

Defense Acquisition University
Curriculum
Development
Guide



Version 7 – May 2007

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Important Note This guide is designed to be both descriptive and prescriptive.

The “Sections” portions *describe* instructional design processes and are intended for developers and non-developers.

Conversely, the “Appendices” provide the type of detail necessary to help *developers* to produce instructional products.

Defense Acquisition University Curriculum Development Guide

Notices

Mandates This curriculum guide was produced under the direction of the Learning Capabilities Integration Center (LCIC)

Web-Based *The Guide* may be viewed electronically on the DAUNet, LCIC 'Curriculum Development' link.

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References The accumulation of this text came from many sources. Section and Appendix references have been purposefully omitted from the document but are available by request to the Director, Learning Capabilities Integration Center.

Where specific items demand reference or permissions were granted; occasional, but necessary references are selectively placed throughout the document.

Introduction to the Curriculum Development Guide

Introduction to the CDG

A real curriculum is one that the acquisition student experiences. It is the result of the activities, processes, and arrangements designed to provide learning opportunities to educate the Department of Defense acquisition workforce for the future. As such, the ultimate goal of the Defense Acquisition University is to prepare today's students to be successful in tomorrow's world. Policies, priorities, and practices must be redirected, redefined, and restructured to create conditions which allow for the success of all students. The learning environment must be transformed through standards-based curricula that focus on student competence. The DAU curricula must stretch students' thinking; expand experiences beyond the classroom walls; reflect the use of appropriate instructional materials and strategies; and prepare students to live, learn, and work together to achieve common goals in an increasingly diverse world.

This transformation can only be achieved through a continual, well-designed curriculum development process that is collegial in nature; reflects the interrelationship of curricula, instruction, and assessment; and continually realigns curricula to high academic expectations. Teachers who have a strong knowledge and experiential base; a strong understanding for, and the ability to apply pedagogical and andragogical learning theories; and the facility to combine these into relevant, stimulating instructional programs develop the most effective curriculum.

The designing of curricula should involve a thoughtful process which encourages questioning, rethinking, and revisiting. This *Curriculum Development Guide (CDG)* provides the framework for curricula development at the DAU. The guide suggests procedures which the University, along with its partners and stakeholders, can use in designing curricula for the acquisition student. The processes outlined in this guide are descriptive, and not intended to be rigid, exclusive, or used in a manner that restricts curriculum developers from using new and innovative approaches to teaching and learning. The DAU does not consider course and program development as a stagnant process. As such, the *Curriculum Development Guide* is not a static tool. It will be updated as any defining changes occur.

Section 1

Introduction To Curriculum Development

Overview

Background

The Defense Acquisition Workforce Improvement Act of 1991 created the Defense Acquisition University (DAU). The DAU coordinates an educational delivery system throughout regional campuses and strategically placed satellite locations. Students are primarily Army, Navy, Air Force, National Defense University, Defense Logistics Agency, and Department of Defense civilian and military employees. The DAU coordinates and tailors education and training to the needs of the acquisition component within the Department of Defense (DoD) community. It is the DoD center for developing education, training, research, and publication capabilities in the area of acquisition.

In an effort to ensure consistency of course and curriculum development, the DAU has prepared this internal *Curriculum Development Guide (CDG)* for developers and teachers of the University's curricula.

Purpose

The *Curriculum Development Guide* provides a common foundation for DAU and its components to prepare, review, and evaluate instructional products and student achievement. The purpose of the *CDG* is to provide tools for the development, delivery, and evaluation of effective education and training. Accordingly, the *CDG* provides:

- guidance for designing DAU performance-based curricula
 - a structure for using the guidance to develop new and review existing instructional materials
 - support materials (definitions, examples, job aids, etc.) which
 1. define the course and/or curricula criteria
 2. assist instructional designers developers/reviewers in completing and evaluating instructional design
 3. a system for evaluating instructional design quality
-

Overview, Continued

**Purpose,
Continued**

Performance-based training and education presents providers with an opportunity to apply adult learning methodology, technology-based instructional design, multi-media development, and especially performance-based assessment techniques.

In this section

This section covers the following:

Topics	See Page
About This Guide	6
What Is Performance-Based Training and Education?	7
What Is Competency/Criterion-Based Training and Education?	10
Section Summary and References	11

**Primary
Audience**

The Defense Acquisition University (DAU) *Curriculum Development Guide* is for those individuals who are involved in the design, development, delivery, and evaluation of DAU training and education courses. These include:

- DAU Administrators & Directors
 - Faculty
 - Education specialists
 - Instructional systems designers/Instructional Technologists
 - Functional Advisors
 - Functional Board members and their representatives
 - Subject matter experts
 - Contractors
-

About This Guide

Introduction

No single document can solve the full range of potential instructional system design problems. *The Guide* will focus on phases of the instructional system development of performance-based training and education and rapid prototype processes to develop, maintain, and evaluate courses or curricula for the current DAU environment.

DAU Policy Guidance

The DAU *Curriculum Development Guide* is NOT a policy document, although it is intended to be consistent with applicable existing policy established by the DAU. University policies may be viewed by going to DAUNet, LCIC link.

Instructional Systems Development (ISD) Phases

The following are the instructional systems development phases addressed in this guide:

If you need to know about . . .	Then go to . . .
Overall ISD Process	Section 2
Analysis	Section 2
Design	Section 4
Development and Implementation (Delivery Methods)	Section 5
Evaluating Student Performance	Section 6

What is Performance-Based Training and Education?

Introduction

The acquisition educational environment is constantly changing. The DAU must prepare students for the future by preparing them to become lifelong learners who can work with others, communicate clearly, think critically, apply what they have learned in practical ways, recognize quality, and be creative as well as original problem solvers.

Performance-based training and education ensures how learners *master* the knowledge, skills, and abilities that emphasize application and use of what has been learned. It clearly defines what students are expected to *know* and be able to *do* with that knowledge. Students are periodically tested or assessed to determine their progress and, to the extent possible, each is given needed time and assistance to become proficient. Individuals who demonstrate meaningful progress or skill development are advanced to more challenging courses or curricula.

Differences Between Traditional Testing And Performance-Based Assessment

One of the guiding principles of student evaluation is that the way we assess students should reflect as closely as possible what we want them to learn. If we want to check whether they have acquired content knowledge, we use something like a paper-and-pencil test that requires them to display that knowledge. But if we want to know if they can construct an argument, analyze a report, develop a plan, or evaluate the quality of a particular plan or proposal, then we have to use an assessment technique that allows them to demonstrate those skills.

In a performance assessment, students are expected to answer two questions: What do you know? And what can you do with what you know? Students show their basic knowledge and understanding through a variety of activities that demonstrate their level of proficiency. This kind of assessment not only requires thorough knowledge of the basic skills, but also demands that students demonstrate their knowledge through projects, performances, experiments, research, essays, critiques, and other practical ways.

What is Performance-Based Training and Education?, Continued

Performance-Based Assessment Standards

Performance-Based tests and assessments are purposeful. That is, they are used as *exit criteria*. Exit criteria are predetermined standards of acceptable student performance at the completion of a module, course, or curriculum.

Performance-based assessment standards are designed to describe the student's level of proficiency in meeting the *exit performance standards*. Performance standards take many forms, but generally revolve around the concept of *mastery learning*. Usually, however, a learner's performance is measured in *levels* of proficiency like those illustrated below.

Performance assessments may be either paper-and-pencil or an actual product or performance. This *Guide* provides more information about both tests and assessments in Section 6 *Evaluation: Student Performance*, Appendix D *Test Assessment: Planning and Writing* and Appendix E: *Performance-Based Learning and Assessment*.

Examples Of Levels Of Performance

Performance-based assessments describe the student's level of proficiency or mastery in meeting the exit performance standards. For example:

If . . .	Then . . .
The learner demonstrates <i>minimum development</i> toward proficiency	Learner meets few of the basic requirements set forth in the <i>exit performance standards</i>
The learner is <i>developing toward proficiency</i>	Learner meets some, but not all, of the basic requirements. He or she has difficulty communicating.
The learner is <i>proficient</i>	Learner meets the basic requirements and communicates these concepts clearly and easily.
The learner is <i>advanced</i>	Learner goes beyond the basic requirements, demonstrates a thorough understanding of the exit performance standards, and communicates those concepts clearly and easily.

What Is Performance-Based Training and Education?, Continued

Competency-Based Vs. Performance-Based Training And Education

Competency-based training typically evolves from an in-depth occupational or job task analysis. Students receive training about specific processes and procedures for learning and performing specific tasks. Competency-based training is based on the concept of *mastery learning* that usually includes a 100% standard when student remediation is available. Students can demonstrate mastery by taking paper-and-pencil tests, or by actually performing a task, procedure, or performance.

How to develop student performance measures is covered extensively in DAU Faculty Professional Development in Education course FPDE-6: *Measuring Performance: Assessing Student Outcomes*.

Performance-based education involves direct, systematic observation and rating of student performance of an educational objective, often an ongoing observation over a period of time, and typically involving the creation of products. The assessment may be a continuing interaction between teacher and student and should ideally be part of the learning process. The assessment typically involves a “real-world performance” with relevance to the student and learning community. Assessment of the performance is done using a rubric, or analytic scoring guide to aid in rater objectivity. Performance-based assessment is a test of the ability to apply knowledge in a real-life setting.

Performance-based assessment is operationally defined as the use of performance criteria to determine the degree to which a student has met an achievement target. Important elements of performance-based assessment include clear goals or performance criteria clearly articulated and communicated to the learner; the establishment of a sound sampling that clearly envisions the scope of an achievement target and the type of learning that is involved (use of problem-solving skills, knowledge acquisition, etc.) Attention to extraneous interference (cultural biases, language barriers, testing environment, tester biases) and establishment of a clear purpose for the data collected during the assessment before the assessment is undertaken, keeping in mind the needs of the groups involved (teachers, students, etc.).

What Is Competency/Criterion-Based Training and Education?

Introduction

Historically the Department of Defense, when referring to training its acquisition workforce, applied the term “competency-based” in attempting to determine training and education requirements. Competency-based training and education was viewed as *job or occupation specific*. That is, an individual learner would concentrate on *mastering* the “competencies” associated with a particular government job series or classification (e.g., Contract Specialist).

Subsequently, as learning designs have become more sophisticated, the term “competency-based” is a bit too restrictive when applied to some higher-level courses within the DAU. Currently, requirements are more generally built around what are called “criterion-based” instructional designs. Competency-based training still exists within the DAU, but usually is considered in the Analysis Phase of the Instructional Design Process (ISD). When courses go into the Development Phase of the ISD, course designers use criterion-based referencing in course and curricula designs.

The Structure Of Competency/Criterion- Based Learning

Competency/criterion-based learning combines a primary focus on subject content with the individual interest of the learner. It requires a deep and consistent commitment to rigorous academic standards. That is, competency/criterion-based training defines relevance with reference to the knowledge/content base of any given field. In competency-based or performance-based learning designs, the student ultimately receives certification in a profession by demonstrating facility with both theory and practice. Both performance-based and competency-based interventions are designed around the concept of *mastery* learning.

There are different approaches to performance-based and competency-based designs. Competency-based designs usually evolve from job-task analysis (JTA) and are typically process or procedure oriented. Mastering such processes or procedures may prepare a person to perform the duties and tasks in a job or occupation; however, effective *performance-based design* may also include elements such as:

- Problem-solving,
 - Decision-making,
 - Computer literacy,
 - Interpersonal, cross-occupational communication skills,
 - Adaptability to rapid change, and
 - Increasing self-direction,
 - Among others.
-

Section Summary and Selected References

Summary

The *Curriculum Development Guide* is DAU's approach to bringing together public law, policy, and instructional systems design. The *Guide* emphasizes the concept of performance-based education and training learning systems.

The long-range promise, and ultimately the justification, for performance-based education and training are to increase student learning by improving the quality of instruction. Theoretically, this should occur as the direct consequence of improved faculty education programs and continuing professional development of faculty.

In order to facilitate faculty development and to improve performance as educators, this *Guide* provides acquisition education and training professionals the necessary information to successfully engage in instructional systems design. Most of the material covered in the *Guide* can be explored at greater depths by enrolling in one of the many Faculty Professional Development (FPD) courses made available to all DAU faculties through the LCIC.

This *Guide* is not a document that can be consumed in one sitting. It is used best as a reference document. Each section is broken into specific units that affect all levels of instructional systems development of DAU courses.

For the convenience of the user, each Section of the *Guide* has been authored in descriptive language while the Appendices are written in more prescriptive language.

Related References

Public Law 101-510 National Defense Authorization Act for Fiscal Year 1991 known as the *Defense Acquisition Workforce Improvement Act*

See corresponding 700-Series DAU Policy Directives on the DAUNet linked to the LCIC.

Section 2

The Systems Approach To Instructional Design

Overview

Introduction

The systems approach to instructional design is a five-phase process that ensures education and training seeks to accomplish the following goal: To provide a practical, results-oriented instructional program which provides people with the skills and knowledge to do their jobs correctly, efficiently, and with confidence.

Instructional Systems Design is often called SAT (Systems Approach to Training) or ADDIE (Analysis, Design, Development, Implement, Evaluate).

There are several traditional systematic approaches to training such as Performance-Based Training (PBT) and Criterion Referenced Instruction (CRI). These approaches have some common elements:

- *Competency Based (Job Related)*: The learners are required to master a Skill, Knowledge, or Attitude (SKA). The training focuses on the job by having the learners achieve the criteria or standards necessary for proper task performance.
- *Sequential*: Lessons are logically and sequentially integrated.
- *Tracked*: A tracking system is established that allows changes and updates to the training materials to be performed efficiently.
- *Evaluated*: Evaluation and corrective action allows continuous improvement and maintenance of training information that reflects current status and conditions.

The following topics are covered in this section:

Topics	See Page
ISD Overview	13
ISD And Program Evaluation In The DAU	20
Rapid Deployment/Rapid Prototyping Model	21
Section Summary	24

ISD Overview

Overview

The systematic approach and design model has many names; however, Instructional Systems Design (ISD) remains the standard. This model takes into consideration audience characteristics, the nature of the knowledge, skills, job, and tasks to be learned, and environmental constraints.

Instructional systems design is a field that takes many of its concepts and principles from various disciplines. For example, as an *applied discipline*, ISD uses learning theory from psychology to determine how an individual learns (learning style) and how to best address their learning need. Instructional theory uses that person's learning style to determine how to best develop instruction.

The ISD process provides a means for sound decision making to determine the who, what, when, where, why, and how of training. The concept of a systems approach to training is based on obtaining an overall view of the training process. It is characterized by an orderly process for gathering and analyzing collective and individual performance requirements, and by its ability to respond to identified training needs. The application of a systems approach to training insures that training programs and the required support materials are continually developed in an effective and efficient manner to match the variety of needs in an ever rapidly changing environment.

The five phases of the ISD model are Analysis, Design, Development, Implementation, and Evaluation (ADDIE). It is pictorially displayed on the following page as a linear model, but the approach involves continuous iterations. Decisions made in one phase affect actions and plans in other phases.

ISD Model

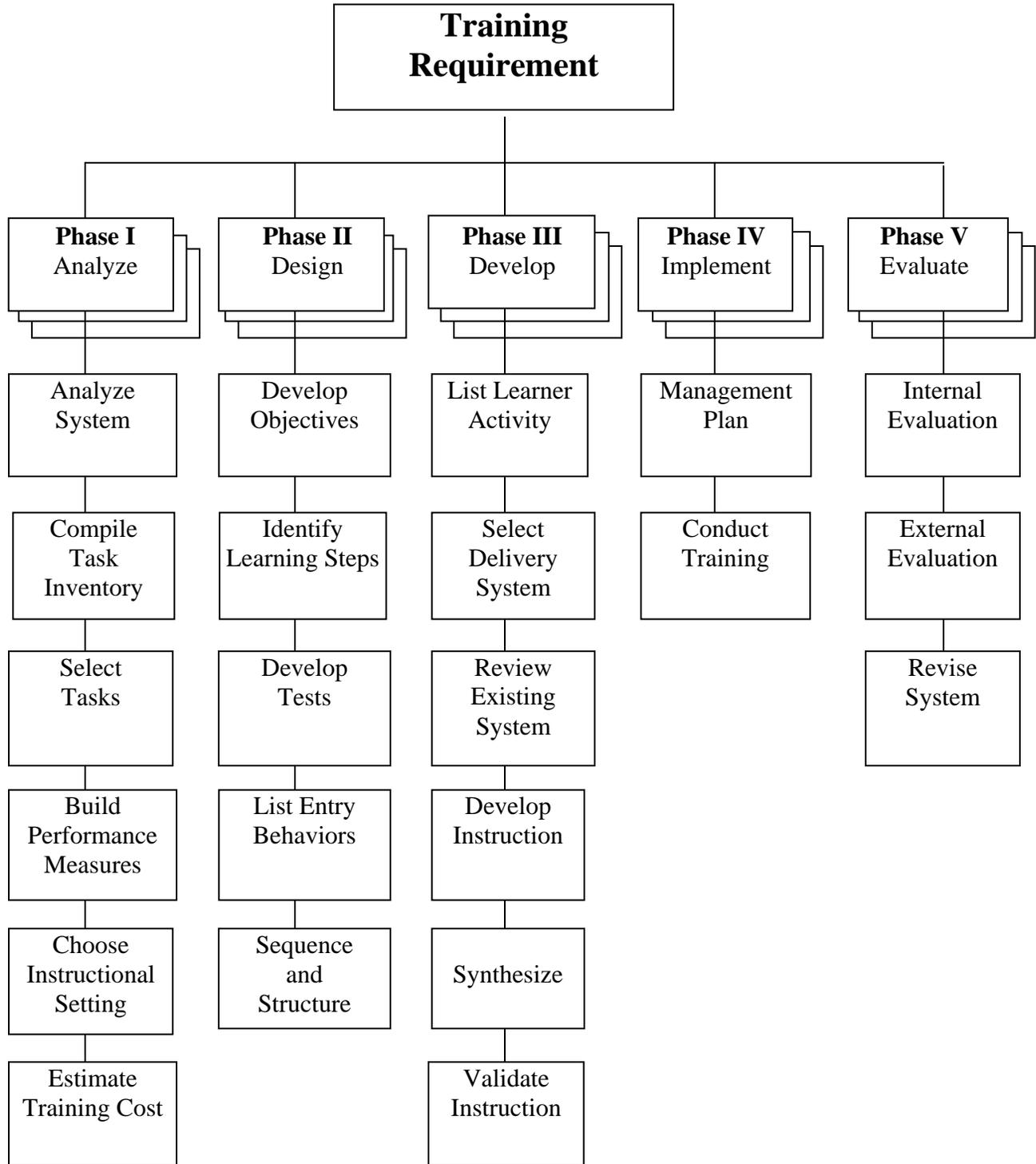
The ISD model was first established by the Department of Defense, but can now be found in almost any type of organization. It grew out of the "systems analysis" concepts that became popular after World War II. Today, it is probably the most extensively used instructional design model.

ISD is concerned with the identification of training requirements based on the analysis of job performance requirements data obtained from experts in the job to be performed. The following is an illustration of the ISD model.

Continued on next page

Overview, Continued

ISD Model



Overview, Continued

ISD And Training Requirements

Training objectives are formulated as a result of the job or task analysis process, and tests are developed to assess the learner's progress toward meeting the training objectives. ISD or SAT also attempts to bring structure to the instructional design process when determining the optimal instructional strategies, instructional sequencing, and instructional delivery media for the types of training objectives involved.

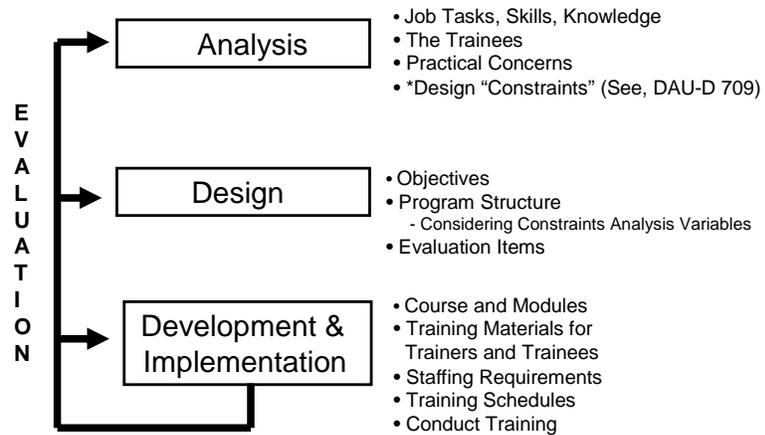
Although there are minor differences, most development systems follow an approach similar to this sequence:

1. *Analyze* the system in order to completely understand it, and then describe the goals you wish to achieve in order to correct any shortcomings or faults within the system.
 2. *Design* a method or model to achieve your goals
 3. *Develop* the model into a product (in training, this product is called courseware).
 4. *Implement* the courseware.
 5. *Evaluate* the courseware and audit-trail throughout the four phases and in the field to ensure it is heading in the right direction and achieving the desired results.
-

Overview, Continued

The ISD Model and Evaluation

Evaluation in instructional design is an ongoing process. As the visual below illustrates, evaluation is actually conducted at the end of *each* phase of the ISD in addition to an overarching evaluation.



*Constraints are factors that can affect Design outcomes, like resources.

Analysis

Analysis provides a method of responding to changes in human resource requirements, solving job performance problems, and learning from "real world" experience. In the analysis phase, detailed practical studies are performed to determine what areas require instruction, learner characteristics, cost-effectiveness of a selected delivery system, constraints, and the scope, timeline, and budget of an education and training project or program. These facts are gathered to make informed development decisions and provide the linkage between the job and the instructional project or program.

The following types of analyses maybe completed:

- Needs or Performance Analysis and Constraints Analysis
- Audience or Learner Characteristics Analysis
- Job/Task Analysis
- Skill/Knowledge (Competency) Analysis
- Content, Learning, and/or Instruction

Overview, Continued

Design

Design uses the performance information collected earlier to help the instructional project/program take shape. The information gathered specifies, in measurable terms, the knowledge, skills, and aptitudes that the instruction will develop.

Learning objectives are developed for groups of related knowledge and skills. These written statements of learning outcomes define exactly when, what, and how well the learner must perform during instruction. Defining how individual tasks are performed focuses development efforts. In addition, the information gathered permits more effective decisions regarding:

- Developing learning objectives for each task, to include both terminal and enabling objectives.
- Identifying and listing the learning steps required to perform the task.
- Developing the performance tests to show mastery of the tasks to be trained.
- Listing the entry behaviors that the learner must demonstrate prior to training.
- Sequencing and structuring the learning objectives, e.g., easy tasks first.

Development

Development organizes the instructional materials needed for learners to achieve the learning objectives. Emphasis is on maximizing the use of existing materials and resources. Instructor and learner activities are defined and these activities describe how the instructor and learners will perform to achieve the learning objectives.

Existing, suitable instructional materials and lesson plans are selected and new ones are produced as needed. Resulting materials are reviewed for technical accuracy, tried out with a group of learners, and revised as necessary. Performance-based instructional materials are the products of this phase.

Overview, Continued

Development, Continued

Typical instructional development activities include:

- Listing the activities that will help the students learn the task.
 - Selecting the delivery methods.
 - Reviewing existing materials so that you do not reinvent the wheel.
 - Developing the instructional courseware.
 - Synthesizing the courseware into a viable training program.
 - Validating the instruction to ensure it accomplishes all goals and objectives.
-

Implementation

Implementation is the process of putting the instructional program into operation. This finalized product is ready to be delivered to the target audience. If it is to be instructor-led or facilitated, instructors are selected and trained usually with a train-the-trainer session.

Activities in this phase include:

- Creating a management plan for conducting the training.
- Conducting the training.

Instruction is delivered as planned, and learner as well as and instructor, performance is evaluated. These evaluations serve two purposes. First, they verify that learners have achieved the learning objectives. Second, learner evaluation results and instructor comments are useful for future program revisions and follow-up evaluation.

Evaluation

The evaluation phase ensures continuing ability to produce qualified learners. Evaluation involves:

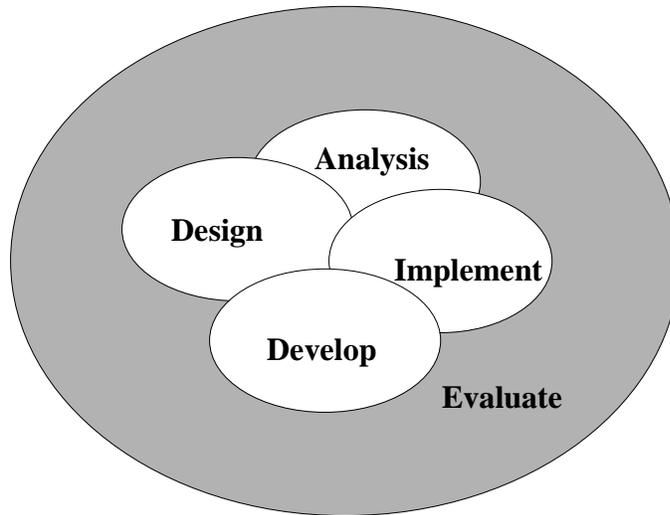
- Reviewing and evaluating each phase (analysis, design, development, and implementation) to ensure it is accomplishing what it is supposed to do.
- Performing external evaluations, e.g. that the tasks that were trained can actually be performed by the learner on the job (refer to the Kirkpatrick approach described on page 28).
- Revising training to make it better.

Evaluation is the dynamic process of assessing performance, identifying concerns, and initiating corrective actions. Data sources for evaluation often include surveys, interviews, tests, course evaluation results, service or product data, and observations.

Overview, Continued

**Evaluation
Illustrated**

The illustration below demonstrates both the dependency and interdependency of the Evaluation Phase of the ISD.



ISD And Program Evaluation In The DAU

DAU Evaluation Program The evaluation of training in the public service is generally represented by the systems approach to training. , the Kirkpatrick¹ model is most often cited in the general literature. The Bell System Approach, the Result-Oriented Human Resource Development (HRD) models have been described by Jack Phillips². They are described, as used by the DAU, in the table below.

	Level	Outcome	DAU Initiative
Kirkpatrick	I. Reaction	How do learners feel about the program or like the course?	End of Course Survey Instrument (EOCI).
Kirkpatrick	II. Learning	To what extent did the learner increase knowledge, improve skills, and/or change attitudes? How well did the student learn?	In class/on-line student assessment(s) (Performance Evaluations).
Kirkpatrick	III. Behavior	To what extent did the learner's job behavior or performance change resulting from the education and training?	Postgraduate survey.
Kirkpatrick	IV. Results	What are the tangible results of the program in terms of reduced cost, improved quality and quantity?	Academic program review and resource graduate survey.
Phillips	V. Return on Investment (Method will be functionally applied on a selective basis by the DAU)	The examination of monetary value of the result with respect to the cost of the training.	Selective, telephonic data gathering.

¹ Refer to: Kirkpatrick, Donald L. (2d ed. 1998) *Evaluating Training Programs: The Four Levels*. Berrett-Koehler Publishers: San Francisco.

² Refer to: Phillips, Jack (1991). *Handbook of Training and Evaluation and Measurement Methods*. American Society for Training and Development.

Rapid Deployment Model

Introduction

In today's environment of spontaneous change, there is a need for ISD processes that are quicker and more efficient, while still maintaining the focus on effectiveness. The DAU employs a capability to deliver rapid deployment training (RDT) courses or modules to balance the challenges of maintaining high quality, while decreasing cycle time.

Overview

Rapid deployment design uses a more formative model that is based on usability testing of prototypes. Actual results of the deployment are used to modify and improve the product. This model shares many attributes with the standard ISD model in that it stresses the importance of iterative analysis and evaluation.

Rapid deployment is a viable model for instructional designs using classroom, but more especially technology-based forms of instruction (i.e., a continuous learning module (CLM)). The processes typically do not occur in a linear fashion, as in the traditional systems model. For example, the completion of the analysis of the content is dependent on the knowledge gained from creating a prototype lesson. RDT reduces potential risks by having stakeholders review materials early in the process when changes can be made more cost effectively. Using RDT, early reviews of completed course materials can reduce the development cycle by at least one-third.

Comparison of RDT & ISD

Step	RDT	ISD
1	Assess needs and analyze	Analysis
2	Set objectives	Design
3	Build skeletal (prototype system)	Develop
4	User/customer evaluation	Evaluate
5	Concept refinement	Develop
6	Implementation of refined requirements	Evaluate
7	Concept refinement	Develop
8	Implementation of refined requirements	Evaluate
9	Etc., in a continuous cycle	Etc., in a continuous cycle
10	Implement and evaluate.	Implement and evaluate

Rapid Deployment, Continued

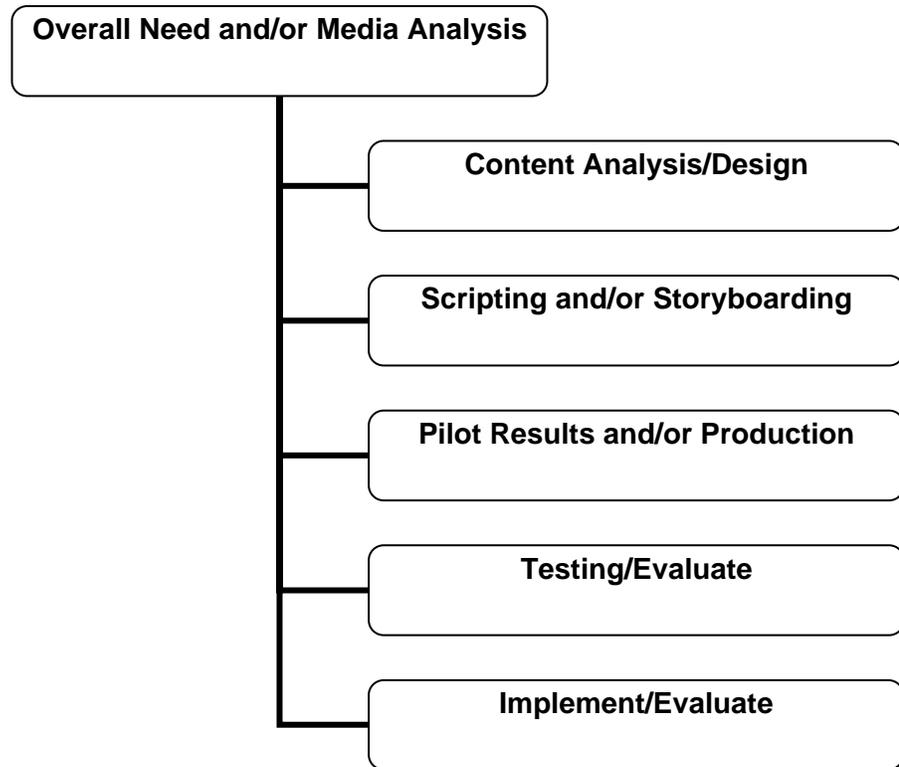
When Are We Using RDT And When Are We Using ISD?

If we know a subject well, how learners best learn that subject, or have built similar training programs, then we will perform less prototyping, thus our development will fall more into the traditional (dynamic) ISD method.

When the subject is new, we are more into RDT. Both traditional ISD and RDT are acceptable methods. Rapid development prototyping (RDP) can be advantageously used to reduce potential risks of development by having stakeholders review materials early in the process when changes can be made more cost effectively (this is especially true with technology-based interventions). The ISD approach is the preferred method when developing more traditional classroom-based courses.

A Rapid Deployment Prototyping Model For TBT

The figure below shows how the RDP steps can be conducted in technology-based models. The waterfall effect of the boxes below illustrates how the rapid prototype model is different than the more linear systems model of input, throughput, and output.



Rapid Deployment, Continued

DAU Interactive Process Teams (IPT) Both RDP and ISD utilize an interactive team process to arrive on agreement for DAU on a course design approaches.

RDP Process The steps below illustrate the DAU method for rapid-development prototyping.

Step	Action
1	Identify performance outcomes.
2	Develop course design guide.
3	Create scripts/prototypes.
4	Develop course materials.

Step 1 Establish specific performance outcomes for the course. Identify certification criteria and test/assessment strategy.

Step 2 Establish terminal and enabling learning objectives and/or performance outcomes. Divide content into units. Select methods, media, and develop validation plan.

Step 3 Convert course content into lessons. Develop exercises/ interactions. Create prototypes of lessons, graphics, and interactions. Finalize test and/or assessment items.

Step 4 Develop course materials for prototype testing.

Section Summary

Summary

The systems approach to education and training provides a method for analyzing, designing, developing, implementing, and evaluating cost-effective, results oriented instructional programs. These guidelines were developed to describe the ISD systematic model. *These are development guidelines, not development requirements.*

The rapid development training prototyping model enables the developer to create instructional materials in a non-linear; rapid paced method, more cost effectively, and in reduced time.

Section 3

Analysis Phase Of Instructional Design

Overview

Introduction

Analysis means to break down or take apart. Analysis is used in the ISD model to identify a performance deficiency or problem and to determine the solution to that deficiency. A job analysis obtains a detailed listing of what activities (tasks) a particular job entails. Once identified, these activities (tasks) are ranked and a determination is made on which ones require training. The task analysis process describes what actions the job incumbent does in performing this task and what skills and knowledge the learner needs to accomplish this.

For those tasks that are not behaviorally or procedurally driven, i.e., those tasks that are more mental in nature—as in decision-making—a content, learning, or cognitive analysis is completed. Frequently, even in the presence of a task analysis, instructional designers must ask how the information is best organized for learning.

In this section the following topics are covered.

Topics	See Page
Types of Analysis, Terminology, and Methodologies	26
Preplanning Analysis	30
Job Analysis	32
Task Analysis	40
Content/Instructional Analysis	42
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Types of Analyses, Terminology, and Methodology

Overview

There are several different types of analyses. The types include but are not limited to the following:

- Needs or Performance Analysis
- Job Analysis
- Task Analysis
- Knowledge/Skill(Competency) Analysis
- Content/Instructional Analysis

Each of these can be used by itself or in combination. This section will cover questions to be answered by the various types of analysis, terminology common to all types, and methods for conducting the analysis.

Types Of Analyses

Each type of analyses answers a different question.

Type	Question
Needs or Performance Analysis	<ul style="list-style-type: none"> • Is it a training need? • If so, how will it be satisfied?
Job Analysis	<ul style="list-style-type: none"> • What tasks are performed in an identified job position? • Of these tasks, which ones will be selected for training?
Task Analysis	<ul style="list-style-type: none"> • What are the components of each task within this job position? • What are the skills, knowledge, and abilities needed?
Knowledge/Skill (Competency) Analysis	<ul style="list-style-type: none"> • What are the underlying skill and knowledge requirements?
Content/Instructional Analysis	<ul style="list-style-type: none"> • What are the underlying skill and knowledge requirements and how do they relate to task performance? • How can these skills and knowledge be organized to aid training design?

Types of Analyses, Terminology, and Methodology, Continued

Terminology The language of analysis.

Term	Example
Job: The name of an occupation.	<ul style="list-style-type: none"> • Contract Specialist
Duty: A large segment of an occupation (job), an arbitrary clustering of related tasks into a broad functional area or general area of responsibility.	<ul style="list-style-type: none"> • Managing schedules • Monitoring contracts • Preparing reports
Task: A unit of work activity that constitutes a logical and necessary event during job performance and that leads to a product, service, decision or change in the environment. The skills or competencies that the learner must obtain in order to be successful workers.	<ul style="list-style-type: none"> • Produce contract schedule • Initiate work request • Verify Statement of Work
Element: A specific activity, often part of an ordered process, by which a task is performed; also called a “step”.	<ul style="list-style-type: none"> • Replace worn or damaged parts • Enter password to access contractor information
Skill: Physical or mental activities that are needed to accomplish a job/task.	<ul style="list-style-type: none"> • Determine solutions • Analyze a problem • Manipulate figures in a formula
Knowledge: Items required to comprehend, recognize, and/or recall principles, rules, concepts, symbols, and terminology.	<ul style="list-style-type: none"> • How to locate specific data or kinds of data • What something looks like • Formulas to use
Ability: Capacity to acquire and use skills or knowledge.	<ul style="list-style-type: none"> • Language ability • Mathematical ability • Reasoning and problem solving ability • Interpersonal ability

Types of Analyses, Terminology, and Methodology, Continued

Organizing Tasks

It is very important to break the job down into major duties, then the major duties into tasks, and the tasks into elements, skills and knowledge. This structure serves as an organizing scheme in curriculum design. In addition, it is unlikely that the instruction being developed will provide learners with all the necessary skills and knowledge they need if tasks have not been accurately and completely defined.

Generating Task Listing

There are several sources that may provide a task listing. It may come from:

- an actual job/task analysis;
- job performance requirements, or
- job descriptions.

If the list of tasks is not provided, a jury of *subject matter experts* (SMEs) is often convened to help generate and compile the list of tasks necessary to perform the total job.

Actual Job/Task Analysis (JTA)

Job analysis is the systematic process of identifying all tasks performed in a given job position.

Task analysis is the systematic process of clarifying selected tasks and identifying how to do the task and what is required to learn to do the task.

A job-task analysis (JTA) is most appropriate in analyzing observable, repetitious, and procedure-driven performance processes. However, this may not work well when the process is unobservable, requires complex decisions, and is not repetitious.

Data Collection Methods For JTA

Data collection methods include: observation, interviews, and panels of:

- subject-matter experts,
 - occupational analysis centers, and
 - group interviews (also known as a table top or jury of experts).
-

Types of Analyses, Terminology, and Methodology, Continued

Panel Of Experts Or Jury Of Subject Matter Experts Generally there are two strategies that may be used to facilitate this panel or jury:

- Brainstorming
- Index Card Method

Brainstorming Brainstorming is a group process that involves spontaneous contribution of ideas by all members of the group. The group interaction and discussion can be beneficial in developing the task inventory as this interaction may help uncover tasks that might have otherwise been overlooked.

As tasks are generated, they are written on large sheets of paper or easel pads and posted. All ideas should be accepted even though some may eventually be eliminated. Frequently, the tasks are then categorized or grouped around a central theme—things that go together to form a group—from which duty areas will be identified.

Index Card Method Generate categories of job events and have panelists write as many tasks as they can think of on index cards, one task per card. When all panelists have finished, have one person read each card aloud to check for duplicates among the panelists. Have all the panelists read their cards for this one category. Follow this method for each category.

Knowledge/Skill (Competency) Analysis This analysis is useful for performance processes that tend to be unobservable and include a great deal of individual judgment. Such processes tend to be nonlinear, do not necessarily follow a step-by-step procedure, and cannot be described in terms of flowcharts. This analysis is not appropriate for highly routine, procedural tasks.

Step	Action
1	Identify and list the knowledge and skills for a given job position.
2	Sequence the results in hierarchical or logical order.
3	Determine what type of information is required.
4	Identify what decisions/problem solving/or information processing are required by the learner.
5	Structure the content flow (learning points) to include these variables.

Preplanning Analysis

Early Concerns Before beginning any major undertaking, it is always a good idea to ask several questions to determine the breadth and scope of the project.

If you need to know about...	Then conduct a(n)...
The intended audience	Audience Analysis.
The need or performance deficiency	Needs or Performance Analysis.
Parameters that affect the project	Constraints Analysis.
How training can best solve a performance problem	Training Needs Analysis.

Audience Analysis

An audience analysis gathers information for each of the potential audiences. It may include, but not necessarily be limited to:

- exact and similar job title(s)
- audience size
- geographic distribution
- entry level skills and knowledge
- formal and informal education
- service or agency issues and/or
- audience learning style (How do they learn best—by doing, hearing, seeing, thinking or a combination?)

Preplanning Analysis, Continued

Needs Or Performance Analysis

One of the first steps in the analysis phase is to conduct a needs or performance analysis, and, if appropriate, a needs analysis.

The purpose of the performance analysis is to determine:

- if a performance problem exists,
- the nature and cause of the performance problem (skill/knowledge, motivational, environmental, organizational, evaluation, and feedback),
- the impact of the performance problem, and
- an appropriate intervention (solution) to the performance problem.

Results of the needs or performance analysis are used to determine whether it is the intervention. (e.g., instruction, job aid, performance standards in a job description, job re-engineering, improving work site tools).

Constraints Analysis

A constraints analysis identifies the parameters that might affect the project. Such items might be:

- Who is making the request?
- What are the time limitations?
- Which, if any, regulations impact the training?
- What resources and facilities are available and/or required?
- What documentation and tools are available?
- What equipment/processes are needed?
- What are the physical work and instructional environments?
- Are there additional constraints such as time, labor, money, etc.?

Constraints analysis should *always* be performed in conjunction with the Performance Resource Management (PRM) and Regional Deans to ensure (e.g.) facilities, equipment, and faculty limitations are considered in the design of a course. (See DAU-Directive 709, *Developing and Managing DAU Curriculum* for details).

Training Needs Analysis

If instruction is the identified solution to a performance problem or deficiency, training needs analysis looks at the question, *What does education and training need to do to solve this deficiency?* Answering this issue helps determine what resources will be committed to the development of the project.

Job Analysis

Introduction

Job analysis is the process of examining career field or ratings, jobs, major duties and tasks of an existing job, or planning the duties and tasks of a new job. Within ISD, a job analysis is conducted for the purpose of establishing a manageable foundation for an instructional development project.

Job Analysis: Goal

The goal of the job analysis is to develop a complete list of tasks associated with a selected job position, career field or rating. It can be as complex as identifying tasks for a complete field or related just to a single duty or the operation of a new piece of equipment.

The method to generate this complete list of tasks (known as a task inventory) is to identify the job, determine the major duties that make up that job and then those tasks that are associated with each duty.

Note

AT THIS POINT ONLY IDENTIFY TASKS—DO NOT THINK EDUCATION AND TRAINING

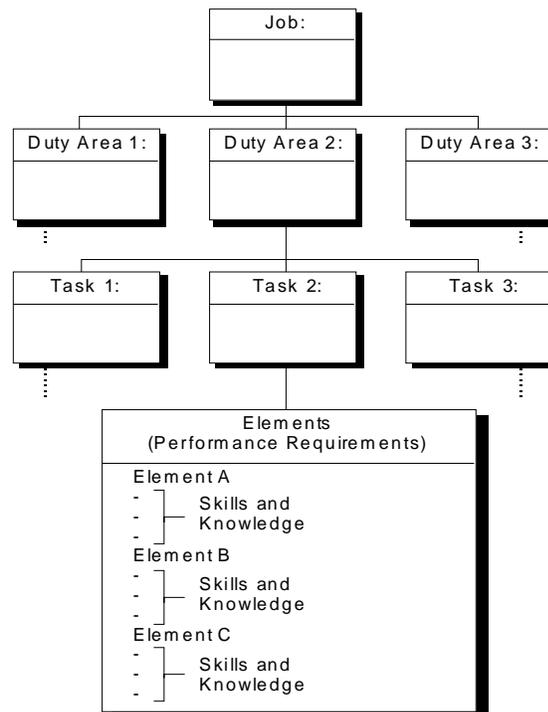
Job Analysis Overview

During job analysis, job incumbents and their supervisors share their knowledge and experience with analysts to develop a detailed list of education and training tasks required to perform a particular job or duty. **Job analysis** produces a list of valid tasks and obtains information related to those tasks, which is used to select tasks for education and training. These tasks are then further analyzed using the task analysis process. Data collection methods used during job analysis typically consist of documentation review, interviewing workers, conducting group meetings using a jury of subject matter experts, or conducting surveys using questionnaires.

Job Analysis, Continued

Structure Of A Job

There is general agreement on an overall structure through which most jobs can be analyzed. The usual pattern is illustrated here:



Note

It is very important to break the job down into major duties and then the major duties into tasks. This structure serves as an organizing scheme in curriculum design. In addition, it is unlikely that the education and training being developed will provide learners with all the necessary skills and knowledge they need if tasks have not be accurately and completely defined.

Job Analysis, Continued

Task Statement Requirements And Guidelines

Once you have determined that the tasks identified are indeed tasks, they must be worded accurately. Below are some guidelines for writing task statements.

Requirement	Rule	Task Statement Example
Clarity	<ul style="list-style-type: none"> • Use easily understood wording. • Use precise action verbs. 	<ul style="list-style-type: none"> • File Documents • Supervise files
Completeness	<ul style="list-style-type: none"> • Use complete statements, avoid abbreviations. • Avoid “and” as it implies two tasks. 	<ul style="list-style-type: none"> • Evaluate Statement of Work (SOW)
Conciseness	<ul style="list-style-type: none"> • Be brief. • The subject “I” or “you” is understood. 	<ul style="list-style-type: none"> • Complete all sections • Identify all elements
Relevance	<ul style="list-style-type: none"> • Do not include attitudes, knowledge or experience requirements or required education and training. 	

Note

During the job analysis process it is helpful to also identify the conditions and standards of the task if possible. It is often the case that a group of tasks will have identical or nearly identical conditions.

Job Analysis, Continued

Types Of Task Conditions

The major items that need to be included in an accurate and complete statement of task conditions are listed below.

Item	Example
Tools and equipment	<ul style="list-style-type: none"> • Personal Computer • Calculator
Special job aids and manuals	<ul style="list-style-type: none"> • Procedural checklist • <i>Acquisition Deskbook</i>
Kind and amount of supervision	<ul style="list-style-type: none"> • Task performed under close supervision • Task performed as a member of a team
Special physical demands	<ul style="list-style-type: none"> • Kneeling or squatting • Unusually cramped positions
Location	<ul style="list-style-type: none"> • Outdoors in all weather • At contractor's location

Task Statement Standards (Products)

The standard of performance can be described by defining an acceptable product, process, or by defining both.

The standard should be defined in terms of an acceptable *product* if the:

- product is observable and can be inspected;
- process by which the product was produced cannot be easily observed, and
- process is relatively unimportant as compared to the product.

Product standards are generally described in terms of accuracy, tolerances, completeness, format, clarity, the number of errors, and/or quantity (i.e., the number of work units produced per time unit).

Job Analysis, Continued

Task Statement Standards (Processes)

The standard should be defined in terms of an acceptable *process* if:

- performance of the task does not leave a readily observable product and/or,
- failure to use the correct process could result in damage to equipment or danger to the performer or others.

Process standards generally are described in terms of sequence, completeness, accuracy, and/or speed of performance.

Validating The Job Analysis Data

Once task statements have been identified, written and categorized, validating the information is an important next step. In the validation process, job incumbents (and sometimes their supervisors) are asked two significant questions:

- Of all the tasks that you do, how do you rate this task according to its *difficulty, importance* (consequence of doing it wrong), and *frequency (DIF)*?
 - Has anything been left out?
-

Validation Methods

There are many methods for this verification process, each with its own set of advantages and limitations. The one chosen will depend on time, resources, and availability of workers. Among these data gathering methods and tools are:

- Interview
- Focus Group
- Observation
- Flowcharting
- Questionnaire—Surveys

The surveys are the method most often used, followed by a focus group.

Job Analysis, Continued

Difficulty, Importance, Frequency (DIF) Survey And Ratings

In a job (DIF) survey, incumbents are asked about their job position, length of time in the position, education, and areas of special experience. Instructions for how to complete the survey and a description of each rating level are provided. The ratings are generally on a five-point scale.

Importance Table

Importance refers to how critical the task is compared to other tasks. Stated another way, what are the consequences of doing it wrong?

Rating	Importance (Criticality)
1	Minimal Value
2	Moderate Value
3	Needs to be done
4	Important
5	Critical

Examples

TASK: *Negotiate a contract.* Importance: 5
 TASK: *Complete a purchase order.* Importance: 3
 TASK: *Make a copy on copier machine.* Importance: 1

Difficulty Table

Difficulty refers to how difficult this task is to perform compared to other tasks done by this worker.

Note

Sometimes a distinction is made between *difficult to learn* and *difficult to perform*.

Rating	Difficulty
1	Among the easiest
2	Easy
3	Average or Minimally difficult
4	Difficult
5	Most difficult

Examples

TASK: Conduct a source selection Difficulty: 4
 TASK: Perform the negotiation process Difficulty: 2

Job Analysis, Continued

Frequency Table Frequency refers to how often the task is performed.

Rating	Frequency
1	Rarely (once a year or less)
2	Seldom (about three or four times a year)
3	Occasionally (about once a month)
4	Often (about once a week)
5	Very often (daily)

Examples TASK: Identify specific elements on a contract. Frequency: 5

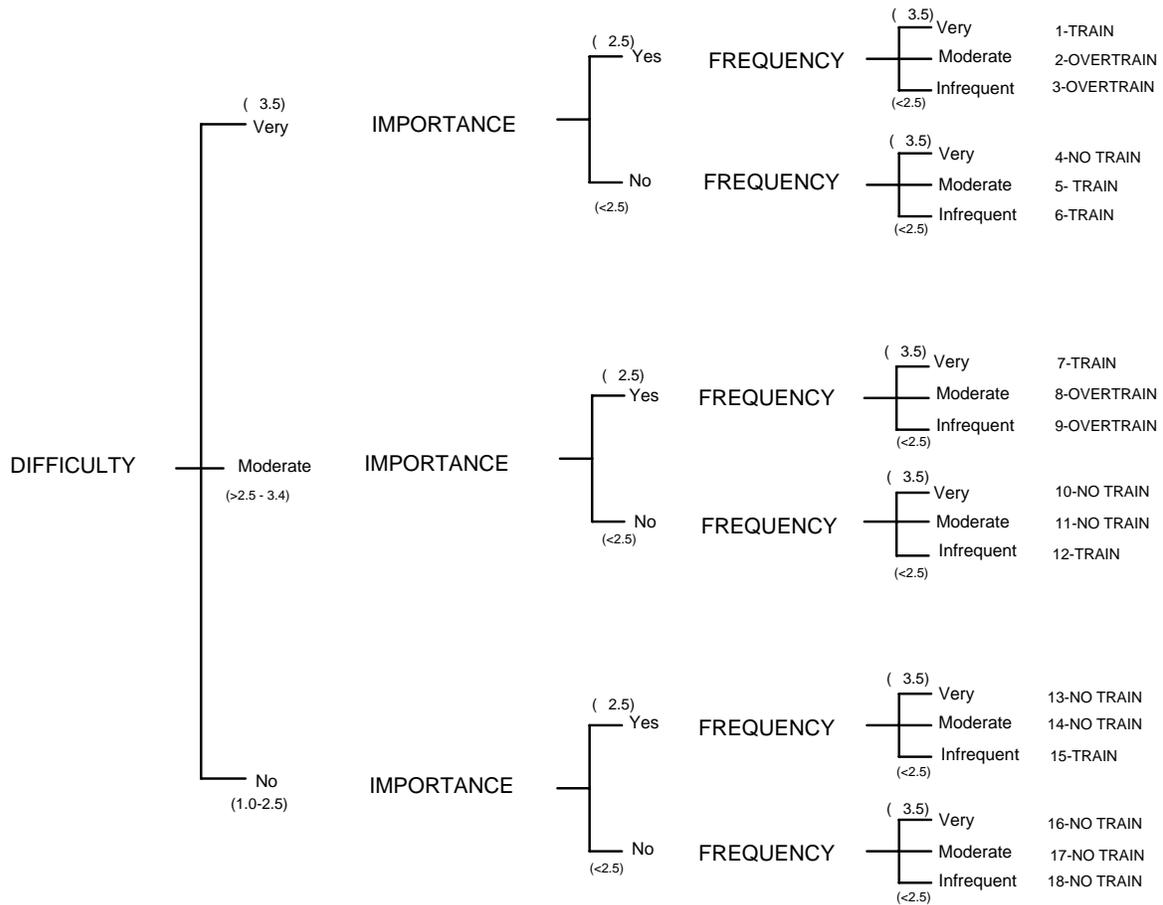
Decision Table The decision table shown below illustrates one way to sort the ratings and provide recommendations for the next step.

If the value of the task for . . .	Then . . .
Importance is a 2 or less	Do not consider any type of training intervention.
Importance is a 3 or more	Go to difficulty.
Difficulty is a 2 or less	While the task needs to be done, workers will learn the task from others already on the job; no formal training will be developed or training dollars spent.
Difficulty is 3 or more	Determine if learning will occur via a job aid, formal initial training, or initial and continuing training.

Job Analysis, Continued

Decision Tree

A decision tree is another method used to help sort the average DIF ratings and assist in determining which tasks are identified for initial instruction, continuing (refresher or over training) instruction, or no formal training.



Task Analysis

Introduction

Once tasks have been selected for education or training, the next step is to analyze the individual tasks. This process is time consuming and difficult, but it is in this step where documentation of the task actions (elements or steps) and the abilities, skills, and knowledge required to perform the task are determined. This information is critical to the instructional development process. Without it, developers have no idea of what skills and knowledge students need for learning to take place. For example, you need to know basic algebra and have skills in performing basic computations in order to successfully complete the DAU Cost Analysis course.

Documenting The Task

The first step in documenting the task involves gathering data about the task itself. Data gathered about the task includes:

- Task title (Of major importance in the development of *terminal learning objectives (TLOs)*)
 - Task conditions
 - Task standards
 - Average time to perform task
 - Initiating signal or cue
 - Terminal signal or cue
 - Tools and equipment
 - References
-

Listing Task Procedures

The second step in task analysis requires the listing of procedures or steps a person would actually perform to successfully accomplish the task. These task actions are called *elements* and are useful for the developer in the writing of *enabling learning objectives (ELOs)*.

Task Analysis, Continued

Determining Abilities, Knowledge, And Skills

The third step in analysis is to identify abilities knowledge, and skills required to perform a task.

Ability, also referred to as aptitude, is a person's capacity to acquire skills and knowledge. Some illustrative examples are:

- *Verbal Comprehension* - to understand the meaning of words and their relationship to each other; to readily comprehend what is read.
- *Verbal Fluency* - to be fluent in naming or making words.
- *Numbers* - to be speedy and accurate in making simple arithmetic computations such as adding, subtracting, multiplying, and dividing.
- *Space*, - memory, perceptive speed, inductive reasoning and physical attributes.

Knowledge is the range of information or understanding of a subject or a variety of subjects. It includes items of information required to comprehend, recognize, and recall principles, rules, concepts, phenomena, symbols, and terminology. Knowledge is viewed as the combined result of formal education, training, and experience.

Skills are the application or use of one's knowledge in a practical situation. Skills generally result from a combination of basic abilities and their augmentation by formal training and practical experience. Skills are acquired through training and practice and usually denote competence in doing or performing specific *physical* and *mental* jobs.

These skills and knowledge are the specific points of information that will be included in the content of the training and are called *learning points*. Identifying the steps (actions) in performing the tasks provides the elements. Identifying what a person must do (skill) or must know (knowledge) to perform each step helps the developer distinguish between what students need to know and what is nice to know.

Remember, the purpose of conducting the task analysis is to establish a manageable foundation to build the training program/project.

Content/Instructional Analysis

Introduction

A content analysis (also known as an instructional or learning analysis) is the process by which a designer/developer looks at the skills and knowledge (learning points) required in learning the task to create the opportunities for student learning.

Steps In Performing A Content Analysis

The following steps are included in a content analysis:.

Step	Action
1	Identify the type of learning required for mastery
2	Determine if the skill and knowledge learning points should be taught to the <i>use</i> or <i>remember</i> level.
3	Based on this information determine the <i>covert mental operations</i> of the learner

Step One

The first step is to identify the type of learning required to master the content identified in a task analysis and decide what type of content is involved. The different types of content are:

- Facts
- Concepts
- Procedures
- Processes
- Principles

This is of major importance if the task is more *cognitive* (mental) rather than *behavioral* (observable).

Facts

A fact is a one-of-a-kind piece of information. It can be:

- a singular fact (e.g., a name, Defense Acquisition Workforce Improvement Act), or
- a fact statement (e.g., date associated with event—DAWIA was signed and implemented in 1991).

Content/Instructional Analysis, Continued

Concepts

A concept is a term that refers to a group of objects, events or symbols which share common attributes or features and are identified by the same name. When presenting concepts, all critical attributes of the concept must be presented so that students can distinguish all future examples from non-examples.

Example: A contract is an agreement between two or more parties.

Procedures

A procedure is an ordered sequence of steps necessary to accomplish some goal, solve a class of problems, or produce some product that can (usually) be accomplished by one person.

Examples: How to develop a statement of work (SOW). How to terminate a contract is a procedure

Processes

A process is an ordered sequence of events necessary to reach a goal that is accomplished by more than one individual, department, organization, component or subsystem. A process is achieved outside the control of any one person.

The difference between procedures and processes is that a procedure describes steps which are performed (first do this, then do that...), while a process describes events or phases in a cycle that are not described in terms of performance (first "this occurs", then "that occurs"...). For example:

Example: How a contract is actually terminated is a process.

Content/Instructional Analysis, Continued

Principles

A principle is a statement of cause and effect relationships allowing one to make predictions about some natural or behavioral action. A principle states what should be done (policies, rules), what seems to be true in light of the evidence (generalizations, theories, hypotheses), or what is not provable but implied by other statements (assumptions). For example:

- All DAU courses will test and/or assess student performance (policy); All students learn at the same rate (generalization).
 - To find the area of a rectangle, use the equation $A = \text{length} \times \text{width}$ (law).
-

Step Two

The second step in the content analysis is to match the information and instruction to a specific performance level. The content, as noted above, can be facts, concepts, processes, procedures, or principles. The performance outcome can be one of two levels: *Remember* or *Use*.

Remember

The performance *remembers* (knowledge) would ask learners to memorize, recall or recognize information that has not been applied in any way.

Example: Describe how to log on to the network computer system and access the word processing application “*Word*”.

This task would require learners to memorize the steps, however, it does not guarantee that the learner could actually access “*Word*”.

Use

The performance *use* (skill) asks learners to apply the information that has been memorized to some real world task. An example: Access the word processing software, “*Word*” on the network computer system.

Note

Facts, concepts, processes, procedures, or principles may be at *remember*, or *use* performance levels.

Step Three

The final step is for the designer/developer to look at the information the learner must process and the sequence of cognitive operations required making decisions, solving problems, or process information. The purpose is to represent the covert mental operations of the learner while performing a task, rather than modeling the overt behavior exhibited by the learner.

Section Summary

Summary

There are many variations to the Job and Task Analysis process. However, the purpose of analysis is to identify content so that meaningful, appropriate, and performance-based training can be developed. Without proper and detailed analysis regardless of the approach, method or type meaningful and measurable objectives cannot be written, appropriate content cannot be developed, and performance outcomes will not be achieved. Much time, energy, and money will have been wasted.

Section 4

Designing Learning

Overview

Introduction

The second step in the systematic approach to training (ISD) is design. Design is the “big picture” and is the process of using data accumulated during the analysis phase to specify where and how the tasks selected for training are presented in the training program. The purpose is to create a blueprint of the training program.

During this phase, learning objectives are written and sequenced, assessment items are constructed, and the instructional setting, media, and instructional strategy are selected.

In This Section

The following topics are covered in this section.

Topics	See Page
Learning Objectives	47
Design Concepts	51
Performance and Assessment	52
Instructional Strategies and Methodologies	55
Section Summary	57

Learning Objectives

Introduction

For every education or training program, and for each course and lesson within that program, there is a set of intended outcomes, or statements of what the learners should be able to do as a result of the instruction. The outcomes expected from a course or lessons are also known as learning objectives, which serve three important functions:

- defining the desired outcomes of learning;
- serving as a guide to the selection of strategies and methods of instruction, and
- providing criteria for evaluation of the learning.

Thus, learning objectives play a crucial role in the planning and implementation of instruction.

Preparing Learning Objectives

Learning objectives serve as the foundation for performance-based education and training programs. In general, they are derived from skill and knowledge requirements identified during a task analysis, and they fall into two distinct categories: terminal and enabling objectives.

Note

Learning objectives are also known as performance outcomes, performance objectives, learning outcomes, or behavioral objectives. Each of these terms is referring to the desired outcome of instruction. A more detailed discussion on writing learning objectives is provided in *Appendix A: How To Write Learning Objectives*.

Terminal Objectives

Terminal performance objectives are the identified desired learning outcomes after a segment of instruction. This segment could be an entire course or a lesson or module. Terminal objectives are frequently translated directly from task statements and clearly state the after-instruction performance the learner must be able to demonstrate.

Learning Objectives, Continued

Enabling Objectives

Enabling objectives provide the means for reaching the terminal objectives and generally consist of the skills, knowledge, and task steps that must be completed or satisfied in order to *master* the terminal objective. Enabling objectives are derived from the elements, skill, and knowledge requirements identified during task analysis.

Components Of Objectives

To describe the desired performance outcomes clearly, an objective should always address three questions:

Question	Meaning	Examples
Under what circumstances do you want the learner to perform the objective? What is available or supplied?	These are called the “ <i>Conditions of Testing</i> ” student performance. Under what conditions will the student perform?	Given a simplified acquisition request... Given a copy of Procedure 5003... Given a scenario... From memory (implied)...
What should the learner be able to do at the end of instruction?	<i>Performance</i> (Action Verb + Object of that action), or; what the student should be able to do.	Identify acquisition life cycle phase... List the five phases of ISD...
How well the objective must be performed?	<i>Standard</i> , or how well should the student be able to perform?	...within one hour. ...in accordance with procedure. ...correctly or completely (implied).

Learning Objectives, Continued

Levels Of Objectives

Using Bloom's cognitive classification system, the taxonomic level of each behavioral term listed in the chart which follows has been decided somewhat arbitrarily. Many of the terms may be classified at two or more levels depending upon the *context* in which the term appears.

These six levels, however, provide a system for classifying objectives by moving from simple recall to complex evaluation. Each level of performance has inputs from lower levels and provides output to higher ones. The first three levels - knowledge, comprehension, and application - provide the basic information needed during normal performance. The last three levels - analysis, synthesis, and evaluation - address the higher levels of complex thinking skills required to perform during uncertain, unusual, abnormal, or emergency situations.

Learning Objectives, Continued

Cognitive Levels Six cognitive levels are generally recognized when sequencing learning objectives:

Learning Level	Definition	Associated Action Verbs	Test Format
Knowledge	Recalling of specific bits of information: no comprehension required; memorization	Define, Match, Repeat, Underline, Name, Label, List, State, Recall, Identify	Multiple Choice Completion True/False Short Answer
Comprehension	Understanding the meaning of material without application	Classify, Identify, Describe, Explain, Compare and Contrast	Multiple Choice Completion Matching Labeling Restricted Essay
Application	Using methods, concepts, principles, and theories in new situations (Rule governed thinking)	Apply, Construct, Calculate, Modify, Show, Demonstrate, Operate, Solve, Choose, Distinguish, Use	Multiple Choice Completion Matching Drawing Restricted Essay
Analysis	Breaking down information into its constitute elements	Analyze, Examine, Resolve, Relate, Classify, Breakdown	Multiple Choice Essay Practical Exercise
Synthesis	Putting together new constitute elements or parts to form an original result	Derive, Generate a Plan, Design, Develop, Formulate, Create, Organize	Essay Practical Exercise Case Exercise Develop Plans
Evaluation	Judging the value; applying standards	Assess, Defend, Judge, Criticize, Justify	Essay Practical Exercise Case Exercise Evaluate Plans

Design Concepts

Levels Of Design Defined Curriculum design generally uses the following terms:

Term	Definition
Program Design	The full set of activities to train or educate a particular group for a defined career position or a broadly related skill and knowledge area
Course Design	A component of a program to train in a major topic or duty area
Lesson, Unit or Module Design	A segment of instruction devoted to a particular task or topic
Activity Design	A learning experience that supports the teaching of enabling objectives

Relationship Between Analysis And Curriculum Design/ Development

The following table compares performance of the analysis of jobs and tasks to designing program structure and sequence and developing the materials for the education or training program.

Analysis	Design/Development
JOB: Specific titles, what one earns money for doing	Training Program or Curriculum Plan
DUTY AREA: Common group of job responsibilities	Courses in the Program
TASKS: Job requirements in terms of performance, conditions, standards	Lesson (Units, Modules) with Terminal Objectives, Lesson Plans, Teaching Units
TASK ELEMENTS: Major steps (actions) in doing the task	Performance Measures, Practical Exercises, Teaching Points
SKILLS and KNOWLEDGE: What the learner must know and do for each element of the task	Enabling Objectives, Content, Teaching Points

Performance and Assessment

Performance Assessment

Performance assessment involves using various methods to determine what a student knows and/or what she or he can do with what they know. We also assess students to ensure that they have achieved the learning objectives and mastered the content and/or process skills that are an ongoing part of the instruction.

There are a number of ways to assess student performance. In some cases, an informal assessment might be a short oral quiz or having students provide brief written answers. A final course examination would involve a full-blown, formal written test and/or performance assessment where in which students would show evidence of a product, performance, or behavior.

The Nature Of Performance

Broadly speaking, there are two main categories of performance-based assessments: (1) written tests, which are used to determine the degree of content knowledge, and (2) assessments that involve the development of a product, performance, or behavior. The diagram below depicts the types of assessment associated with each.

Student Assessment Methods	
<p>Written Tests</p> <p>Selection-Type Items:</p> <ul style="list-style-type: none"> • True-False • Matching • Multiple-Choice <p>Supply-Type Items</p> <ul style="list-style-type: none"> • Completion • Listing <p>Essay Tests Items</p> <ul style="list-style-type: none"> • Extended Response • Restricted Response 	<p>Product/Performance/Behavior</p> <ul style="list-style-type: none"> • Simulation • Role Play • Case Study • Practical Exercise • Checklists • Rating Scales • Oral Examinations • Working Collaboratively

Performance and Assessment, Continued

Written vs. Performance Test

The chart below compares written tests with performance/practical tests.

Written Tests	Performance/Practical Tests
Indirect measurement-select or supply type test items	Direct measurement-simulation, role play type exercises
Measures mental behavior	Measures mental and physical behavior
Gathers scores about an individual	Gather data about an individual or group
Can be norm-referenced or criterion-referenced	Can be norm-referenced or criterion-referenced
Helps make educational decisions	Helps make educational decisions
Validity and Reliability important (mostly reliability)	Validity and Reliability important (mostly validity)
Isolation of mental aspects of a job task	Simulation of a job task--a matter of degree
Limited forms of written tests	Can take on a variety of forms--role play, demonstration, produce a product (e.g. report)--can be process, product or both
Product or process evaluated (mostly product)	Product or process evaluated (mostly process)

Written Tests

Written tests are most effective in measuring the extent of cognitive learning. A written test can accurately tell how much a learner can recall, list, describe, compare, contrast, calculate, etc. It may be important to ascertain this. The learner may need to apply that information in real job or role situations. Non-written tests are most effective when the job/role situations are simulated in a learning environment.

Performance and Assessment, Continued

Norm - and Criterion - Referenced Testing

There are two basic kinds of testing, *norm-referenced* and *criterion-referenced testing*.

- *Norm-referenced testing* involves comparing participants with each other or with other groups. Norm-referenced testing can be useful for testing large numbers of participants when average scores and relative rankings are important. The disadvantage of this type of testing is that even top-ranking learners may not be able to perform required tasks adequately-they are only better than those ranking below them.
- *Criterion-referenced testing* determines the students' degree of learning as measured against carefully written objectives and a predetermined cutoff score. It measures, reports, and analyzes participants' performance in terms of present learning objectives. Criterion-referenced testing is objective-based, precise, and easy to administer. It requires the development and use clearly defined objectives that can be measured.

Test Qualities

The test must be *valid*. Validity is the extent to which a test measures what it is supposed to measure. *Content validity* is directly concerned with the extent that the test measures the learner's achievement of learning objectives.

The test should also be *reliable*. Reliability is the consistency with which a test measures achievement. There are three factors that have a great effect on test reliability:

- *subjectivity of the scoring* (two or more evaluators should evaluate using the same criteria);
 - *equivalent forms* (two or more versions of the test should measure the same set of skills and knowledge);
 - *inter-occasional reliability* (every administration of the test should be similar in terms of time allotment, physical conditions, directions, etc).
-

Instructional Strategies and Methodologies

Instructional Strategies

There are several strategies for delivering instructions which can be one, or a combination of the following:

- Direct Instruction
- Experiential Learning
- Independent Learning
- Indirect Learning
- Interactive Instruction

Instructional strategies are driven by the instructional design. Each is described in detail below.

Direct Instruction

Direct instruction is using instructional strategies that involve a high degree of teacher control.

<ul style="list-style-type: none"> • Compare & Contrast • Cues, Question, and Advanced Organizers* • Demonstrations • Didactic Questions • Drill and Practice 	<ul style="list-style-type: none"> • Explicit Teaching • Graphic Organizers • Guides for Reading, Listening, Viewing • Identifying Similarities and Differences* • Mastery Lecture 	<ul style="list-style-type: none"> • Reinforcing Effort and Providing Recognition* • Setting Objectives and Providing Feedback* • Summarizing and Note Taking* • Structured Overview
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Experiential Learning

Experiential learning uses instructional strategies where students learn by doing or experiencing.

<ul style="list-style-type: none"> • Conducting Experiments • Field Observations • Field Trips 	<ul style="list-style-type: none"> • Model Building • Surveys • Modeling • Nonlinguistic Representations* 	<ul style="list-style-type: none"> • Role Playing • Games • Simulations • Synectics
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* Marzano, Pickering, and Pollock note that incorporating these nine strategies into instruction can improve student achievement across all content areas and levels.

<http://www.learn-line.nrw.de/angebote/greenline/lernen/downloads/nine.pdf>

Instructional Strategies and Methodologies, Continued

Independent Learning

Independent learning uses instructional strategies where students work independently, sometimes at their own rate on self-selected assignments or topics.

<ul style="list-style-type: none"> • Assigned Problem Questions • Computer Assisted Instruction • Correspondence Lessons • Essays 	<ul style="list-style-type: none"> • Graphic Organizers • Homework and Practice* • Learning Activity Package • Learning Centers 	<ul style="list-style-type: none"> • Learning Contracts • Reports • Research Projects • Summarizing and Note Taking*
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Indirect Learning

Indirect learning uses instructional strategies where the teacher establishes the learning situation or task, but the students determine the direction and/or solution.

<ul style="list-style-type: none"> • Case Studies • Concept Attainment • Concept Formation • Concept Mapping 	<ul style="list-style-type: none"> • Close Procedures • Generating and Testing Hypotheses* • Graphic Organizers • Inquiry 	<ul style="list-style-type: none"> • Problem Solving • Role Playing • Socratic Seminars • Tutorial Groups
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Interactive Instruction

Interactive Instruction uses instructional strategies that involve students working with other students and/or the teacher to move toward the learning goals.

<ul style="list-style-type: none"> • Brainstorming • Circle of Knowledge • Cooperative Learning* • Debates 	<ul style="list-style-type: none"> • Interviewing • Laboratory Groups • Panels • Peer Practice 	<ul style="list-style-type: none"> • Problem Solving • Role Playing • Socratic Seminars • Tutorial Groups
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Section Summary

Summary

In the design phase of ISD learning objectives are written and sequenced, assessment items are constructed, and some major decision about the instructional intervention are made. Objectives, which are based on our analysis data, are the foundation for the instructional design and development. This section covered both terminal and enabling objectives, their three component parts, the six cognitive levels of objectives, and how to sequence objectives. Objectives also provide a direct link to learner assessment which will confirm if learners have achieved instructional objectives.

Section 5

Development and Implementation

Overview

Introduction

During the development and implementation phase of the Instructional Systems Development processes, the details of course and lesson content are determined, student learning activities and support materials are produced, and delivery methods decided. For classroom instruction, the Lesson Plan , Instructor and Student Guides are essential tools for effective instructional delivery.

In This Section

The following topics are covered in this section.

Topics	See Page
Learning Methods, Media and Modes	75
Modes of Delivery	89
Technology-Based Learning	95
Structured Writing Style	97
Instructor Guide	98
Development of Lesson Plans	99
Development of Student and Instructional Support Materials	102
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Learning Methods, Media, and Modes

Introduction

An important part of teaching and learning has to do with the methods, media, and modes used in delivering the material. The rationale, especially as it relates to adult learners, is *the way that concepts and skills are presented may have more impact on the learning process than their content.*

Learning Methods

The term instructional method is very familiar. It can be defined as a procedure or process used to attain an objective or series of objectives. Traditionally, most classroom instruction has been instructor-led. The instructor's role in the classroom placed him or her in control. Students had little control over what they learned, how they learned it, and how much time they spent. It became easy to develop instructional programs for the teacher rather than the student. A greater emphasis is now placed on students controlling learning situations.

Existing and emerging technologies, adult learning theories, and the inherently student-oriented performance-based educational designs are changing the emphasis from teacher-centered to learner-/student-centered instructional methods. The learning method(s) used in course design will be very dependent upon the amount of control given students in the learning situation. For example, the lecture method is almost entirely instructor-controlled, while a simulation gives the greater degree of control to students. Learner-centered learning is illustrated below.

Teacher- vs. Student-Centered Learning Methods

Teacher-Centered Learning Methods	Learner-Centered Learning Methods
<ul style="list-style-type: none"> • Student is dependent on the teacher • High stimulus control by teacher: <ul style="list-style-type: none"> • Information • Knowledge • Cognitive • Intellectual • Formal • Passive learner role 	<ul style="list-style-type: none"> • Dependence is on self and other students • Low stimulus control by teacher: <ul style="list-style-type: none"> • Behavior • Attitudes • Self-insight • Experiential • Informal • Active learner role

Learning Methods, Media, and Modes, Continued

Traditional vs. Accelerated Learning Methods

There are also interesting comparisons between traditional and accelerated learning methods. Accelerated learning methods allow students to:

- learn material faster,
- remember it longer, and
- recall it more easily.

The two basic principles of accelerated learning are that:

1. learning should be fun--not boring, threatening, or judgmental, and
2. learning should be global, involving the “whole student” on all levels:
 - intellectually,
 - emotionally,
 - kinesthetically,
 - consciously, and
 - subconsciously.

The table below provides a comparison of traditional and accelerated methods.

Traditional Methods	Accelerated Methods
Data-intense	Process-intense
Information stuffing	Information accessing
Emphasis on data storage	Emphasis on data processing
Rote memorization	Thinking skills
Manpower	Mindpower
Emotionless	Expressive
Colorless	Sensory evocative
Emphasis on correct response	Free to “wobble” and grow
Inhibited, guarded	Open, relaxed
Individualistic and judgmental	Collaborative and supportive
Punishing	Empowering
Draining	Energizing
Somber and serious	Playful and enjoyable

Learning Methods, Media, and Modes, Continued

Selecting Methods

Selecting appropriate traditional or accelerated learning methods for instruction and learning can determine the success or failure in reaching desired learning outcomes. The type of method(s) used may also be affected by the media selected. The criterion for method development generally follows three broad principles. Truly effective instructing:

- has a general pattern of well-organized procedures,
- stresses comprehension, and
- tends to be more direct than implicit.

The following are recommended steps for selecting the appropriate method of delivery.

Step	Action
1	Specify the goals (objectives) of the educational effort and ways in which success will be measured.
2	Assess each individual's proficiency. Assess each learner's prior knowledge.
3	Structure the learning situation to maximize the probability of learning while minimizing the likelihood of behavior that is incompatible with learning.

Learning Methods, Media, and Modes, Continued

**Learning Methods:
Advantages &
Disadvantages** The advantages and disadvantages of various instructional learning methods are provided below.

Method	Advantages	Disadvantages
<p>Reading Assignments (written text)</p> <p>Appropriateness</p> <ul style="list-style-type: none"> • Formal course • Homework assignments • Knowledge building 	<p>Reaches large number of students with the same information.</p> <p>Can be studied at times, conditions, and pace suitable to student (if outside classroom).</p> <p>Represents a reasonably efficient way of learning.</p> <p>Can be used to provide basic concepts before an activity or provide more in-depth information.</p> <p>Provides flexibility in learning style (e.g., words and graphics).</p> <p>Can be used as a reference after training.</p>	<p>Is expensive to duplicate and distribute.</p> <p>Students read at different paces.</p> <p>Can be boring and isolating if overused.</p> <p>Can alienate students who associate reading assignments with negative school experience.</p>
<p>Lecture (oral presentation of material by instructor with or without question-and-answer session)</p> <p>Appropriateness</p> <ul style="list-style-type: none"> • On-the-job instruction • Formal course • Audiotapes 	<p>Reaches large number of students with the same information.</p> <p>Provides familiar, direct, easy-to-use method.</p> <p>Persuades students to accept a particular point of view.</p> <p>Can be used to summarize results of group activities.</p> <p>Preparation is easier when compared to other methods.</p> <p>Can be adapted to audience interests.</p>	<p>Little group participation; learning is passive. Students tend to remember less of what they hear.</p> <p>Adequate delivery is highly dependent on instructor's presentation skills.</p> <p>Tiring to group if too long.</p>

Continued on next page

Learning Methods, Media, and Modes, Continued

**Learning Methods:
Advantages &
Disadvantages, Continued**

Methods	Advantages	Disadvantages
<p>Demonstration (showing a process or procedure so that students can see action correctly carried out)</p> <p>Appropriateness</p> <ul style="list-style-type: none"> • On-the-job instruction • Formal course Knowledge/Skill building 	<p>Illustrates application of theory or principles.</p> <p>Tends to be a motivation enhancer.</p> <p>Emphasizes and clarifies important procedures.</p> <p>Tends to emphasize realism, true-to-life experiences.</p>	<p>Requires careful planning.</p> <p>Danger of appearing artificial.</p>
<p>Field Trips (Learners go to a site location and observe product development)</p>	<p>Reinforces points made in the classroom.</p> <p>Provides firsthand experience.</p> <p>Broadens perspective and understanding.</p> <p>Can increase interest and enthusiasm.</p>	<p>Requires time and effort to arrange.</p> <p>Requires careful planning.</p> <p>Can be physically tiring.</p> <p>Can be disruptive to normal work operations.</p> <p>Cost and resource intensive.</p>

Continued on next page

Learning Methods, Media, and Modes, Continued

**Learning Methods:
Advantages &
Disadvantages, Continued**

Methods	Advantages	Disadvantages
<p>Discussion (information shared through student-teacher and teacher-student interaction)</p> <p>Appropriateness</p> <ul style="list-style-type: none"> • Formal course • On-the-job instruction 	<p>Reinforces acquiring and practicing knowledge stages.</p> <p>Allows students to use each other as resources and to learn from one another.</p> <p>Allows for exchange of ideas, views, and opinions.</p> <p>Relieves instructor from being sole provider of information.</p> <p>Makes lessons more flexible.</p> <p>Can be used to assess the student's understanding of material.</p>	<p>Does not work if students are not knowledgeable.</p> <p>Takes time.</p> <p>Aimless/dominated discussions lose student interest.</p> <p>Opens potential for interpersonal conflict.</p> <p>Requires clear direction and focus.</p> <p>Less opportunity for full participation if large group.</p>
<p>Breakout Groups (small group of no more than 4 to 6 to conduct an activity)</p> <p>Appropriateness</p> <ul style="list-style-type: none"> • Formal course • Knowledge/Skill building • Motivation 	<p>Can be used to divide a problem into manageable tasks to be analyzed in small groups.</p> <p>Provides situation for analyzing group process skills.</p> <p>Allows learners to use each other as resources and to learn from one another.</p> <p>Allows less assertive learners a chance to talk in a non-threatening situation.</p>	<p>Takes time.</p> <p>Instructor cannot monitor all groups, so groups can get off track.</p> <p>Depending on quality of group dynamics, can create problems focusing on group task.</p> <p>Compounded by group size.</p>

Continued on next page

Learning Methods, Media, and Modes, Continued

**Learning Methods:
Advantages &
Disadvantages, Continued**

Methods	Advantages	Disadvantages
<p>Recall Exercise or Self-Evaluation (paper and pencil activities to help students acquire knowledge)</p> <p>Appropriateness</p> <ul style="list-style-type: none"> • Knowledge reinforcement • Formal course • Homework assignment 	<p>Allows learners to test their knowledge.</p> <p>Gives learners feedback on how they are learning.</p> <p>Helps learners focus on critical factors.</p> <p>Tests knowledge and facts when this is a prerequisite to the objective.</p>	<p>Can appear to be “busy work.”</p> <p>Can appear threatening, like a test.</p>
<p>Practical Exercise</p> <p>Appropriateness</p> <ul style="list-style-type: none"> • On-the-job instruction • Formal course • Skill building • Motivation 	<p>Allows for practice of knowledge and performance.</p> <p>Allows for practice of job behavior in a safe environment and enhances transfer of skills to real work situation.</p> <p>Can be used with individual students and groups of students.</p>	<p>To avoid confusion and be productive, procedures practiced must exactly duplicate those used on the job.</p>

Continued on next page

Learning Methods, Media, and Modes, Continued

**Learning Methods:
Advantages &
Disadvantages, Continued**

Methods	Advantages	Disadvantages
<p>Case Study (a factual account of a real situation for students to analyze to determine the problem and alternative solutions)</p> <p>Appropriateness</p> <ul style="list-style-type: none"> • Seminar • Formal course • Skill building 	<p>Very motivating.</p> <p>Highly participatory.</p> <p>Simulates the way analytical skills are used on the job and enhances transfer.</p> <p>Gives learners insight into their own habits of thinking, viewing, and interpreting.</p> <p>Relieves instructor from being sole source of information.</p> <p>Can be used to practice knowledge or performance.</p> <p>Allows for flexibility; can be used individually or in groups, in self-paced or classroom situations.</p>	<p>Time consuming to conduct.</p> <p>Requires careful preparation.</p> <p>Apathetic, shy, or less able learners may not like to be actively involved; may let others do the work.</p> <p>Especially-interested students may dominate.</p> <p>May require advance study by students.</p> <p>May require certain level of prior knowledge.</p>
<p>Critical Instance (miniature case study for students to analyze a critical situation)</p> <p>Appropriateness</p> <ul style="list-style-type: none"> • Seminar • Formal course • Skill building 	<p>All learners apply knowledge to arrive at a solution.</p> <p>Very motivating.</p> <p>Gives less creative or slower learners a chance to learn from others and not have to perform alone.</p>	<p>Can appear artificial.</p> <p>Forced decision-making can create resentment.</p> <p>Apathetic, shy, or less able learners may not like to be actively involved; may let others do the work.</p>

Continued on next page

Learning Methods, Media, and Modes, Continued

**Learning Methods:
Advantages &
Disadvantages, Continued**

Methods	Advantages	Disadvantages
<p>Incident Process (problem to be solved through questioning)</p> <p>Appropriateness</p> <ul style="list-style-type: none"> • Seminar • Formal course • Skill building 	<p>Develops probing and questioning skills.</p> <p>Requires no advance study by students.</p> <p>Pressure to decide on action can develop ability to reconcile differences.</p>	<p>Can appear artificial.</p> <p>Requires skillful leadership.</p> <p>Forced decision making can create resentment.</p>
<p>Role Play (student to “act out” a situation which others observe and analyze)</p> <p>Appropriateness</p> <ul style="list-style-type: none"> • Seminar • Formal course • Skill building • Motivation 	<p>Facilitates understanding and communication.</p> <p>Allows learners to examine their attitudes and behavior.</p> <p>Provides forum where students practice complex interpersonal skills in a relatively safe environment.</p> <p>Reinforces practicing knowledge stage.</p> <p>Allows participants to learn from each other’s comments.</p>	<p>May be fear-inducing for shy/self-conscious students.</p> <p>May be painful learning.</p> <p>Difficult to communicate results.</p> <p>Requires skillful leadership.</p> <p>Can appear artificial.</p> <p>Relies on prior knowledge.</p>
<p>Simulation (practice of authenticated job situations, with variables)</p>	<p>Replicates on-the-job conditions.</p> <p>Offers students the chance to try out the job before they do it.</p>	<p>Time consuming to conduct.</p> <p>Requires careful preparation.</p> <p>Can be costly.</p> <p>Can appear artificial.</p>

Continued on next page

Learning Methods, Media, and Modes, Continued

**Learning Methods:
Advantages &
Disadvantages, Continued**

Methods	Advantages	Disadvantages
<p>Performance Tests (student exercise to demonstrate job performance in a controlled environment)</p> <p>Appropriateness</p> <ul style="list-style-type: none"> • OJT • Skill building 	<p>Tests the performance practice stage.</p> <p>Provides students the chance to practice on-the-job behavior with no penalty for mistakes.</p> <p>Allows for specific feedback.</p>	<p>Can intimidate students.</p> <p>Takes time to plan, implement, and provide specific feedback.</p>
<p>In-Basket Exercise (paper and pencil simulation for students to take appropriate action on group of work papers)</p>	<p>Provides practice in analyzing, setting priorities, problem-solving, and communicating.</p>	<p>Very detailed to construct.</p> <p>All necessary information must be provided.</p>
<p>Presentation By Students (students verbal presentations of their own work)</p> <p>Appropriateness</p> <ul style="list-style-type: none"> • Seminar • Formal Course • Skill building • Motivation 	<p>Can be highly motivating.</p> <p>Develops presentation skills.</p> <p>Allows for development and use of visual aids.</p> <p>Students can learn to orally defend or rebut points of contention.</p>	<p>Can be intimidating to students who are apprehensive about talking in front of groups.</p> <p>Time consuming.</p> <p>Can be boring and/or repetitious.</p>

Learning Methods, Media, and Modes, Continued

Media Media are the means, instruments, or materials used to communicate information. Various mediums include print, visual, verbal/aural, verbal/visual, etc. The type of media selected must be appropriate to ensure that information to be learned is accomplished in the most effective and efficient ways. While there are all types of media, no single medium is appropriate for every learning situation.

Types Of Instructional Media

There are at least nine specific type of instructional media used in education.

- Instructional objects, e.g., giving demonstration
- Social models, e.g., imitation and modeling
- Oral communication, e.g., teaching by telling, group interactions
- Printed language, e.g., textbooks, newspaper
- Pictures and diagrams, or graphic representations of real objects
- Motion pictures, which can represent a combination of demonstration and verbal communication
- Instructional television/videos: however, be careful, most educational films and videos fail to specify their instructional objectives
- Programmed instruction, materials that are programmed to specifically meet certain learning tasks
- Computer-aided instruction (CAI), or computer-based instruction(CBI) which has not yet realized its full potential but is typically viewed as superior to other mediums because it is more responsive and can engage a student's attention to a greater degree

Note Drill or practice, tutorial systems, and dialogue-interaction are among the many potential uses for computers.

Learning Methods, Media, and Modes, Continued

Benefits

There are at least four positive characteristics of educational media.

- Media can often catch a learner's interest and hold it.
 - Adults frequently learn from media with pleasure and enthusiasm.
 - Media can provide stimulation and information that would not be available any other way.
 - Media offer teachers the possibility of individualizing instruction.
-

Use Of Media

Two major steps are involved in designing a learning program using media.

Step	Action
1	Clearly state learning objectives so that sequence and steps in the task are clear.
2	Given specific learning objectives, choose the appropriate combination of media.

A general description of selected media is provided on the following page. The list is merely illustrative and offers some advantages and disadvantages of selecting certain media.

Learning Methods, Media, and Modes, Continued

Media: This chart lists the advantages and disadvantages of using certain media.
**Advantages/
 Disadvantages**

Media	Advantages	Disadvantages
Instructor (Teacher/facilitator delivers information)	Allows for flexibility. Can model desirable attitudes as well as convey information.	If instructor has poor presentation skills, very ineffective. Must be supplemented with other media.
Text, Printed Media (Used for reading, handouts, forms, job aids)	Can be expensive. Is easy to transport. Is easy to duplicate. Requires no equipment.	Does not show motion. Can become boring. Inappropriate for audiences who do not read well. Is expensive.
Flipchart (Can be pre-lettered or blank; used to present and record information)	Can tear off pages and fasten elsewhere. Can easily change. Captures highlights of moment. Use to record and display summary points. Stimulates participation.	Not durable. Sometimes not visible in large groups.

Continued on next page

Learning Methods, Media, and Modes, Continued

Media: This chart lists the advantages and disadvantages of using certain media.
Advantages/
Disadvantages

<p>Transparencies (Overhead slides that can be pre-lettered or blank; used to present and record information)</p>	<p>Easy to revise.</p> <p>Can be produced quickly.</p> <p>Can be used in a lighted room.</p> <p>Can face class when using.</p> <p>Can use instead as notes.</p> <p>Can use color.</p> <p>Can write on in some cases.</p> <p>Effective for demonstrating how to fill out forms.</p>	<p>Equipment is required.</p> <p>Can be used as a “crutch” by the instructor.</p> <p>Can be boring with overuse.</p> <p>Sometimes not visible in larger groups.</p>
<p>Film, Tapes, Slides, TV, Web (Media products; used to inform or demonstrate)</p>	<p>Stimulates attention.</p> <p>Appeals to visual/aural learners.</p> <p>Effective for demonstrations.</p> <p>Is usually transportable.</p>	<p>Equipment is required.</p> <p>Can be expensive to produce.</p>

Learning Methods, Media, and Modes, Continued

Modes Modes are the format in which learning content will be delivered to the student. Modes are the ways in which we organize media. There are several modes of delivery, which are described in the section below.

Classroom The classroom mode is a planned education and training program during which the student is guided to the achievement of objectives by the instructor and the course materials. The characteristics of the classroom mode are:

- Learning occurs in a formal classroom setting,
 - All activities are led by an instructor,
 - There is a structured sequence with time limits for completion of activities, and
 - There is instructor-to-student and student-to-student interaction.
-

Tutoring Tutoring has traditionally been a less frequent mode of delivery, although performance-based education and training designs require the consideration of this mode of delivery as a possible remediation device. Essentially, it consists of a period of reading or independent work, followed by a tutoring session. The tutor's function is four-fold:

- To stimulate the student's thinking by answering questions and discussing issues relevant to the reading,
- To assess what the student has learned from the readings,
- To provide feedback relative to the assessment, and
- To provide direction for future reading and study.

This mode requires that the bulk of learning be performed by the learner, primarily through reading, and it presupposes a motivated, skillful, and mature learner who can function effectively in a self-directed manner.

Learning Methods, Media, and Modes, Continued

Lecture The lecture mode, consisting of verbal communication from the instructor, is the most commonly used mode; although, its effectiveness has long been questioned because of the necessity for extremely good communication skills on the part of the instructor. An effective lecturer can inspire enthusiasm and motivate learners to achieve. However, irrespective of the quality of the speaker, the lecture format is not conducive to prompting and guiding learners, assessing the information gained or providing feedback. Thus, under close scrutiny, the lecture has limited instructional value.

Recitation Recitation is a mode that simply has a class or individual recite what they have learned, and the instructor evaluates their performance and provides feedback. There are many variations using recitation (e.g., inquiry questioning, review sessions, etc.). Recitation is an appropriate mode of learning for the purposes it serves, which is a low-level, convergent type of questioning technique. The main limitation is that learning must have occurred for the recitation to function properly.

Discussion The purpose of discussion in the classroom is to “take off” from a certain level of information and apply the learned principles in a variety of situations and contexts. The questioning techniques used by the instructor are intended not to elicit facts but rather to stimulate and generate questions and ideas. Discussion is concerned with the transferability of learning, and therefore it cannot (and should not) assume the role of teaching specific information or facts.

Laboratory In laboratory situation students learn information through exposure to and manipulation of real objects and events, or by testing hypotheses with actual materials. The laboratory mode is appropriate for a variety of subject areas and need not be tied to a specific physical location.

Note Most of the above learning methods can be easily transferred to web-based synchronous and/or asynchronous modes. DAU courses intending these modes should contact the Director, e-Learning and Technology Center e-LTC) for further guidance.

Learning Methods, Media, and Modes, Continued

Selecting A Mode Of Delivery Which mode of delivery a course designer chooses will, of course, depend upon several variables. Regardless of the mode used, course designers need to be aware of the advantages and disadvantages of the various modes: classroom-based; self-instruction, technology-based interventions, and the use of homework assignments. While there are other types of teaching/learning modes, these are the one's that are currently being applied in training and education. Each of the three *primary* modes is discussed in isolation in the text that follows. Homework (which is a form of self-instruction) as a learning modality is discussed as a common feature of the three primary modes. In practice, of course, all of the modes can be used in varied combinations.

Classroom: Advantages/ Disadvantages The classroom mode has several advantages and disadvantages as described below

Advantages	Disadvantages
Provides for instructor-to-students and students-to-instructor interaction.	Requires classroom space. Requires students being taken away from the job.
Provides structured learning activities.	Students may have to wait a long time for a course quota.
Provides opportunity to validate student's achievement of objectives.	Differences between instructors from one course offering to the next can cause inconsistency in content covered. Slow learners may be left behind; fast learners may be bored. Limited time to achieve objectives.

Learning Methods, Media, and Modes, Continued

- Self-Instruction** Self-instruction is defined as a planned training program conducted in a learning center, or other appropriate environment. The student learns through a series of self-administered activities without the aid of a full-time instructor or coach. The self-instruction mode offers the most potential in terms of developing remediation exercises, assessments, and computer-based instruction. The characteristics of self-instructional program are:
- It is self-administered, and all instructions are provided for the student,
 - It provides feedback throughout the program,
 - It is self-paced within established organizational guidelines, and
 - It contains extremely detailed content, as there is no instructor to explain or elaborate on content.
-

Learning Methods, Media, and Modes, Continued

Self-Instruction: The self-instruction mode has several advantages and disadvantages to consider as listed in the table below:
Advantages/
Disadvantages

Advantages	Disadvantages
<p>Portability—can be used anywhere any time that required equipment is available.</p> <p>Flexibility—students can select alternate paths through material, work at their own pace, and take only those lessons relevant to their jobs (or remediation).</p> <p>Cost reduction in travel and per diem—students can take training at their office.</p> <p>Uniformity—can standardize information being taught.</p> <p>Consistency of quality— variations caused by differences in instructors are eliminated.</p> <p>Students can begin training at any time, do not have to wait for class quotas.</p> <p>Development of independent learners—students learn how to complete learning activities according to their own schedule.</p> <p>Versatility—can be used in the classroom in conjunction with classroom activity.</p>	<p>Requires the learner to take time away from the job, but not possibly less time than attending a class.</p> <p>Revisions are more difficult. Must change all the materials instead of instructor announcing changes to class.</p> <p>Validation of materials takes longer; needs more tryouts.</p> <p>Requires student initiative and self-discipline.</p> <p>Students who need interaction to learn may find self-instruction difficult.</p>

Learning Methods, Media, and Modes, Continued

Homework

Homework is not a word that students like to hear, yet it remains one of the most viable learning options. Homework is actually an important mode of *self-instruction* as cited on the previous page. Self-instruction can be used to learn prerequisite material, develop pre-assignments for technology-based courses, for recitation and facilitated discussion sessions, or it can be in the form of practicing previously studied material.

Because homework can be an essential element of learning modes, it is important to remember: If the task is within the capabilities of the learner, then the functions of self-instruction can be served. However, if the task is too difficult and (becomes frustrating), homework may be detrimental to the learning process.

Technology-Based Learning

Introduction

Education and training have traditionally been delivered in a traditional classroom setting. In the past, technology has been used to improve the quality of classroom delivery. Emerging technology allows for the delivery of courses over the World Wide Web. Advancements in computer technology now allow for the delivery of quality instruction in the learner's work setting.

When To Use Technology-Based Learning

For curriculum design purposes technology-based learning can be used when the following applies:

- The learner needs to apply rules or perform a procedure to accomplish the task.
 - The task is interactive and the learner needs feedback to go through the steps.
 - Animation will convey the concept more effectively than a static representation.
 - Many repetitions are needed so that the task can be accomplished automatically.
 - The task involves understanding processes that are not always visible in the actual equipment.
 - The task is so critical that it must be performed flawlessly every time.
 - The task is to solve a problem or arrive at a reasoned decision.
-

Note

Questions regarding DAU technology-based course and/or curricula initiatives should be directed to the Director, e-Learning and Technology Center (e-LTC)

Technology-Based Learning, Continued

**Advantages/
Disadvantages**

There are many advantages to Interactive Distance Learning (IDL), and other Technology-Based Learning (TBL) modes.

Advantages	Disadvantages
<p>Can be used independently at a learner's own pace.</p> <p>Permits repetition until content is mastered.</p> <p>Provides immediate feedback.</p> <p>Costs can be amortized over time.</p> <p>Can be interactive; with Interactive Video Conferencing (IVC) many sites can be reached at the same time.</p> <p>Permits learner to think through more than one solution to a problem.</p> <p>Can be used to manage learning in a systematic way.</p> <p>Can be perceived as fun.</p> <p>Permits decentralized training.</p>	<p>Instructors may perceive this media as less rigorous than traditional classroom instruction.</p> <p>Instructor workload may intensify.</p>

Structured Writing Style

Introduction

Structured writing style text, also called course mapping, is a preferred format style for developing instructional products. The principle behind this style is that all information should be grouped into small manageable “blocks” or “chunks” of information with each block covering one main point or idea. Templates are available by arrangement with the Director, Curriculum Development and Support Center.

Grouping

This grouping of text into blocks of focused information makes it easier for learners to clearly distinguish one main idea or point from another. This aids initial comprehension of material as well as later recall of the content.

Naming blocks

As information is grouped into blocks, a short description or title indicates the type of information it contains. As blocks of related information are grouped together, this organization also is given a title or name.

An example

This document was written using a modified structured writing style or course mapping. Review some sample pages for a general idea on layout and formatting. The intent of structured writing is to be flexible and respond to the requirements of the purpose for the document. While the grouping, blocking, chunking, and formatting style pictured on these pages uses many of the structured writing style guidelines, its intent is to be illustrative rather than prescriptive.

Instructor Guide

Introduction This section contains information about a *generic approach* to developing instructor guides. All courses should have instructor guides; especially if the course is designed to be taught by more than one faculty.

Instructor Guide The instructor guide defines the content and instructional methodology for each unit of instruction. It includes descriptions on

- how the course is administered
- what materials to use and how they are to be used, and
- how learners are to determine success.

The instructor guide accounts for time spent in class and clearly prescribe parameters of the course. The aim is to standardize delivery of the content without inhibiting academic freedom.

**Components Of
The Guide**

The instructor guide contains, but is not limited to the following:

- Course outline and daily schedule
 - Terminal and enabling learning objectives
 - Guidance for administering the course, to include room set-up, homework requirements, testing procedures, and attendance policies, etc.
 - Key teaching points
 - Student assessments and standards for successful completion
 - Reference material citations, including references to sources for student self-remediation
 - Materials required such as training aids, and equipment
-

Development of Lesson Plans

Introduction

Lesson development involves compiling all the components of the lesson plan and student material. A teaching outline is developed using the documentation from analysis and design, incorporating strategies to aid learning. All additional student and teaching materials are assembled and finalized.

Definition

The Lesson Plan provides consistency of content in lesson delivery. It is not intended to mandate methodology or restrict academic freedom. Its purpose is to allow for uniform content delivery among all instructors of a course. The course design plan is the blueprint for specifications for the education and training to be developed. An example is provided in Appendix E, Components of a Design Plan.

The Lesson Plan documents:

- Learning Objectives
 - Lesson Content and Presentation Strategies
 - Instructor and Student Activities
 - Student Assessment and all Resources
-

Purpose and function

As noted, the major purpose of a lesson plan is to promote consistent delivery of the lesson content. The objectives are sequenced and the content is organized in the order of the lesson's presentation. The lesson plan serves as a guide to the "what" and "how" of lesson delivery.

- What—The actual content of the lesson.
 - How—Guidance on the methods and strategies used for delivery.
-

Development of Lesson Plans, Continued

Steps In Development

The following actions are taken in the development of a lesson.

Step	Action
1	Research data to include analysis.
2	Prepare a course design plan.
3	Organize and develop lesson plan.
4	Select or create instructional support materials.
5	Submit for review and approval.
6	Pilot and revise.
7	Use in conducting training and maintain and revise.

Instructor Preparation

The following items are usually part of the instructor's preparation and are usually identified as the "cover" information.

- Title of the lesson
- Revision number (if required)
- Time required (length) to teach this lesson
- References
- Objectives (Terminal and Enabling)
- Instructional aids, media and equipment
- Student preparation and prerequisites
- Presentation methods
- Evaluation method
- Notes and other information that would be helpful to another instructor

Development of Lesson Plan, Continued

Instructor Presentation

The body of the lesson plan contains the following four sections:

Section	Components
1. Introduction	Attention gaining device, motivator, objectives (how will they be presented to students), and a tie to past learning.
2. Development	Content outline, activities, media, reviews and practice, questions for each enabling objective section
3. Application or Practice	Practice or application may have a separate section that would include group activities or exercises
4. Closure	Review objectives and main points, evaluation [if not part of Development Section or Practice Section], and point ahead to next lesson

Development of Student and Instructional Support Materials

Student Guide The Student Guide is a reference resource to assist the student’s learning experience during and after the course. It may be paper-based or on the Internet, or both.

Components Of Student Guide A Student Guide (text or manual) contains, but is not limited to, such items as:

- Administrative information
 - Terminal and Enabling Objectives
 - Student assessment information
 - Written text/outline on topics covered in the course
 - Checklists, worksheets, job-aids for use during exercises, group activities and independent study
 - Exercises—questions, situations, data, role play descriptions, etc., and directions for completion
 - Answers to exercises, if not to be reviewed in class
 - Additional references
-

Course Pilot

Purpose

The purpose of a course pilot is to determine if the instructional materials are performing according to their design and development specification. In other words: Did the materials accomplish the instructional and learner objectives?

Course Validation

After the design phase of the ISD is completed, it is time to validate the material by using representative samples of the target population and then revising the program as needed. The heart of the systems approach to training is revising and validating the instructional material until the learners meet the planned learning objectives. Also, it should not be thought of as a one-shot effort. Success or failure is not measured at a single point.

How to Validate a Course

The initial validation will depend upon the complexity of the training material and resources. Listed below is [a] procedure that provides an effective validation of a training program. It can be adjusted as needed to fit the size and complexity of the training, but keep in mind that the closer the validation follows this method, the less problems will be encountered during the training.

- 1. Select the participants that will be in the trials.**

The participants should be randomly selected, but should represent all strata of the target population, bright, average, and slow learners. They should be clearly told what their roles are in the validation process are. Let them know that they are helping to develop and improve the lessons and that they should feel free to tell you what they think about it. The participants should be pre-tested to ensure that the students learn from the instructional material and not from past experience.

- 2. Conduct individual trials.**

This trial is performed on one learner at a time. The instruction is presented to the learner. The separate pieces of instructions, tests, practice periods, etc., should be timed to ensure they match the estimated times. Do not tutor unless the learner cannot understand the directions. Whenever you help or observe the learner having difficulty with the material, document it.

Course Pilot, *cont.*

How to Validate a Course, *cont.*

3. **Revise instruction.**

Using the documents from the individual trials, revise the material as needed. Closely go over any evaluations that were administered. For example, a large number of wrong answers for a test item indicates a trouble area. Conversely, a large number of correct answers for a test item could indicate the learners already knew the material, the test items were too easy, or the lessons over taught the material. Repeat individual trials until the lesson does what it is supposed to do.

Conduct group trial.

After finishing with the results of the individual tryouts, move on to the group tryouts. These can be of any size. It may consist of several small groups, one large group, or a combination of both. The procedure is the same as the individual tryouts except for one difference. At some point in the trials it must determine if the program needs to be accepted or if it needs major revision. Usually a minimum of two successful tryouts are conducted to ensure the program teaches. Minor problems should not hold up implementing the program; revisions should not stop the first implementation of the program, but are performed throughout the life of the program.

Section Summary and References

Summary

In this section the developmental phases of a systematic approach to education and training were discussed. One of the main purposes of the development phase is to create documents that help ensure consistent delivery of course content. Included in the discussion was an outline of methods, media, and modes of learning, a structured writing style, and the development and components that make up the Instructor's Guide, Topic Lesson Plans, and Student Materials. All of these materials are validated during an initial conduct of the course called a pilot.

Section 6

Evaluating Student Performance

Overview

Introduction

Acquisition education and training reform efforts have mandated greater emphasis on student performance outcomes. As a result reform leaders are asking several fundamental questions: (1) How well are students learning; what do they know? (3) What can students do with what they know?. Both of these questions can be answered through effective testing and assessment of learning, regardless of the mode of delivery.

Performance Objectives Are Critical

Good performance objectives are critical to the creation of sound learner test and assessment processes. Performance objectives play an important role in developing effective learner testing and/or assessment outcomes.

Purposes of Performance Objectives

Well written performance objectives serve three fundamental purposes for performance-based tests and assessments.

- *Objectives ensure that the assessment is directly related to desired learner outcomes.* This is an especially important consideration in performance-based learning because the content for assessments is derived from task or need analysis procedures that order objectives hierarchically. Matching test or assessment items to the appropriate course objectives within these hierarchies, guarantees that all essential content is assessed.
 - Objectives increase the accuracy with which cognitive processes can be assessed. A well-written objective becomes the blueprint for the creation of assessment items that measure the specific performance outcome described by the objective.
 - The size of the domain covered by the objectives and the homogeneity of the objectives being assessed are important factors in determining the number of assessment items.
-

Overview, Continued

Curriculum Designers

Curriculum designers need to ensure the appropriateness of test and/or assessment items. Educational research reveals that many teachers teach at lower levels, but frequently test at the higher cognitive levels. In other instances, the exact opposite occurs; teachers teach at the higher levels, but test at low levels of cognition.

This emphasizes the need to match learning objectives and teaching activities with test or assessment items to determine whether or not they approximate the level described in the performance terminal or enabling objectives. Such activities form the measurement component of curriculum alignment. Thus, well-written performance objectives are the key to effective teaching and the construction of valid measures of learning.

In This Section The following topics are covered in this section:

Topic	See Page
Applied Definitions	93
Types of Tests and Assessment Items	95
Guidelines For Selecting Assessment Techniques	97
Multiple-Choice Items	98
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Overview, Continued

In This Section,
Continued

The following topics are covered in this section:

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Deciding How Many Test Items	126
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Applied Definitions

Introduction

Learner performance may not always be measured numerically. Different approaches to measurement are frequently confusing and need to be defined. There are four terms that are used interchangeably:

Applied Definitions

The table below makes the distinction among these approaches.

Term	Definition
Testing	is the collection of quantitative (numerical) information about the degree to which a competency or ability is present in the test taker. There are right and wrong answers to the items on the test, whether the test is comprised of written questions or a performance test requiring the demonstration of a skill.
Assessment	is a systematic information collection without reference to making judgments of worth. It may involve the collection of qualitative (narrative) as well as quantitative information. Assessments are usually made by building a profile using a series of qualitative and quantitative inputs; i.e., successful learning.

Continued on next page

Applied Definitions, Continued

**Applied
Definitions,
Continued**

Term	Definition
Measurement	Is the collection of quantitative data to determine the degree of whatever is being measured. There <i>may not</i> be right or wrong answers. A measurement inventory (e.g., of learning styles) might be used to determine a preference for using a systematic style versus a spontaneous one. One style would not be right and the other wrong; the two styles would simply be different.
Evaluation	Is the process of making judgments. Evaluation may or may not involve testing, measurement, or assessment. Most informed judgments of worth, however, would likely require one or more of these data-gathering processes. Evaluation decisions may be based on either quantitative or qualitative data, the type of data being strictly dependent on the nature of the evaluation question. For example: <i>Has this student demonstrated the skills necessary to become a Program Manager?</i>

Types Of Test And Assessment Items

Introduction Several types of test and assessment items are available to course designers. Curricula that reside under the DAU are required to have criterion-referenced tests and assessments. That is, each test or assessment item must be *directly referenced* to a specific performance objective. This method is called criterion referencing.

Criterion Referencing vs. Norm Referenced Tests

There are two major ways to interpret test scores: criterion referenced interpretation and normative scoring interpretation. While some tests can be interpreted both ways, this is usually not the case. Tests should be constructed to facilitate either a criterion-referenced or norm-referenced interpretation.

Basically, norm referenced tests need to be composed of items that will separate the scores of test-takers from one another, while criterion-referenced tests need to be composed of items based on *specific objectives or competency statements*. A standard or criterion is written in behavioral terms within the context of the terminal and enabling learning objectives.

Thus, learner performance is measured regarding each individual's ability to demonstrate *mastery* of the learning objectives. That is, learner achievement is measured against the predetermined criterion established in the performance objectives. Learners achieve *mastery* or *non-mastery*, *pass* or *fail* grades, and not letter or number grades. Criterion-referenced measures usually result in a much higher level of performance because the standard for performance can be 100% (e.g., competency-based training and education test and assessment).

Conversely, using norm-referenced testing, a learner's performance is compared with the performance of other learners. Achievement is measured on a percentage basis (e.g., 80% of all items attempted is passing) rather than *mastery* or *non-mastery*.

Test and assessment standards for DAU curricula vary, depending on mode of delivery, the type of course analysis and/or development (e.g., competency-based or topics-based), etc. For guidance on standards, consult the DAU policy on Student Assessment.

Types Of Tests And Assessment Items, Continued

Types Of Test And Assessment Items

Without a basic understanding of the principles of test design, several problems can result in the instructional design process. In fact, test development should be on an equal footing with the development of instructional materials. The following are the major types of tests and assessments used to measure student performance:

- Multiple-choice
- Alternative-choice
- Matching
- Completion/Fill-in
- Essay
- Restricted-response essay
- Case Study
- Critical Incident
- Incident
- Practical Exercise
- Simulation
- Role Play

The DAU provides Faculty Professional Development in Education (FPDE) courses for its faculty. FPDE 3: *Measuring Student Performance: Developing Written Tests* or, FPDE-6: *Measuring Student Performance: Measuring Performance Outcomes* support the material in this Section.

Required Preconditions

There are some necessary factors for faculty/developers to consider in writing successful test items. A test writer must...:

- *...have a thorough mastery of the subject matter being tested.* The test writer must not only understand the implications of the facts and principles of a particular field, but also be aware of the common fallacies and misconceptions.
- *... develop and/or use a set of educational objectives.* Unless the test writer considers what students are to learn, they will not be able to establish the groundwork to evaluate student's progress or achievement.
- *... know the students who will be taking the test in order to appropriately adjust the complexity and difficulty of the items.* That is, knowing the target audience: Are they entry-level, or are they experienced both educationally and from job experience?

Guidelines For Selecting Assessment Techniques

Selecting Assessment Techniques

The following are guidelines that will assist you in selecting the type of test or assessment technique for the course.

If you want to test for . . .	Then use this type of item . . .
...selecting a correct answer from a group of alternatives	Multiple-Choice.
...a “Yes” or “No”, or other types of two-possibility discriminations for each of several cases	Alternate-Choice
...associating a term or concept with its definition or corresponding property	Matching.
...making short identifications	Completion/Fill-In.
...explaining or interpreting a relationship more complex than selection, recognition, association, and simple recall	Extended Response Essay.
...answering brief questions from memory	Restricted Response/Short Answer.
...evaluating data and using it to solve a problem	Case Study.
...performing situations similar to those performed on the job	Practical Exercise.
...demonstrating ability to do a variety of complex job tasks with minimal supervision	Simulation.
...responding appropriately to situations with many variables that require problem solving processes	Incident Or Critical Incident Process.
...providing practice on previously learned material	Role-Play.

Multiple-Choice Items

Introduction

Multiple-choice questions are one of the most popular types of performance test items. They are also one of the most difficult to write.

Description

A multiple-choice question is one which has a phrase followed by several possible completions of the phrase, only one of which is correct. Multiple-choice questions can sometimes take the form of an incomplete sentence followed by a series of alternative completions from which the test-taker is to choose one.

When To Use

Multiple-choice test items are appropriate to use when the *objective* calls for the student to be able to select a correct response from among several alternatives.

Components Of Multiple-Choice Items

Multiple-choice items have three components:

- The **stem**, or introductory phrase that will be completed by the correct answer.
 - The **distractors**, which are the *incorrect* choices. Distractors must be plausible answers representing common errors and misconceptions.
 - The answer **key**, which is the correct answer.
-

Important Note

This Section of the DAU *Curriculum Development Guide* provides a variety of examples of test and assessment items. Since the first edition of the guide was published, changes in acquisition [may] have rendered some of our [acquisition] examples as *content* invalid. This need not be a problem because, as in the non-acquisition example items, the reader should focus on the *design* of the item in relation to the sample objective provided to see that there is a “match” between the behavior called for in the objective and the behavior tested.

Multiple-Choice Items, Continued

**Example #1:
Multiple-Choice
Item**

The following is an example of an objective using a criterion-referenced multiple-choice test item:

<i>Performance Objective</i>	Recognize the purpose of the Component Cost Analysis (CCA).
<i>Item Stem</i>	The purpose of the Component Cost Analysis (CCA) is to:
<i>Distractor</i>	A. present the Program Manager’s life-cycle cost estimate.
<i>Key</i>	B. provide an independent check on the program office estimate.
<i>Distractor</i>	C. present the Service’s cost position to OSD.
<i>Distractor</i>	D. estimate the cost of a major component of a system.

Multiple-Choice Items, Continued

**Example #2:
Multiple-Choice
Item**

The following is an example of an objective using a criterion-referenced multiple-choice test item:

<i>Performance Objective</i>	Given the latest research about atomic discoveries, select the criteria that would most likely contribute to the advancement of such discoveries in medicine.
<i>Item Stem</i>	Which one of the following would do the most to advance the application of atomic discoveries to medicine?
<i>Key</i>	A. Development of standardized techniques for treatment of patients.
<i>Distractor</i>	B. Training of the average doctor in application of radioactive treatments.
<i>Distractor</i>	C. Removal of restriction on the use of radioactive substances.
<i>Distractor</i>	D. Addition of trained radioactive therapy specialists to hospital staffs.

**Multiple-Choice
And Bloom's
Levels**

Multiple-choice questions can assess all of Bloom's cognitive levels except the synthesis and evaluation levels. These two levels require original "supplied" responses on the part of the student.

Multiple-Choice Items, Continued

Interpretive Multiple-Choice Questions

Many multiple-choice tests pose a series of separate, unrelated questions. In contrast to this method is the *interpretive exercise* format. This type of multiple-choice question presents a series of test *items based on a common stimulus*. The stimulus can be written material like case scenarios, tables, graphs, maps, pictures, and even audio or videotapes.

Interpretive multiple-choice exercise items can be written to assess a wide range of student abilities, for example: to recognize generalizations, assumptions, or inferences; to apply principles; or to interpret data or experimental findings.

To achieve this, however, the material must be novel or new to the students, not something previously covered in class or found in the text/student guides.

Advantage Of Interpretive Method

Multiple-choice items in are the most preferred item for testing higher (Bloom's) levels and complex materials. Interpretive exercises share that advantage and also serve to minimize the influence of irrelevant information because they confine the data to be interpreted to the actual material presented in the scenario.

Disadvantages Of Interpretive Method

Interpretive exercises are more difficult to construct. For written material (which is the most common form), a greater demand is also placed on the test-taker's reading skills.

Alternative Choice Items

Introduction Alternative choice items assess the student’s ability to *recognize* information instead of *selecting* the right answers from among a number of possibilities (as in multiple-choice).

Description Alternative choice test items provide either a statement or a question that has only two possible choices (alternatives), as in “Yes or No.” More commonly known as *True-False*, alternative choices can also include *right-wrong*, *fact-opinion*, *example-non-example*, etc.

When To Use Alternative choice test items are appropriate when the objective calls for a clear instance-by-instance acceptance or rejection.

Example #1: Alternative Choice Item The following is an example of an objective using a criterion-referenced alternative choice test item.

<i>Performance Objective</i>	The student will identify the activities required in the various phases of the acquisition life-cycle.
<i>Test Item</i>	One objective of Phase III, Production and Deployment, is to achieve an operational capability that satisfies the mission need.
<i>Alternative 1</i> <i>Alternative 2</i>	A. True B. False

Alternative Choice Items, Continued

**Example #2:
Alternative
Choice Item**

The following is an example of an objective using a criterion-referenced alternative choice test item.

<i>Performance Objective</i>	The student should be able to recognize the sum of a triangle.
<i>Test Item</i>	The sum of a triangle is 180.
<i>Alternative 1</i> <i>Alternative 2</i>	A. True B. False

**Alternative
Choice And
Bloom’s Levels**

Alternative choice items can assess the knowledge, comprehension, and application levels. They are most frequently used to assess the Knowledge level.

**Proceed With
Caution**

Alternative choice questions are not frequently used on written tests. Many test experts suggest such items should not be used if at all. The rationale is that test-takers have a fifty-fifty chance of getting the item correct either because they knew it or they guessed. Thus, alternative-choice test items are not very *reliable* in assessing student learning. The key to writing this type of item effectively is to make sure that the content being tested is truly dichotomous and that more than memorization is required for the student to respond to the item.

Matching Items

Introduction Matching test items present test-takers with two lists or columns of related words, phrases, numbers, or symbols.

Description Matching items require the student to match each item on one list with the appropriate item on another list. Matching items most frequently take the form of a list of words to be matched with a list of definitions.

When To Use Matching test items are appropriate when the objective calls for the student to demonstrate an understanding of homogeneous content, for example, types of contracts, types of terminations, types of wires, etc.

**Items
Appropriate For
Matching**

The following items are appropriate for matching items on a test:

- Terms with their definitions
 - Short questions with their answers
 - Symbols with their proper names
 - Causes with effects
 - Rules with situations in which the rules apply
 - Parts of mechanical units with their proper names
 - Parts with the mechanical units to which they apply
-

Matching Items, Continued

**Example:
Matching Item**

The following is an example of an objective using a criterion-referenced matching test item.

<i>Performance Objective</i>	The student will identify the relationship between Program Characteristics and Program Categories.										
<i>Matching Test Item</i>	<p>Match the program characteristic item in Column A with the program categories in Column B. The responses in column B may be used once, more than once or, not at all.</p> <table style="width: 100%; border: none;"> <thead> <tr> <th style="text-align: left; width: 50%;">Column A</th> <th style="text-align: left; width: 50%;">Column B</th> </tr> </thead> <tbody> <tr> <td>A. Major Programs</td> <td>1. Category I</td> </tr> <tr> <td>B. Major Defense Acquisition Programs</td> <td>2. Category II</td> </tr> <tr> <td>C. Program delegated to Component Head</td> <td>3. Category III and IV</td> </tr> <tr> <td>D. Milestone Decision Authority at lowest level deemed appropriate</td> <td></td> </tr> </tbody> </table>	Column A	Column B	A. Major Programs	1. Category I	B. Major Defense Acquisition Programs	2. Category II	C. Program delegated to Component Head	3. Category III and IV	D. Milestone Decision Authority at lowest level deemed appropriate	
Column A	Column B										
A. Major Programs	1. Category I										
B. Major Defense Acquisition Programs	2. Category II										
C. Program delegated to Component Head	3. Category III and IV										
D. Milestone Decision Authority at lowest level deemed appropriate											

Matching and Bloom's Levels

Matching items can assess the knowledge and comprehension levels. However, like alternative-choice items, they are not often written beyond the Knowledge level.

Completion/Fill-In Items

Introduction Completion/fill-in test items are called “supply-type” items because the answer does not appear before the student.

Description Completion/fill-in questions are usually comprised of an incomplete statement followed by a blank line upon which the student writes (supplies) the answer.

When To Use Completion/fill-in questions are appropriate when the instructional objective requires that the learner *recall* or *create* the correct answer rather than simply recognize it.

Example #1: Fill-In The following is an example of an objective using a criterion-referenced completion/fill-in test item.

<i>Performance Objective</i>	Describe the calculation of a uniform annual cost (UAC).
<i>Fill-In Test Item</i>	A uniform annual cost is determined by dividing _____ by _____.

Example #2: Completion The following is an example of an objective using a criterion-referenced completion/fill-in test item.

<i>Performance Objective</i>	The student should be able to name the central core of an atom.
<i>Completion Test Item</i>	Every atom has a central core called _____.

Completion/ Fill-In And Bloom’s Levels Completion/fill-in items can assess the knowledge, comprehension, and application levels. They are written most often, however, at the knowledge level.

Extended Response Essay Items

Introduction An extended response essay test item consists of an open-ended question that leaves learners free to determine the content and to organize the format of their answer.

Description In extended response type questions the student decides which facts are pertinent, and how to organize, synthesize, and evaluate them.

When To Use Extended response essay questions are appropriate when the objective is to test writing (composition) skills, including conceptualization, organization, analysis, synthesis, and evaluation. It gives the learner maximum choice regarding how they will respond to the question posed to them.

**Example #1:
Extended
Response Essay**

Performance Objective

The learner will describe at least two styles of management and compare and contrast their effectiveness in the areas of interpersonal relations, goal-setting, and assessment of results.

Essay Item

Write an essay in which you describe two different styles of management. Compare and contrast the effectiveness of the two styles as to interpersonal relations, goal setting, and assessment of results.

Note: Scoring of extended response essay questions is sensitive because they are especially open to violations of rater or inter-rater **reliability**. Problems can arise due to **who** scores the question, or **when** it was scored, in addition to **what** the learner wrote.

Extended Response Essay Items, Continued

**Example #2:
Extended
Response Essay**

Performance Objective

The learner will, in an essay, describe the federal acquisition process.

Essay Item

Write an essay which describes the sequential activities associated with the federal acquisition process.

Note: Any time a student is permitted to develop or supply an original response the assessor can anticipate varied depth levels or detail of the answer. This can cause problems with item validity and reliability.

**Extended
Response And
Bloom's Levels**

Extended response essay questions can be used to assess all levels of Bloom's cognitive taxonomy. It is the *only* type of test item with this of capability, and the only item type that can truly assess the evaluation level.

Restricted Response/Short Answer Items

Introduction

Restricted response/short answer questions limit both the content and the form (e.g., describe vs. compare and contrast) of an answer. Restricted response questions are also called “short answer” items.

When To Use

Restricted response/short answer items are appropriate to use when the objective to be assessed requires that the test-taker recall information unassisted or create an original response. They are the appropriate item forms when content knowledge is tested.

Example: Short Answer Item

The following is an example of an objective with a criterion-referenced short answer test item:

<i>Performance Objective</i>	The student should be able to describe two situations that illustrate the application of the law of supply and demand.
<i>Short Answer Test Item</i>	Describe two situations that illustrate the application of the law of supply and demand. Do not use examples discussed in class. Your answer is to be no longer than one-half page for each situation.

Example: Restricted Response Item

The following is an example of an objective with a criterion-referenced restricted response test item:

<i>Performance Objective</i>	The student should be able to explain the meaning of the standard error of the estimate.
<i>Restricted Response Test Item</i>	Explain what the standard error of the estimate tells one about the quality of a regression equation.

Restricted Response/Short Answer And Bloom’s Levels

Restricted response or short answer test items can assess all of Bloom’s levels except evaluation. Responses to evaluation questions would be somewhat longer to permit the student to develop a rationale for their “evaluation.”.

Case Study Items

Introduction The case study item can be used either as a teaching or an assessment method. The case method allows learners to review data, identify critical issues, and develop appropriate solutions. A case study can be either complex (with many interrelated issues) or simple, depending on its objectives.

When To Use The case method can be used to determine where students are (as a needs assessment), or to determine how well students can apply what they know to a particular set of circumstances.

Assessing Groups Or Teams

Case methods are frequently used in assessing groups or teams.

Assessment solely on an *individual* learner’s performance is usually not recommended.

Individual performance in groups *can* be measured by using a Peer Assessment Form.

Note: The method for developing group and peer assessments are covered extensively in the DAU/FPDE-6 course offering.

Example Case Method Item

The following is an example of an objective referenced to a specific assessment item.

<i>Performance Objective</i>	Given a case scenario, the student will be able to explain a well integrated acquisition strategy.
<i>Case Method Assessment Item</i>	Using the following case scenario, identify and explain one strength (if any), and one limitation (if any) of the processes used to develop the acquisition strategy for System X.

Case Method And Bloom’s Levels

Because a case study can be either complex or simple, depending upon the objective, it has potential for the full range of Bloom’s cognitive levels.

Case methods are especially conducive for applying creative and critical thinking skills.

Note: There are different types of case methods—Harvard, Wharton, Incident, Critical Incident, etc. The type of case used depends on several factors which are covered in the DAU/FPDE-7 course: *Understanding Problem and Product-Based Learning*.

Critical Incident Item

Introduction

A critical incident item presents a brief authentic or hypothetical situation and asks the learner to provide a solution or reaction based on the principles learned in the classroom.

Critical incident items usually engage learners in a situation that deviates from that which is normal (e.g., given a situation under which “war time” conditions exist; would processes, procedures, or behavior be any different?).

When To Use

The critical incident method is particularly good to assess performance objectives that require the learner to choose from among several responses.

**Example:
Critical Incident**

The following is an example of an objective referenced to a critical incident assessment item.

<p><i>Performance Objective</i></p>	<p>Given a scenario and guidelines on the process of conducting a pre-award fact-finding site visit, propose solutions to problem(s) encountered during such visits.</p>
<p><i>Critical Incident Assessment Item</i></p>	<p>You are at a pre-award fact-finding visit to a contractor’s plant for a Firm Fixed Price (FFP) contract. In an effort to develop the cost estimate and determine the capabilities of the contractor’s resources, you have requested specific data that the contractor has refused to provide. What other options do you have to obtain that data?</p>

Incident Method Item

Introduction The incident process is a variation of the case study method. Learners are given minimal or conflicting facts and then asked to analyze what additional data is needed to resolve the problem.

When To Use The incident method is particularly valid for assessing objectives that require fact-finding; it particularly suits assessment of a learner's fact-finding ability.

**Example:
Incident Method** The following is an example of a performance objective referenced to an incident assessment item.

<i>Performance Objective</i>	Given a job reclassification problem, compare the position description for the jobs involved and determine the questions necessary to establish whether the [reclassification] is possible.
<i>Incident Method Assessment Item</i>	A supervisor calls you and requests that you rewrite a GS-235 Employee Development Specialist vacancy announcement into a GS-1701, Education Development Specialist position. What questions must you ask to find out if this is possible? Position descriptions are attached.

Practical Exercise Item

Introduction

A practical exercise is an activity in which the learner actually performs what he or she is going to be doing on the job. As with the case study method, using practical exercise items requires careful planning and must have *predetermined*, stated criteria. Also, as in the case method, practical exercises may be used to determine where learners are (needs assessment), or if they can apply what they know to a particular set of circumstances.

When To Use

The practical exercise is appropriate when the objective calls for the learner to perform in a job-related situation.

**Example:
Practical
Exercise**

The following is an example of a criterion-referenced practical exercise assessment item.

<i>Performance Objective</i>	<p>Provided several sample completed Forms 11 and 11b, the student will be able to “blue pencil” them at a rate of 10 per hour. The student will:</p> <ol style="list-style-type: none"> a. Examine and perform checks. b. Compare remittance with amount due on documents. c. Blue pencil amounts on the documents. d. Prepare Forms 2007 and 3737. e. Separate Forms 11 and 11b.
<i>Practical Exercise Assessment Item</i>	<p>Blue pencil the Forms 11 and 11b contained in this envelope. You have 1 hour to complete all 10 forms.</p>

Simulation Item

Introduction

A simulation is an assessment method in which learners are asked to act out a long-term process or take part in an event authenticating real life.

Whereas a case study or practical exercise usually involves a single problem-solving event, a simulation includes many factors which would otherwise be difficult to replicate in a classroom setting.

Example: A simulated negotiation exercise..

When To Use

Simulations are appropriate when the objective requires the learner to engage in specific duties or tasks associated with performance-based designs. Simulations can be used as assessments if they are scored in such a way that success in the simulation is *dependent* on the skill being performed. Simulations represent a powerful assessment mechanism for competency-based training programs or interventions.

What You Should Know

A simulation exercise can focus on the application of a single competency or on the use of several competencies in conjunction with each other. Critical path assessments of the subordinate tasks to the principal competencies can also be completed.

Simulations used for assessment purposes can be as simple or complex as the designer wants them to be. However, the performance expectations, activities, and the conditions for successful performance must always be clear to the learner.

In general, the design of an instructional or assessment simulation should replicate as closely as possible the manner in which the competency is used on the job.

Simulation Method, Continued

**Example:
Simulation**

The following is an example of an objective-referenced a simulation exercise assessment item.

<p><i>Performance Objective</i></p>	<p>Given situation data, and in the role of a Program Manager, identify and resolve the problem(s) presented</p>
<p><i>Simulation Assessment Item</i></p>	<p>You are a Program Manager. The Source Selection Advisory Council asks you to serve as consultant and to critique the attached contractor proposal 2 hours before the meeting of the Council. You are to provide a briefing of your concerns relative to this request. Your briefing must provide (1) problems that may occur if the contractor’s proposal is accepted and (2) the influence of the program/proposal on cost, personnel, and time to completion.</p>

Role Play Item

Introduction

A role play is an attempt to reproduce, before actual job contact, the dynamics of personal interactions. It can be used as either an assessment device or learning method. Role play is an interaction among two or more individuals on a given topic or situation.

When To Use

Role plays are used extensively in, but are not limited to the following:

- human relations training
- counseling
- instructor training
- interpersonal skills
- interview techniques
- supervisory/management training

Example Role Play

Here is a sample role play where the objective is for the learner to demonstrate skill in interpersonal communication.

<i>Objective</i>	Given a situation with a “troubled employee,” the learner will discover the major problem underlying the employee’s comments by demonstrating empathetic listening skills.
<i>Role Play Assessment Item</i>	In a referral interview with a troubled employee, discover the main problems underlying the employee’s comments, using empathetic listening skills.

What You Should Know

If the role play is used as an assessment device, a rating sheet (rubric) or checklist must be devised to ensure uniformity of assessment (reliability). The roles should be set up so that, no matter who does the acting, the points necessary for rating student’s skills are revealed.

Role plays are difficult if used as assessment devices because they generally provide low test and test scorer reliability. They are also highly subject to bias on the part of the observer/grader.

Item Analysis: Validity

Introduction

Analyzing performance-based, criterion-referenced test items is not a difficult process. Effective item analysis can actually be viewed as multidimensional and involves two basic questions:

- Is the item valid: does the item match the objective?
- Is the item reliable?

Effective test and assessment items should be able to stand up against *both* of these questions.

Item Validity

To match the objective, the test or assessment item must:

- test the proper performance
- be at the proper level (conditions and standards)
- be free from unrelated skills
- be free of “tricks”

A valid test is one which measures knowledge and skills needed for job success. A valid performance test is based on task or need analysis and the learning objectives.

Matching The Objective To Proper Performance

To test the proper performance, check to see that there is a sound match between the action verb and the performance required by the test item.

Item Analysis: Validity, Continued

Example/Non-Example Of Item Validity

After reading the objective below, decide which of the two test items best measures the performance in the objective.

Objective: Identify the unit used to measure the amount of radiation absorbed by a substance.

Test item #1: The amount of radiation absorbed by a substance is measured in:

- A. rods.
- B. r units.
- C. rads.
- D. rems.

Test item #2: The amount of radiation absorbed by a substance is measured in _____.

Test item #1 best measured the performance stated in the objective. Item #1 asked the learner to *identify* the unit, as stated in the objective. Item #2 asks for complete recall and is not valid because it calls for *supplying* rather than *identifying* information.

Matching The Objective To The Proper Level

In addition to testing for proper performance, it is important to attend to the proper *skill* and *knowledge* level of the objective. This level might be indicated by *either* the conditions or the standard stated in the objective.

Item Analysis: Validity, Continued

**Example:
Matching The
Level Of The
Condition**

The *conditions* of an objective – which are really the conditions of testing - often call for the use of specific instructional aids such as diagrams, reference manuals, or tables.

For example, post office clerks are given access to charts and tables when they are selling postal services or carrying out other duties. With that in mind, look at the objective below and its test item and see if you can determine if it *matches the level of testing*.

Objective: Using the *Domestic Mail Manual* as a guide, identify the necessary forms needed to process any given piece of undelivered-as-addressed mail.

Test Item: A letter returned to the post office due to the addressee moving without leaving a forwarding address should be processed on Form(s) _____ and _____.

The test item obviously *is not* a valid measure of the objective. Why? Without the manual (stated as a condition) the student is expected to know all the information about processing “undeliverable-as-addressed” mail and (as stated in the condition) any “necessary forms.” The objective does not demand this level of knowledge.

Item Analysis: Validity, Continued

**Example:
Matching The
Level Of The
Standard**

A test item can also test at an improper level by not matching the standards of the objective.

For example, an objective for a word-processing student demands certain standards of speed and accuracy, as in the following objective. See if you can determine whether the test item is valid.

Objective: Given 8 medical terms, correctly type the words within 1 minute.

Test Item: Type these medical terms:

Meningitis	Pneumococcal
Pyogenic	Pyelonephritis
Lymphoedema	Distichiasis
Dyspepsia	Inoculation

The test item *is not* valid because it fails to include the standard of the objective “within 1 minute.”

**Matching The
Objective To The
Proper Skill
Level**

In order for a test item to be completely valid, it must test only those skills directly contained in the objective. To do so, the item must be:

- free of unrelated skills, and
 - free of tricks.
-

**Avoid Testing
Unrelated Skills**

It is important that the test items do not test unrelated skills. For example, test items that are written at a higher verbal level than the learner possesses are actually testing comprehension. Test items must be easily read and understood by the learner.

Item Analysis: Validity, Continued

Example: Unrelated Skills

Skills might be unintentionally tested such as drawing diagrams, interpreting specifications, or blueprints and maps, as in the following example using a test item for a lab assistant.

Objective: Locate any given piece of equipment in the laboratory.

Test Item: Match the location indicated on the map of the laboratory to the equipment stored in each location by writing the corresponding letter in the blank provided.

_____ Bunsen burners
 _____ Microscope
 _____ Safety apparel
 _____ Eyewash
 _____ Glassware

This, of course, is not a valid measure of the objective because the test item is testing a skill (map reading) unrelated to the objective.

Make Sure The Item Is Free Of Tricks

It is important that learners understand what knowledge or skills are being tested. So-called trick questions seem to be testing one skill while they are actually testing another.

A trick question is invalid because it does not really test the learner's *mastery* of the objective; it merely tests the learner's ability see through the trick. Although a bit dramatic, the Allen wrench test item below is a trick question. It uses a misspelled word to trick the test-taker.

Objective: Distinguish whether or not a given tool is appropriate for a given task.

Test Item: An Alan wrench can be used to loosen a bolt or screw.

- A. True
- B. False

Since the test item misspells a critical word, it is considered to contain a "trick."

Item Analysis: Reliability

Item Reliability Reliability is another quality or characteristic of well-written test items. A reliable item is one that gives consistent results. Test items that are confusing or give hints to test-wise test-takers are not reliable.

The two main characteristics of reliable test items are:

- The test item must be free from ambiguity.
 - The test item must be free from clues.
-

Freedom From Ambiguity

To be free from ambiguity test items must:

- Be written in clear language.
 - Have one clear theme.
 - Make careful use of negatives.
-

Clear Language

If a test item is unnecessarily wordy or has a confusing grammatical structure, the item may not test the learner on the intended knowledge or skill and may yield inconsistent results, as in the following item.

Poor Test Item: The energy possessed by any object or being, in space and time, owing to its motion or movement regardless of the cause of said motion, is called _____ energy.

The item is obviously confusing. It tests the learner's ability to unravel the statement as much as it tests the required knowledge. It could be improved by simplifying the wording, like this:

Improved Item: The type of energy illustrated by the motion of an object is _____ energy.

Item Analysis: Reliability, Continued

One Clear Theme

When an item tests more than one theme or idea it is difficult to know how to respond, as in this true-false item:

Test Item: Rotational motion is the movement of an object in a circular path, while angular displacement is the measurement of the amount of rotation of a body about an axis.

- A. True
- B. False

If learners answer incorrectly, we cannot be sure whether or not they failed one or both parts of the question, or whether the two parts of the item confused them so that they were unable to interpret the question.

Careful Use Of Negatives

Avoid using negatives in test items, if at all possible. Negatives add confusion (when test-takers are reading quickly, which frequently occurs during tests).

It is easy to miss small word segments such as *not*, *un-*, or *mis-*. We should try to write items in a positive form. If this is not possible, emphasize negative words by underlining, CAPITALIZING LETTERS, *italics*, or **bold type**, as in this example:

Test Item: An “open” is caused when there is **not** enough voltage going to the circuit divide.

- A. True
- B. False

Although it is best to avoid negatives, the test item is not difficult to interpret because the negative is emphasized [in this instance] by **bolding** it.

Continued on next page

Item Analysis: Reliability, Continued

Avoid Using Double Negatives

There is no rationale for using double negatives. When two negatives are used in an item, it becomes difficult to interpret and therefore unreliable. Keep in mind that double negatives are not always easy to spot. Words with prefixes like *in-*, *un-*, *mis-*, or *dis-* are negatives too. The following example is of an item using a double negative.

Test Item: An SCR will not stop conducting when the holding current does not rise above the cutoff valve.

- A. True
- B. False

The item is difficult to interpret because the word “not” is used twice.

Freedom From Clues

The second major characteristic of reliable test items is freedom from clues. To be free of clues, the test item must:

- Use plausible distractors.
- Have a random order of answers.

Using Plausible Distractors

Multiple-choice and matching items include responses that are not correct, called *distractors*. If the distractors are implausible, the learner may be able to guess the correct answer by eliminating responses that cannot fit. For example, we can look at the following sample test item to see if it is reliable.

Test Item: Complete the sentence under column A by matching the formulas in column B.

Column A

The area of a rectangle is _____.
 The area of a 2-inch square is _____.
 The area of a triangle is _____.

Column B

- a. 4 square inches
- b. L x W
- c. 6 square inches
- d. $\frac{1}{2}$ distances x H
- e. 2 x L

Item Analysis: Reliability, Continued

**Random Order
Of Answers**

It is important to randomize the order in which the alternative responses fall. Use a logical order for alternative responses, such as alphabetical, or in order of magnitude; however, the point is to avoid a pattern for correct responses throughout the test. Test-wise students will be able to spot the pattern and use it as a cue to the correct response.

Summary

Validity and reliability are the two most important characteristics of a test. Validity determines whether a test measures what it should. A test can, in fact, be consistent (reliable) but measure the wrong thing. Reliability actually involves the consistency of test scores and involves test-retest and inter-rater functions. What is important to remember is that there is no such thing as validity without reliability.

: Note: Specific types of
 : validity and reliability
 : are covered in the
 : faculty professional
 : development courses
 : DAU/FPDE-3 and
 : reinforced in FPDE-6
 :
 :
 :

Deciding How Many Test Items

Introduction

One frequently asked question associated with criterion-referenced testing is: How many items should be on a test? The question does not have a simple numeric answer. The improvement in accuracy tends to level off between four and six items per objective. The question is important, however, because the length of a test has a direct relationship to the test's validity and reliability.

Factors In Deciding Test Length

The question of test length hinges on at least four factors:

- The criticality of the *mastery* decisions made on the basis of the test.
- The resources—time and money—available for testing.
- The domain size described by the objectives to be addressed.
- The homogeneity or relatedness of the objectives to be assessed.

Each of these four factors will be briefly discussed, in terms of influence on the decision of test length.

Deciding How Many Test Items, Continued

Criticality And Test Length

A simple method for resolving the issue of criticality is to ask the question:

What are the costs to the organization of erroneously classifying a non-master employee as a master?

Thus, the extent to which errors in criticality can be tolerated, tests can be shorter. But, if the consequences of criticality errors are severe, the tests used to make mastery/non-mastery decisions will have to be longer and still meet the requirements for test validity and reliability.

Resources And Test Length

The creation of tests takes time and costs money. The longer and more sophisticated the test, the greater the developmental costs. There are also costs associated with maintaining and scoring tests.

Tight budgets necessitate the need to trade off the cost of test development and implementation against the cost of errors in test results. Knowing the consequences of testing errors is essential toward balancing this trade-off wisely.

Domain Size Of Objectives And Test Length

The number of items required for a test is influenced by the objectives that the test is designed to assess. In general, the larger size of the domain of content described by an objective, the greater the items required to assess the objective adequately.

Most objectives require more than one test item—called parallel items—to assess them adequately.

Deciding How Many Test Items, Continued

Homogeneity Of Objectives And Test Length

Homogeneity of objectives has to do with their relationship to each other. Consider these two objectives:

A. Without access to references, describe the steps in conducting a performance appraisal.

and

B. Without access to references, describe the four stages of interpersonal communication.

These two objectives are related because the content they cover is similar. In fact, the objective **B** is very likely a prerequisite to objective **A**. As a result, test-takers are likely to perform the same way on the test items written for these two objectives.

If objectives are homogeneous to the extent that they result in test items to which test-takers respond similarly, fewer items need to be included to assess each objective independently. Conversely, if the objectives covered by the test are largely unrelated—heterogeneous—we would expect that the test would have to be considerably larger since several items will probably be required for each objective.

Section Summary

Section summary In this section of *The Guide* we have focused on assessing student performance. Testing and assessment is one of the most important aspects of the teaching-learning process. We have discussed the significance of referencing test and assessment items to the criterion stated in the performance objectives, introduced several types of tests and assessment items available to course developers, addressed the importance of test item validity and reliability, and considered the factors in deciding how many items it takes to make a test valid and reliable.

Several standard textbooks in the Reference and Suggested Readings on the next page give detailed suggestions for designing and developing the types of test and assessment items covered in the Section. Additional guidance and checklists are provided in the appendices of this *Guide*.

Appendix A

How To Write Learning Objectives

Writing Learning Objectives

Introduction Learning objectives form the foundation of any educational intervention. Before developing instructional materials, decisions must be made about what the learners are expected to do as a result of a lesson, course, and curriculum.

In This Section This section covers the following topics:

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Definition A learning objective is a clear statement of the behaviors expected of the learner as a result of a course or unit of instruction.

Writing Learning Objectives, Continued

Description

Performance-based learning objectives can be written in a variety of styles and can be included in the specification of a performance outcome.

Objectives have three characteristics:

- They state performance goals, or what the student should be able to do. Performance should be as close to actual job performance as possible.
 - They specify the conditions under which the student is to perform.
 - They specify the criteria for acceptable performance; the standards from which the degree of achievement can be measured or observed.
-

The Purpose And Characteristics Of Performance Objectives

Introduction

Performance-based learning objectives are purposeful and an inherent part of the instructional planning process. Task or need analysis forms the foundation of the learning objectives; therefore, the learning objectives should tie directly back to analysis.

Purposes Of Objectives

Performance-based learning objectives have three purposes. They provide:

- a sound basis for selection and design of instructional materials;
 - standards for determining whether instructional outcomes have been achieved, and;
 - students with a framework for performance.
-

Definition

A performance-based learning objective is a clear statement of the behaviors students are expected to demonstrate as a result of learning. This is what students are to exhibit at the end of a course or unit of instruction.

The Purpose And Characteristics Of Performance Objectives, Continued

Levels Of Objectives

There are three levels of performance objectives.

Objective Level	Description
Course Objective	This is the highest level of objective, which indicates what the learner will do at the end of the course.
Unit or Module Objective	A statement of what the learner will do after a group or series of lessons.
Lesson Objectives	<p>Lesson objectives are the most commonly developed in DAU courses. There are two types of lesson objectives:</p> <ul style="list-style-type: none"> <li data-bbox="997 835 1427 1052">• <i>Terminal Learning Objectives</i> (TLOs), which describe the performance students should exhibit at the end of a significant body of instruction. <li data-bbox="997 1094 1427 1379">• <i>Enabling Learning Objectives</i> (ELOs), which are subdivisions of terminal objectives. Enabling objectives describe the separate behaviors that, taken together, build toward <i>mastery</i> of the TLO.

The Purpose And Characteristics Of Performance Objectives, Continued

Sample TLO

Here is an example of a terminal learning objective:

Given simulated technical evaluations, source selection reports, and proposals from unsuccessful offerors, develop a documented rationale for not awarding to an unsuccessful offeror.

Sample ELOs

Here are some examples of enabling objectives:

- Distinguish which reports are sufficient.
- Identify technical representatives needed to assist in the debriefing.
- Identify technical deficiencies (from technical report) and the basis for not awarding, as well as material not to be disclosed.
- Prepare written documentation for a briefing session.

Writing Clear Objectives

There is a six-step process that can be used in writing clearly defined performance objectives:

Step	Action
1	Using each instructional goal, separate each goal into tasks or behaviors that can be managed by the target population (based on the learning characteristics of the students).
2	Using the content of the module/lesson to be presented, choose a hierarchy of learning on which to structure your objectives. Arranging in the levels of difficulty is the most common hierarchy: simple to complex. Organize the behaviors into a hierarchy of learning.
3	For each learning task, identify the desired performance outcome in behavioral terms.

Continued on next page

The Purpose And Characteristics Of Performance Objectives, Continued

Writing Clear Objectives,
Continued

Step	Action
4	For each performance outcome, identify the conditions under which the student will perform.
5	For each performance and condition, identify the expected level of <i>mastery</i> .
6	For each clearly stated objective, identify the criterion and method for evaluating that specific objective.

Developing Performance Condition Statements

Introduction

A terminal learning objective includes a statement identifying the condition(s) of performance. Some instructional designers think of it in terms of the *conditions of testing* (or assessment), because they are trying to communicate the conditions under which the student will be asked to demonstrate *mastery* of the knowledge and/or skills learned.

Definition

A performance condition statement is a description of the resources or tools the learner will need to complete the measurable or observable behavior.

Guideline

A condition is usually established with the word “Given” followed by such phrases as

- a set of questions
 - a scenario
 - a series of problems
 - a visual representation of an object
 - a list of conditions
 - a choice between...
 - materials (list components), or
 - a calculator.
-

Implied Conditions

Frequently objectives are written with no condition(s) of performance stated. When this occurs, the condition is

- stated in the terminal objective and then subsumed by the enabling objectives, or
- is implied within the context of the performance statement.

Example: The student will write the formula used for cost accounting with no errors.

Explanation: In this example, the implied condition is *Given pencil and paper, and no references...*

Developing Performance Statements

Purpose After establishing the conditions of testing; the performance statement, then, is the second of the three parts of a learning objective. It is the most critical because it describes what the learner will be able to do as a result of the unit or module of instruction.

Definition The performance statement is a description of learner activity, using a specific verb which clearly and concisely identifies a measurable or observable behavior.

Use Action Verbs When writing performance statements, use only specific action (as in doing) verbs. Specific verbs make the desired behavior clear and, therefore, observable or measurable.

Examples Of Specific Vs. Ambiguous Verbs Below are some examples of specific versus ambiguous verbs.

Specific action verbs: identify, select, complete, locate, write, compute.

Ambiguous verbs: know, comprehend, understand, appreciate, be familiar with.

Performance Verbs Performance statements are comprised of verbs that describe what the learner will be doing. A performance statement can begin with: “the learner will...” and be followed by words that describe performance. The following list is illustrative, and not exhaustive, of the types of words that can describe performance:

match	select	state	eliminate	label
write	define	fill-in	construct	isolate
type	solve	design	categorize	perform
list	measure	describe	cost out	underline

... trace the steps of	... perform steps in order
... generate solutions for	... explain in essay form
... press the key that	... list the characteristics of
... discriminate by	... analyze the properties of

Developing Performance Criterion Statements

Introduction The third component of a well written learning objective is the criterion, or standard for acceptable performance.

Definition A performance criterion statement is a statement of the quality or quantity standards required for acceptable achievement as the result of training or education program.

Criterion statements can also be referred to as “level of *mastery*” statements.

A criterion may include specifications relating to time, speed, accuracy, or overall quality.

Level Of Mastery Indicators The level of mastery usually follows the performance statement with such phrases as those listed below:

- ...(percent) of the time
- ...(number) out of (number of times)
- ...with percent of accuracy (number) out of (number of) attempts
- ...with less than (number)
- ...in (state amount) of time

Levels of mastery may be *implied* by using phrases that illustrate 100% accuracy, such as:

totally	each	corresponding
correctly	all	successfully
accurately	every	without error

Bloom's Taxonomy Of The Cognitive Domain

Introduction

Developing performance-based learning objectives that evolve from need or job task analysis usually result in content hierarchical analysis. For example, using the results from task analysis, task statements are arranged in a *sequence for learning*. Learning sequences can be from beginning to end, by order of performance, or chronological.

A practical and workable approach to validating a hierarchy of knowledge is to identify the learning level of each objective, and then see if the levels are in the proper sequence from a learning theory viewpoint.

The cognitive domain developed by Dr. Benjamin Bloom and his associates is the most widely accepted in the development of competency/performance-based, criterion-referenced instructional designs.

Definition

Bloom's Taxonomy is a classification scheme that breaks down cognitive processes into six steps: knowledge, comprehension, application, analysis, synthesis, and evaluation.

Description

Bloom's Taxonomy is considered a learning hierarchy because the next higher level subsumes each level of learning. That is, it is assumed that in order to function at the application level, a learner must also be able to function at all levels below application (comprehension and knowledge).

Bloom's cognitive learning hierarchy is analogous to climbing a set of stairs. A learner must acquire factual knowledge before he or she can understand theory. She or he must comprehend theory before they can apply it, and so on up the hierarchy. Thus, when developing a hierarchy of objectives, each objective can be classified according to a Bloom's cognitive level and subsequently cross-checked against a task or content hierarchy.

Tasks, objectives, or test items are classified at the highest level of cognitive functioning they require. Therefore, even though analysis level tasks also involve application, comprehension, and knowledge, they are said to be at the analysis level.

Bloom's Level 1—Knowledge

The Knowledge Level

Knowledge is defined as the remembering of previously learned material. This may involve the recall of a wide range of material, from specific facts to complete theories, but all that is required of the student is the recall of the appropriate information. Knowledge represents the lowest level of learning outcomes in the cognitive domain.

Related Knowledge Level Verbs

The following is a list of some of the common knowledge level verbs.

Acquire	Group	Locate	Quote	Reproduce
Choose	Match	Read	Select	Count
Recall	State	Define	Identify	Memorize
Name	Recite	Tabulate	Indicate	Recognize
Trace	Draw	Pick	Record	Underline
Label	Point	Repeat	Write	Find

Note

This and other verb lists provided are illustrative, not exhaustive.

Typical Tasks At The Knowledge Level

The knowledge level of learning calls for objectives that require simple recall of previously learned material. Some typical knowledge tasks are:

- Name
- List
- Define
- Who? What? When?
- *Yes* or *No* questions
- How many? How much?
- Describe
- Label
- Match
- Select

Bloom’s Level 2—Comprehension

The Comprehension Level

Comprehension is defined as the ability to grasp the meaning of material. This may be shown, for example, by translating material from one form to another (words to numbers), by interpreting material (explaining or summarizing), and by estimating future trends (predicting consequences or effects). At the comprehension level, more than rote memorization and recall is required. For example, previously unseen examples cannot be memorized. These learning outcomes go one step beyond the remembering of material, and represent the lowest level of understanding.

Related Comprehension Level Verbs

The following is a list of some of the common comprehension level verbs:

Account for	Distinguish	Generalize	Paraphrase	Reword
Associate	Draw	Predict	Rewrite	Give in own words
Change	Estimate	Prepare	Restate	Give examples
Classify	Expand	Show	Put in order	Outline
Conclude	Explain	Simplify	Compare	Express in other terms
Group	Read	Suggest	Convert	Reorder
Covert	Illustrate	Recognize	Demonstrate	Determine
Infer	Rearrange	Summarize	Convert	Differentiate
Describe	Extrapolate	Interpret	Reorganize	
Fill in	Measure	Represent	Define	

Typical Tasks At The Comprehension Level

The comprehension level of learning calls for objectives that require the learner to restate or reorganize material in a literal manner to suggest they understand the meaning. Some typical comprehension level tasks are:

- Give an example
- What will the consequences be...?
- What was the author’s important idea?
- What caused this?
- Compare (things)
- Contrast; how are things different?
- Paraphrase
- Rephrase
- Summarize
- Translate

Bloom’s Level 3—Application

The Application Level Application refers to the ability to use learned material in new and actual situations. This may include the application of such things as rules, methods, concepts, principles, laws, and theories. Learning outcomes in this area require a higher level of understanding than those under comprehension.

Related Application Level Verbs The following is a list of some of the common application level verbs.

Apply	Determine	Generalize	Record	Relate
Calculate	(calculate)	Graph	Choose	Develop
Restructure	Classify	Discover	Interpret	Select
Collect	Discuss	Interview	Plan	Show
(information)	Illustrate	Distinguish	Investigate	Practice
Solve	Complete	Predict	Construct	Estimate
Present	Examine	Produce	Expand	Make
Prove(in	Convert	Demonstrate	Organize	Put into
math)	Put into use	Put together	Track (as in	process)
Put into action				

Typical Tasks At The Application Level The application level of learning objectives requires students to use previously learned material to solve problems in new situations. Some typical application level tasks are:

- Solve (a problem)
- Apply the principle (concept) to...
- Compute
- Prepare
- Relate
- Produce
- Modify
- Classify

Bloom’s Level 4—Analysis

The Analysis Level

Analysis refers to the ability to break down material into its component parts so that its organizational structure may be understood. This may include recognizing the relationship between parts, and the organizational principles involved. Learning outcomes here represent a higher intellectual level than application because they require an understanding of both the content and the structural form of the material.

Related Analysis Level Verbs

The following is a list of some of the common analysis level verbs.

Analyze	Determine	Examine	Order	Simplify
Break down	Diagram	Formulate	Outline	Sort
Categorize	Differentiate	Examine	Point out	Subdivide
Classify	Discover	Group	Put into	Survey
Compare	Discriminate	Identify	categories	Take apart
Contrast	Distinguish	Illustrate	Recognize	Transform
Criticize	Divide	Infer	Relate	Uncover
Debate	Draw	Inspect	Search	
Deduce	conclusions	Make	Select	
Detect		inferences	Separate	

Typical Tasks At The Analysis Level

The analysis level of learning objectives requires the learner to break down an idea into its component parts for logical analysis. Some typical analysis tasks are:

- What reasons does the author give for his conclusions?
- What does the writer seem to believe?
- What vocabulary seems to imply bias or emotion?
- Does the evidence support the conclusion?
- Break down
- Distinguish

Bloom’s Level 5—Synthesis

The Synthesis Level

Synthesis refers to the ability to put parts together to form a new whole. This may involve the production of a unique communication (a theme or speech), a plan of operations (a research proposal), or a set of abstract relations (scheme for classifying information). Learning outcomes in this area stress creative behaviors, with major emphasis on the formulation of new patterns or structures.

Related Synthesis Level Verbs

The following are some of the common synthesis level verbs.

Arrange	Derive	Integrate	Present (an	Specify
Blend	Design	Invent	original re-	Suppose
Build	Devise	Make up	port or work)	Summarize
Categorize	Develop	Modify	Produce	Synthesize
Combine	Document	Originate	Propose	Tell
Compile	Explain	Organize	Rearrange	Write
Compose	Form	Perform	Reconstruct	
Constitute	Formulate	Plan	Relate	
Construct	Generalize	Predict	Reorganize	
Create	Generate	Prepare	Revise	
Deduce	Imagine	Prescribe	Rewrite	

Typical Tasks At The Synthesis Level

The synthesis level of learning objectives requires the learner to combine ideas into a statement, plan or product that is new for them. Some typical synthesis tasks are:

- Develop a model
- Combine elements
- Write a speech
- Create
- Combine
- Design
- Diagram
- Write
- Propose

Bloom's Level 6—Evaluation

The Evaluation Level

Evaluation is concerned with the ability to judge the value of material (statement, novel, market research report, trend data) for a given purpose. The judgments are to be based on definite criteria. These may be internal criteria (organizational) or external (relevance to the purpose), and the student may determine the criteria given to them. Learning outcomes in this area are the highest in the cognitive hierarchy because they contain elements of all of the other categories, plus conscious value judgments based on clearly defined criteria.

Related Evaluation Level Verbs

The following are some of the common evaluation level verbs.

Appraise	Consider	Determine	Interpret	Standardize
Argue	Contrast	Discriminate	Measure	Summarize
Assess	Criticize	Distinguish	Rank	Support
Award	Critique	Evaluate	Rate	Test
Choose	Decide	Grade	Recommend	Validate
Compare	Defend	Judge	Relate	Verify
Conclude	Describe	Justify	Select	

Typical Tasks At The Evaluation Level

The evaluation level of learning objectives requires the learner to judge something based on some criteria. Some typical evaluation level tasks are:

- Evaluate that idea in...
- Give a reason for or against...
- Present a rationale...
- Criticize
- Justify
- Assess
- Appraise

Appendix Summary

The Three Parts Of An Objective

In this section we have covered what a learning objective is and the purposes of objectives. We have also discovered the three parts of an objective which are summarized in the following table:

Part	Definition	Example
Performance condition statement	Describes the circumstances under which the learner will complete the measurable or observable behavior called for in the performance statement.	Given a calculator and cost and pricing data...
Performance (action) statement	Describes what the learner will be “doing” when demonstrating “mastery.” Action statements use a specific verb which clearly and concisely identify an observable or measurable behavior.	...the student will calculate the cost of paint...
Performance criterion statement	Describes the quality or quantity standards required for acceptable performance. A criterion (or standard) may be established using time, speed, accuracy, or quality.	...without errors

Appendix B

Course Design Plan

Components Of A Course Design Plan

Introduction A course design plan is a blueprint for the specifications of the course to be developed. Typically such a plan is prepared by the development team after analysis of the target audience, job duties/tasks, and content processes.

Basis For Design A course design plan:

- is based on clearly articulated goals and measurable objectives;
- facilitates learner readiness;
- calls for a stimulating learning environment;
- focuses on the critical outcomes identified, and;
- is learner-centered.

Design Plan Contents A course design plan contains but is not limited to the following:

- Assumptions—all requirements which weren't previously listed in the management plan which if not met would impact on the quality or timeliness of the instruction produced.
- Course map—sequential listing of all topics covered along with a rationale for the sequence.
- Detailed descriptions for each unit, module, or lesson.

Components Of A Course Design Plan, Continued

Detailed Descriptions

Detailed descriptions of each unit or lesson of instruction are important to ensure the customer and the developer has agreement on the content and methods for learning to be emphasized throughout each section of the training. Such a description usually includes:

- A listing of all terminal and enabling objectives
 - Critical teaching points for learning activities
 - Methods of instruction for each TLO/ELO or PO and teaching and/or learning points
 - A description of the learning activities
 - A summary of the assessment methods to be utilized to provide student feedback on mastery of critical outcomes
-

Elements For Design Consideration

The following should be taken into consideration when preparing a course design:

- Does the design provide options for a variety of learning methods?
 - Does the design encourage interaction for:
 - students to students (one on one & small groups)?
 - students to subject matter content?
 - students to instructors?
 - Does the design provide adequate learner feedback on mastery of course objectives?
 - Does the design encourage active learning?
-

Summary

The course design plan is used as the blueprint for specifications of the course to be developed. It should include course assumptions, a sequential listing of topics, and detailed descriptions of each unit.

Appendix C

Lesson Planning

Overview

Introduction A lesson plan is an arrangement for learning and the accounting for the procedures or process to be used to facilitate learning. A lesson or module is a collection of interacting and interdependent parts which are elements of a complete system (the course). Each lesson, then, is a component of the complete system.

There are several ways to develop lesson plans. Rather than establish a standard “model” here, it is sufficient to suggest that all course-lesson development share common elements. These fundamentals will be illustrated in this Appendix.

For guidance on any standardized approach for specific curricula modes, contact the DAU Curriculum Development and Support Center.

In This Appendix This section provides templates and examples of the following:

Topic(s)	See Page
Components of a Lesson Plan	150
Checklist for Lesson Plan Development	152
Instructor Presentation	153
Appendix Summary	158

Components Of A Lesson Plan

Course Title Write the full the name of your course in this section.

Lesson Title Write the name of the specific lesson in this section.

Time Required Include the specified time in this section. Include hours and minutes (e.g. 1 hour and 30 minutes).

Objectives Include both the terminal (TLO) and enabling objectives (ELOs):

TLO: Given “X” (state the conditions of performance), Do “Y” (state the behavior), so that “Z” (state the standard of performance).

<i>Enabling</i>	<i>Performance Statement</i>
ELO #1	Statement
ELO #2	Statement
ELO #3	Statement
ELO #4	Statement
ELO #5	Statement

Note List all enabling objectives in sequence.

Components Of A Lesson Plan, Continued

Instructional Aids

List all support materials needed for the lesson:

Type	Description or Identification
Slides	ID Number
Overheads	ID Number
Handouts	Describe
Video	Name
Equipment	Overhead projector Flipchart TV/VCR Computer
Other	Any special items

Note: List all items the instructor(s) must have in order to present the lesson.

Student Preparation

State what the student must accomplish before participating in this lesson. Cite any and all prerequisites of any courses, classes, qualification, pre-course or homework, etc. required prior to beginning this instruction.

Presentation Method

List all methods used to deliver learning, i.e., case study, lecture, group discussion, role-play, etc.

Evaluation Methods

State whether students will be required to take a written exam, pass a performance quiz, participate in a graded group or individual exercise, etc., and to what standard, i.e., *with 80% accuracy*.

Notes To Instructor

Describe the background of the lesson and identify any actions the instructor must take to prepare for this lesson, i.e., *prepare in advance the chart used during the role play exercise on page...or, review the article about recent changes in acquisition...*

Checklist for Lesson Plan Development

Developer's Name: _____ Date: _____				
Organization or Department: _____				
Lesson Title: _____				
Item	Yes	No	Suggestions for Changes	Notes
1. COVER SHEET COMPLETE				
2. OBJECTIVES				
A. Based on analysis				
B. Complete				
C. Measurable				
3. INTRODUCTION				
A. Objectives presented				
B. Reason for study				
C. Tied to past learning				
4. LESSON CONTENT				
A. Consistent with objectives				
B. Sequenced for learning				
C. Clear, consistent structure				
D. Summary provides review				
5. LEARNING METHODS				
A. Matched to an objective				
B. Student involvement assured				
6. PRESENTATION STRATEGIES				
A. Key questions				
B. Examples, analogies, etc.				
C. Instructional aids				

Instructor Presentation

Introduction

One of the most crucial elements of a lesson is the introducing new material to students. A lesson introduction involves many pre-planned elements that can assist faculty in establishing the learning environment. The goal of the lesson introduction is to provide focus, motivation, attention, and preparation for the students to assist in the learning process. The following are suggestions, based on current educational research, of elements that should be included in the introduction to a lesson.

Section One

The primary goal of the lesson introduction is to provide focus, motivation, attention, and preparation for the students to assist in the learning process. The following are suggestions, based on current educational research, of elements that should be included in the introduction to a lesson.

A. Preliminaries

- Lesson Title.
 - Student Materials.
 - State your name and provide a brief background, as applicable.
 - Student comfort: Ensure the environment is comfortable *and conducive to learning* with attention to lighting, temperature.
 - Solicit class participation: Let students know they are welcome and encouraged to ask questions during any part of the lesson. Inform them of any special requests such as raising hands, etc.
-

B. Tie-in or Review of Previous Lessons

- Stimulate the recall of previous learning and relate it to new information.
 - Ask review questions.
-

C. Preview Of Learning Objectives

- Terminal: Speak to the terminal learning objectives in clear, concise language.
 - Enabling: Explain the enabling objectives and how they relate to the *mastery* of the terminal objective.
-

Instructor Presentation, Continued

Section One, Continued

D. Motivator

- Attention Getter: Prepare the mind of the learner by attracting attention, arousing curiosity, creating interest and a desire to learn.
 - Ask questions, give examples, personal experiences; create some type of interesting reason for study --WIIFM: What's In It For Me?
-

Presentation

The purpose of the presentation is to present new ideas, provide instructions, and reinforce previously learned information. It also provides the lesson content, as well as student and instructor activities.

Section Two

A. Present the Learning Material

- Present statements of new information in meaningful context, logical sequence, and chunked or grouped into small, manageable blocks, each of which covers one main point or idea centered around the enabling objective.
 - Expand each main content area into organized, complete thoughts.
-

B. Transitions

- Use clear, concise transitions when moving from one topic (enabling objective) to the next.
 - Provide periodic reviews or internal summaries.
-

C. Transition to the next topic/ELO learning materials:

- Overview
 - Details
 - Practice, as appropriate, for this enabling objective
 - Repeat above as necessary for each subsequent enabling objective and topic area.
-

Instructor Presentation, Continued

Write Lesson Plans That Others May Teach

Text material in the content outline should have sufficient detail so that another qualified instructor can deliver the instruction as intended without having to “read” the content to the students. In other words, write the lesson plan for a substitute instructor.

Incorporate Methods

Instructional aids, group activities, and other involvement exercises and experiences should be incorporated in the content section and within the structure of the presentation.

For example, with the use of computers, graphic icons can be included as cues to help others visually recognize instructional intent. The icon below could be used to indicate the lecture mode.

Instructor Presentation, Continued

Application The application (or practice) section gives the students practice in applying knowledge, skills, and attitudes. It also helps facilitate retention of materials or skills learned.

Section Three The Application of Learning

The lesson plan does not have to have a special heading entitled, “APPLICATION.” However, it does have to include some type of activity/exercise/assignment that provides students with practice.

Describe some type of learning activity, with written clear directions, to ensure the students understand and can use the material presented

A. Ask Questions: Pre-prepared questions are written into the lesson plan (with the “ideal” answer, perhaps, placed in the right column).

B. Conduct an Exercise:

- Brainstorm
- Facilitate a group discussion
- Provide a demonstration
- Use written instruction sheets
- Role play
- Use a case study
- Be creative as time permits

C. Provide time for repetition and rehearsal of the information, concept, principle, etc.

Instructor Presentation, Continued

Section Four: Providing Closure

A lesson summary that highlights the important points and provides a review of the learning objectives is essential for every lesson plan. This is referred to as “planned closure,” which is a method of bringing all of the elements in a lesson together, and possibly preview what is ahead.

A. Review the Main Points

- To determine the extent of the students’ learning.
 - To determine the efficiency and effectiveness of instruction.
 - To aid in retention and help reinforce what has been learned.
-

B. Restate Lesson Objectives

- To make sure the students have accomplished the terminal and enabling objectives.
 - To ensure that all of the objectives has been adequately absorbed by the learner.
-

C. Solicit and Respond To Any Remaining Questions

D. Tie to Next Lesson

If appropriate, prepare an advanced organizer, or point ahead to let students know what is coming up.

Appendix Summary

Appendix Summary

Appendix C has provided a sample lesson plan outline and also included suggested elements that faculty need to include in a well-prepared lesson. A review of the lesson plan requirements would suggest that it favors learning over instructing. Following the guidelines provided in this appendix will insure a robust learning experience for students.

Appendix D

Test Items: Planning And Writing

Overview

Introduction

Section 6 of the DAU *Curriculum Development Guide*, Evaluating Student Performance introduced various types of tests and assessments that can be used in performance-based instructional designs. Appendix D takes a more prescriptive approach and focuses on the construction of student achievement tests. It will emphasize those principles and procedures of test construction that are most useful in classroom instruction.

In This Appendix Appendix D covers the following topics.

Topic	See Page
Method for Deciding the Type of Test or Assessment	160
Advantages and Disadvantages of Various Test and Assessment Items	163
Multiple Choice	164
Alternative Choice	165
Matching	166
Completion/Fill-In	167
Essay/Short Answer	168
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Methods For Deciding The Type Of Test Or Assessment

Introduction

Deciding which type of test or assessment item to use can be perplexing. While there are no really hardcore rules to follow, sound judgments can be made by considering whether or not you want to test performance objectives for

- acquiring knowledge,
- practicing knowledge, or
- practicing performance.

Acquiring Knowledge

Acquiring knowledge tests to determine if the student has gained new information or knowledge. This involves testing for

- facts or concepts,
- recognizing or discriminating between alternatives,
- steps in procedures,
- rules or principles, and/or
- conditions of performance (when, where, or how).

Samples Of Testing For Acquiring Knowledge

The following are examples of testing for acquiring knowledge.

Example 1	List three facts necessary to establish distribution of assets by a transfer corporation.
Example 2	Distinguish between criterion-referenced and norm-referenced grading systems.

Practicing Knowledge

Practicing knowledge tests to see if the learner can apply knowledge in a job-related situation, although in smaller, very structured pieces. This involves testing for making decisions and applying decisions to situations.

Methods For Deciding The Type Of Test Or Assessment, Continued

Samples Of Testing For Practicing Knowledge

The following are examples of testing for practicing knowledge.

Example 1	After receiving the details of a transfer of assets, determine whether property was transferred for less than full and adequate considerations <i>after, or at the same time</i> a tax liability was accrued.
Example 2	Using the test items and objectives provided, revise the items to follow criterion test item guidelines.

Practicing Performance

Practicing performance tests the student’s ability to use knowledge and skills acquired in a job situation, or in the closest approximation of job conditions. This involves

- performing the job using knowledge and skills learned, and;
- applying rules, principles, and facts in solving simulated job problems.

Samples Of Testing For Practicing Performance

The following are examples of testing for practicing performance.

Example 1	With the data provided, prepare a statement of the transferor’s of assets and liabilities as of the date of transfer. Your statement must include (a) market value of assets; (b) exclusion of assets from transferred, levied, and partially owned property, and; (c) accrued and assessed taxes plus penalties and interest as part of liabilities.
Example 2	Using the objectives provided, develop appropriate test items.

Methods For Deciding he Type Of Test Or Assessment, Continued

Associated Types Of Test And Assessment Items The following are associated types of tests and assessments for acquiring knowledge, practicing knowledge, and practicing performance.

If you want to test for . . .	Then use . . .
Acquiring Knowledge	Multiple-Choice Alternative Choice Matching Completion/Fill-In Short Answer, or Essay
Practicing Knowledge	Case Study Critical Incident Incident Essay Practical Exercise, or Role Play
Practicing Performance	Practical Exercise Case Study Role Play, or Simulation

Advantages And Disadvantages Of Test And Assessment Items

Introduction All of the various tests and assessments in this *Guide* have both advantages and disadvantages.

What You Should Consider You should consider each of the advantages, and especially the disadvantages, of using specific test or assessment devices before making a decision on which to use.

Multiple-Choice Here are the advantages and disadvantages of multiple choice test items.

Advantages	Disadvantages
<ul style="list-style-type: none"> • Learning outcomes from simple to complex can be measured. • Highly structured and clear tasks are provided. • A broad sample of achievement can be measured. • Incorrect alternatives provide diagnostic information • Scores are less influenced by guessing. • Scoring is easy, objective and reliable. 	<ul style="list-style-type: none"> • Constructing good items is time consuming • It is frequently difficult to write plausible distractors. • Is ineffective in measuring some types of problem solving and the ability to organize and express ideas. • Scores can be influenced by reading ability.

Advantages And Disadvantages Of Test And Assessment Items,
Continued

**Alternative
Choice**

Here are the advantages and disadvantages of alternative choice test items.

Advantages	Disadvantages
<ul style="list-style-type: none"> • The item is useful for outcomes where there are only two possible alternatives. • Less demand is placed on reading ability than in a multiple-choice item. • A large number of items can be answered in a shorter amount of time. • Scoring is easy, objective, 	<ul style="list-style-type: none"> • Subject to an extremely high guessing factor; student could have a 50/50 chance of correctly answering the item without any knowledge of the item's content. • Difficult to write statements which are unequivocally true or false. • Items do not discriminate between students of varying ability as well as other item types. • Can often include more irrelevant clues than do other item types. • Can result in testing trivial knowledge.

Advantages And Disadvantages Of Test And Assessment Items,
Continued

Matching Items Here are the advantages and disadvantages of matching test items.

Advantages	Disadvantages
<ul style="list-style-type: none"> • Requires short periods of reading and response time, allowing the instructor to test more content in limited time. • Provides objective measurement of student achievement or ability. • Provides highly reliable test scores. 	<ul style="list-style-type: none"> • Difficulty in measuring learning objectives requiring more than simple recall of information. • Difficult to construct due to the problem of selecting a common set of stimuli and responses.

Advantages And Disadvantages Of Test And Assessment Items,
Continued

**Completion/
Fill-in**

Here are the advantages and disadvantages of completion/fill-in test items.

Advantages	Disadvantages
<ul style="list-style-type: none"> • Test items are easy to construct. • Guessing is less likely than in selection-type items. • This item type is well suited to computational problems and other learning outcomes where supplying the answer is important. • A broad range of knowledge outcomes can be measured. 	<ul style="list-style-type: none"> • It is difficult to phrase statements so that only one answer is correct. • Scoring can be contaminated by spelling ability when responses are verbal. • Scoring is tedious and time consuming. • Not adaptable to measuring complex learning outcomes.

Advantages And Disadvantages Of Test And Assessment Items,
Continued

Essay Items

Here are the advantages and disadvantages of essay-type test items.

Advantages	Disadvantages
<ul style="list-style-type: none"> • Easier and less time consuming to construct than are most other item types. • Provide a means for testing the student's ability to compose an answer and present it in a logical manner. • Can efficiently measure higher order cognitive objectives: analysis, synthesis, and evaluation. 	<ul style="list-style-type: none"> • Cannot measure a large number of content objectives. • Generally provide low test and test-scorer reliability. • Require an extensive amount of instructor's time to read and grade. • Generally do not provide an objective measure of student achievement or ability (subject to bias on the part of the grader).

Advantages And Disadvantages Of Test And Assessment Items,
Continued

Critical Incident, Incident, Or Practical Exercise Here are the advantages and disadvantages of critical incident, incident, and practical exercise assessment items.

Advantages	Disadvantages
<ul style="list-style-type: none"> • Minimize guessing by requiring students to provide an original response. • Easier to construct than multiple-choice or matching items. • Can most appropriately measure learning objectives which focus on the ability to apply skills or knowledge in the solution of problems. • Can measure an extensive number of content objectives. 	<ul style="list-style-type: none"> • Generally provide low test and test scorer reliability. • Require an extensive amount of instructor time to read and grade. • Generally do not provide an objective measure of student achievement or ability (subject to bias on the part of the grader when partial credit is given).

Advantages And Disadvantages Of Test And Assessment Items,
Continued

Simulation And Role Play

Here are the advantages and disadvantages of simulation and role playing assessment items.

Advantages	Disadvantages
<ul style="list-style-type: none"> • Can most appropriately measure learning objectives which focus on the ability of the student to apply skills or knowledge in real-life situations. • Usually provide a degree of test validity not possible with standard paper and pencil items. • Useful for measuring learning objectives in the psychomotor domain. 	<ul style="list-style-type: none"> • Difficult and time-consuming to construct. • Primarily used for testing students individually and not for groups. Consequently, they are relatively costly, time-consuming, and inconvenient forms of assessment. • Generally provide low test and test-scorer reliability. • Generally do not provide an objective measure of student achievement or ability (subject to bias on the part of the observer/grader).

Advantages And Disadvantages Of Test And Assessment Items,
Continued

Case Study

Here are the advantages and disadvantages of the case study as assessment items.

Advantages	Disadvantages
<ul style="list-style-type: none"> • Provides a method for students to apply cognitive ability to real life situations. • Can assess cognitive objectives and using analysis, synthesis, and evaluation. • Can be used as a needs assessment tool to identify areas for learning. • Can individualize instruction using small group processing techniques. 	<ul style="list-style-type: none"> • Difficult to construct realistic, well integrated case studies. • Requires a skilled facilitator to ensure meaningful and useful feedback. • Generally does not provide an objective measure of student achievement or ability. • Subject to grader bias. Bias can be minimized by determining criteria for scoring ahead of time.

Guidelines For Developing Test And Assessment Items

Introduction

Once the type of items is selected to test objective(s), there are some guidelines that are helpful in constructing valid and reliable questions. Appendix D offers guidelines for developing various types of test items.

Guidelines For Using Multiple-Choice Items

The following guidelines should be used when constructing multiple-choice test items.

- ✓ The stem should contain a central problem.
- ✓ The question as a whole should be realistic and practical. It should not be academic and artificial.
- ✓ It should present a problem that requires knowledge of the job or of the instruction. Questions that can be answered on the basis of intellect or general knowledge alone should not be included in a test.
- ✓ Each question should be an independent problem and should not reveal the answer to another question.
- ✓ The problem should contain only material relevant to its solution (unless selection of what is relevant is part of the problem).
- ✓ Do not include choices that are trivial, implausible, or obviously incorrect. The distractors (wrong answers) should be plausible answers representing common errors and misconceptions.
- ✓ The best answer should not be given away by irrelevant details. Avoid clues to the correct answer.
- ✓ When a negative word is used in the stem, the negative word or phrase should be emphasized. Items containing negative words should also be checked to be certain that a double negative has not been used. When a negative is used in the stem, a negative should not appear in the alternatives.
- ✓ Choices that are numerically or logically related in a sequence should be placed in proper order.

Guidelines For Developing Test And Assessment Items, Continued

Guidelines For Developing Multiple Choice, continued

The checklist for developing multiple-choice test items is continued below:

- ✓ Place the choices at the end of the statement. Do not use blank spaces in the stem. This makes for continuity of reading and is less confusing for the student.
- ✓ Words or phrases common to all alternatives should be placed in the stem.
- ✓ “All of the above” or “None of the above” alternatives:
 - Should be used **ONLY** when they can meet a bona fide requirement for testing against an absolute standard of correctness or incorrectness. These choices may have application in the one correct answer variety of multiple choice items, but are inappropriate in best answer items.
 - Should not be used merely to provide another alternative in a multiple choice item when the test-writer has difficulty in writing the required number of choices.
 - If used, should not be used together. When one of these option-type of alternatives is appropriately used in a test item, the other should not be used. The situations in which both “*none of the above*” and “*all of the above*” might represent logical and challenging choices in a requirement are so remote that it is best not to consider their use together.
 - Are tempting to over utilize as the correct response. When using either, be careful not to always make *it* the correct response.

Guidelines For Developing Test And Assessment Items, Continued

Guidelines For Using Alternative Choice Items

The following guidelines should be used when constructing alternative choice test items.

- ✓ Compile a list of significant true statements and reword about half of them to make them false.
- ✓ Phrase the statements so as not to quote verbatim from the lecture or text.
- ✓ Make statements definite and clear.
- ✓ Make statements brief and of about the same length. A frequent mistake is to unconsciously make the true statements longer than the false ones.
- ✓ Be careful with specific determiners. Whenever words are used such as "no", "never", "always", "should", "all", and "only," be sure that they do not make correct answers obvious.
- ✓ Avoid trick questions. Do not contrive items that endeavor to catch the student unaware.
- ✓ When possible, make the crucial element come near the end of the statement.
- ✓ Avoid words which are open to interpretation such as few, large, small, average, etc.

Guidelines For Developing Test And Assessment Items, Continued

Guidelines For Developing Matching Items

The following guidelines should be used when constructing matching test items.

- ✓ Make at least 5 (and rarely more than 12) responses in completing a matching exercise. Responses are placed in the column on the right which is usually column B.
 - ✓ Include at least three plausible responses from which each correct response may be selected. If this requires too many choices in the right-hand column, it indicates that the material included in the exercise is not sufficiently related for use in this type of test item. Only homogeneous or related materials can be effectively used in matching exercises.
 - ✓ Write directions so that the student knows whether to use items in the right-hand column more than once or only once.
 - ✓ Set up the test so that the complete matching exercise appears on one page.
 - ✓ Assign a value to each correct response that is equal to the value of multiple-choice items used in the test.
 - ✓ Use the first item as an example and relate the example to the entire matching exercise. Also use a title at the head of each column.
 - ✓ Write the directions to fit the specific matching exercise.
-

Guidelines For Developing Test And Assessment Items, Continued

**Guidelines For
Developing
Completion,
Fill-In, Or Short
Answer Items**

The following guidelines should be used when constructing completion, fill-in, or short answer test items.

- ✓ Select and state the questions in such a way that they can be answered with a word or a short phrase.
 - ✓ Select and phrase the questions so that only one or a very few answers will be correct.
 - ✓ Do not provide optional questions.
-

Guidelines For Developing Test And Assessment Items, Continued

Guidelines For Developing Essay Items

The following guidelines should be used when developing essay-type test items.

- ✓ Essay questions should be used when the objective requires the student to demonstrate an understanding of complex relationships which cannot be represented in matching, true-false, short answer or the other more concrete types of items.
 - ✓ The essay question should pinpoint a specific relationship the student is to explain, rather than asking for essentially everything he or she knows about the topic.
 - ✓ The test author should provide the test grader with specific criteria, or a checklist of key points which the essay should include, even if the test author and grader are the same person. This checklist minimizes the subjective evaluation of essay answers.
-

Guidelines For Developing Test And Assessment Items, Continued

Guidelines For Developing Case Study Items

The following guidelines should be used when developing case study assessment items.

- ✓ Case studies should be used where there is data to analyze but no conflict. Where the situation involves conflict use a critical incident tem.
- ✓ Whenever possible, keep narrative to a minimum and present the case through realistic documents and briefly stated facts on which to base decisions and actions³.
- ✓ Clearly specify what decisions and actions are expected of the student, including any forms they are to fill out.
- ✓ Provide all facts necessary to solve the problem(s), along with enough generally related but unnecessary information to give the student practice in sorting relevant from irrelevant data while solving the problem⁴.
- ✓ If used in small groups, the case study must include clear assignments for the group and clear instructions for reporting back to the larger group.
- ✓ Include an ambiguous ending that stimulates problem-solving.
- ✓ If there are only one or two correct answers to the problem, such as a form with all information correctly computed and filled out, the test author should provide the answer key. If a number of different answers are acceptable, the test author should provide some rating sheet or list of minimum elements included in an acceptable answer. Otherwise, the instructor should be available to give personal feedback in as unbiased a manner as possible on case study answers.

³ This particular guideline is directed more toward the use of the Wharton Case Methods used in several DAU Level II and III courses, vs. the Harvard Case Methods employed in (e.g.) DAU-PMT-401.

⁴ The exception to this guideline is when individual faculty develops Problem-Based Learning events that require students to confront illogical situations which require additional information not provided.

Guidelines For Developing Test And Assessment Items, Continued

Guidelines For Developing Critical Incident Items

The following guidelines should be used when developing critical incident assessment items.

- ✓ Critical incident items must be short.
 - ✓ Critical incident items must concretely describe a situation that includes a conflict or problem to which the student would have to react quickly on the job. The description should be clear enough so that the student can picture it and him or her taking action in the situation.
 - ✓ For administrative ease, the student can be asked to describe his or her action in writing.
 - ✓ As with essay questions, the test writer should provide the test grader with a checklist or key points to look for that will minimize the subjective evaluation of the answer(s).
-

Guidelines For Developing Test And Assessment Items, Continued

Guidelines For Developing Practical Exercises

The following guidelines should be used when developing practical exercises as assessment items.

- ✓ The practical exercise must be easy to administer in a relatively short time. In most cases, the amount of time that can be allotted to formal testing is quite limited. Students must be exposed to the concepts and be given a chance to practice them before tests are administered. If the tests are too time consuming, they will take up class time that should be devoted to other teaching and learning activities. Also, an excessively long test may measure endurance rather than mastery. After 2 or 3 hours students get tired and cannot do work that shows all they have learned.
- ✓ The format and directions should be easy to follow. This makes the test easy to administer and conserves the student's time and energy.
- ✓ The practical exercise should extract the most critical elements of the task or objective. Select the critical elements on the basis of their importance, frequency, and difficulty. A practical exercise is much more selective than a simulation. In a simulation a student may be required to go through the entire process of preparing a written document, whereas in a practical exercise the student is asked to prepare the most critical elements of the document. In constructing the exercise, try to include a representative sample of the critical elements.
- ✓ The practical exercise should be presented in a format that simulates job conditions. In presenting the material in this manner, the probability of evaluating relevant job behaviors is increased. Moreover, the value of the test as a teaching device is enhanced. The more frequently a student encounters a job behavior in the classroom, the more able the student will be to cope with the situation on the job.
- ✓ All the materials required by the objective must be supplied to the students.

Guidelines For Developing Test And Assessment Items, Continued

Guidelines For Practical Exercises, continued

The guidelines for developing practical exercises are continued from the previous page.

- ✓ The practical exercise should provide a scheme for weighting each critical element. The procedures for weighting should be based on the relevance of the element to the objective, i.e., its importance, difficulty, and frequency. Assigning a numerical weight to each element makes it possible to quantify the results. The test score will be less dependent upon the person grading the exercise.
- ✓ A minimum acceptable score or standard should be established for each practical exercise or test item. If a student falls below that standard, he or she *has not* met the criterion for this particular objective. He or she should be given remedial training to be able to perform at the minimum acceptable level.

Guidelines For Developing Test And Assessment Items, Continued

Guidelines For Developing Simulation Items

The following guidelines should be used when developing simulation assessment items.

- ✓ Be sure the simulation is the best evaluation method for the training situation.
- ✓ Determine the primary learning behavior. Refer back to the learning objective for the simulation and decide which of the following four primary learning behaviors the simulation will focus on.
 - *Discrimination and Decision-Making*—focusing on essential differences in objects or situations, weighing factors which make certain choices preferable.
 - *Problem-Solving*—analyzing or diagnosing a problem to locate its cause and take appropriate action.
 - *Explaining or Public Communication*—communicating clearly and precisely, as well as according to departmental/organizational practices.
 - *Effecting Attitudinal or Emotional Change*—including increase or decrease in anxiety, frustration, or other feeling toward a situation.

Note: Once you have identified the primary learning behavior, in all subsequent steps try to provide as many opportunities as possible for students to respond using that category of behavior.

Guidelines For Developing Test And Assessment Items, Continued

Guidelines For Developing Simulations continued

The guidelines for developing simulations as assessment items are continued from the previous page.

- ✓ Design an analytical model of the simulation. Although there are many ways of designing an analytical model, the three steps below provide an easy approach to design one:
 - List in sequential order all steps an employee performs as part of the task or job to be simulated
 - Underscore all critical steps
 - List all decision-making or critical steps
 - ✓ Specify the presentation specifications (stimulus/response/feedback sequences) for each activity or phase of the simulation.
 - ✓ Design the simulation activities to represent each major task.
 - ✓ Make sure instructions and procedural guidelines of the simulation are clear. This includes writing instructions to tell participants whether the simulation is competitive, how they will know when a round is over, what length of “real world” time the compressed time of the simulation represents (e.g., one round = 1 week on the job), etc.
 - ✓ Review the written parts of the simulation.
-

Guidelines For Developing Test And Assessment Items, Continued

Guidelines For Developing Role Play Items

The following guidelines should be used when developing role play assessment items.

- ✓ There should be a broad range of human problems; participants should be given the opportunity to perform effectively, if the intent is to develop skills.
- ✓ It is best to use simulation problems *before* attempting to use real organizational problems.
- ✓ Develop clear, concise, and highly focused materials for participants. Materials should be readable and neither lengthy nor too complicated for a participant to remember.
- ✓ Include some hints on how to play the role.
- ✓ Provide observer background data sheets to the “scorers.” Scorers could be other faculty, or peers asked to observe and critique performances of others.

Item Analysis Of Criterion-Referenced Tests

Introduction

Whether administered before, during, or after instruction, a test that measures *carefully written objectives* is called a criterion-referenced test.

Criterion-referenced tests are designed to describe which learning tasks a student can and cannot *perform* rather than to discriminate among students. This, of course, represents a huge departure from the traditional use of norm-referenced grading systems by DoD schools.

Very Different Approach

The approach of the commonly used norm-referenced testing may be familiar, even comfortable, but not very useful for criterion-referenced tests. That is because the traditional indexes of item difficulty and item discriminating power are of little value using norm-referenced testing.

For example, a set of items in a criterion-referenced mastery test might be answered correctly by all students (giving it zero discriminating power) and still be effective items. With norm-referencing, if no student ever missed a test item, it would be considered to be inferior.

In criterion-referencing, if test items closely match an important learning outcome, the results simply tell us that *here is an outcome that all students have mastered*.

Item Analysis Of Criterion-Referenced Tests, Continued

Basic Concerns

One of the basic concerns in evaluating items in a criterion-referenced *mastery* test is the extent to which each item is *measuring the effects of instruction*.

If a test item can be answered correctly by all students *before* and *after* instruction, the item obviously is not measuring instructional effects.

While the above is an extreme example, it highlights the importance of obtaining a measure of instructional effects as one basis for determining item quality.

Note:
Information in the next two blocks pertains to courses that use, or plan to utilize pre- and post-tests.

Measuring The Effect Of Instruction

To obtain a measure of item effectiveness based on instructional effects, the same test *must* be given before and after instruction. Effective items will be answered correctly by a larger number of students after instruction than before.

An index of *sensitivity to instructional effects* can be computed by using the following formula:

$$S = \frac{R_A - R_B}{T}$$

R_A = the number of students answering the item correctly *after* instruction

R_B = the number answering the item correctly *before* instruction

T = the total number answering the item both times

Applying this formula to an item that was answered incorrectly by all students ($N = 32$) before instruction and correctly by all students after instruction, our result would be as follows:

$$S = \frac{R_A - R_B}{T} \text{ becomes } S = \frac{32 - 0}{32} = 1.00$$

Thus, the maximum sensitivity to instructional effects is indicated by an index of 1.00. The index for effective test items will fall between .00 and 1.00, with larger values indicating items with greater sensitivity to the effects of instruction.

Item Analysis Of Criterion-Referenced Tests, Continued

The Reporting Grid

Another method of item analysis, and perhaps a more utilitarian approach in performance-based training designs, is to cross-reference *each student* against the test or assessment items relative to specific objectives.

A simple reporting grid with the student names listed on one axis and the terminal objectives listed on the other would be sufficient (a sample is on the following page). The individual responses to test items associated with the terminal or enabling objective indicated on the grid would be noted as pass or fail, mastery or non-mastery based on a predetermined level of acceptance.

Predetermining The Level Of Mastery

Mastery or non-mastery, pass or fail levels of acceptance must be *predetermined*. Here is an example of how that might work.

- A terminal objective is keyed to test items 3, 4, 6, and 10, and has a *predetermined level of mastery* of three out of four items must be answered correctly.
 - Then, if student A answers items 3, 6, and 10 correctly, but misses item 4, he or she would still have *mastered* the terminal objective.
 - But, if student B answers items 6 and 10 correctly, but misses items 3 and 4, he or she will have *failed to master* the terminal objective.
-

Using The Grid

Keeping track of students and test items is not as difficult as it seems. Setting up a simple grid allows the teacher to track the progress of each student relative to the terminal objectives being tested.

Item Analysis Of Criterion-Referenced Tests, Continued

**Sample Grid:
Mastery Or Non-
Mastery**

The following is an example of a tracking grid. Several variations are possible, but the concept is the same: the need to test and report criterion-referenced test data for each student on each objective.

Student

A
B
C
D
E

	Objective 1	Objective 2	Objective 3...
A	Yes	No	Yes
B	Yes	Yes	Yes
C	Yes	No	No
D	No	Yes	Yes
E			

**If You Don't
Remember
Anything Else,
Remember ...**

A very important point to remember when using criterion-referenced testing is that the test results on individual objectives *are not* averaged.

That is, outstanding performance on one objective *cannot* make up for poor performance on others. Ergo, the individual areas of non-mastery are easily identified.

Item Analysis Of Criterion-Referenced Tests, Continued

**Strategic Points
Of Analysis**

Using the sample grid above (or in a similar manner), a number of important points can be analyzed.

- Class totals on the individual objectives can indicate curriculum or instructional problems, i.e., objectives where only a few students were successful might indicate a need to enhance the instruction. Or, an objective where all students were successful might indicate that an area of instruction is *not* needed.
 - To the extent that what is expected from group performance differs from what actually happens is a sign of a curriculum problem of some type. This aggregate data allows a better job of managing the curriculum.
 - By ranking the students on the basis of total number of objectives achieved, rather than simple numeric scores, student *mastery* can be identified and rewarded.
 - Finally, the total number of items which must be successfully completed to “pass” a given terminal objective can be set using factors such as the *criticality* of the subject matter as a basis, thus giving the certification of *student mastery* in a specific job or occupation real meaning.
-

Appendix Summary

Appendix Summary

Appendix D has provided guidance about the advantages and disadvantages of using various test and assessment items. A guideline for developing the different types of tests and assessments with checklists provided. Some methods for test item analysis were also presented.

Test and assessment instruments that contain appropriate and well-constructed items provide good data for analysis. Effective criterion-referenced test instruments have the characteristic of all types of tests: they are valid and reliable.

Additionally, good criterion-referenced tests must be objective, comprehensive, and capable of differentiating; that is, capable of separating masters from non-masters.

APPENDIX E

Performance-Based Learning and Assessment

Performance-Based Learning

Introduction Performance-based is learning in an environment where students actually do something (hence, “performance”). This type of environment is in contrast to one in which students learn by just reading, thinking or hearing someone lecture about something and then taking a written test.

In this Appendix This appendix covers the following:

Topics	See Page
What Is Performance-Based Learning?	191
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What Is a Rubric?	193
Advantages for Using Rubrics	194
Why Use Rubrics	195
Developing a Rubric	196
Types of Rubrics	197
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What Is Performance-Based Learning?

Performance-Based Learning Defined

When “performance” is defined as an act or process, and “learning” is knowledge gained through study, then the definition of “performance-based learning” is: knowledge gained as a learner works through some sort of process.

Performance-based learning is basically the type of learning in which a real (authentic) environment is simulated, and people operate in it to gain experience.

Components of Performance-Based Learning

Performance-Based Learning has the following components:

- Organizing the curriculum
 - Determining competency assessment
 - Developing performance assessment skills
 - Integrating productivity skills
 - Engaging students in learning to achieve results
 - Managing the performance-based learning process
 - Designing courses to include competency, productivity, and performance
 - Scheduling performance into the school day
 - Managing/developing student behavior
 - Developing student ownership
 - Including performance and productivity in reporting results
-

Performance-Based Assessment

Assessing Performance

Within instructional design; there are five different kinds of learning goals or *achievement targets*:

- Knowledge of facts and concepts (recall);
- Thinking, reasoning, and problem solving using one's knowledge;
- Skill in procedures or processes, such as constructing projects, reports, or other products, and;
- Dispositions, such as appreciating the importance of a discipline.

Different methods of assessment are, of course, better suited for measuring different kinds of achievement.

Effective Assessment

Effective assessment is a continuous process. It's not simply something that's done at the conclusion of a unit of study or at the end of a lesson. Effective assessment and *evaluation* are integrated into all aspects of the curriculum, providing both teachers and students with relevant and useful data to gauge progress and determine the effectiveness of materials and procedures. An effective way to assess student performance is through the use of a rubric.

What Is A Rubric?

What Is A Rubric?

The **Rubric** is an authentic assessment tool which is particularly useful in assessing criteria which are complex and subjective.

- A rubric is assessment tool which is designed to simulate real life activity (authentic assessment) where students are engaged in solving real-life problems.
- It is a formative type of assessment because it becomes an ongoing part of the whole teaching and learning process. Students themselves are involved in the assessment process through both peer and self-assessment.

As students become familiar with rubrics, their involvement increases, thus empowering the students and as a result, their learning becomes more focused and self-directed.

Rubrics are both a tool and a method for communicating expectations and assessing outcomes. Using rubrics *is about assessing student performance with the intent of improving performance*. A rubric describes exactly what is expected in completing a task or producing a product; things such as, analyzing a report, working in collaboration, solving a problem, etc.

Rubrics tell students how they will be graded on an assignment; what items will be graded and what level of quality is required to earn a particular grade or score. And because they define all this up front, rubrics make an instructor's job of grading assignments much easier. Moreover, they give students the guidance needed as they complete the assignment. There are two general categories of rubrics.

- **Analytic** rubrics which identify and assess components of a finished product.
 - **Holistic** rubrics that assess student work as a whole.
-

Advantages For Using Rubrics

Advantages For Using Rubrics

The **advantages** of using rubrics in assessment are that they:

- allow assessment to be more objective and consistent
- focus the teacher to clarify his/her criteria in specific terms
- clearly show the student how their work will be evaluated and what is expected
- promote student awareness of about the criteria to use in assessing peer performance
- provide useful feedback regarding the effectiveness of the instruction
- provide benchmarks against which to measure and document progress

Rubrics can be created in a variety of forms and levels of complexity, however, they all contain common **features** which:

- focus on measuring a stated **objective** (performance, behavior, or quality)
 - use a **range** to rate performance
 - contain specific performance characteristics arranged in levels indicating the **degree** to which a standard has been met
-

Why Use Rubrics?

Rubrics Improve Grading

Rubrics cause grading to have more clarity, consistency, and equitability.

Clarity comes from stating up front on the rubric what is to be evaluated. Consistency is gained by providing this information to all students via the rubric and then using that rubric to grade each student's work. Equity is gained when every student knows what is expected and is given the information they need to succeed.

Success or failure then becomes less an arbitrary judgment by the teacher and more a responsible choice on the part of the student.

Rubrics & Quality

Well constructed rubrics raise the quality of work students produce.

A well-developed rubric provides students with a clear picture of what the end result should look like and what range of quality is acceptable for a given task or product.

Rubrics Save Teacher's Time

Grading an assignment using a rubric is much less time-consuming since the rubric spells out very clearly what to look for and how to rate it. In addition, if students have had the rubric in hand as they worked on the assignment, they will be turning in better quality and more easily gradable work.

Rubrics Save Classroom Time

Rubrics give students the information they need to start an assignment, information that the instructor would otherwise have to convey verbally.

Rubrics Save Students Time

When a rubric is provided at the time an assignment is given, students will immediately know what is expected of them. They spend more of their time and energy on the tasks at hand and less on trying to figure out what the teacher wants.

Developing A Rubric

Steps in Rubric Development

There are endless ways to design. Most rubrics can be designed using the following criteria:

1. Determine learning outcomes
2. Keep it short and simple
3. Each rubric item should focus on a different skill
4. Focus on how students develop and express their learning
5. Evaluate only measurable criteria
6. [Ideally], the entire rubric should fit on one sheet of paper
7. Reevaluate the rubric (Did it work? Was it sufficiently detailed?)

Terms To Use In Measuring Range/Scoring Levels

There are numerous terms that can be used as quality indicators on a rubric. Some examples of quality indicators are:

- Needs Improvement...Satisfactory...Good...Exemplary
- Beginning...Developing...Accomplished...Exemplary
- Needs work...Good...Excellent
- Novice...Apprentice...Proficient...Distinguished
- Numeric scale ranging from 1 to 4, for example

Conveying various degrees of performance

After writing the first paragraph of the highest level, circle the words in that paragraph that **can vary**. These words will be the ones that can be changed as you write the less than top level performances. Here are some examples of concept words that convey various degrees of performance:

- Depth; Breadth; Quality; Scope; Extent; Complexity; Degrees; Accuracy
- Presence to absence
- Complete to incomplete
- Many to some to none
- Major to minor
- Consistent to inconsistent

Frequency: always to generally to sometimes to rarely

Types of Rubrics

Types of Rubrics There are endless ways to design and use rubrics. Most rubrics fall into two categories: analytic (also called trait) and holistic rubrics

Holistic Rubrics Holistic rubrics are so-named because they focus on the whole or the big picture, and provide students with one score their "whole" score for an assignment.

When to use:

- when you need to show quick snapshot of overall achievement, rather than description of quality;
- good for speed scoring;
- good for simple products or performances.

Potential Disadvantages:

- Two students can get same score for vastly different reasons.
 - Does not clearly identify strengths or weaknesses
 - Possibly no opportunity for the student to improve performance
-

Trait Rubrics Trait rubrics evaluates for selected traits, with each trait receiving a separate score/grade. For example, a piece of writing may be evaluated according to content, organization, sentence fluency, diction, and mechanics. Trait scores/grades may be weighted differently.

When to use:

- when you need to describe quality;
- good for complex skills, products, performances for which several dimensions are needed to be clear;
- teaching students nature of quality, showing strengths and weaknesses in detail;
- providing detailed feedback to students.

Potential Disadvantages:

- Evaluating is slower
 - Takes longer to learn
 - Cannot be used as a single-event assessment; more than one opportunity to perform is required to baseline and to improve performance.
-

Continued on next page

Types of Rubrics, Continued

Grid Rubrics

Holistic rubrics generally appear in a grid-like format. Grid rubrics are designed in rows and columns, with each row describing a different characteristic of a task, product, or performance and each column describing a different level of quality. The rows (characteristics) and columns (levels of quality) intersect to form a grid that describes the characteristics expected for each level of quality.

Here is an example of a holistic grid rubric:

Writing			
	High Quality	Acceptable	Below Quality
Topic Sentence	Names topic exactly' brief, precise, and appealing sentence; correctly placed.	Names topic; proper sentence; correctly placed.	Does not name topic; improper sentence.
Organization	Clear logic; clearly ended; each idea and sentence flows smoothly into the next.	Logical; 1-2 questionable transitions; order a bit weak.	Hard to follow order. Thought process is confusing.
Creativity and Thinking	Clever and original, but still on task; takes risks which all succeed; deep and clear thinking.	Some appeal; some good clear thoughts; demonstrates some effort.	Dull or even boring; demonstrates little effort.
Mechanics	No misspellings or grammar errors.	One misspelling; one grammar error.	Too many errors.

Continued on next page

Types of Rubrics, Continued

Open-Column Holistic Rubrics

Open-column holistic rubrics have just one row, with several columns describing the various levels of quality. It appears similar to the grid rubric, but it does not have the row descriptors in the leftmost column. Instead, each column includes a more detailed description of a particular level of quality.

Open-column rubrics are particularly effective when used to describe concepts or skills which students improve or develop. The column describing the lowest level of quality may include items considered "basic". The next level would include all of the basic items as well as a few more intermediate skills. The highest level would include both basic and intermediate skills as well as more advanced skills, as in this example:

Sending and Receiving e-Mail		
Highly Skilled	Somewhat Skilled	Minimally Skilled
<p>Sends and receives messages:</p> <ul style="list-style-type: none"> Composes, addresses and sends e-mail messages Cuts and pastes information into e-mail messages Replies to e-mail messages Forwards e-mail messages to one or more addresses Broadcasts e-mail messages to a group of addresses Demonstrates proper netiquette when communicating. <p>Creates and uses signature files.</p> <p>Organizes/manages address book.</p> <p>Attaches files to e-mail messages.</p>	<p>Sends and receives messages:</p> <ul style="list-style-type: none"> Composes, addresses and sends e-mail messages Cuts and pastes information into e-mail messages Replies to e-mail messages Forwards e-mail messages to one or more addresses <p>Organizes/manages address book.</p> <p>Attaches files to e-mail messages.</p>	<p>Sends and receives messages:</p> <ul style="list-style-type: none"> Composes, addresses and sends e-mail messages Cuts and pastes information into e-mail messages Replies to e-mail messages <p>Organizes/manages address book.</p>

Types of Rubrics, Continued

Mixed-Criteria Rubrics

Note how this four level rubric treats critical thinking as a set of cognitive skills supported by certain personal dispositions.

To reach a judicious, purposive judgment a good critical thinker engages in analysis, interpretation, evaluation, inference, explanation, and meta-cognitive self-regulation. The disposition to pursue fair-mindedly and open-mindedly the reasons and evidence wherever they lead is crucial to reaching sound, objective decisions and resolutions to complex, ill-structured problems (as discussed in DAU/FPD-7 *Understanding Problem & Product-Based Learning*).

This rubric was used here with permission from the authors: Facione, P.A., & Facione, N.C. (1994) The California Press.

Holistic Critical Thinking Scoring Rubric

Rating	Criteria
4	<p>Consistently does all or almost all of the following:</p> <ul style="list-style-type: none"> • Accurately interprets evidence, statements, graphics, questions, etc. • Identifies the salient arguments (reasons and claims) pro and con. • Thoughtfully analyzes and evaluates major alternative points of view. • Draws warranted judicious, non-fallacious conclusions. • Justifies key results and procedures, explains assumptions and reasons. • Fair-mindedly follows where evidence and reasons lead.
3	<p>Does most or many of the following:</p> <ul style="list-style-type: none"> • Accurately interprets evidence, statements, graphics, questions, etc. • Identifies relevant arguments (reasons and claims) pro and con. • Offers analyses and evaluations of obvious alternative points of view. • Draws warranted non-fallacious conclusions. • Justifies some results or procedures, explains reasons. • Fair-mindedly follows where evidence and reasons lead.
2	<p>Does most or many of the following:</p> <ul style="list-style-type: none"> • Misinterprets evidence, statements, graphics, questions, etc. • Fails to identify strong, relevant counter-arguments. • Ignores or superficially evaluates obvious alternative points of view. • Draws unwarranted or fallacious conclusions. • Justifies few results or procedures, seldom explains reasons. • Regardless of the evidence or reasons, maintains or defends views based on self-interest or preconceptions.
1	<p>Consistently does all or almost all of the following:</p> <ul style="list-style-type: none"> • Offers biased interpretations of evidence, statements, graphics, questions, information, or the points of view of others. • Fails to identify or hastily dismisses strong, relevant counter-arguments. • Ignores or superficially evaluates obvious alternative points of view. • Argues using fallacious or irrelevant reasons, and unwarranted claims. • Does not justify results or procedures, nor explain reasons. • Regardless of the evidence or reasons, maintains or defends views based on self-interest or preconceptions. • Exhibits close-mindedness or hostility to reason.

Types of Rubrics, Continued

Combination Rubrics

Combination rubrics include methods for both detailed feedback, via the checklist, and bigger picture evaluation, as with holistic rubrics. The list of grading criteria is grouped under major category headings. While the categories are graded on a more holistic scale, the details beneath each are marked with a plus or minus to show areas of strength and weakness.

- **Strengths:** Because of their dual nature, combination rubrics are often the most instructive type of rubric. They provide students with the detailed feedback they need to improve, while giving them a bigger-picture view of their overall progress. Plus, by organizing grading criteria into major and sub-criteria, combination rubrics help present difficult or complex information more clearly.
- **Weaknesses:** The major weakness of combination rubrics is that their rating scales may be somewhat subjective. If the major categories of a combination rubric are rated on a numbered scale, different numbers may mean different things to different students and often nothing close to what the teacher intends. Teachers can avoid this problem by providing a key to their rating scale and using the same scale throughout the learning experience.

Continued on next page

Types of Rubrics, Continued

**Sample
Combination
Rubric**

Being Trustworthy, Honest, and Ethical				
<p>In the right column, mark: 2=High Mastery; 1=Mastery; 0=Not Yet. In the left column, mark + for strengths and – for needs improvement.</p>				
<p>Is Trustworthy</p> <p>___ Often can depend on him or her to do what is right.</p> <p>___ Does what he or she says will be done.</p> <p>___ Does what he or she says will be done.</p> <p>___ Can be trusted to work hard without supervision.</p> <p>___ Regularly displays behavior that builds others' trust.</p>	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="width: 33%; text-align: center;">2</td> <td style="width: 33%; text-align: center;">1</td> <td style="width: 33%; text-align: center;">0</td> </tr> </table>	2	1	0
2	1	0		
<p>Is Honest</p> <p>___ Lives by the rules and laws of all groups.</p> <p>___ Is truthful, even if difficult consequences may result.</p> <p>___ Admits mistakes, faults, and inappropriate behavior.</p> <p>___ Accepts responsibility for own behavior and actions.</p>	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="width: 33%; text-align: center;">2</td> <td style="width: 33%; text-align: center;">1</td> <td style="width: 33%; text-align: center;">0</td> </tr> </table>	2	1	0
2	1	0		
<p>Is Ethical</p> <p>___ Knows what it means to be ethical (fair and lawful)</p> <p>___ Is committed to being ethical (making lawful choices)</p> <p>___ Makes ethical choices even though difficult consequences may result.</p>	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="width: 33%; text-align: center;">2</td> <td style="width: 33%; text-align: center;">1</td> <td style="width: 33%; text-align: center;">0</td> </tr> </table>	2	1	0
2	1	0		
<p>Goes Beyond: (Extra Effort, depth, quality, creativity, cleverness, etc.)</p>				
<p>Comments:</p> <div style="text-align: right; margin-top: 20px;"> <table border="1" style="display: inline-table;"> <tr> <td style="padding: 5px;">Score:</td> </tr> </table> </div>		Score:		
Score:				

Types of Rubrics, Continued

Total Point Rubric?

Total points rubrics are very similar to combination rubrics, in that they have major criteria that are scored holistically, with specific details underneath that are marked to indicate strengths and weaknesses. The major difference between combination rubrics and total points rubrics is that each category of a total points rubric is assigned a certain number of points which are then added together to produce a total score.

- **Strengths:** Total points rubrics work well if you want to weight certain parts of an assignment, giving more credit for some parts than others. Total points rubrics also help communicate to students which areas are more or less important on an assignment, helping to better focus their efforts.
- **Weaknesses:** With a total points rubric in hand, it is easy for students to lose focus on the meaningfulness of the assignment or the satisfaction of doing it well, and instead turn their efforts toward maximizing point values. When this happens, students may be less likely to try new strategies or experiment with ideas.

Continued on next page

Types of Rubrics, Continued

Sample Total Point Rubric

Draft-Analyze-Revise Rubric

To the right, rate each area on a scale from 1 to 10. On the blanks to the left, mark an "X" for strength or an "N" for an area that needs improvement.	Possible Points	Total Points
<p>Sets high standards for self.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Understands what it takes to make tasks high quality. <input type="checkbox"/> Uses draft-analyze-revise process on a regular basis. <input type="checkbox"/> Develops plans to complete major projects. <input type="checkbox"/> Defines desired results for major projects. <input type="checkbox"/> Defines specific criteria for meeting desired results. <input type="checkbox"/> Develops timelines/plans for achieving desired results. <input type="checkbox"/> Evaluates timeline to make sure it makes sense. 	10	_____
<p>Develops quality first drafts.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Completes first draft. <input type="checkbox"/> Evaluates first draft to see that specific criteria are met. <input type="checkbox"/> Makes initial revisions as part of first draft. 	10	_____
<p>Analyzes own work/benefits from analysis of others.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Critically analyzes own work. <input type="checkbox"/> Accepts and appreciates critique from others. <input type="checkbox"/> Effectively critiques the work of others. 	10	_____
<p>Revises drafts to quality based on analysis.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Evaluates the recommendations of others. <input type="checkbox"/> Makes revisions based on self-analysis. <input type="checkbox"/> Makes revisions based on recommendations of others. 	10	_____
<p>Persists through difficulties and frustrations.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Performs multiple revisions of same task. <input type="checkbox"/> Continues working until quality criteria is met. 	10	_____

Appendix Summary

Appendix Summary

Appendix E has provided guidance about performance learning, performance outcomes and how to assess performance using rubrics. Several examples of different types of rubrics were presented.

While learning; few students can produce quality without some sort of direction. Most need to be given some guidelines—to hear examples, or to be shown models at varying levels of quality in order to compare one to another, or to practice the task a few times and get feedback—in order to develop a sense of what constitutes "quality".

When we assign students a particular task, we are far more likely to get quality work from them by providing these things. Thus, Appendix E has been about achieving quality using rubrics. A rubric is the perfect tool for communicating this kind of information. As we have discovered, a rubric provides two key pieces of information to the student:

- "What is quality?" Or rather, in student terms, "On what will I be graded?" The rubric lists the specific attributes that the work must have in order to receive a particular grade.
- "How do I produce quality?" By detailing the steps that students are expected to follow, the rubric acts as a guide to producing a quality end-product.

Finally, we are reminded in Appendix E that a rubric not just an assessment device, it is a communication tool. Used appropriately; rubrics are the way teacher's can assess student performance with the intent of improving their performance.

APPENDIX F

Facilitated Online Learning Environments Design Standards

Asynchronous Online Learning

Introduction

Within its range of learning product lines; the DAU has the capability to design and deliver web-based asynchronous and asynchronous-hybrid courses. Asynchronous learning simply refers to the provision of learning opportunities and support that can take place or be accessed at any time; it is not fixed to standard timetabled lectures, seminars, labs etc. At the DAU we call asynchronous learning courses Facilitated Online Learning Environments (FOLE).

In this Appendix This appendix covers the following:

Topics	See Page
The Elements of FOLE	207
What Is FOLE?	208
The DAU-FOLE Design Standards	209
Appendix Summary	214

What Is FOLE?

What Is FOLE? Using the asynchronous mode of learning; FOLE does not require the simultaneous participation of all students and instructors.

- Students do not need to be gathered together in the same location at the same time.
 - Students may choose their own instructional time frame and gather learning materials according to their schedules.
 - Asynchronous instruction is more flexible than synchronous instruction.
 - Asynchronous instruction allows and encourages community development.
-

Advantages of FOLE The advantages of asynchronous delivery include student choice of location and time, and (in the case of electronic communications such as email) interaction opportunities for all students. Other advantages include:

- Allowing students to access material at any time
 - Supplementing resources
 - Allowing student and facilitators to communicate with each other at any time
-

Potential Disadvantages of FOLE

The potential disadvantages of asynchronous delivery are:

- Loss of face to face contact, if this were the only mode used
 - Possibility for overload of resource material
 - Possible loss of a sense of continuity and immediacy
 - With email-based interaction and product-based assignments, there is considerable written exchange
-

The Elements Of FOLE

The Elements of FOLE

The elements of FOLE are not aimed at separating students from instructional aid or from each other; in fact quite the opposite is true. There are several types of activity that are predicated on groups of students (group discussions, team mastery of skills, etc.) and student/teacher interaction (remediation, feedback, etc.).

FOLE Means Decreasing Learner Dependence

Decreasing the dependence of instruction on lecture and shifting to asynchronous learning techniques could take several forms, ranging from simple and elementary to advanced and complex:

- replacing lectures with streaming video presentations, or with Internet based multimedia presentations;
- replacing the administrative elements of class time with web-based document distribution or asynchronous Discussion Board question-and-answer postings;
- replacing laboratory experiences with web-based interactive, collaborative, authentic problem-solving and decision making exercises;
- implementing coordinated, credited and endorsed small group meetings for discussions;
- implementing coordinated, attributed and endorsed work sessions connected with specific skill or task outcomes, and;
- implementing coordinated, attributed and endorsed peer-mentoring, peer-tutoring and peer-coaching strategies.

These are just a few of the ideas about how to convert from teacher-centered instruction to learner-centered asynchronous online facilitation.

The FOLE Design Standards

Facilitated Online Learning Environment Checklist

The Facilitated Online Learning Environment (FOLE)/Blended Learning (BL) *Course Design Standards Checklist* was developed and validated by the DAU e-Learning and Technology Center (e-LTC).

The standards can be used in [checklist] form (as illustrated here in Appendix F), or in a rubric format to actually review courses that have already been developed.

The FOLE standards checklist is designed to be constructively used in two ways:

- as a course design evaluation instrument, or;
- as a curriculum development guide for new course development or for courses that are targets for conversion.

Purpose of the Checklist

The purpose of this Checklist is to help Course Managers and Instructional Designers quickly review an existing course and determine if all of the criteria are in place for developing or converting courses to a FOLE mode, including blended learning (BL) designs.

About the Checklist

The Checklist contains *7 General Course Standards* and *35 Specific Course Standards*, all of which must be accounted for a course to reach the desired level of quality.

Each Standard and Course Standards is on the pages that follow. A copy of the actual checklist or rubric forms are available from the Director, e-Learning and Technology Center (e-LTC).

The FOLE Design Standards, Continued

**Standard 1:
Course Overview
and Introduction**

General Standard: The overall design of the course, navigational information, as well as course, instructor and student information are made transparent to the student at the beginning of the course.

Specific Course Standards
1.1 Navigational instructions make the organization of the course easy to understand
1.2 There is a statement introducing the student to the course and to how student learning is structured.
1.3 Netiquette expectations with regard to discussion and email communication are clarified.
1.4 The self-introduction by the instructor and the students is appropriate.
1.5 Course requirements and expectations are clearly stated.
1.6 Course interaction requirements are clearly stated.
1.7 Course policies and procedures ensure the integrity of the student's work.
1.8 Course contains information about being an online learner and links to resources.
1.9 Course contains information about being an online learner and links to resources.

The FOLE Design Standards, Continued

**Standard 2:
Learning
Objectives**

General Standard: Learning objectives are clearly defined and explained. They assist the learner to focus on learning activities.

Specific Course Standards
2.1 Learning outcomes are clearly stated.
2.2 Learning outcomes are observable, measurable and achievable.
2.3 Learning outcomes are closely correlated with real world (authentic) performance expectations.
2.4 Learning outcomes address content mastery, complex reasoning (process mastery) ability, and increased learning skills.
2.5 Instructions to students on how to meet the learning objectives are adequate and easy to understand.

**Standard 3:
Assessment and
Measurement**

General Review Standard: Assessment strategies use established ways to measure effective learning, assess learner progress by reference to stated learning objectives, and are designed as essential to the learning process.

Specific Course Standards
3.1 Assessment methods are appropriate to the outcomes, activities and technologies.
3.2 Assessment of student learning is timely, appropriate and responsive to the needs of the individual learner.
3.3 Assessment of student achievement is conducted by comparing student performance to the intended learning outcomes.
3.4 Achievement of learning outcomes is documented.
3.5 Student evaluation policies are easy to understand.

The FOLE Design Standards, Continued

**Standard 4:
Resources and
Materials**

General Review Standard: Instructional materials are designed to be sufficiently comprehensive to achieve announced objectives and learning outcomes and are prepared by qualified persons competent in their fields (Materials, other than standard textbooks produced by recognized publishers, are prepared by the instructor or distance educators skilled in preparing materials for distance learning.)

Specific Course Standards
4.1 Course materials are presented to accommodate multiple learning styles.
4.2 Presentation of content cultivates active learning opportunities.
4.3 Resources and materials are accessible to the learners
4.4 The purpose of the course elements (content, instructional methods, technologies, and course materials) is evident.
4.5 All resources and materials used in the online course are appropriately cited.

**Standard 5:
Learner
Interaction**

General Review Standard: The effective design of instructor-learner interaction, meaningful learner cooperation, and learner-content interaction is essential to learner motivation, intellectual commitment and personal development.

Specific Course Standards
5.1 The course design prompts the instructor to be present, active, and engaged with the students.
5.2 Clear standards are set for instructors' response to students
5.3 Learning activities are developed to foster instructor-student, student-content and, where appropriate, student-student interaction.
5.4 Course and its resources are in accordance with the Americans with Disabilities Act (ADA) Standards.

The FOLE Design Standards, Continued

**Standard 6:
Course
Technology**

General Review Standard: To enhance student learning, course technology should enrich instruction and foster learner interactivity

Specific Course Standards
6.1 Technologies employed are appropriate for the course outcomes.
6.2 Student minimum Technology requirements are accurately and clearly stated.
6.3 Course resources are accessible to the learners (all downloads are identified and made available to student).
6.4 Course instructions articulate or link to tutorials, technical support, and resources that answer basic questions related to research, writing, technology etc.

**Standard 7:
Quality/Course
Efficacy**

General Review Standard: A plan is in place for the course to be reviewed for currency and is effectively supported for update from both formative and summative data.

Specific Course Standards
7.1 Plan is in place for continual review and improvement of course.
7.2 Faculty has been provided with appropriate training and technical support.
7.3 Faculty has access to appropriate technical infrastructure.
7.4 The learning design is evaluated regularly for effectiveness: both student and instruction components.

Appendix Summary

Appendix Summary

Appendix F has provided guidance about the standards for designing and assessing facilitated online learning (FOLE) courses. Using the DAU Learning Management System (LMS); asynchronous learning structures can be constructed which will support group collaboration; which can facilitate a desired behavior, not produce it.

This appendix has provided a validated development and review checklist with 7 standards and 35 sub-standards. Using the DAU/FOLE Design Standards; designers can mold, model, and encourage desired behavior. The checklist and its corresponding course review rubric are available from the Director, e-LTC.

APPENDIX G

Creating A Course Syllabus

Introduction

Introduction

Syllabus can be operationally defined as a written summary outline of discussion topics, required reading, and assignment, which professors usually hand out the first day of class or post online.

A carefully planned, clearly written, comprehensive syllabus is one of the most important resources we can provide our students. A well-designed syllabus performs many functions for the instructor and for the student: it outlines course expectations, organizes information, sets the tone for class interactions, and guides student learning. A carefully constructed syllabus helps prevent misunderstandings as to course goals and objectives, assessment and evaluation standards, grading policies, and student or faculty behavior.

It is highly recommended that each DAU course provide a syllabus for its students. Because of the diversity of courses and modes of delivery of DAU curricula there is purposefully no standardized, established policy requirement for creating a course syllabus. Creating a syllabus for each DAU course is, however, inherently suggested in several policy directives (e.g., DAU-D 701 - *Curricula And Program Evaluation*, and 703 – *Student Assessment and Evaluation*). The rationale and guidelines for a course creating syllabus are offered in this Appendix.

In this Appendix This Appendix covers the following:

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Syllabus Questions	218
The Syllabus As A Contract	220
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Sample DAU Syllabus	224

The Syllabus As An Organizational Tool

Syllabus as an Organizational Tool

A lack of organization makes the learning experience more difficult. The course syllabus can play an important role in keeping everyone moving toward the same goals. The following is a list of organizational questions that can help formulate the content of a well designed syllabus:

What do I need to know?

One of the first indicators that a course is well organized is the set of learning outcomes that the instructor has defined to guide the students in the learning process. Learning outcomes specify the material that will be covered and how the student will demonstrate mastery of the content.

When will I learn it?

A course schedule is the next step in providing a scaffold for the students to organize their learning. It provides an outline of topics presented in the course and estimates a day, date or time by which they will be covered.

When are assignments due?

Students need to know at the beginning of the course when assignments are due in order to organize their time and resources necessary to complete them.

When are the tests, and what will they cover?

Unfortunately, one question seems to constantly be on students' minds, "Is that going to be on the test?" A well-designed syllabus answers those questions by clearly stating what topics or materials will be included on each test. A course schedule specifying exact dates for tests or exams is critical to avoid student confusion, anger, or failure.

What resources are required and where are they located?

The syllabus should be organized by tying resources into the scheduled topics. Students should be able to anticipate when external resources will be necessary and know where to obtain them. It will minimize student anxiety and prompt students to ensure they have access to these resources in ample time to complete assignments or prepare for tests and assessments.

Syllabus Questions

Syllabus Questions

The syllabus defines where students are in the learning process, what tools they will need to take their journey, where the journey will take them, and how well they have negotiated the path. The syllabus answers the following student questions:

Where am I?

A well-designed syllabus indicates what prerequisite skills or knowledge is necessary to succeed in the course so that students can make decisions as to whether or not they are ready to undertake the content.

Where am I going?

The course information provided in the syllabus gives students a clear idea of the content of the course and relates where this particular course fits in the context of a course of study. Specific learning outcomes related to the course content are critical if students are to fully understand the extent of what is expected and what they will learn as a member of the class.

How will I get there?

A carefully constructed syllabus will provide details as to the pacing of the course and the schedule of topics that will be covered. Students must know how they will master each of the learning objectives is another important feature of the course syllabus. Students appreciate being told up front the extent to which they will be expected to work independently (e.g., in-class groups or out-of-class projects).

What resources will I need along the way?

Students need to know from the outset what materials they need to accomplish the learning objectives/outcomes and how they access the materials. In the course syllabus, clearly detail textbooks, required readings, Internet sites, and other lab or class materials.

Is there assistance if I require it?

Feeling alone on the learning journey can be a daunting experience. The course syllabus should clearly state what assistance is available and how to access it. This can range from posted office hours during which the student can obtain assistance from the instructor to the instructor offering to facilitate the formation of student study groups.

Syllabus Questions, *Continued*

What do I get at the end of the course?

While we all would love to think that the joy of learning is sufficient to motivate students, in fact, most students are really concerned about how you will evaluate their performance and assign grades. Your course syllabus should address the grading/rating process.

Whenever applicable, provide students with the rubric or checklist that will be used for performance assessments.

The Syllabus as A Contract

The Syllabus Is A Teaching and Learning Contract

Teaching and learning does not take place in a vacuum. Within the context of the classroom, *effective* teaching and learning require a partnership between the teacher and the students. As in any partnership, the parameters of the relationship need to be clearly defined and the responsibilities of each party articulated. The syllabus represents a contract between the teacher and the students: it provides a binding agreement stating teacher/course expectations, how the student should proceed, and how they will be evaluated.

As a contract, the syllabus means that both the teacher and the students are agreeing to a certain course of action, with specific expectations on both parts, and that all are accountable for maintaining the agreed upon route.

Syllabus: Recommended Contract Minimums

Within the DAU; the value and use of a syllabus is determined by the quality and range of information provided. The following list of recommended items comes from a careful review of the literature, an analysis of high-quality syllabi rated by students and faculty, and a survey of student evaluations of course syllabi.

When developing a syllabus (contract), include at least the following items:

- instructor information
 - course information
 - method/mode of instruction
 - course description
 - course objectives and or performance outcomes
 - course calendar or schedule (also called a time-syllabus)
 - course policies
 - textbooks and supplies
 - assignments
 - grading
 - specific notes or rules
-

Sample Syllabus Template

Sample Syllabus Template

No two syllabuses are exactly alike. The following is a template that would constitute effective syllabus planning at the DAU:

- A. Course Title
 - B. Course Number
 - C. Course Prerequisites:
 - D. CLPs/CEUs/Number of Recommended Credits:
 - E. Faculty Name(s)
 - a. Phone
 - b. E-mail
 - F. Course Description
 - G. Course Objectives
 - H. Stated Competencies (if applicable)
 - I. The following concepts (ideas, goals, topics) will be covered:
 - J. Course Materials
 - K. The following critical performances are required in this course:
 - a. Performance
 - b. Product
 - c. Behavioral
 - L. Evaluation (How performance will be assessed)
 - M. Course Policies
 - N. Course Sequence/Time Schedule
-

Appendix Summary

Appendix Summary

In today's world of increasing pressures and demands on faculty and students, the course syllabus has taken on new import. Students and faculty are finding that the syllabus functions:

- as a road map to guide the teaching and learning process
- as an organizational tool to help manage the teaching and learning process
- as a contract to ensure that all parties are clear on the expectations and responsibilities associated with the course

This Appendix has reflected the elements of a good syllabus and its functions. The syllabus is one of the few artifacts to remain after the students move on. The syllabus represents both an end and a beginning—a final product for course planning and a valuable way to introduce the teacher and the course to students.
