

## DETAILED LESSON PLAN OUTLINE

PROGRAMME: TRAINING FOR INSTRUCTORS

UNIT: 11 Testing and Evaluation

SUGGESTED TIME: 1 1/2 hours

TRAINING AIDS NEEDED: Overhead projector, transparencies (8), Easel, Flipcharts and workbooks.

OBJECTIVE(S): Upon completion of this unit you will be able to do the following:

1. Explain the difference between knowledge testing and performance testing.
2. Describing how, what, why and when we test.
3. Defining validity & reliability as they pertain to testing.
4. List five different types of test items that may be used in the construction of a knowledge test.

UNIT OVERVIEW

*Purpose:* To bring it all together with the need for testing the objectives to determine the effectiveness of the training.

*General Guidance:* Point out that in the development of training, the testing and evaluation are developed right after the objectives are written. We have presented it last here so that it will make sense when we discuss it. Stress the relationship to the objectives and the method of instruction. Testing should be as job-like as possible. Evaluation should include all the factors of the job.

*Cautions:* It is easy to get into deep philosophical discussions of the various methods of testing, validity and test difficulty, etc. Avoid this trap. Focus on the concepts and the need for testing and evaluation and suggest further reading in the many books available on the subject.

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<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px; width: fit-content;">WB 11-1</div> <div style="border: 1px solid black; padding: 5px; width: fit-content;">TR 11-1,2</div>	<p><b>1. Introduction</b></p> <p>1.1 Introduce self and assistant.</p> <p>1.1. Present unit objectives and refer to workbook pages.</p> <div style="border: 2px solid black; border-radius: 15px; padding: 10px; margin: 10px 0;"> <p><b>Upon completion of this unit you will be able to do the following:</b></p> <ol style="list-style-type: none"> <li><b>1. Explain the difference between knowledge testing and performance testing.</b></li> <li><b>2. Describe how, what, why and when we test.</b></li> <li><b>3. Define validity &amp; reliability as they pertain to testing.</b></li> <li><b>4. List five different types of test items that may be used in the construction of a knowledge test.</b></li> </ol> </div> <p>There will be a test at the end of the unit.</p>	

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<p data-bbox="225 757 363 857">TR 11-3</p> <p data-bbox="225 1149 363 1249">TR 11-4</p> <p data-bbox="212 1630 363 1877">WB 11-2 FC 11-1</p>	<p data-bbox="395 315 584 347">1.2 Background</p> <p data-bbox="451 351 1171 521">You can probably all recall personal experiences with testing. Maybe a test in school which you thought you had really studied for - but when you received the results, you discovered that you did poorly and then you argued with the teacher because of how you interpreted the questions.</p> <p data-bbox="451 562 1161 732">Anyone can write a test - but a good test takes skill and knowledge to develop. We test or evaluate in many different ways - not just giving a person a written test that we grade. We also frequently hear about management training "That's something that can't be tested".</p> <div data-bbox="544 752 1102 958" style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p data-bbox="568 768 1082 938"><b>Whatever exists at all, exists in some amount.</b> <b>Anything that exists in amount can be measured.</b> <b>E. L. Thorndike</b></p> </div> <p data-bbox="451 976 1161 1146">Objectives, Performance and Instructional, tell student and instructor from the beginning "where we are going and how we are going to get there". Testing will tell us if we have obtained our objectives. Without testing, we cannot be sure if we reached our objectives - no matter how skilled we are.</p> <div data-bbox="456 1155 850 1301" style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p data-bbox="480 1182 775 1285"><b>Where am I going?</b> <b>How will I travel?</b> <b>When have I arrived?</b></p> </div> <p data-bbox="866 1146 1150 1317">During this unit we will emphasize the relationship of "Where am I going" and When have I arrived."</p> <p data-bbox="451 1323 1153 1494">If our students or employees do not "pass" our test, we have to examine our objectives and methods of instruction to determine why they did not gain the knowledge and skill we wanted them to learn. Our skill at instructing is also being tested!</p> <p data-bbox="451 1532 1153 1635"><b>Evaluation</b> is broader in scope than testing and tells us whether an individual is ready for a job or how they are performing on a job. More on this later.</p> <p data-bbox="395 1668 584 1700">2. Presentation</p> <p data-bbox="424 1740 459 1771">2.1</p> <div data-bbox="493 1715 748 1854" style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p data-bbox="512 1738 748 1841"><b>TYPES of TESTS</b> <b>Knowledge</b> <b>Performance</b></p> </div> <p data-bbox="451 1877 1086 1908">There are two general types of testing we will discuss.</p>	<p data-bbox="1193 797 1378 900">E.L. Thorndike was a social scientist.</p> <p data-bbox="1193 1173 1374 1276">Review the components of objectives.</p>

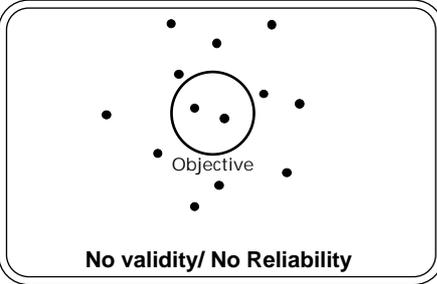
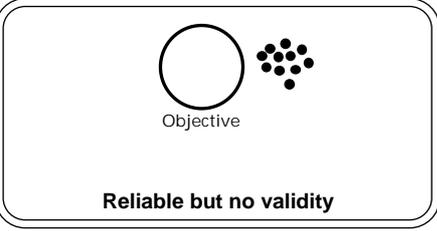
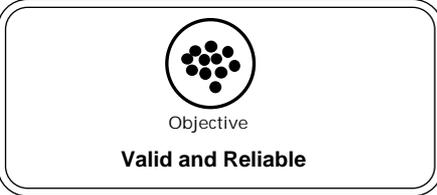
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<div data-bbox="215 1361 367 1514" style="border: 1px solid black; padding: 5px; width: fit-content;">FC 11-2</div>	<p>2.1.1. <b>KNOWLEDGE</b> tests measure students retention of facts, concepts, vocabulary, process and procedures. They are more widely used in education and training than any other kind. A written or oral test measures the students knowledge as it asks questions about facts, process or procedures.</p> <p>2.1.2. <b>PERFORMANCE</b> tests measure the students skill at using facts, processes, procedures and manipulative skills to accomplish a specific task.</p> <div data-bbox="435 636 1171 976" style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <p>NOTE: This doesn't mean that some written tests cannot properly be called performance tests or vice versa. The primary consideration is what is measured (knowledge or skill), not the procedure by which it is measured. Too often the limitation of a written test in evaluating technical training is that it is not an adequate measure of actual operating skill. Therefore, it is often valuable to use a written test and a performance test to obtain a more complete picture of a students proficiency.</p> </div> <p>We would not feel real comfortable if the pilot of the aeroplane that brought us here was only tested with a written test on the steps necessary in flying the aeroplane. We would really like to know that he or she had satisfactorily demonstrated that they can fly the aeroplane, especially landing.</p> <p>Continually, we must apply some test or measure to see if our students are getting anything out of training. There are four questions we must address in our discussion of testing and evaluation. (Why, what, when and how)</p>	<p>What are some verbs. Explain.... Describe....</p> <p>What are some verbs. Operate.... Calculate....</p>
	<p>2.2. <b>WHY TEST</b> <b>Feedback</b> <b>Validation</b> <b>Certification</b> <b>Alternatives</b></p> <p>2.2.1. <b>FEEDBACK</b> is one of the reasons. Feedback enables the instructor to periodically check student progress. It also may become a check for how well the instructor is doing. Strengths and weaknesses of the instruction can also be identified.</p> <p>2.2.2. <b>VALIDATION</b> is the second reason. When we are trying to validate instruction we are examining the question: Is the instruction doing what it should and are the desired results being achieved? Any new instruction should be validated before it is finally used to train.</p>	

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<div data-bbox="209 1406 360 1561" style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>FC 11-3</p> </div>	<p>2.2.3. CERTIFICATION is another reason why we test. We have to certify that students have reached a certain competency level.</p> <p>Ask for some examples of where we use certification testing:  Aviation, health and medicine, engineering, drivers license. Others might be electricians, ham radio operators &amp; lawyers.</p> <p>Certification goes hand in hand with accountability.</p> <p>Public schools as well as government training programmes often come under heavy scrutiny. Attendance does not certify competency. Desired competencies have to be tasked out and put in the form of performance and instructional objectives. Before, during and after training testing takes place to determine if those competency levels have been attained.</p> <p>Some secondary school systems in the US are now offering "warranties" to business and industry that their graduates can meet minimum requirements.</p> <p>2.2.4. CHALLENGING or ALTERNATIVES is the last reason that we will examine. An alternative to training.</p> <p>Challenging courses to show you already have the required knowledge or skill. Maybe training is not needed. Time and money will be saved. Training someone who already knows how, is expensive, and may be counter productive.</p> <div data-bbox="459 1406 719 1621" style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>2.3. <b>WHAT WE TEST</b>  <b>Knowledge</b>  <b>Skill</b>  <b>Competency</b>  <b>Abilities</b></p> </div> <p>What we test may be grouped into four categories:</p> <p>KNOWLEDGE - cognitive/ informational.  Objectives use verbs such as <u>describe</u> and <u>list</u> and are tested with a written test.</p> <p>SKILL - psychomotor/manipulative.  Objectives use verbs such as <u>demonstrate</u> and <u>prepare</u> and are tested with performance tests.</p>	

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<div data-bbox="220 981 368 1133" style="border: 1px solid black; padding: 5px; width: fit-content;">FC 11-4</div>	<p>COMPETENCE- level of <u>application</u> of knowledge and skills. Testing is progressive in complexity and difficulty so that a rating of "level of competency" may be determined. You may be competent to drive a car but not a semi-tractor.</p> <p>ABILITY- personal attributes, capability to perform. Testing of physical, emotional and mental abilities may be used to evaluate an individual for a position. Pilots are tested for reaction time, hearing and vision for example.</p> <p>What we test is directly related to what we teach. Earlier we said that written and oral testing measure the students knowledge, and performance testing measures knowledge and skill. Competence is usually measured with a test that is as job like as possible. Ability is frequently a skill type test. A fireman trainee may be tested for the ability to carry a 50' length of 2 1/2" hose up a 20' ladder for instance.</p> <div data-bbox="448 958 794 1196" style="border: 1px solid black; padding: 5px;"> <p>2.4. <b>WHEN WE TEST</b>  <b>On the job</b>  <b>Training Development</b>  <b>Pre-test</b>  <b>During training</b>  <b>Post test</b></p> </div> <p>There are five different situations when testing may take place. All of them may not be done in a training course but a trainer may get involved with the testing.</p> <p>2.4.1. THE JOB  <i>Entry</i> - When a new employee is hired is one time when testing often takes place. The test measures or identifies the employee's ability to perform requirements of the job or job performance requirements. Any deficiencies noted by virtue of the test can be overcome with formal or on the job training.  <i>Periodic evaluation</i> - Some jobs require a periodic evaluation that can result in training being one result. A training needs analysis may be done to determine employee knowledge and performance deficiencies.</p> <p>2.4.2. TRAINING DEVELOPMENT  Testing may take place during course, or training development. The course design may take several directions before a final product is realised which attains the desired competency level.</p>	<p><b>Before Training</b>  On the Job  Development  Pre-test</p> <p><b>During Training</b>  Feedback  Unit test</p> <p><b>After Training</b>  Post test  On the job</p> <p><b>On the job testing can result in training. Training testing can come from on the job testing</b></p> <p><b>Testing during training development is used to modify the training.</b></p>

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<div data-bbox="209 1066 357 1218" style="border: 1px solid black; padding: 5px; width: fit-content;"> <b>FC 11-5</b> </div>	<p data-bbox="475 342 687 371"><b>2.4.3. PRE-TEST</b></p> <p data-bbox="512 376 1158 443">This testing may take place for a variety of reasons. Included in the list would be the following:</p> <ol data-bbox="512 479 1158 613" style="list-style-type: none"> <li>1. As a selection process.</li> <li>2. To identify strengths and weaknesses of the students.</li> <li>3. To design a training approach.</li> <li>4. To finalise an agenda or modify training.</li> </ol> <p data-bbox="475 651 815 680"><b>2.4.4. DURING TRAINING</b></p> <p data-bbox="512 685 1145 786">Testing often takes place during training sessions to check competencies in specific instructional blocks or Instructional Objectives.</p> <p data-bbox="475 824 703 853"><b>2.4.5. POST TEST</b></p> <p data-bbox="512 857 1174 1025">The most obvious time for testing to take place is the post-test or test that is administered at the conclusion of a course or session. The test may serve as the instrument that certifies that specific competencies outlined in the performance objectives have been mastered or attained.</p> <p data-bbox="416 1070 738 1223"><b>2.5. HOW WE TEST</b>  <b>Written</b>  <b>Oral or verbal</b>  <b>Performance</b></p> <p data-bbox="475 1240 1145 1375"><b>2.5.1. WRITTEN</b> testing is the most widely used form in education and training. It has many advantages. Many different test items can be developed to measure a student's knowledge of a subject. Grading is easier.</p> <p data-bbox="475 1413 1145 1514"><b>2.5.2. ORAL</b> or verbal testing may be used to accommodate unique situations. Examples of when this type of testing would be used include the following:</p> <ol data-bbox="512 1518 1158 1794" style="list-style-type: none"> <li>1. Participants are non-readers or have problems with reading and responding.</li> <li>2. Language barriers. The language of the course is not the first language of the participant or they can speak the language but have difficulty in reading and writing.</li> <li>3. Alternate test. Some people have difficulty taking a written test but can do well with an oral exam.</li> </ol> <p data-bbox="512 1832 1174 1899">These situations occur in training like First Aid where we want all participants to pass but some have difficulty.</p>	<p data-bbox="1193 365 1398 465">The post test can become the pre-test.</p>

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<p data-bbox="229 698 352 831">WB 11-3</p> <p data-bbox="225 983 363 1093">TR 11-5</p> <p data-bbox="218 1095 370 1249">FC 11-6</p> <p data-bbox="229 1303 363 1413">TR 11-5</p> <p data-bbox="221 1415 371 1570">FC 11-7</p>	<p data-bbox="453 309 1166 376">2.5.3. PERFORMANCE testing may be accomplished by using any of the following examples:</p> <ol data-bbox="483 414 1182 651" style="list-style-type: none"> <li>1. Real thing - using the real thing in an actual performance. A radio for communications training.</li> <li>2. Demonstration - using models for the real thing for process testing. CPR training for breathing demonstration.</li> <li>3. Simulations - The real thing is not possible or feasible. Emergency procedures where the real emergency has too much risk for participants.</li> </ol> <p data-bbox="395 689 959 723">2.6. VALIDITY AND RELIABILITY in testing</p> <p data-bbox="424 759 1174 965">Some tests have limited value because they give an untrue estimate of the student's achievement or give only partial information about his/her performance. Validity and reliability are always discussed in depth whenever testing and measuring are being taught. For the purpose of this lesson we will keep the discussion as simple as possible.</p> <p data-bbox="453 1003 1150 1070">2.6.1 <b>TEST VALIDITY is defined as how well a test measures what it is supposed to measure.</b></p> <p data-bbox="488 1108 1166 1272">A test that helps to assess the achievement of a student in the specific knowledge and skill area is said to be valid. Another way to look at it would be to see if the objectives of the instruction were met by the test or examination. If the answer is yes then the test can be termed valid.</p> <p data-bbox="453 1310 1150 1377">2.6.2 <b>TEST RELIABILITY is the degree to which a test repeatedly measures the same thing.</b></p> <p data-bbox="488 1415 1174 1482">A test would be perfectly reliable if a student taking it several times received the same score each time.</p> <p data-bbox="453 1520 1150 1588">Let's check your understanding of validity and reliability by your response to three transparencies (Flip charts).</p> <p data-bbox="453 1626 1182 1792">Let's assume that we are teaching mathematics and our objective is to be able to solve a particular problem. The circle represents the answer we expect-our objective. The dots represent the answers we get. We will assume that the instruction is not the problem.</p> <p data-bbox="453 1830 1166 1928">The test is not to put dots in a circle. This is a graphic representation of desired outcomes - the objectives - and actual results.</p>	<p data-bbox="1203 421 1414 555"><b>REMEMBER</b> The testing must be practical to do.</p> <p data-bbox="1203 1525 1406 1592"><b>Take your time-go slowly.</b></p> <p data-bbox="1203 1839 1366 1906"><b>Each dot is a test result.</b></p>

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<p data-bbox="225 443 363 548">TR 11-6</p>	<p data-bbox="427 338 1094 369"><b>SHOW TR'S WITH IDENTIFICATION COVERED</b></p> <div data-bbox="539 383 986 667">  <p data-bbox="627 629 895 656"><b>No validity/ No Reliability</b></p> </div> <p data-bbox="469 674 1123 775">This test is not valid and not reliable. The results are different at each administration and not the result that is expected.</p>	
<p data-bbox="225 801 363 907">TR 11-7</p>	<div data-bbox="539 779 986 1010">  <p data-bbox="643 965 876 992"><b>Reliable but no validity</b></p> </div> <p data-bbox="464 1021 1128 1090">This test lacks validity but is reliable. The results are the same every time but not what was expected.</p>	
<p data-bbox="225 1153 363 1258">TR 11-8</p>	<div data-bbox="544 1106 991 1301">  <p data-bbox="667 1249 855 1276"><b>Valid and Reliable</b></p> </div> <p data-bbox="466 1328 1163 1395">Here is a valid test that is reliable. The answers are consistently within our objective.</p> <p data-bbox="466 1431 1142 1496">What if the test is valid and reliable and the students fail? Two choices:</p> <ul data-bbox="497 1503 1137 1637" style="list-style-type: none"> <li data-bbox="497 1503 1018 1568">• The instruction and/or the instructor failed. The materials and/ or the delivery.</li> <li data-bbox="497 1570 1137 1637">• The participants should not have been in the training. Not qualified or not ready.</li> </ul> <p data-bbox="408 1673 767 1704"><b>2.7. WRITTEN TEST ITEMS</b></p> <p data-bbox="466 1742 1177 1912">Any test should be looked upon as an instrument which is made for the specific purpose of determining an individuals knowledge of a subject or ability to apply knowledge. With slight changes in punctuation, the objectives can become the test. That is if the objectives are well written.</p>	

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<div data-bbox="197 456 349 609" style="border: 1px solid black; padding: 5px; margin-bottom: 20px;">FC 11-8</div> <div data-bbox="217 734 336 864" style="border: 1px solid black; padding: 5px;">WB 11-3</div>	<p data-bbox="467 315 1150 412">Since the majority of testing centres around written testing we will briefly examine some different types of test items that may be used in the construction of written tests.</p> <div data-bbox="520 427 820 703" style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <p data-bbox="555 450 791 479"><b>WRITTEN TESTS</b></p> <p data-bbox="571 488 660 517"><b>Essay</b></p> <p data-bbox="571 524 703 553"><b>Matching</b></p> <p data-bbox="571 560 722 589"><b>True-False</b></p> <p data-bbox="571 595 788 624"><b>Multiple Choice</b></p> <p data-bbox="571 631 671 660"><b>Listing</b></p> <p data-bbox="571 667 655 696"><b>Fill-in</b></p> </div> <p data-bbox="467 730 1166 931">2.7.1. ESSAY items are not objective test items. The most recurrent criticism is that they are unreliable and difficult to score. This may be due simply to instructor personalities. An example would be two experts scoring the same item and differing in the rating given the same answer key.</p> <p data-bbox="467 972 1161 1137">2.7.2. MATCHING items have a singular disadvantage in that they are difficult to construct unless you can continually think of short elements or ideas that are suitable for matching. It is best suited for short definitions of ideas or things.</p> <p data-bbox="467 1178 1155 1518">2.7.3. TRUE - FALSE items are the basis for more quibbling, complaint and cause more irritation to students than any other form. The critical factor in the true-false item is the fact that it must be based on statements which are, absolutely and always, true or false. Only a small number of subject matter statements can satisfy this requirement. There is also the age old theory of every one has a 50/50 chance. If we try to relate test validity and reliability to the true-false items we could spend the rest of the afternoon discussing it.</p> <p data-bbox="467 1559 1166 1935">2.7.4. MULTIPLE - CHOICE items are adaptable to a wide variety of item topics. The two varieties most widely used are those in which the stem of the item is either a question or an incomplete statement followed by several detractors. Probably the greatest drawback in the construction of this type of item is that it is difficult to continually find distractions which are similar to the correct answer. Advantages of this type of item are many. Almost any type of information or skill can be tested by this type of item. Because there is only one correct answer, scoring is easy.</p>	<p data-bbox="1185 472 1385 640"><b>Don't compare one with the other. Each has its particular use.</b></p>

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<p data-bbox="233 533 352 663">WB 11-3</p> <p data-bbox="233 741 352 846">TR 11-9</p> <p data-bbox="233 1391 352 1496">TR 11-1</p> <p data-bbox="233 1693 352 1823">WB 11-5</p>	<p data-bbox="477 353 1166 421">2.75. LISTING produces a list of facts, steps, etc. This test definitely tests retention of facts, etc.</p> <p data-bbox="477 459 1142 560">2.76. FILL-IN-THE-BLANKS uses a statement that has blanks to be filled in by the student. This test requires student recall which reinforces learning.</p> <p data-bbox="448 598 895 629">2.8. TRAINING NEEDS ANALYSIS</p> <p data-bbox="477 631 1155 698">Finally, lets look at how testing and training are related to the job.</p> <div data-bbox="501 712 1082 943"> <pre> graph TD     EMPLOYEE[EMPLOYEE] -- 1 --&gt; JobRequirements[Job Requirements]     JobRequirements --&gt; PerformanceTest[Performance Test]     PerformanceTest -- 2 Pass --&gt; OnToJob[On to the Job]     PerformanceTest -- 3 Fail --&gt; OnToTraining[On to Training]     OnToTraining -- 4 --&gt; PerformanceTest </pre> </div> <p data-bbox="467 954 1177 1261">The diagram on WB 11-3 shows that a performance test is used to measure an employee's performance qualifications. If he/she passes the test, then on to the job. If not, training is given, then they are tested again for the job. This may have to be repeated several times. The performance test for the job is the same as the final test for the training. If our goal is to have employees who can perform on the job, then our training and testing have to be as much like the job as possible.</p> <p data-bbox="467 1301 991 1332">This is the basis of a training needs analysis.</p> <p data-bbox="384 1370 539 1402"><b>3. Summary</b></p> <p data-bbox="442 1442 1090 1473">During this unit we have examined the following areas:</p> <ol data-bbox="442 1512 911 1644" style="list-style-type: none"> <li>1. Knowledge and performance testing..</li> <li>2. Why, what, when and how we test.</li> <li>3. Validity and reliability.</li> <li>4. Different types of test items.</li> </ol> <p data-bbox="384 1682 472 1713"><b>4. Test</b></p> <p data-bbox="442 1753 1177 1854">In order to test whether or not you have attained the competency level as outlined by the unit objectives, we will have you take the unit test.</p>	