tools and Resources
LC	Learning Center
LP	Lesson Plan
LO	Learning Objectives
LS	Learning Site
LSO	Learning Standards Officer
N7	Director, Learning and Development Division
N74	Branch Head, Learning Standards Branch

NAVEDTRA	Naval Education and Training
NAVMAC	Navy Manpower Analysis Command
NETC	Naval Education and Training Command
NETCINST	Naval Education and Training Command Instruction
NMCI	Navy Marine Corps Intranet
OCCSTDs	Occupational Standards
OIC	Officer in Charge
OJT	On-the-Job Training
ORM	Operational Risk Management
PADDIE	Plan, Analyze, Design, Develop, Implement and Evaluate
PEVT Code	Personnel Event Code
PII	Personally Identifiable Information
PPP	Personnel Performance Profile
PQS	Personnel Qualification Standard
PSA	Personnel Support Activity
PSD	Personnel Support Detachment
R3	Re-use, Re-purpose, and Reference
RTM	Rate Training Manual
SAT	Satisfactory
SCO	Student Control Office
SINS	Ship's Inertial Navigation System
SME	Subject Master Expert
SPL	Skill Proficiency Level
SYSCOM	Systems Command
TCCD	Training Course Control Document
TG	Trainee Guide
TO	Terminal Objective
TPP	Training Project Plan
TQI	Training Quality Indicator
TRIM	Total Records and Information Management
TSC	Training Support Command
TSD	Training Support Detachment
TTA	Training Task Analysis
TTE	Technical Training Equipment
TYCOM	Type Commander
USMC	United States Marine Corps
USN	United States Navy
UNSAT	Unsatisfactory