

Department of the Army
Headquarters, United States Army
Training and Doctrine Command
Fort Eustis, Virginia 23604-5700

TRADOC Pamphlet 350-70-7

9 January 2013

Army Learning

ARMY EDUCATIONAL PROCESSES

FOR THE COMMANDER:

OFFICIAL:

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History. This publication is a new U.S. Army Training and Doctrine Command (TRADOC) pamphlet (TP).

Summary. This new publication provides information to institutions that primarily provide education. It presents general principles of education using analysis, design, development, implementation, and evaluation (ADDIE). ADDIE is a generic process to conduct instructional system design. In addition, the pamphlet provides a template of educational processes grounded in adult learning principles used across Army educational institutions.

Applicability. This pamphlet applies to TRADOC activities and The Army School System (TASS) institutions that primarily provide education: the U.S. Army War College; all Leader Development and Education schools including intermediate level education (ILE) and captains career course (CCC); the Sergeants Major Course within the Sergeants Major Academy; graduate level courses; and courses required for civilian certification. Education provides intellectual constructs and principles. It helps develop individuals and leaders who can think, apply knowledge, and solve problems under uncertain or ambiguous conditions. Education is associated with "how to think." Education gives leaders and individuals the tools to think at all levels (organizationally and strategically) and to enhance leadership abilities along with knowledge and experience. This achievement occurs over a leader's career with increasingly complex education, especially in the areas of leader development and the military arts. It also applies to non-TRADOC agencies and organizations possessing memoranda of understanding,

memoranda of agreement, and contracts for developing educational learning products for TRADOC and TASS agencies and organizations. This pamphlet does not pertain to assessments and/or evaluations conducted on behalf of the Army Quality Assurance Program.

Proponent and exception authority. Army regulation (AR) 350-1 assigns the Commanding General (CG), TRADOC, the responsibility to develop and publish training development policy and procedures and serve as the Army's proponent for the Army Training and Education Development process. The proponent of this pamphlet is the U.S. Army Combined Arms Center — Leader Development and Education (CAC-LDE). The proponent is the authority to approve exceptions or waivers to this pamphlet consistent with controlling law and regulations, unless otherwise designated. Exceptions are granted on an individual basis. The commander or senior leader of the requesting activity must endorse all waiver requests before forwarding them through higher headquarters to the policy proponent. Requests must include requestor contact information; type of request (initial, extension, modification, appeal, or cancellation); specific line items requested for waiver; unit, institution, or center/school affected; proposed alternative; justification; impact; expected benefits; anticipated effective dates; and duration requested. The proponent continually seeks innovation and process improvement. Significant process improvements and global exceptions will be considered for addendum to policy prior to the next revision.

Suggested Improvements. Submit changes for improving this publication on Department of the Army (DA) Form 2028 (Recommended Changes to Publications and Blank Forms) through channels to CAC-LDE, Fort Leavenworth, Kansas. Also, submit suggested improvements using DA Form 1045 (Army Ideas for Excellence Program Proposal). Individuals and organizations are authorized to send comments electronically.

Distribution. This TP is available only on the TRADOC Web site <http://www.tradoc.army.mil/tpubs/>.

Summary of Change

TP 350-70-7

Army Educational Processes

This new publication, dated 9 January 2013-

- o Addresses the Analysis, Design, Development, Implementation and Evaluation processes focusing on the systems approach to curriculum development and the interdependence of the five phases (chap 2).
- o Demonstrates how the five phases can be used in developing a disciplined process to ensure classroom instruction accomplishes the institution's educational purpose (chap 3).
- o Serves as a reference for curriculum developers who are preparing instructional material to use in Army Educational Institutions (apps A-E).

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Chapter 1

Introduction

1-1. Purpose

This pamphlet provides information to institutions that primarily provide education. It presents general principles of education using analysis, design, development, implementation, and evaluation (ADDIE). ADDIE is a generic process to conduct instructional system design. In addition, the pamphlet provides a template of educational processes grounded in adult learning principles used across Army educational institutions.

1-2. References

Required and related publications and prescribed and referenced forms are listed in appendix A.

1-3. Explanation of abbreviations and terms

Abbreviations and special terms used in this pamphlet are explained in the glossary.

1-4. Scope

This pamphlet covers all areas of education such as teaching, curriculum development, assessment, and evaluation.

1-5. Overview

This chapter discusses the purpose and scope of this pamphlet. It outlines the philosophy of educational institutions, degree programs, and accreditation.

1-6. Philosophy of educational institutions

Army educational institutions have different philosophies. A philosophy is the distillation of a collective set of values and principles that motivate students and faculty to achieve institutional purpose and desired effects.

1-7. Degree programs

Some Army educational institutions offer degree programs to their students. Congress gives the United States Army Command and General Staff College (USACGSC) and the United States Army War College (USAWC) the authority to grant master's degrees to students who complete approved programs. The National Defense Authorization Act for Fiscal Year 2008 reaffirmed this authority:

a. Under regulations prescribed by the Secretary of the Army, the Commandant of the USAWC may, upon recommendation of the faculty of the college, confer appropriate degrees upon graduates of the college who meet the degree requirements consistent with the recommendations of the U.S. Department of Education and principles of the regional accrediting body.

b. Under regulations prescribed by the Secretary of the Army, the Commandant of the USACGSC may, upon recommendation of the faculty of the college, confer appropriate degrees upon graduates of the college who meet the degree requirements consistent with the recommendations of the U.S. Department of Education and principles of the regional accrediting body.

1-8. Accreditation agencies

Regional accrediting agencies accredit Army institutions that offer advanced degrees. In addition, the Chairman of the Joint Chiefs of Staff (CJCS) accredits joint professional military education (JPME) programs offered at intermediate and senior level colleges. The U.S. Army Training and Doctrine Command (TRADOC) accredits using Army Enterprise Accreditation Standards. Finally, some schools choose specialized accreditation agencies to accredit their programs. A description of each accreditation agency follows.

a. **Regional.** Regional accreditation agencies include the Middle States Association of Colleges and Schools, the New England Association of Schools and Colleges, the Higher Learning Commission of the North Central Association, the Southern Association of Colleges and Schools, and the Western Association of Schools and Colleges. Each institution completes self-study prior to the on-site regional accreditation review. The regional agencies' accreditation is valid for 10 years.

b. **Joint.**

(1) The Chairman of the Joint Chiefs of Staff accredits intermediate and senior level colleges for their JPME programs. The five-phase approach to developing joint qualified officers results in JPME learning areas and objectives taught at each level; however, the intermediate level is the first level to receive an on-site accreditation review by a Process for Accreditation of Joint Education team representing the Chairman. In the Army, there is one intermediate-level college, USACGSC, and one senior-level college, the USAWC; these are the two Army schools that warrant a joint accreditation review. Both institutions' JPME programs are 10 months long. As with regional accrediting agencies, a joint accreditation review requires that the institution completes an institutional self-study prior to the on-site Process for Accreditation of Joint Education visit.

(2) JPME institutions must implement the joint learning areas and objectives within their respective curricula to satisfy the goal of joint education, which is to produce a joint qualified officer. In addition, the intermediate- and senior-level colleges must adhere to seven common educational standards to achieve a fully met accreditation status. Joint accreditation status is valid for 6 years.

c. **TRADOC.** As with the training institutions, the TRADOC Quality Assurance Office (QAO) accredits educational institutions using the Army Enterprise Accreditation Standards. In addition, QAOs from individual schools accredit The Army School System (TASS) brigades for professional military education. The institution completes a self-assessment of the standards prior to the on-site accreditation visit. Currently, TRADOC accreditation is valid for 3 years.

d. **Accreditation of TASS by the QAO.** The process includes a self-study done by the brigade and a visit by the proponent QAO to sites where courses are delivered (inactive duty for training and active duty for training) to review faculty qualifications, curriculum, student records, learning environments, and administrative procedures.

e. **Specialized accreditation.** Some schools are accredited by specialized accreditation agencies recognized by the Department of Education. Examples of these specialized

accreditation agencies are the Council on Occupational Education and specialized medical accreditations.

Chapter 2

The Analysis, Design, Development, Implementation, and Evaluation (ADDIE) Process

2-1. Introduction

The ADDIE process is a framework used to organize and manage educational programs. ADDIE organizes all course and curriculum development activities using a disciplined process that ensures classroom instruction accomplishes the institution's educational purpose. The ADDIE process includes five phases which support program management with inputs to the process by the institutional leadership, and outputs to support systematic review and updates.

2-2. ADDIE phases

The following is an overview of each ADDIE phase.

a. **Analysis.** The analysis phase is the link between identifying the educational requirements and developing the instruction. In this phase, the curriculum developer determines what must be taught and how the content can be taught effectively with the available resources.

b. **Design.** The design phase uses the results of the analysis phase to help identify the lesson components. Topic lists are translated into major topics which become terminal learning objectives (TLOs) and minor topics which become enabling learning objectives (ELOs).

c. **Development.** In this phase, the ELO standards, and lesson content outline are converted into an actual lesson plan and advance sheet to support learning outcomes.

d. **Implementation.** This phase emphasizes the planning components required to teach the course. It has two distinct components. Component 1 ensures instructors/facilitators understand the course vision, content, and delivery methodology, and are ready to teach. Component 2 is the actual conduct of the course.

e. **Evaluation.** Although depicted last in the ADDIE process, this is actually a continuous process that consists of data collection and analysis to determine the effectiveness and value of a course or program.

2-3. ADDIE examples for educational institutions

The ADDIE process is central to the Accountable Instructional System (AIS). The two models presented below are the AIS (figure 2-1) and the hierarchy of educational outcomes, objectives, and standards (figure 2-2). Understanding both models is critical to curriculum developers. Other educational institutions may use other models with the same outcome.

a. The AIS model shown in figure 2-1 demonstrates the continuing nature of a systems approach to curriculum development and the interdependence of the processes and of the five ADDIE phases: analysis, design, development, implementation, and evaluation. The evaluation arrows in the center show that the activities of one phase may generate data or information that results in a revision of the products of another phase (or phases). For example, during the design

phase, the curriculum developer may determine that some educational topics identified during the analysis phase are not realistic. They must then return to the analysis phase for appropriate revisions. This act of continual validation provides the checks and balances that lead to a quality curriculum.

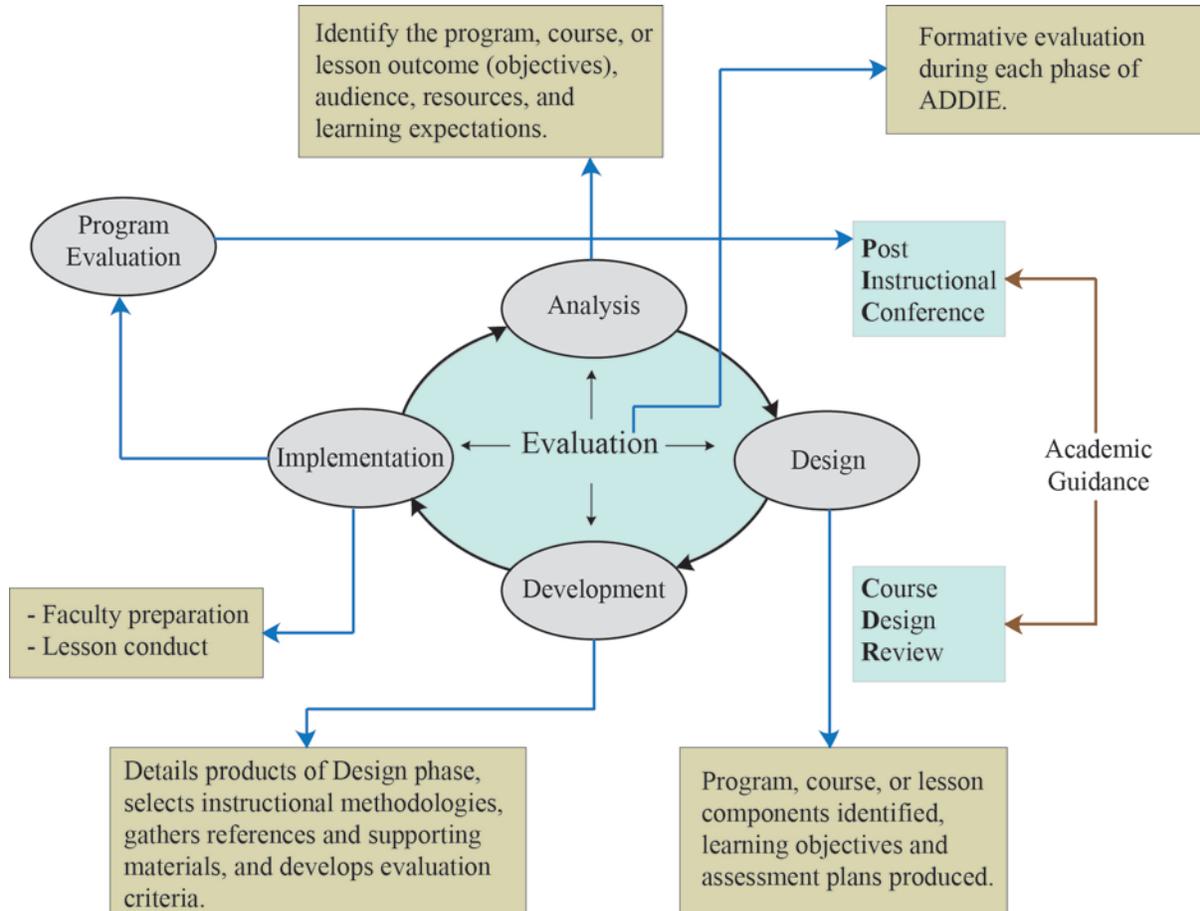


Figure 2-1. Accountable Instructional System (AIS)

b. The hierarchy of educational outcomes, objectives, and standards model in figure 2-2 depicts the links between educational outcomes, objectives, and standards.

(1) The AIS directly supports the mission of ensuring that graduates achieve the educational outcomes that enable students' success. These educational outcomes are to produce successful graduates who will lead teams to solve complex problems throughout the unified land operations. This description of "what a graduate looks like" loosely defines the content focus for courses spanning the areas of leadership, problem solving, and decisive action.

(2) From these broad educational outcomes, TLOs are defined for blocks of instruction to fulfill the educational requirements in each area supporting the educational outcomes.

(3) The TLOs, in turn, define subordinate ELOs that specify the individual lesson requirements that support the learning. Finally, the standards of the ELOs define how you

measure achievement of the objective. Please note relationships between the elements of the hierarchy.

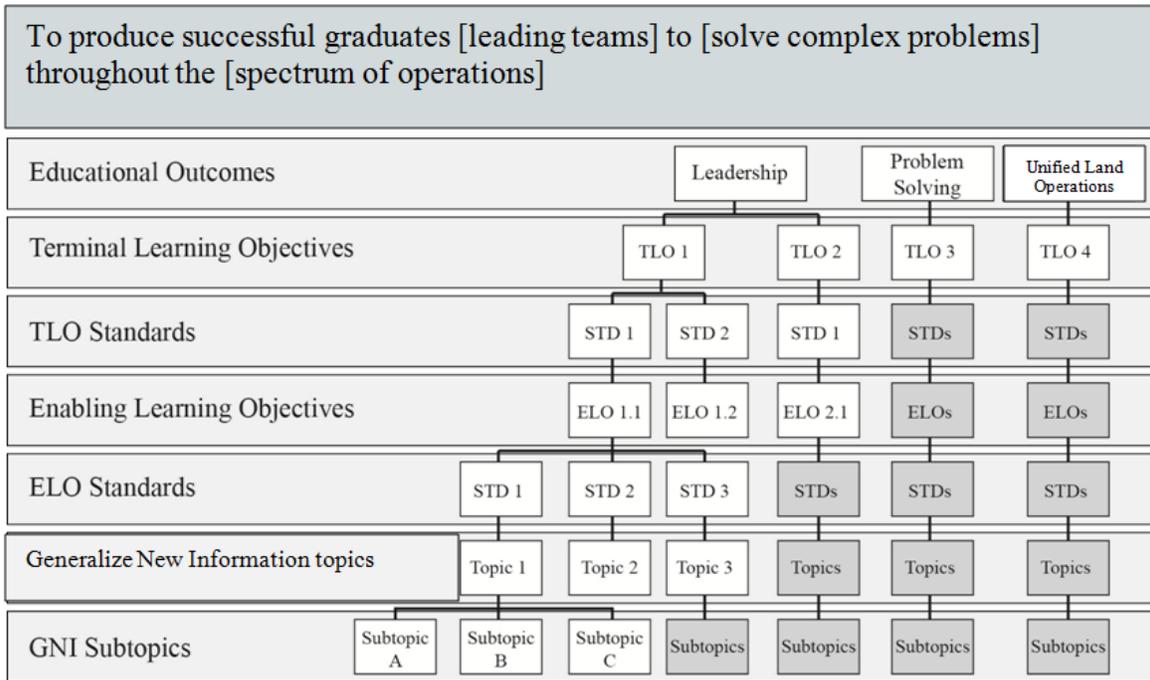


Figure 2-2. Hierarchy of educational outcomes, objectives, and standards

2-4. The five phases of the ADDIE

Discussion of the five ADDIE phases used in AIS follows.

a. Analysis. This phase determines whether the institution needs a course. Analysis identifies what to teach and how much to teach. Whether a course is new or pre-existing, a thorough analysis ensures its relevance and necessity.

(1) Analysis components.

(a) Goal analysis. Identifies how the course supports the institutional mission, vision, and learning outcomes; develops a course goal.

(b) Topic analysis. Specifies topics that support identified goals and learning outcomes.

(c) Target audience analysis. Describes students' current knowledge and experiences.

(d) Gap analysis. Compares the desired education outcome of the above topic analysis with the student's pre-instruction knowledge determined in the target audience analysis.

(e) Resource analysis. Identifies resources and constraints.

(f) Evaluation plan. Determines potential evaluation processes to measure course success.

(g) Milestone plan. Establishes target dates.

(h) Continuity book. The author begins to build a continuity book covering all phases of the ADDIE process. Place all analysis phase products in a continuity book.

(2) Conducting an analysis.

(a) Goal analysis. Link the course goal to institutional mission, goal and/or learning outcomes. The goal analysis identifies the topics included in the new or revised course or lesson. The following is a technique for conducting a goal analysis:

- Develop a clear, concise goal or lesson scope statement. If one already exists, review it to determine whether it is still appropriate. Does this statement clearly describe what the student should be able to do because of the instruction? Is it a clear description of the end state?
- Determine whether the course goal supports the institution's goals and learning outcomes. If not, the leadership must determine whether to develop or revise the course. For lesson development, determine whether the lesson supports the course. If not, determine whether to develop or revise the lesson.
- Determine how the goal relates to, or links with, the goals of other courses or lessons. Coordinate with other curriculum developers to ensure the course or lesson complements, not duplicates, other courses or lessons.

(b) Topic analysis. Once determined that the course goal or lesson scope supports the institutional mission, goals, or learning outcomes, identify exactly what the adult student must accomplish to meet that goal. The following is an approach to conducting a topic analysis:

- Collect information from all possible sources: subject matter experts (SMEs), publications, libraries, Internet, command directives, previous course evaluations, etc. Complete the basic research before continuing to other steps.
- Develop a topic list. Brainstorm and list all possible topics. Base this on the approved course or lesson goal. It is a good idea to involve SMEs in developing the topic list.
- Identify related topics, and then group the related topics.
- Identify which related topics are major topics and which are minor topics. The major topics will become the TLOs, and the minor topics will become the basis for the standards for achieving the TLO and for developing the ELOs to support the TLOs. See appendix B for more information on learning objectives.
- Build a learning hierarchy of topics. Next, develop a topic hierarchy list. The hierarchy list places the topics in a progressive and sequential order.

(c) Target audience analysis. Target audience analysis identifies the skills and abilities the adult student brings to the course. The following is an approach to conducting a target audience analysis:

- Identify student experiences that may influence their ability to achieve the course objectives.

- Determine the type of target audience data needed. For example, if the course requires using distributed learning, what skills will the target audience possess and bring to the course?
- Determine where to find target audience data — personnel data forms, class demographics, questionnaires, etc.
- Develop a target audience profile. What are the expected experience, knowledge, skills, and abilities of the student? What level of learning, course content, delivery methods, and instructional strategies would be appropriate?
- A lack of target audience baseline knowledge and experience may require modification to the topic list or a prerequisite requirement.

(d) Gap analysis. In this step, the curriculum developer compares the product of topic analysis to the product of target audience analysis to determine not only what to teach, but also how much to teach in a given lesson. Without this analysis, the author risks producing a lesson that is beyond student capability and neither advances learning nor sustains interest. To conduct a gap analysis, perform the following steps:

- Analyze the target audience profile with respect to the topic list. This analysis provides what must be taught.
- Refine the data from the step above. The result of this analysis provides the information to write learning objectives addressed in the design phase.
- Analyze the list with respect to the lesson goal. Do all the topics actually support the lesson goal? Are the topics critical for accomplishing the lesson goal?

(e) Resource analysis. Identify and list the resource requirements in the areas of equipment, facilities, funds, personnel, and time. Early planning of resources will help manage the time involved in securing them. The following questions may help determine whether sufficient and appropriate resources are available.

- Equipment: What specific equipment will you need (for example, computers)? How will you use the equipment in the course? What quantities do you require?
- Facilities: How much work space will you require? What facilities are available? Are there special environmental requirements?
- Funds: What are the initial personnel, equipment, and facilities costs?
- Personnel: What categories of personnel do you need to develop the lesson (for example, computer operators)? How many instructors/facilitators do you need? What are the student requirements?
- Time: What are the milestones? How much time do you need to develop the instruction? What is the estimated course length? When must you order material to meet course milestones?

(f) Identify resource constraints. Every course has constraints such as maximum course length, manpower, budget, and student load. Ignoring these constraints may lead to a course or

lesson that is either too large for the time allotted or requires too large a share of resources. If faced with a resource constraint, select an alternative strategy or delivery approach.

- Equipment: Computers to support simulation? Appropriate networks?
- Facilities: Room to post maps and overlays? Student work area? Reference material storage in the classroom? Library?
- Funds: Impact on cutting printing dollars? Copyright dollars cut?
- Personnel: Faculty replacement for those who retired or transferred? New faculty have instructional experience?
- Time: Other "non-curriculum developer" duties? Student requirements?

(g) Develop evaluation plan. After completing all analyses, begin developing the evaluation plan. The evaluation plan analysis identifies potential evaluation processes. The following is an approach to developing an evaluation plan:

- Identify potential evaluation methods to measure course success.
- Identify potential data collection tools.
- Identify the potential data collection dates.
- Write a program evaluation plan, which is a document describing the course or lesson and possible evaluation measures.

(h) Milestone plan. During initial course or lesson planning, develop a milestone plan to serve as a road map for managing the development process. To meet deadlines, backward plan from the date the product is required. The following is an approach to developing a milestone plan:

- Determine the date the course materials are due. These include lesson plans, course and lesson materials, copyrights, and other materials.
- Determine the evaluation requirements dates: date of program evaluation plan, dates of formative evaluation of lesson plans and assessment tools, and date of evaluation tool development. Determine the timeline for implementation of evaluation tools, for analysis of data collected, and for the official program evaluation report.
- Identify dates for faculty content workshops ("train-up").
- Update the milestone plan. Because the milestone plan is a tool for managing the course building process, update it at the end of each ADDIE phase or when any significant change occurs.

b. Design. Use the products created during the analysis phase to identify the course and lesson components. During this phase, translate topic lists into realistic TLOs and supporting ELOs. Sort TLOs and ELOs into a progressive and sequential learning order. Design an assessment plan to determine whether students meet the course or lesson standards to the prescribed learning level. Design the evaluation plan to ensure the course or lesson meets its stated objectives.

(1) Design components.

(a) Write learning objectives. Write statements clarifying the desired end state and what students will master because of the course or lesson.

(b) Design assessment plan and sample assessment tools. Plan how to measure whether or not students met the stated objectives, and design sample assessment tools to measure student achievement.

(c) Conduct preliminary research for possible course or lesson materials. Identify information available to assist in meeting the objectives — resources, methodology, current and emerging doctrine, publications, guidance, etc.

(d) Design course or lesson plan. Determine the order in which to present the learning events. Design a plan for conduct of the class.

(e) Design the evaluation plan and sample evaluation tools.

(f) Update resource analysis.

(g) Update milestone plan.

(h) Incorporate adult learning principles. Curriculum developers ensure the course or lesson is designed for the adult student. Applying the principles of adult learning reinforces students' assuming responsibility for their learning.

(2) Producing the design components.

(a) Learning objectives. The first component in the design phase is to write learning objectives based on the topic list produced during the analysis phase. A learning objective is a precise statement of the student's expected learning (action), the learning environment (condition), and the measure of student achievement (standard) of the prescribed level of learning and domain. The curriculum developer writes the learning objective from the perspective of the student. The learning objective:

- Is the contract among the students, faculty, and learning organization.
- Serves as the foundation for educational design.
- Provides the basis for method of instruction.
- Determines instructional content and establishes the learning conditions.
- Identifies the standards for measurement or assessment of student learning.
- Establishes student responsibility and accountability.

(b) Learning objective parts. All learning objectives must include an action, condition, standard, level of learning, and domain.

- **Action.** An action statement specifies what a student should do as a result of the education. Use only one verb in any action statement. The verb selected for the action statement must be congruent with the level of complexity of the action described.
- **Condition.** A condition statement describes the learning environment. It states what will be provided (a scenario, small group, etc.), what will be withheld (without references, closed-book, etc.), and any time constraints. It includes anything that affects student learning; for example, material, equipment, special environmental conditions, references, the role the student is assuming, etc.
- **Standard.** The standard statement provides the criteria used to measure if and how well students master the objective. It also minimizes subjectivity in measuring student attainment of the identified skills. The standard should incorporate the minor topics identified in the topic analysis.
- **Learning level.** Base the level of learning on the complexity of learning. The desired level of learning dictates the selection of the verb in the action statement and is reflected in the criteria used to assess student learning. Many educational institutions use Bloom's Taxonomy when selecting the cognitive level of learning. In addition, if the objective indicates assessment of the affective domain, the level of learning within the affective domain must be the same level as the cognitive domain.
- **Domain.** The three domains are cognitive, affective, and psychomotor. Educational institutions generally use the cognitive and affective domains.

(c) Types of learning objectives. There are two types of learning objectives in course or lesson design:

- TLOs are the major topics identified during topic analysis. The learning level of the TLO is always equal to or at a higher level than the ELO.
- ELOs are the prerequisites required to achieve the TLO. They are the minor topics identified in the topic analysis. These are the standards identified in the TLOs, written in action verb form. (Adding an action verb to the TLO standards provides the action statement for the ELO.)

(d) Writing learning objectives.

- Review the results of the gap analysis produced in the analysis phase. Eliminate redundancies or add topics based on new guidance.
- Compare the list to the stated course or lesson goal. Do all the topics actually support the course or lesson goal? Are the topics critical for accomplishing the course or lesson goal? Are there topics that are related or nice to know, but that do not support course or lesson goal? If so, eliminate them.
- Analyze the topic hierarchy previously made. Examine those relationships. Are the topic priorities still valid? Are the topic relationships still valid? Which topics represent end states? (These will probably become TLOs.) Which topics must be covered first? (These will probably become ELOs.) Do any topics not contribute to the desired end state? (If so, delete.) Are any necessary topics left out? (If so, add.)

If a topic supports the goal but stands alone, consider making it a new TLO rather than an ELO.

- Change each topic into a learning objective action statement. (See figure B-1.) State the topic in a sentence beginning with an action verb. For example, mission analysis becomes "conduct a mission analysis"; course of action (COA) development becomes "develop a COA." Placing the action verb at the beginning of the sentence converts a topic into a learning objective action statement. The action verb describes behavior the student must exhibit to achieve the learning. Is the statement clear and concise? Does the statement accurately describe the desired student behavior? Does the statement have only one verb?

Caution: If statement has a conjunction, there may be two objectives.

- Write the condition statement for each learning objective. Condition statements set parameters. They describe the condition under which the objective will be taught or measured. The condition includes such things as environment (individually, as a member of a group, in a role, etc.), resources (given a case study, specific reference material, etc.), and constraints (within 30 minutes, etc.). For example, "Acting as a leader at the strategic or organizational level in the operational environment; using an organizational-level leadership perspective, references, case studies, practical exercises, and class discussions based on decisive action." Must the student perform the action alone or as part of a group? Are there take-home requirements? Are there in-class requirements? Will students be able to use references? Will students receive new materials such as a scenario? How much time is available?
- Write the standard statement. The standard statement lists the criteria used to measure the accomplishment of the objective. Do not use action verbs in the standard statement. Instead, introduce the standard by making the action verb a noun or gerund. For example, "Analysis includes the role officers play in influencing the development of organizations and leaders." What does the success of the action look like? What must be included, addressed, or considered to measure the action? What determines successful completion of the action? Is there an Army standard with which the student must comply? (Identify specific standards, not just a regulation number.)
- Determine the learning level of the objective. Each action verb reflects a level of learning, and each part of the objective must reflect the same level of learning in order for it to be accurate. Do the action, condition, and standard statements support each other? Must students recall facts (knowledge)? Must students explain in their own words (comprehension)? Must students apply a process (application)? Must students compare courses of action (analysis)? Must students generate a new product (synthesis)? Must the students judge the value of something (evaluation)?

Note: The highest learning level chosen includes all learning levels below it. For example, analysis includes knowledge, comprehension, and application.

- Determine learning domain. When the affective domain is used, it must be equal to the cognitive domain. For further information on learning levels, refer to materials in the library associated with your school/center.

(e) Designing an assessment plan. After determining the desired outcome of instruction, measure student accomplishments. Write an assessment plan. The learning objectives tell what performance is expected, under what conditions, and to what extent. To attain acceptable performance, students must meet or exceed the standards specified in the learning objective's standard statement.

- To design an assessment plan, determine how to assess the accomplishment of each learning objective. For example, will the students explain a concept, conduct a briefing, or develop a solution to a problem? The design of the assessment plan provides the framework to be used in the development phase. Finalize the assessment plan and assessment instruments during the development phase of ADDIE.
- Analyze each learning objective. What assessment methods are appropriate (for example, written, role-play, practical exercise, presentation, etc.)? What does the verb indicate?
- Determine how to measure each learning objective. Note that there may be more than one way to measure the objective. How will students show they have met the objective? What is the learning level of the learning objective? Can the learning objective be measured adequately with a written assessment? A practical exercise (PE)? A briefing? Will the student need to write a paper? Perform an action? Play a role? Does the method adequately assess student outcomes in accordance with criteria in the standard?
- Design a sample assessment item for each measurable learning objective. Assessment items are not limited to written examinations; they may also include briefings, plans, papers, skits, role-play exercises, tasks, products, and other instruments. Begin to design appropriate rubrics to support assessment. Are the students required to write a paper? If so, the sample assessment instrument will be the draft of "directions to students." Is there a practical exercise? If so, the sample assessment instrument will be a draft of the concept of the PE (what the student does, what is expected, etc.). Will the students produce something? If so, the sample assessment instrument will be a draft describing the expectations for the product.
- All assessments require rubrics to provide students with feedback and faculty with tools to assess learning. See appendix E.

(f) Conducting preliminary research. Conduct preliminary research for possible course materials when developing the learning objectives, assessment plan, and sample assessment tools.

- Select sources for possible course materials. Consult all possible sources to determine which are appropriate, including existing course materials. Relevant existing materials save time, personnel, material, and funding. Faculty and curriculum developers of previous versions of the course may also provide relevant insight. Other sources include publications and personnel from Department of Defense, joint and other

federal agencies, industry and commercial enterprises, and colleges and universities. Additional research sources include data from various evaluation reports, student and faculty course surveys, libraries, World Wide Web/Internet, and government databases.

- Identify possible course materials and link to course learning objectives. If learning objectives in the source materials match the course learning objective, consider their use.
- Evaluate material. Select initial course or lesson materials at this time. If using copyrighted materials, obtain permission from the publisher before using these. Determine if the user fee is within the budget or if the material provides adequate benefit to support the cost. Copyrighted material must have clearance for use if it is labeled "limited to U.S. students only," "no foreign," or "no contractors," or if the material is unclassified information from a classified source. Only materials listed on the course syllabus may be provided to international military students. Clear all material (including unclassified material) through proper channels before providing them to international military students or contractors. Does the material match the learning objectives? (If not, reject it.) Is the content level of the material appropriate for the planned level of instruction? Is the material accurate and free of error? Is the material current? Is the material copyrighted? Does the material address motivational factors? Does the material encourage active learning? Is the material well organized? Is the material properly sequenced? Will the material be meaningful to students? Will the material be appealing to students? Is the material at the appropriate level of difficulty and complexity? Is the reading level appropriate? Can the available materials be used in part, modified, or combined with other materials to accomplish the desired goal? Are materials cleared for international military students or contractors?

(g) Designing the course or lesson plan. The course plan outlines the course development process, sequences course events, and identifies course design flow. It is the course blueprint.

- Design a course or lesson outline. Put learning objectives in instructional sequence.
- Order content progressively and sequentially.
- Place lower-level learning objectives up front.
- Introduce broad concepts and technical terms early.
- Provide practice and review of concepts and knowledge that are essential parts of later lessons.
- Introduce a concept in the lesson where it is most frequently used.

Caution: Cognitive overload may occur because of excessive amount of information and reading assigned in a short time period.

- Place complex or cumulative concepts late in the sequence.

- Evaluate (formative evaluation) the course or lesson outline. Are ELOs sequenced appropriately to effectively support the TLO(s)? Is there adequate time for each learning objective and sufficient time to accomplish all the ELOs supporting the TLO? Are cognitive levels appropriately sequenced? Do the topics flow logically?
- Design the evaluation plan and sample evaluation tools. The evaluation plan is a document that describes the context, purpose, tools, implementation plan, and final report for the program evaluation.
- The first part of the evaluation plan describes the context of the evaluation, such as the school, department, dates of the research, and the population, if applicable.
- The second part of the evaluation plan describes the purpose of the research. The evaluation plan should state the year for the program evaluation of a curriculum, funding issues, quality of life, curriculum re-design or new curriculum, and any specific research questions, if appropriate.
- The third part of the evaluation plan describes the data collection tools such as interviews; surveys (internal and external); focus groups; observations, insights, and lessons; viability inspections; and any historical documents. In the case of a curriculum program evaluation, an external curriculum review using the ADDIE process is imperative. Also, in the case of curriculum program evaluation, there must be a tool to capture and analyze student assessment. Ensure these tools are contained in the appendices to the evaluation plan.
- The fourth part of the evaluation plan describes the methodology to include the implementation of the data collection and the method of analysis of the data collected. This may include specific schedules or rules for implementation of data collection tools.
- The fifth part of the evaluation plan describes the implementation plan. The curriculum developer may write the implementation plan in chart or narrative format, but the plan should explain the expectation for implementation of the tools.
- The sixth part of the evaluation plan describes how, when, and where to present the evaluation results.
- Prepare samples of any tools used and ensure the tools will collect the data to measure the program's success.
- Update resource analysis. Resource needs may change throughout the ADDIE process. Review the resource estimate and make any necessary changes.
- Update milestone plan. Review and update the milestone plan. This is a critical step because the milestone plan guides the course building process.

c. Development. Compare the analysis and design phases to ensure consideration of all aspects of the course or lesson. Continue to gather references and supporting materials and select or develop media and methods of instruction that support accomplishing the learning objectives. At the end of development, the course or lesson will be ready for implementation and instructional materials ready for use. Before developing any materials, review the goals and learning objectives to ensure the course or lesson meets the learning outcomes. The components of the development phase include the following:

- (1) Select the method of instruction.

- (2) Select the instructional media.
- (3) Select and develop instructional material.
- (4) Develop evaluation tools.
- (5) Update resource analysis.
- (6) Develop lesson plans and advance sheets.
- (7) Develop assessment instruments.

(8) Collaborate in course or lesson development. The curriculum developer develops the course and may develop or assist in the lesson development to support the course goals and objectives. The leadership, however, has course approval responsibilities. Collaborate with all curriculum developers if more than one curriculum developer is responsible for course or lesson development.

- (9) Produce the development components.

(a) Select method of instruction. In the development phase, one of the first and most important actions is selecting the method of instruction for the course or lesson. In effect, this is the selection of the procedures used to attain the objective. Any instructional program may require different methods at different times. The importance of a method lies not in itself but in how well it accomplishes the course or lesson objectives.

- Refer to the learning objectives. The learning objectives are the keys to selecting methods of instruction. The learning objectives tell what learning methodology must support the learning level. For example, if the learning objective states that the student will analyze a COA, the methodology used could be a case study, a practical exercise, or related activity. A lecture or memorization exercise would support lower level cognitive learning.
- Consider the subject taught. In determining the methodologies to use, the subject is a critical factor. Who will direct the learning experience (that is, students, faculty, or shared)? Is the action an individual or group effort? What is the class' level of education, aptitude, background, and interests? Will the subject stimulate discussion? Are there different points of view presented? Would the subject be enhanced by an exercise? What type? Is there a problem-solving component? Does the subject matter change frequently?
- Determine faculty qualifications and experience. How much time is available for "train-up?" What types of teaching experiences have the faculty had? Have the faculty had recent field experience involving the subject area? Are there experienced faculty available to help neophytes? Is it possible for new faculty to assist with a class before assuming full faculty duties?
- Determine the level of student involvement. The learning objective is the course guide. It tells the level of desired student involvement. It is important to remember that student involvement maximizes student retention and learning. What is the action

verb in the objective (for example, apply, explain, or analyze)? How is student accomplishment of the learning objectives being measured? What conditions are specified for the learning objectives? Is preparation time required for the students? What formative feedback is required? Is the final product a group product or an individual product?

- Consider student ability, experience, and background. Use the target population description developed during the analysis phase and the methodology information to help identify the appropriate methodology to meet student knowledge and experience and course objectives.
- Determine the student-to-faculty ratio. The resource analysis done during the analysis phase and the information gained during the previous five steps help determine the student-to-faculty ratio.
- Determine time available. Match the time available for instruction against the time required to accomplish a specific learning objective using a particular method. Some methods may require more time but allow the learning to last. For example, a discussion typically requires more time than a lecture; however, a discussion can enable higher level learning to take place during the course.
- Determine the type of facilities and equipment available. Facilities and equipment influence the success of the method. What type of facility is needed (classroom, distributed learning, computer room, or off-site)? Does the facility lend itself to formal or informal learning? Are any possible constraints identified? Is the necessary equipment available?

(b) Select instructional media. Almost without exception, every method of instruction needs some type of media support. No single medium is the most appropriate choice for every instructional situation. Select media that supports learning. The media used in a course must support the method of instruction selected and uphold the supported learning objective.

- Determine appropriateness of media selected for the method of instruction. Specify the media device(s) for each method of instruction. The media must support the selected method of instruction.
- Determine if the media supports the learning objectives. The media selected must support the action verb in the learning objective. Ask which medium or combination of media best supports the intended instruction.
- Determine the ease and cost involved in updating and revising. Consider the frequency of change to doctrine and/or equipment. If the TLO or ELO is subject to change, the media devices selected should be those that are easiest to change with the least cost.
- Determine compatibility of available equipment with proposed media.
- Determine amount of student interaction the learning objective requires. Adults prefer to be involved.
- If the learning activity requires student involvement to accomplish the objectives, select media that provide the interaction.

- Consider student interest and motivation. Choose media that trigger student interest and provide motivation.

(c) Select and develop instructional material. Each type of media requires material selection or development. Ensure that the materials are appropriate for the media selected. There are two parts involved in acquiring the appropriate material: selecting and developing. Review the selected material and determine its usefulness.

- Review material collected during the analysis and design phases. Eliminate any material no longer needed.
- Select course materials.
- Make any required material modifications.
- Develop material. Producing instructional material is both expensive and time consuming. The time spent in developing material reduces the time available to develop lesson plans, work with students, or perform other tasks.
- Analyze resources before developing material. How much time is needed to develop and produce the materials? Is the instructional value of the material enough to justify the amount of time needed in the development? (If material is for long-term use for a large number of classes, justify the developmental time.) Are there support personnel who can assist with material development? How much media expertise is needed to develop the material? Is it available? Is the cost of developing the material within budget constraints?
- Develop material appropriate for the selected media. Clear all material cited from another source through copyright channels.

(d) Develop evaluation tools. Finalize all evaluation tools identified in the evaluation plan. Demonstrate validity and reliability for each evaluation tool and include this information in the program evaluation report.

- Finalize each evaluation tool. Be sure to write all items so they can produce a metric (measure) of the program.
- Validity ensures the evaluation tool is an accurate measure of the curriculum. To evaluate the ratio of "content validity" of an evaluation tool, ask at least three SMEs to comment on how each item in the tool relates to measurement of a specific part of the program, documenting a summary of comments for the program evaluation report. Examples of comments are "Is the 'thing' measured by each item 'essential,' 'useful but not essential,' or 'not essential' or 'not necessary' to the performance or attainment of the construct?" An increasing level of agreement among SMEs supports the argument that each particular item is essential and therefore valid. Content validity ratio = number of SMEs who indicate "essential to the curriculum" minus the N of SMEs/2, divided by N of SMEs/2. The highest possible number to represent content validity ratio is 1.00.
- A measure is considered reliable if a subject's response of the same evaluation tool given twice is similar (test/retest reliability). Conduct a reliability evaluation by asking a limited number of subjects to repeat an evaluation tool within a short time,

approximately 2 weeks, followed by a comparison of among the scores between the results of Time 1 and Time 2 for each subject. Correlation may be computed using the statistical package for the social sciences. An alternate method to estimate reliability can be conducted using the statistical package for the social sciences to develop a Cronbach's alpha, demonstrating correlation among all items in an evaluation tool, demonstrating reliability.

- Include evaluation tool validity and reliability results in the final program evaluation summary. Retain the data that supports the results for 3 years.

(e) Update resource analysis. Identify resource needs. Make methodology and media changes if required resources are not available to support the course as designed. If changes are necessary, return to the design phase.

(f) Develop lesson plans and advance sheets. Lesson plans are critical components of the course development process. The lesson plan organizes what is presented in the lesson as well as when and how it is presented. It is the curriculum developer's way of communicating course intent to the faculty. The lesson plan tells the faculty how to implement the course. Much of the preliminary work that goes into developing a lesson plan was completed during the design phase. Write the lesson plan from the faculty's viewpoint.

- Examples of lesson plans from educational institutions. See appendix D for detailed lesson plan directions.
- Advance sheet development. Write advance sheets from a student's perspective. Advance sheets have specific components. See appendix D. Institutions may have additional requirements. The following is an explanation of the components of an advance sheet.
- Scope paragraph. The scope paragraph should match the scope of the lesson plan.
- Learning objectives. The learning objectives should be the same as those in the lesson plan.
- Issue material.
 - Advance issue. List any courseware available to the students before the start of the lesson.
 - During class. Include handouts, quizzes, PEs, and other material students will receive in class.
- Homework assignments. List all homework assignments.
- Reading and study requirements.
 - Read. The required reading material gives the course or lesson consistency. Prioritize the reading requirements.
 - Review. Review readings should have a specific purpose for having students review previous material besides linkages among lessons.
 - Scan. Have a purpose in mind when assigning canned material. Scanning can orient students to a topic, serve as a preview of further discussion, establish a knowledge baseline, pique interest, or alert students to class activities or requirements. Do not use scanning as a method to cover nice-to-know material.
- Items required. Be specific about what students must bring to class and why. Do not list items that will not be used or are only nice-to-have.

- Assessment plan. Write a lesson-specific assessment plan in either of two ways: (1) Write a short narrative which stipulates which specific points of the lesson will be assessed, what performance measure(s) the student has to accomplish to demonstrate mastery level, and what criteria are assessing for mastery. (2) Refer the students to an appendix. This option may be more appropriate if the assessment plan is lengthy and requires additional enclosures or supporting documents.

(g) Develop course assessment criteria. After determining the method of instruction and media and after selecting and developing the learning support materials, develop the course assessment criteria. Assessment criteria specifically identify what process or product should be used to assess students. This must match the learning objectives and the learning level identified in the objectives. For example, if the learning level is analysis and in the assessment plan has identified a written test as part of the assessment, the assessment must be written at the analysis level. Recall or recognition of matching or fill-in-the-blank questions would not be appropriate.

- Review the TLOs and ELOs, learning levels, and assessment plan.
- Construct a matrix from review in the step above.
- In column 1, list the learning objective number.
- In column 2, list the learning level of each objective. This could influence the amount of time spent in the classroom and weighting of grades.
- In column 3, record the instruction time (in hours) and the preparation time (homework, readings, etc., also in hours) that is needed to accomplish each objective.
- In column 4, list the type of assessment identified in the assessment plan for that objective and identify its weight or percentage total.
- In column 5, record the number of assessment items and the learning level of the assessment. The assessment item's learning level must match the learning in the objective.
- In column 6, identify the weighting of possible points toward the final grade.
- The following assessment matrix (table 2-1) provides an example.

Table 2-1
Assessment matrix

Column 1 TLOs & ELOs Numbers	Column 2 Learning Level	Column 3 Time (in hours)	Column 4 Type of Assessment	Column 5 Assessment Items Number and Learning Levels	Column 6 Weighting of points toward final grade
1. TLO A	Synthesis	20 Hours	500 word written paper	1 Product Synthesis	50 points
2. ELO A.01	Analysis	12 Hours	In-Class Discussion	Daily Class Participation Analysis	10 points
3. ELO A.02	Application	4 Hours	Independent PE	1 Product Application	a. 10 points (Product) b. 10 points (Process)
4. ELO A.03	Application	4 Hours	Group PE	1 Product	20 points

- Write the assessment plan criteria as it will appear on the advance sheet. Write in a narrative format the information identified in the two previous steps above.

- Figure 2-3 is an example of an assessment plan.

1. Your faculty member will assess the course learning objectives using the following:
 - a. A 500-word, double-spaced, typed paper. This paper will be a critical discussion of _____.
Your written discussion must include the following (insert the standards from TLO A at this point). This paper is worth 50 points (or 50%) of your total grade for C000.
 - b. Twenty points (or 20%) of your grade will be determined by your staff group's final product on _____ (insert specifics from ELO A.03 at this point.)
 - c. You will also be assessed on your individual class product _____ (insert the standard from ELO A.02). Both the process that you select and your final product will be worth a possible 20 points (10 points each).

Figure 2-3. Sample assessment plan

- Faculty awards grades. (Each institution has a particular grading policy.)

(h) Develop assessment instruments. At this point in ADDIE, develop assessment instruments that match the learning objectives and learning levels. Develop assessment instruments to determine how well the student accomplishes the objective, not how well the student performs compared to other students. Options include written assessment methods and any observations of the learning objective (for example, develop orders, participate in group assignments, conduct research, etc.). The key factor is to assess the student against the learning objectives — how well he or she accomplishes the objective given specific conditions, defined standards, and an identified level of learning.

- Review the learning objectives.
- Review the assessment plan developed during the design phase. The assessment plan is the guide for developing assessment instruments.
- Review the sample assessment items developed during the design phase. Are they still appropriate?
- Determine the number of questions, scenarios, exercises, and products needed to adequately assess each learning objective. The amount of class time spent on a learning objective gives an indication of its importance.
- Develop assessment instruments based on input from the first three steps above. Continue to focus assessment items on the action, condition, standard, level of learning, and domain of the learning objectives.
- Develop rubrics and guidance. Whatever the assessment is (written paper, group PE, discussion, etc.), develop a rubric to calibrate assessment and provide feedback. See appendix D for examples of rubrics.

(10) Update milestone plan. Review and update the milestone plan developed during the analysis phase.

d. Implementation. This phase has two distinct components. Component 1 ensures faculty are prepared, materials are available, and everything is ready for the course. Component 2 is the actual conduct of the course or lesson.

(1) Make final coordination.

(a) Coordinate equipment. Have the necessary equipment requirements been identified? Is the equipment available in adequate numbers and in operating condition?

(b) Check facilities. Are the appropriate facilities available and reserved? Are there any modifications needed to existing facilities? If so, have they been completed?

(c) Check personnel (for curriculum developers). Are enough faculty available to facilitate the course? Is the course on the calendar? Is there adequate time scheduled for faculty "train-up?" Are materials and supplies available in adequate quantities to support instruction?(2) Conduct faculty "train-up." The curriculum developer should conduct these sessions. The sessions should replicate the actual instruction as much as possible. At a minimum, curriculum developers should review each lesson with the faculty by covering the critical points of the course, how the faculty will conduct the course, and how they will assess students. If possible, require future faculty to act as students and complete all student requirements.

(3) Teach the course. Focus implementation on teaching and learning.

(a) Conduct instruction. The instruction should follow the course or lesson plan. It should be conducted by qualified faculty, in a professional manner and environment, and using the appropriate method.

(b) Assess student accomplishments of learning objectives. As appropriate, use assessment instruments, faculty feedback, daily faculty records, and data for program evaluation.

(c) Review student assessment results and faculty feedback information. Review and analyze the information to improve or revise the course. This data becomes part of the program evaluation.

(d) Implement evaluation tools (surveys, focus groups, interviews, etc.) per the evaluation plan.

(e) Conduct formative evaluations with faculty. It is extremely helpful to provide feedback on each lesson after it is taught. Ensure experienced and new faculty participate. Be sure to capture data to use in the program evaluation.

e. Evaluation. Evaluation in ADDIE is a continuous process that consists of data collection and analysis to determine effectiveness and value of a course or program. Do not confuse course evaluation with student assessment. Evaluation consists of both formative and program evaluations. Formative evaluation is the internal look at the process during course development.

Program evaluation occurs post instruction and uses data collected during course development, implementation, as well as post instruction.

(1) The QAO and course developers share responsibility for evaluation of course materials. Developers evaluate the materials as a quality control function of AIS; the QAO does so from a quality assurance perspective against Army accreditation standards.. Developer responsibilities include soliciting input and feedback from a number of sources including peers, co-workers, objective observers, curriculum advisers, and ideally a sample target audience during the course development process.

(2) Formative evaluation. Formative evaluation is ongoing during ADDIE and involves making adjustments. For further information on formative evaluation, see chapter 3.

(3) Program evaluation. Program evaluation takes place after implementation. It answers questions such as, was the course worth the effort, and did the lesson or course accomplish what it set out to do? For more information, see chapter 3.

Chapter 3 Evaluation

3-1. Introduction

Evaluation is a systematic continuous method to appraise the quality, efficiency, and effectiveness of a program, process, or product. It provides the mechanism for decision makers to assure quality. In learning organizations, such as Army educational institutions, evaluation results in improvement of programs for enhancement of collective student learning.

3-2. Types of evaluation

There are two types of evaluation that are part of an ADDIE process: formative evaluation and program evaluation (also referred to as summative evaluation).

a. Formative evaluation is the evaluation of the infrastructure during the ADDIE process. Formative evaluation involves making adjustments during the development process to improve the procedure. All new processes and procedures adopted within the educational institution should follow the ADDIE process and use formative evaluation.

b. Program evaluation (summative evaluation) is the use of research to investigate systematically the quality, efficiency, and effectiveness of a program, process, or product. After completion of the data collection and analysis, the curriculum developer writes the final program evaluation report or document. The curriculum developer may collect data throughout ADDIE; but he or she will not write the final program evaluation document until after analyzing and collecting all data. Program evaluations should include executive summaries, conclusions, and recommendations. The curriculum developer should present the results of program evaluations so leadership can make decisions about improvement of student learning grounded in evidence. The audiences for program evaluations include curriculum developers, faculty, and accrediting bodies.

3-3. Formative evaluation

Formative evaluation is the internal look at the process of building curricula, systems, programs, and infrastructure. Formative evaluation allows the curriculum developer to make adjustments during all phases of ADDIE. Formative evaluation increases the chances of having a quality product at the first implementation, thereby preventing the need for adjustments to the product during or after first implementation. A curriculum developer should ask questions during each phase of the ADDIE process.

a. Analysis. The following are proposed questions for each part of the analysis.

(1) Goal. How is the goal linked to the program learning outcomes? Is the goal statement clear and concise? Does the statement include the scope of the curriculum?

(2) Topic. Were all possible sources used (for example, general officer guidance, centers of excellence, previous evaluation data, and SMEs)? Are the topics grouped with major and subtopics? Is the learning hierarchy developed?

(3) Target audience. What do they need? How have they changed? What is their profile?

(4) Gap. Is there a comparison of the topic list to the target audience profile? Does the comparison between what they need to know and what they already know influence the profile? Does resulting gap analysis support the goal?

(5) Evaluation. Is there a description of potential evaluation procedures?

(6) Resources. Does the analysis identify enough equipment, time, funds, and personnel? Are there any constraints?

(7) Milestones. Are milestones realistic, and do they contain a cushion for crisis? Does the milestone chart include a plan for program evaluation?

b. Design.

(1) Learning objectives. How are learning objectives tied to the goal that supports the program learning outcomes?

(2) Assessment plan. How does the assessment plan measure the learning objectives? Do the sample assessments measure the learning objectives to the prescribed learning level?

(3) Evaluation plan. Does the evaluation plan design include course context, metrics (student and faculty success, graduate approval, direct or indirect measures), plan for analysis of data, data collection tools, and research questions (as appropriate)?

(4) Course plan. Is the course plan progressive and sequential?

(5) Course materials. How do course materials support the learning? Are they practical? Are they current? Are the resources (time, personnel, and money) acceptable?

c. Development.

(1) Methods. Are they appropriate methods for adult students? Do they achieve the learning objective to the prescribed learning level?

(2) Media and materials. How do they support the achievement of the learning objectives to the prescribed learning level? Is the distributed learning curricula exportable (methods, media, materials, and readings)?

(3) Lesson plans. Are lesson plans experiential? Do they support the new instructor/facilitator?

(4) Milestone and resource update. Are there issues or events that if not met, could cause the course to be adjusted, delayed, or not conducted?

(5) Evaluation plan, data collection plan, and data collection tools. These may include curriculum reviews, internal and external surveys, focus groups, interviews, and student assessment data. Does the plan have timelines associated with each tool? Does the plan also include when and how analysis is done, and where results will be presented?

d. Implementation.

(1) Faculty development. What do the faculty need (content "train-up")? Are the lesson plans complete and clear? Are student materials available to the faculty?

(2) Student assessment. How will faculty collect and record the data for student accomplishment of the learning objectives? Are there both formative and summative assessments? Are there direct and indirect measures of student learning?

(3) Evaluation data collection. Was the data collected according to the evaluation plan? If not, then capture the reasons for change.

a. Evaluation. How well was the evaluation plan for data analysis followed? What were the challenges? What were the successes? How will the results be presented per the evaluation plan?

b. Report. The formative evaluation report should be part of curriculum developer records so that it may be presented to the leadership as part of a post-instructional conference or review or a program evaluation. (See chapter 2 for an example of the ADDIE process.)

3-4. Program evaluation

Program evaluation is a systematic investigation process used to collect information to determine the worth or merit of a process, program, or procedure. The leadership should use a program evaluation to facilitate deciding a COA for the researched process, program, or procedure. In the case of Army educational institutions, the organization's evaluation plan identifies by year each program evaluation.

a. Program evaluation plan. Program evaluations begin with an evaluation plan. The evaluation plan is a document that describes the context, purpose, tools, implementation plan, and final report for the program evaluation.

(1) The first part of evaluation plan describes the context of the evaluation, such as the school, department, dates of the research, and the population, if applicable.

(2) The second part of the evaluation plan describes the purpose of the research. Is it for curriculum review, funding issues, quality of life, curriculum redesign or new curriculum, or any specific research questions?

(3) The third part of the evaluation plan describes the data collection tools. These tools may include interviews; surveys (internal and external); focus groups; observations, insights, and lessons; viability inspections; and historical documents. In the case of a curriculum program evaluation, an external curriculum review using the ADDIE process is imperative. Also, in the case of curriculum program evaluation, there must be a tool to capture and analyze student assessment. The curriculum developer must present all these tools in appendices to the evaluation plan.

(4) The fourth part of the evaluation plan describes the methodology, to include the implementation of the data collection and the method of analysis of the data collected. This may include specific schedules or rules for implementation of data collection tools.

(5) The fifth part of the evaluation plan describes the implementation plan. The curriculum developer may write in chart or narrative form, but the description should explain the expectation for implementation of the tools.

(6) The sixth part of the evaluation plan describes how, when, and where the presentation of the evaluation results will happen. Examples include a formal meeting of leadership, administrators, faculty, and curriculum developers or at a post-instructional conference or review.

b. Evaluation of the Army Enterprise Accreditation Standards. A program evaluation should include a review of the applicable Army Enterprise Accreditation Standards. This should be done annually to affirm the course meets and maintains the Army accreditation.

Chapter 4

Faculty Development

4-1. Introduction

All TRADOC schools must support their faculty by designing and implementing faculty development programs tailored to support the specific needs of their audiences and to satisfy their accrediting bodies (TRADOC, regional accrediting agencies, joint accreditation, etc.). Since faculty assigned to educational learning organizations must support all staff and faculty in maintaining their professional military and educational competency, each school should rely on the ADDIE process to build an appropriate program.

4-2. Variation in faculty composition

The complexities and challenges of the 21st century have been the catalyst for change within the walls of all schools. Students have a vast amount of field experience, curriculum has transformed, and faculty composition varies among educational institutions. Some institutions have a large civilian faculty who will be at a school long-term; this is in direct contrast to the past and to other schools where faculty continue to be largely a short-term military composition.

4-3. Common faculty development threads

What should be the common thread throughout TRADOC educational institutions follows:

- a. Mission: To develop and certify faculty members and provide educational services.
- b. Goal: That everyone partner in the development of teaching and learning, regardless of school, department, team, subject matter expertise, or leadership role.
- c. End state: The faculty development program supports all staff and faculty members in continuing professional development.

4-4. Faculty and staff development divisions

These divisions partner with faculty in creating a positive adult learning environment. In general, educational institutions ensure that they are using research-based best practices in their academic and faculty development programs. Institutions should publish competencies/outcomes, criteria, and standards for faculty performance.

4-5. Faculty development governance

Each educational institution will have a bulletin or standing operating procedure outlining their particular faculty development program. As an example, see Fig 4-1 for the four-phased USACGSC Faculty Development Program.

CGSC Faculty Development Job Aid

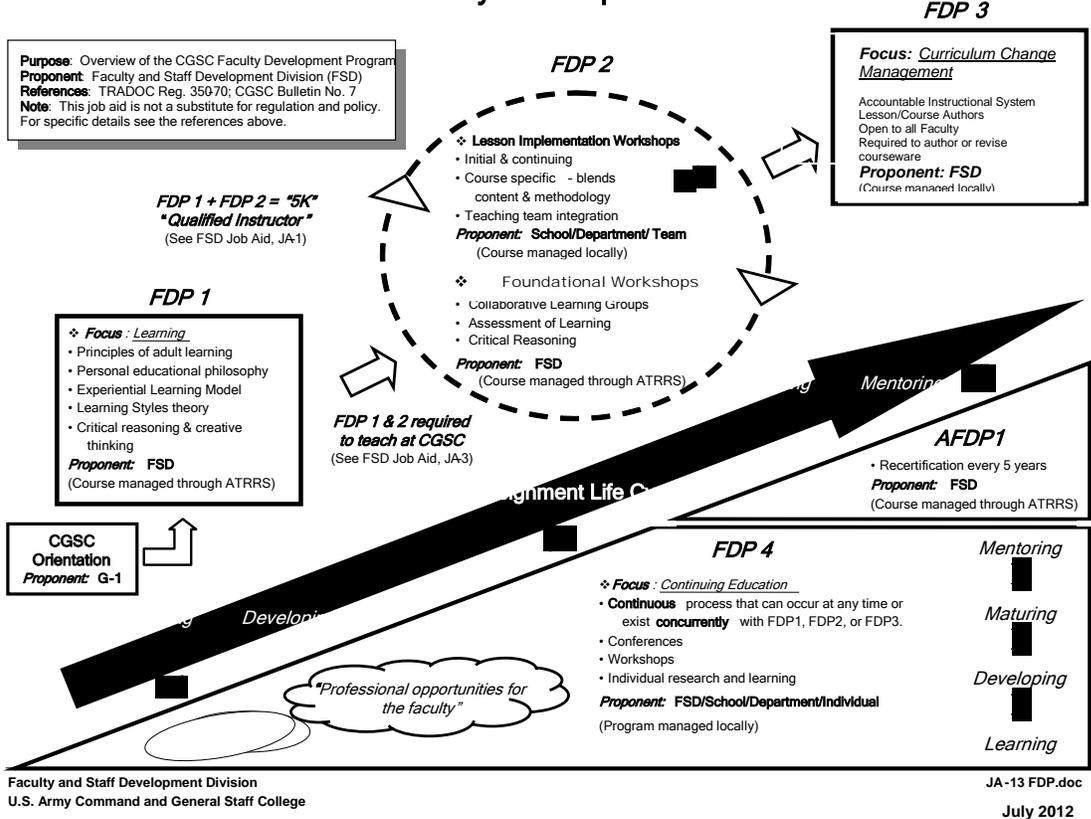


Figure 4-1. USACGSC Faculty Development Program (FDP) Job Aid

Appendix A

References

Army regulations (ARs), Department of the Army (DA) pamphlets, field manuals (FMs), and DA forms are available at www.apd.army.mil. TRADOC publications and forms are available at <http://www.tradoc.army.mil/publications.htm>.

Section I

Required Publications

This section contains no entries.

Section II

Related Publications

A related publication is a source of additional information. The user does not have to read a related reference to understand this publication.

Army Enterprise Accreditation Standards

<https://www.us.army.mil/suite/page/588687>

Army Regulation 350-1

Army Training and Leader Development

USACGSC Circular 350-1

<http://usacac.army.mil/cac2/cgsc/repository/350-1.pdf>

Field Manual (FM) 5-0

The Operations Process

FM 6-22

Army Leadership

National Defense Authorization Act for Fiscal Year 2008 (Available at

<http://www.gpo.gov/fdsys/pkg/CRPT-110hrpt477/pdf/CRPT-110hrpt477.pdf>

Section I

Prescribed Forms

This section contains no entries.

Section II

Referenced Forms

DA Form 1045

Army Ideas for Excellence Program Proposal

DA Form 2028

Recommended Changes to Publications and Blank Forms

Appendix B

Relationships Among Learning Domains, Levels of Learning, and Learning Objectives

B-1. Introduction

Objectives are the cornerstones of learning. Objectives are developed for all levels of instruction where measurement of learning is required.

B-2. Learning domains

One of the most common ways to categorize types of learning is the following learning domains (see figure B-1):

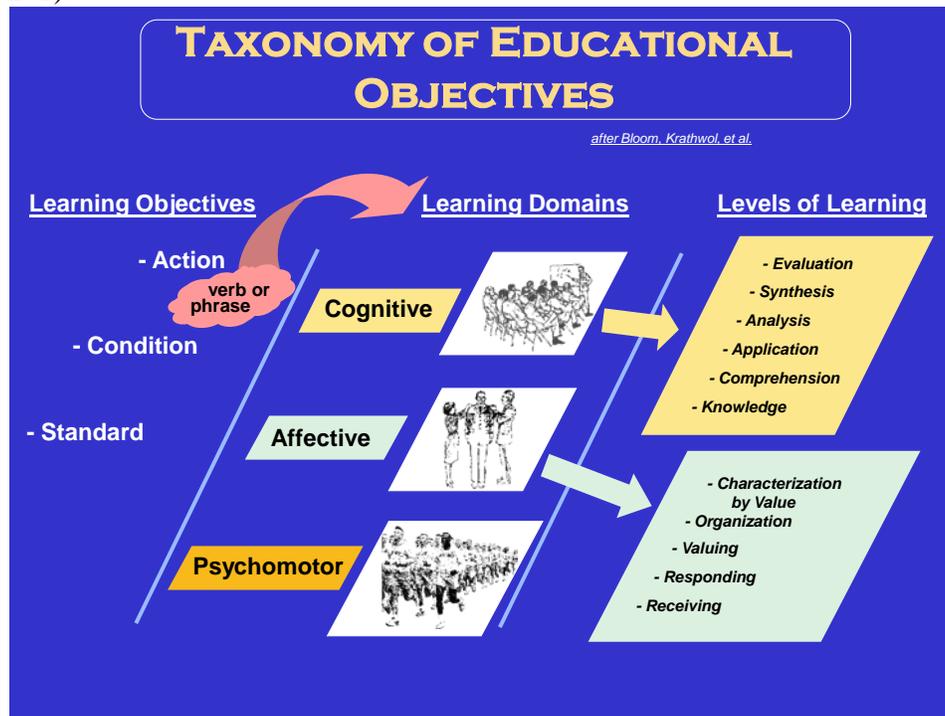


Figure B-1. Taxonomy of educational objectives.

- Affective domain. The affective domain concentrates on emotions, beliefs, attitudes, values, and feelings.
- Cognitive domain. The cognitive domain refers to intellectual skills. Intellectual skills consist of discrimination, concept, rule-using, and problem-solving capabilities. Educational environments commonly focus on intellectual skills.
- Psychomotor domain. The psychomotor domain refers to motor skills learning, and primarily refers to training tasks, not educational performance. (See TRADOC Pamphlet 350-70-6 regarding analysis, design and development of training tasks, which are primarily psychomotor in character.)

B-3. Relationship between learning domains and levels of learning

Each learning domain is broken down into identifiable levels that progress from the lowest level through increasingly more complex levels, and finally to the highest complexity level.

- a. Krathwohl's Taxonomy identifies five affective levels of learning that progress from receiving at the lowest level to characterization by a value complex at the highest level.
- b. Bloom's Taxonomy identifies six cognitive levels: knowledge, comprehension, application, analysis, synthesis, and evaluation. The progression is from the simple recall or recognition of facts at the lowest level, through increasingly more complex and abstract mental levels, to the highest order that is classified as evaluation.

B-4. Relationship between learning objective action verb and level of learning

Select the appropriate action verb for each objective being taught. The action verb tells what behavior the student is expected to achieve. Although action verbs are an indication of the level of learning expected, look at the total behavioral statement (action, condition, and standard) in order to accurately determine the learning objective level, because the same verb may appear in different levels of learning.

Appendix C Assessment Instruments

C-1. Introduction

Schools should develop assessment instruments that clearly measure the course learning objectives. The level of learning for the TLO and ELO is the determining factor in the type of assessment instruments developed. For example, if the level is "evaluation," then require an assessment item measuring the ability to evaluate a situation or product.

C-2. Description of assessment instruments

Design assessment instruments to determine how well students achieve a given standard.

C-3. Guidelines for constructing assessment instruments

- a. General guidelines.
 - (1) Assessment instruments must be *valid*. They must measure the objective they are supposed to measure.
 - (2) Assessment instruments must be *reliable*. They must consistently measure the same knowledge or performance.
 - (3) Assessment instruments must be *comprehensive*. They must include enough assessment items or questions to ensure students have achieved the learning objectives.
 - (4) Assessment instruments must be *free of opinions* and *other biases* caused by wording, grading, etc.

(5) Assessment instruments should *differentiate* between students who have achieved learning objectives from those students who have not achieved learning objectives.

(6) Assessment instruments must assess only essential information; do not measure unimportant details.

(7) The assessment instruments should focus student attention on standards reflected in the appropriate TLOs and/or ELOs.

(8) Weight assessment instruments according to importance of materials and amount of time devoted to the topic.

(9) The assessment instrument should *emphasize learning* rather than a rote response or correct answer.

(10) The assessment instrument should require the student to apply knowledge and reason and to organize ideas.

(11) Avoid problems related to grammar, work form, and phrasing.

(12) Assess the amount of time needed to complete assessment instruments to ensure students have time to satisfactorily complete all requirements.

(13) Design computer-generated assessment instruments to provide immediate feedback to students.

b. Types of assessment items.

(1) Problem-situation items. A problem-situation item provides a realistic problem and asks the student to find a solution. When using the problem-situation item, require the student to think reflectively.

(a) Problem-situation items may measure the student's ability to:

- Classify data.
- Accurately interpret data.
- Determine relationships.
- Apply scientific principles and laws of logic to new or different situations.
- Test conclusions.

(b) A problem-situation item, when properly constructed, is characterized by the following advantages:

- Is effective in obtaining evidence of the student's degree of understanding.
- Can be written to measure the student's ability to reason, either deductively or inductively.

- Assesses the student's skill in the application of principle to a new situation. In other words, it can be used to measure effectively the degree of transfer of knowledge.

(c) General construction guidelines for problem-situation items.

- There are two major parts to every problem-situation assessment item:
- The situation setting the stage.
- The problem the students must solve, given the situation.
- In developing problem-situation items:
- Design the situation to provide the student with the basis to find a solution.
- Add charts, maps, sketches, or diagrams to the situation to increase clarity or realism.
- Make both the situation and the problem realistic.
- When possible, use an actual situation.
- Be specific in both the problem and the situation, allowing no confusion regarding details or student requirements.
- Limit problem response to an allotted time span.
- Require the use of the same principles and ideas presented to the student previously.
- The problem should assess student's achievement of the learning identified in the TLO/ELOs.
- Prepare a rubric.

(2) Essay items. Use essay items when students are required to think reflectively or creatively, to organize knowledge in the solution of a problem, and to express their solutions in writing.

(a) The essay response may embody a number of elements, including comparisons, relationships, explanations, analyses, illustrations, criticisms, summarizations, and/or descriptions.

(b) The most common objection to the essay item is that it lacks reliability because of its subjective nature. This objection largely can be overcome by proper phrasing of the item and by employing a rubric. In this manner, a reasonable degree of the essay assessment instrument can be valid and comprehensive.

(c) General construction guidelines for essay items:

- State the item clearly so the student knows exactly what is expected.
- The essay item should ask for comparisons, decisions, solutions, cause-effect relationships, explanations, or summaries.
- Set limits on essay items.
- Inform the student prior to administering the assessment instrument what weight each item will have on the final grade.

C-4. Simulations

Simulations allow students to practice required learning in a protected environment that closely approximates the actual environment. Students learn from their errors without negatively affecting personnel or resources. (Simulations use technology as the media for instruction.)

a. Recommendations for using simulations.

- (1) Allow enough time for processing and feedback.
- (2) Ensure that the simulation matches course objectives and enhances those objectives.
- (3) Ensure that faculty and students know how to use the simulation properly.

b. Benefits of simulations. Challenge students to:

- (1) Think.
- (2) Practice skills (for example, counseling, active listening, etc.).
- (3) Learn to work as teams.
- (4) Enhance or learn problem-solving skills.
- (5) Visualize problems or issues from their reading assignments.

c. Using simulations as assessment instruments. The purpose of the simulation determines how students are assessed. Decide what is being assessed: the process (way in which the student goes about a simulation), the product (what is produced as a result of the simulation), or a combination of both product and process. Regardless of the assessment measure, faculty and students must know what is being assessed and how their performance is being measured. Types of simulations include role-play, simulation exercises, simulation games, and computer models.

(1) Role-play. Role-play provides an opportunity for students to try out theories and techniques that they may know only from lectures, readings, etc. The purpose of the role-play determines the types of roles and how the roles are played. Generally, some of the class (and often the faculty member) participate in the role-play while others in the class observe and assess the performance.

(2) Simulation exercises and simulation games. Simulation exercises and simulation games most often involve the total class with each member assuming a different role and the whole class acting out a scenario. Design the scenarios either to teach a concept or to allow students to put theory into practice. Simulation exercises more closely resemble role-play, while simulation games most often resemble board games and packages. Simulation games most often have "winners" and "losers." Faculty may have to control the competition when it interferes with the purpose of the game.

(3) Computer models. Computer models are simulation exercises packaged and designed to be used on computers. Computer simulations allow for more interaction than paper-based

exercises and allow students to deal with situations that involve practice of skills and problem solving. Computer simulations allow students to perform tasks that are too dangerous or too expensive to deal with directly.

C-5. Process assessment

Faculty assess students based on their ability to perform a task. For example, faculty assess students' ability to use a computer-based exercise. In this case, faculty focus on the process students go through rather than the final product. Use process assessment techniques when the product requires the procedural steps be performed in proper order and at a certain level of proficiency. Using rubrics is an effective means of providing guidelines for assessing student attainment of the learning objectives.

C-6. Product assessment

Assess students based on the quality of the product. For example, faculty assess students' solutions to a computer-based exercise rather than how they went about solving the exercise. The product assessment approach also makes use of a rubric. However, in this case, faculty assess the correctness, completeness, quality, etc., of the product. Identify the characteristics that distinguish an acceptable product from an unacceptable product and provide students with the appropriate guidance.

Appendix D

Examples of Lesson Plans

D-1. (Name of School) lesson plan example

NAME OF SCHOOL
Title of Academic Program
Course number and title

Lesson Plan for Lesson CXXX
Introduction to Critical Thinking

Theme Author: Title plus First and Last Name

Lesson Author: Title plus First and Last Name

Date prepared: January 6, 2011

1. SCOPE

a. This two-hour lesson introduces the students to the fundamentals of critical thinking (CT) and sets the stage for subsequent lessons in the CT module. As a result of completing this lesson, the students should be familiar with the development of CT doctrine, theory, and philosophy, and have at least a passing familiarity with some of the key historical figures. Historical figures in CT will be briefly discussed in order to provide context for the review of contemporary critical thinkers. This lesson includes an overview of the CT module from the Foundations block through the remainder of the Core Curriculum, and explains how CT applies to all subjects in the curriculum. Instructors and students should have read the assigned article(s)

before class in order to be informed and able to contribute to the classroom discussion. The learning objective for this lesson is to understand what CT is and how it helps individuals make good decisions in both their personal and professional lives. This learning objective supports the core curriculum terminal learning objective, TLO-CC-2, “Refine CT skills to solve problems and make decisions.” The specific skills and behaviors emphasized in this lesson are application of CT in classroom discussions and practical exercises, as well as in all academic work throughout the year.

b. Students should have gained an appreciation of the history and background of CT, and begin to apply fundamental CT skills in all aspects of their studies. As a result of completing this lesson, students should realize that CT is not a new topic resulting from challenges experienced in contemporary military operations or the evolution in military operational doctrine. Students should see the integral nature of CT on the part of key historical figures with whom they should already have at least a passing familiarity, such as Socrates and Plato. The desired end state for each student is a critically-thinking skills should be evident in the classroom discussions as individuals explain, defend, and critically examine their own points of view and perspectives and the perspectives of other students in the classroom. An improved or higher level of CT skill may manifest itself in the first lesson, but the first lesson should lay the groundwork for further development of those skills in later lessons and throughout the rest of the academic year.

c. The intent of the concrete experience is to highlight the commonalities of individual failures to think critically. This sets the conditions for the students to begin to see the importance of CT and establish the value of this and the next several lessons in this module. By identifying instances in their own experience in which bad decisions were made — perhaps even by them — the students will realize the value of being able to habitually think critically and begin to apply effective CT skills in all their academic endeavors.

2. LEARNING OBJECTIVES

Terminal Learning Objective (TLO): TLO-CC-2

Action: Refine CT skills to solve problems and make decisions.

Condition: Acting on a problem-solving team or individually and drawing on references, class presentations, discussions, exercises, personal experience, and individual learning while faced with ambiguous, ill-structured problems characteristic of the current operational environment.

Standard: Refinement includes—

1. examination of CT and creative thinking tools
2. analysis of mental models
3. analysis of probable solutions for an ambiguous problem

Learning Domain: Cognitive

Level of Learning: Analysis

JPME I Learning Areas Supported: None

Enabling Learning Objective (ELO): ELO-CC-2.01

Action: Assess individual cognitive developmental stage.

Condition: Given individual reading and writing assignments, lectures, small group discussions, and the Learning Environment Preferences (LEP) instrument.

Standard: The assessment includes—

1. pre-test
2. post-test

Learning Domain: Cognitive

Level of Learning: Analysis

JPME I Learning Areas Supported: None

ELO-CC-2.02

Action: Describe theories of CT.

Condition: Given individual reading and writing assignments, lectures, small group discussions, and practical exercises.

Standard: The description includes—

1. key theorists
2. historical underpinnings

Learning Domain: Cognitive

Level of Learning: Comprehension

JPME I Learning Areas Supported: None

ELO-CC-2.03

Action: Describe fundamentals of CT.

Condition: Given individual reading and writing assignments, lectures, small group discussions, and practical exercises.

Standard: The description includes—

1. elements of CT
2. intellectual standards

Learning Domain: Cognitive

Level of Learning: Comprehension

JPME I Learning Areas Supported: None

ELO-CC-2.04

Action: Demonstrate critical thought in oral and written communications.

Condition: Given individual reading and writing assignments, lectures, small group discussions, and practical exercises.

Standard: The demonstration includes—

1. elements of CT
2. intellectual standards

Learning Domain: Cognitive

Level of Learning: Application

JPME I Learning Areas Supported: None

ELO-CC-2.05

Action: Solve complex, ill-structured problems.

Condition: Given individual reading and writing assignments, lectures, small group discussions, and practical exercises.

Standard: The solution includes—

1. elements of CT
2. intellectual standards

Learning Domain: Cognitive

Level of Learning: Synthesis

JPME I Learning Areas Supported: None

3. ASSIGNED STUDENT READINGS:

a. Advance Issue:

The Miniature Guide to Critical Thinking: Concepts & Tools

C100, Foundations Readings Book

Learning Environment Preferences (LEP) Inventory

FM 6-22, *Army Leadership*

FM 5-0, *The Operations Process*

b. Issue During Class: None.

c. Read:

(1) *The Miniature Guide to Critical Thinking: Concepts & Tools*. [19 pages]

(2) *The Role of Critical Thinking in Effective Decision Making* (Egan). [14 pages]

(3) *A Brief History of the Idea of Critical Thinking* (Paul and Elder).

<http://www.criticalthinking.org/pages/a-brief-history-of-the-idea-of-critical-thinking/408>

[5 pages]

(4) *Defining Critical Thinking*.

http://www.criticalthinking.org/aboutct/define_critical_thinking.cfm

[3 pages]

d. Instructor Notes: None.

4. INSTRUCTOR ADDITIONAL READING(S)/MATERIAL: None.

5. TRAINING AIDS, REFERENCES, AND RESOURCES

Appendix A: Assessment Plan

Appendix B: Slides

Whiteboards

Smartboard

6. CONDUCT OF LESSON

a. Lesson Timeline:

First hour:

10 minutes Concrete Experience: Worst Decision Ever Made

15 minutes Publish and Process

25 minutes Generalize New Information (GNI): Define Critical Thinking and its Components

10 minutes Break

Second hour:

40 minutes GNI: Critical Thinking requirements and skills; historical figures in development and evolution of CT

10 minutes Develop: How this applies to Contemporary Operating Environment (here and now)

10 minutes Summary/conclusion (*check on learning*)

b. **Concrete Experience:** (10 minutes). Hand out 3x5 index cards to each student. Ask the students to individually think about what they think was the worst decision ever made. It can be one that was made by the individual sitting in class thinking about this task or one that was made by another person or organization. Have them make notes on the index card describing the decision that was made and how they reacted to it. Ask them to be prepared to discuss their selection. The concrete experience should get the students into the affective domain as they recall the bad decision and their reaction to it. The concrete experience should further establish the value of the learning that is about to occur and its importance to each individual from the perspective of improving his or her own CT and decision making skills. An alternative method is to pair up the students and have each pair brief back their selection. The advantage to this method would be fewer experiences to process out in the publish and process (P&P); the disadvantage is that it may take more time for pairs of students to decide on a “worst decision.”

c. **Publish and Process (P&P):** (15 minutes). Ask the students to voluntarily share their worst decision. Some students may be reluctant to publish out loud to the group if the decision they recorded is personal or embarrassing to them. As students publish their worst decisions, ask probing questions to model CT behaviors you will look for in them in later classes. For example:

- 1) Why did you think this was the worst decision ever made?
- 2) What criteria did you use in selecting the worst decision ever made?
- 3) Was this a difficult selection for you to make? Why or why not?
- 4) What *CT* do you think may have been absent or misapplied in the decision you selected?

d. **Generalize New Information:** (25 minutes). This lesson introduces the fundamentals of CT and some of the key figures in the history and evolution of CT. The learning objectives are highlighted in the slides as a reminder for both the students and the instructor. The approach to these objectives will consist of two parts: the components of CT and effective decision making in the first hour; and an overview of key historical figures in the second hour.

The first couple of slides provide an overview of the CT module as it will be taught in the Foundations block and throughout the remainder of the core curriculum. It is important to communicate the idea that CT is not just an 8- to 10-hour block of instruction that begins and ends in the Foundations block. Students should apply CT throughout all their academic endeavors.

<p>Slide 1, Title Slide.</p>	<p style="text-align: center;">Lesson 1:</p> <p style="text-align: center;">Introduction</p>
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The Overview slide should provide not only an overview of the lesson and how it fits into the rest of the Foundations instruction, but also a broad look at the history and evolution of CT.

<p>Slide 2, Overview.</p>	<p style="text-align: center;">Overview</p> <ul style="list-style-type: none"> • Establishes foundation for critical thinking in rest of intermediate level education (ILE) • Introduces critical thinking (CT) concepts, theories, and techniques for application • Five lessons in Foundations block, five more in remainder of Core Curriculum, with assessment of CT at conclusion • Key component is completion of Learning Environment Preference instrument <i>before</i> and <i>after</i> instruction
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This slide may be redundant, but the intent is provide a little more detail on how the CT instruction is divided into two parts and what those parts are going to look like. Not worth spending a lot of time on, but helps clarify expectations for students who are so inclined.

<p>Slide 3, Overview (cont'd)</p>	<p style="text-align: center;">Overview (cont'd)</p> <table border="1" style="width: 100%;"> <tr> <td data-bbox="716 300 1024 657"> <p>Part 1: Foundations</p> <p>Lesson 1: Introduction Lesson 2: Contemporary critical thinkers Lesson 3: Perry; LEP Lesson 4: Models, debate prep & set-up Lesson 5: Debate</p> </td> <td data-bbox="1024 300 1370 657"> <p>Part 2: Core Curriculum</p> <ul style="list-style-type: none"> - DJIMO case study - CTAC case study - DLRO case study - DCL case study - DMH case study - Post –course LEP </td> </tr> </table>	<p>Part 1: Foundations</p> <p>Lesson 1: Introduction Lesson 2: Contemporary critical thinkers Lesson 3: Perry; LEP Lesson 4: Models, debate prep & set-up Lesson 5: Debate</p>	<p>Part 2: Core Curriculum</p> <ul style="list-style-type: none"> - DJIMO case study - CTAC case study - DLRO case study - DCL case study - DMH case study - Post –course LEP
<p>Part 1: Foundations</p> <p>Lesson 1: Introduction Lesson 2: Contemporary critical thinkers Lesson 3: Perry; LEP Lesson 4: Models, debate prep & set-up Lesson 5: Debate</p>	<p>Part 2: Core Curriculum</p> <ul style="list-style-type: none"> - DJIMO case study - CTAC case study - DLRO case study - DCL case study - DMH case study - Post –course LEP 		

It is often helpful to begin each lesson with a graphic showing where they are in the sequence of events. The intent is to show this same slide at the beginning of each lesson with different boxes highlighted for that particular lesson. Not fancy, but it has proven effective. Not essential to the learning objective, and you may find it either a waste of time or just too much information.

<p>Slide 4, Critical Thinking Lesson Outline.</p>	<p style="text-align: center;">Critical Thinking Lesson Outline</p> <table border="1" style="width: 100%;"> <tr> <td data-bbox="821 1052 1097 1125"> <p>Lesson 1: <i>Introduction</i></p> </td> <td data-bbox="1114 1052 1435 1125"> <p>Introduction, overview, History and evolution of CT</p> </td> </tr> <tr> <td data-bbox="821 1146 1097 1220"> <p>Lesson 2: <i>Contemporary Critical Thinkers</i></p> </td> <td data-bbox="1114 1146 1419 1220"> <p>Paul & Elder; Kitchener & King; Meier; Brookfield</p> </td> </tr> <tr> <td data-bbox="837 1262 1097 1314"> <p>Lesson 3: <i>Perry; LEP</i></p> </td> <td data-bbox="1114 1262 1435 1346"> <p>Perry; Learning Environment Preference (LEP) instrument</p> </td> </tr> <tr> <td data-bbox="821 1377 1097 1430"> <p>Lesson 4: <i>Models; Set-up</i></p> </td> <td data-bbox="1114 1377 1419 1451"> <p>CT applied to models; debate prep and set up</p> </td> </tr> <tr> <td data-bbox="878 1472 1097 1524"> <p>Lesson 5: <i>Debate</i></p> </td> <td data-bbox="1114 1472 1419 1524"> <p>Design; Pro or Con?</p> </td> </tr> </table>	<p>Lesson 1: <i>Introduction</i></p>	<p>Introduction, overview, History and evolution of CT</p>	<p>Lesson 2: <i>Contemporary Critical Thinkers</i></p>	<p>Paul & Elder; Kitchener & King; Meier; Brookfield</p>	<p>Lesson 3: <i>Perry; LEP</i></p>	<p>Perry; Learning Environment Preference (LEP) instrument</p>	<p>Lesson 4: <i>Models; Set-up</i></p>	<p>CT applied to models; debate prep and set up</p>	<p>Lesson 5: <i>Debate</i></p>	<p>Design; Pro or Con?</p>
<p>Lesson 1: <i>Introduction</i></p>	<p>Introduction, overview, History and evolution of CT</p>										
<p>Lesson 2: <i>Contemporary Critical Thinkers</i></p>	<p>Paul & Elder; Kitchener & King; Meier; Brookfield</p>										
<p>Lesson 3: <i>Perry; LEP</i></p>	<p>Perry; Learning Environment Preference (LEP) instrument</p>										
<p>Lesson 4: <i>Models; Set-up</i></p>	<p>CT applied to models; debate prep and set up</p>										
<p>Lesson 5: <i>Debate</i></p>	<p>Design; Pro or Con?</p>										

Show the slide and allow the students some time to think about their response. Feel free to clarify if they have questions about who, when, what, and so forth, but allow plenty of latitude for their own reflection and creativity. Ask them to make some notes or jot down specifics they can share with the rest of the class.

<p>Slide 5, Concrete Experience: Worst Decision Ever Made.</p>	<p>Think about the worst decision Ever made - - by anyone - - and <i>write</i> it down; be prepared to discuss your selection and <i>why</i> you chose that particular decision.</p>
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This is the students’ opportunity to express their thoughts about CT and why they think it’s important . . . or not. Don’t rush the P&P, but stay engaged in order to be able to recognize and react to unexpected “teaching moments.” A fundamental P&P approach initially will probably work best: “What happened? How did you react?” *Then*, if you feel some additional development of the students’ experiences would be worthwhile, show the next slide to help them peel apart the nuances.

<p>Slide 6, Publish and Process.</p>	<ul style="list-style-type: none"> - Why did you choose <i>that</i> particular decision? - What aspects or characteristics of the decision were most significant? - What role did CT play in the bad decision you chose?
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Transition to the GNI by reviewing the learning objectives. The TLO is from the Foundations module; the ELOs are for the CT module, both the Foundations parts and the rest of the Core Curriculum parts.

Ensure students have an understanding of what they can expect; query a couple of individuals, have them respond back with their own words.

<p>Slide 7, Learning Objectives.</p>	<p style="text-align: center;">Learning Objectives</p> <ul style="list-style-type: none"> • TLO: Develop CT skills • ELOs: <ul style="list-style-type: none"> - Assess individual cognitive developmental stage - Describe theories of CT - Describe fundamentals of CT - Demonstrate critical thought in oral and written communications - Solve complex, ill-structured problems
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You may want to keep this slide hidden or make it a build slide to provide time for students' input - - what do THEY think CT is?

The students should have had exposure to enough different perspectives on CT in the assigned readings to formulate a rational response to this question. Give them some time to think about it, but then you should be comfortable calling on some individuals to solicit their input. Not the first time they've seen or heard of CT; *everyone* should be capable of rendering an opinion.

<p>Slide 8, What is Critical Thinking.</p>	<p style="text-align: center;">What do you think Critical Thinking is?</p> <p style="text-align: center;"><i>Let's examine what <u>some</u> CT theorists say about it...</i></p>
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The intent in the next hour is to generate discussion on the part of the students about what *they* think CT is. There are a number of misconceptions, false beliefs, and misunderstandings about CT and how it fits into the military mindset. It is worth spending some class time soliciting input from the students, perhaps even asking them to jot down some of their ideas and having them go to the white boards and collaborate in small groups, to drive home the importance of *their* views on the subject.

The following slides provide various definitions of CT by different contemporary CT authorities. Try to show them only briefly in order to communicate that there are a lot of different perspectives and opinions about CT, and that each of them needs to develop a definition that works. You may find it unnecessary to use any of them, in which case simply jump forward to the next part of the lesson or fast forward through them.

An alternative is to select one of the definitions, then use it as a "strawman" to discuss why it is a good definition, why it might be an incomplete definition, what might be missing from it, and so forth. The resulting definition arrived at through collaboration may be as good as or better than any in the readings.

<p>Slide 9, Critical Thinking is . . . (1 of 4)</p>	<p style="text-align: center;">Critical Thinking is...</p> <p>Active, persistent, and careful consideration of a belief or supposed form of knowledge in the light of the grounds which support it and the further conclusions to which it tends. - Dewey, 1909</p> <p>...an investigation whose purpose is to explore a situation, phenomenon, question, or problem to arrive at a hypothesis or conclusion and that can therefore be convincingly justified. - Kurfiss, 1988</p> <p>...reasonable, reflective thinking that is focused on deciding what to believe or do. - Ennis, 1989</p>
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No need to use all the slides, no need to use any of them if the ensuing discussion is serving its purpose. If the students have explored different perspectives and aspects of how they define CT, you're there.

<p>Slide 10, Critical Thinking is . . . (2 of 4).</p>	<p style="text-align: center;">Critical Thinking is...</p> <ol style="list-style-type: none"> 1. An attitude of being disposed to consider in a thoughtful way the problems and subjects that come within the range of one's experience. 2. Knowledge of the methods of logical enquiry and reasoning. 3. Some skill in applying those methods. <p style="text-align: center;">Section II- Glaser, 1941</p> <p>...that mode of thinking...in which the thinker improves the quality of his or her thinking by skillfully taking charge of the structures inherent in thinking an imposing intellectual standards upon them. - Paul, Fisher, and Nosich, 1993</p>
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An alternative is to select one slide, for example, and focus on what it says CT is, soliciting input and perspectives from the students: do they agree or disagree, why or how do they agree or disagree, what is their reasoning or rationale for either one, and so forth.

<p>Slide 11, Critical Thinking is . . . (3 of 4).</p>	<p style="text-align: center;">Critical Thinking is...</p> <p>...skilled and active interpretation and evaluation of observations and communications, information, and argumentation. - Fisher and Scriven, 1997</p> <p>...the art of raising what is subconscious in our reasoning to the level of conscious recognition. It is the art of taking control of our thinking processes so as to understand the pathway and inputs that our thinking employs. - Egan, 2005</p>
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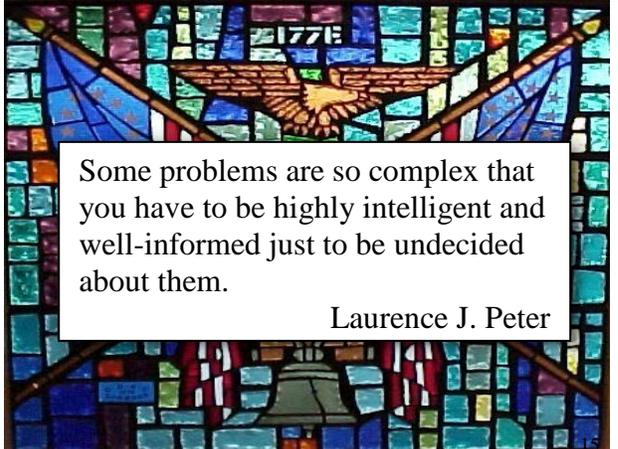
<p>Slide 12, Critical Thinking is . . . (4 of 4).</p>	<p style="text-align: center;">Critical Thinking is...</p> <p>...contrasted with the kind of thinking which occurs when someone jumps to a conclusion, or accepts some evidence, claim, or decision at face value, without really thinking about it. CT requires skill in the interpretation and evaluation of observations, communications, and other sources of information, skill in identifying assumptions, in asking pertinent questions, and in drawing out implications.</p> <p style="text-align: right;">- Fisher, 2001</p>
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<p>Slide 13, Components of Critical Thinking (#1).</p>	<p>Components of Critical Thinking</p> <ul style="list-style-type: none"> • Structure of thought we are better able to find errors in our thinking if we are able to take our thinking apart • Standards for thinking it is impossible to judge the quality of one's thinking if there are no standards with which to compare • Ethics developing a sense of fair mindedness and applying the barb of our criticism evenly. <p style="text-align: right;">- Egan, 2005</p>
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Another way to take apart CT and examine it. The next two slides address some contemporary critical thinkers' perspectives on what CT consists of. Students may be able to add to their lists as part of the ongoing discussion.

<p>Slide 14, Components of Critical Thinking (#2).</p>	<p style="text-align: center;">Components of Critical Thinking</p> <p>Three important areas of CT are <i>logic, epistemology, and ethics.</i></p> <ul style="list-style-type: none"> • Ethics is most important for its contributions to the standards for evaluating the morality of actions • Logic studies the principles of valid and invalid reasoning. The domain of logic is narrower than the domain of CT, which is concerned with evaluating the justification of beliefs and actions. • Epistemology studies the origin, nature, and limits of knowledge. <p style="text-align: right;">- Carroll, 2004</p>
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As you send the students on break, ask them to think about what they think some of the fundamental requirements are for CT to occur, if there are any. If there aren't any, that might also be worth explaining and discussing when they return to class.

<p>Slide 15, Stained Glass Quote — Break.</p>	 <div style="border: 1px solid black; padding: 10px; margin: 10px auto; width: 80%;"> <p>Some problems are so complex that you have to be highly intelligent and well-informed just to be undecided about them.</p> <p style="text-align: right;">Laurence J. Peter</p> </div>
--	---

Requirements might be the wrong word to use or a poor choice, and if re-framing or re-phrasing the question helps, feel free. Others will have no trouble discerning the point of the question and begin formulating a response relatively quickly. Ask the students to think about this a little after returning from their break, make some notes to themselves, and then share with the rest of the class to try and keep the internal influences minimized.

<p>Slide 16, What are Requirements for Critical Thinking?</p>	<p style="text-align: center;">What are Requirements for Critical Thinking?</p> <p>CT requires skill in the interpretation and evaluation of observations, communications and other sources of information, skill in identifying assumptions, in asking pertinent questions and in drawing out implications.</p> <p style="text-align: right;">- Fisher, 2001</p>
--	--

How do the students define competencies? Are there characteristics of individuals who think critically? Does anyone notice how old this critical thinker is, or when these competencies were published?

<p>Slide 17, Critical Thinking Competencies.</p>	<p>Critical Thinking Competencies</p> <ol style="list-style-type: none"> 1. Recognize problems 2. Determine feasible solutions 3. Gather pertinent information 4. Recognize assumptions and values 5. Communicate effectively and accurately 6. Interpret and analyze data 7. Recognize logical relationships 8. Make rational conclusions; test them 9. Adjust beliefs based on experience 10. Render judgments <p style="text-align: right;">-Glaser, 1941</p>
---	---

This could easily be viewed as another way of serving up the same information as the previous slide. How much difference is there between competencies and skills? Do students see some of the same items in both lists? Can they add any of their own that they think are important?

<p>Slide 18, Fundamental Critical Thinking Skills.</p>	<p>Fundamental Critical Thinking Skills</p> <ul style="list-style-type: none"> • Identify the elements in a reasoned case. • Identify and evaluate assumptions. • Clarify and interpret expressions and ideas. • Judge the acceptability (credibility) of claims. • Evaluate arguments of different kinds. • Analyze, evaluate, and produce explanations. • Analyze, evaluate, and make decisions. • Draw inferences. • Produce arguments <p style="text-align: right;">-Fisher, 2001</p>
---	---

This would be a good opportunity to only show the title of the slide and ask the question to the students. They should be able to develop a fairly detailed listing or rationale for why they think CT is important. Such an exercise would help model CT and encourage the same in the students.

<p>Slide 19, Why is Critical Thinking Important? (1 of 2)</p>	<p>Why is Critical Thinking Important?</p> <p>CT ability is significantly related to job performance in the areas of:</p> <ul style="list-style-type: none"> • Analysis and Problem Solving • Judgment and Decision Making • Professional/Technical Knowledge and Expertise, and • Overall Performance. <p style="text-align: right;">- Ejiogu, et al (2006)</p>
--	---

Same approach could be used here, either instead of using it with the previous slide, in addition to using it with the previous slide, or some other permutation. One of these slides could easily be left out and still achieve the lesson’s learning objective, which may be a viable option if you find yourself beginning to get short on time.

<p>Slide 20, Why is Critical Thinking Important? (2 of 2)</p>	<p>Why is Critical Thinking Important?</p> <ul style="list-style-type: none"> • Helps us interpret information. • Assists us in making better decisions. • Helps us see what is not so evident and obvious at first glance • Encourages us to think about our own prejudices. • Challenges prevailing social, political, cultural, and technical ways of thinking and acting. • Encourages us to go beyond the traditional boxes of knowledge and understanding. • Helps us critique, reject, or adapt tools and methods.
--	---

Any number of different ways to approach this part of the lesson, but the least preferred is to read from the slide. One alternative is to assign each of these critical thinkers to a student ahead of class or on the break and have them publish back to the rest of the class. Another is to divide the class into two, three, or four groups and have them research contributions of each critical thinker. The key is going to be consideration of how much time you have available as you near the end of your second hour and how much detail you want to provide. A broad overview was included in the assigned reading, so everyone should have at least an inkling of who these people are and what some of their contributions to CT were. The check on learning at the end of the lesson may be informative.

Slide 21, Historical Figures in Critical Thinking.	Critical Thinking Theorists	
	• Socrates (500 BC)	• Robert Boyle
	• Thomas Aquinas (Middle Ages)	• Voltaire
	• Colet, Erasmus, Moore (Renaissance)	• Isaac Newton • Adam Smith
	• Francis Bacon	• Karl Marx • John Dewey
	• Rene' Descartes	• Jean Piaget
	• Hobbes	
	• Locke	

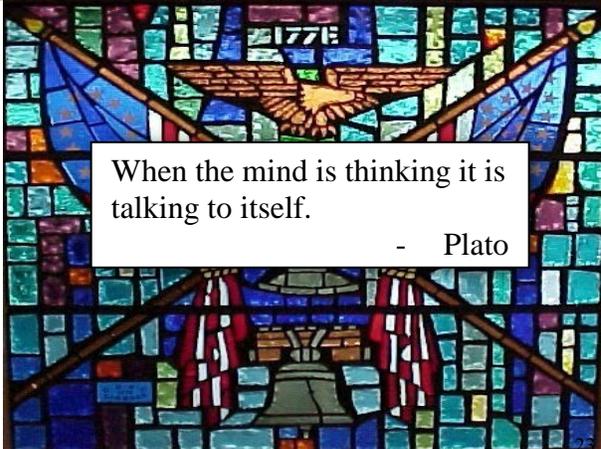
e. **Develop:** (20 minutes). **This part of the experiential learning model belongs to the students;** allow them time to reflect and develop their responses to the question of how they think they will be able to use what they have learned in the future. There are no wrong answers from a content perspective; however, there are incorrect answers from a format perspective if individuals fail to answer the question posed. Try to ensure everyone has an opportunity to provide his or her response. In some, perhaps many cases, you may observe instances of good CT skills; it would be worthwhile to point them out — timing may be an issue in terms of *when* you point out the good examples. An alternative is to organize the class into two or three smaller groups and have them collaborate and develop group consensus.

This is one of the most critical phases in the lesson. If the first hour ends without the students' having realized the value of what they have learned and will continue to learn, the learning will not stick. They will fail to see why learning CT is important and this module will continue to be a “bumper sticker” for USACGSC instruction. Take the time to execute this part of the experiential learning model as well as possible. Taking some time out of the GNI or APPLY phase may be a necessary course of action.

f. **Apply:** (10 minutes). **This is the “check on learning.”** Take a few minutes to determine if the students learned what you had intended. This may be verbal, random questions thrown out to the group, specific questions posed to individual students, a review of the learning objectives slide, or some other quick method of checking what the students think they learned. This phase also belongs to the students. You can't *tell* them what they learned; the students have to recognize and verbalize what *they* think they learned.

Slide 22, Review/Check on Learning.	Review
	<i>Check on Learning</i>
	<ul style="list-style-type: none"> • What is critical thinking? • What are some components of critical thinking? Competencies? Skills? • Why is critical thinking important? • Who are some of the key historical figures in the evolution of critical thinking?

Try to leave enough time to respond to students' input in this phase. If they have clearly not learned or even begun to understand the learning objectives as described in the beginning of the lesson, you will need to revisit these topics in the next lesson. Moving on to another lesson without having learned the key parts of the current lesson will be counterproductive in this module; each lesson builds on and adds to the previous one. You may find it helpful to record the students' inputs on the white boards to add substance to their responses.

<p>Slide 23, Stained Glass Quote — Conclusion.</p>	 <p>When the mind is thinking it is talking to itself. - Plato</p>
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7. ASSESSMENT PLAN: (See Appendix A.)

US ARMY NAME OF SCHOOL
Level of course
C1XX: Foundations
C1XX: Title of Instruction Block
Lesson C1XX: Introduction

Appendix A
Assessment Plan

Part of your performance for the complete C1XX Foundations Block is assessed in this lesson through class participation. Class participation consists of 10% of the overall C100 Block grade.

Class Participation (Individual) 100%. Instructors assess each student's demonstrated understanding of the course material and his or her ability to develop and deliver cogent arguments or relevant insights from course material in a clear and concise fashion. Students demonstrate their knowledge, skill, and ability through the quality and focus of their discussion comments and questions, their preparation for class, their ability to reason critically, their performance during in-class exercises, and contributions to group work. Class participation is assessed on a daily basis. Specifically for this lesson, instructors focus on the following leader behaviors: "seeks and is open to diverse ideas and points of view" and "conveys thoughts and ideas to ensure shared understanding" (see FM 6-22, appendix A.).

US ARMY NAME OF SCHOOL
Level of course
C1XX: Foundations
C1XX: Title of Instruction Block
Lesson C1XX: Introduction

Appendix B
Slides

Slide Number	Description/Title
Slide 1	Lesson 1: Introduction
Slide 2	Overview
Slide 3	Overview (cont'd)
Slide 4	Critical Thinking Lesson Outline
Slide 5	Concrete Experience: Worst Decision Ever Made
Slide 6	Publish and Process
Slide 7	Learning Objectives
Slide 8	What is Critical Thinking?
Slide 9	Critical Thinking is . . . (#1)
Slide 10	Critical Thinking is . . . (#2)
Slide 11	Critical Thinking is . . . (#3)
Slide 12	Critical Thinking is . . . (#4)
Slide 13	Components of Critical Thinking (#1)
Slide 14	Components of Critical Thinking (#2)
Slide 15	Break Slide
Slide 16	What are Requirements of Critical Thinking?
Slide 17	Critical Thinking Competencies
Slide 18	Fundamental Critical Thinking Skills
Slide 19	Why is Critical Thinking Important? (1 of 2)
Slide 20	Why is Critical Thinking Important? (2 of 2)
Slide 21	Historical Figures in Critical Thinking
Slide 22	Review/Check on Learning
Slide 23	Conclusion Slide (Quote)

D-2. TDC USACGSC lesson plan example

**Critical Thinking and Problem Solving
701-C121 / Version 1.0
Effective Date Not Assigned**

SECTION I. ADMINISTRATIVE DATA

All Courses Including This Lesson	<u>Course Number</u>	<u>Version</u>	<u>Course Title</u>
	None		
Task(s) Taught(*) or Supported	<u>Task Number</u>	<u>Task Title</u>	
	<u>Individual</u>	701-CC-0002 (*) Created on: Wed Feb 08 14:40:47 EST 2012 Incorporate critical thinking skills.	
Reinforced Task(s)	<u>Task Number</u>	<u>Task Title</u>	
	None		
Knowledge	<u>Knowledge Id</u>	<u>Title</u>	<u>Taught</u> <u>Required</u>
	None		
Skill	<u>Skill Id</u>	<u>Title</u>	<u>Taught</u> <u>Required</u>
	None		
Administrative/Academic Hours	The administrative/academic hours required to teach this lesson are as follows:		
	<u>Academic</u>	<u>Resident Hours / Methods</u>	
	Yes	0 hrs 0 mins	Test Review
	Yes	0 hrs 0 mins	Test
	Total Hours:	0 hrs 0 mins	
Test Lesson Number	<u>Hours</u>	<u>Lesson Number</u>	
	None		
Prerequisite Lesson(s)	<u>Lesson Number</u>	<u>Lesson Title</u>	
	None		
Clearance Access	Security Level: Not Set		
Foreign Disclosure Restrictions	None		
References	<u>Number</u>	<u>Title</u>	<u>Date</u> <u>Additional Information</u>
	None		
Student Study Assignment	None		

SECTION II. INTRODUCTION

Method of Instruction:
 Instr Type(I:S Ratio/Qty):
 Time of Instruction:
 Instructional Strategy:

Motivator

Concrete Experience: (10 minutes). Hand out 3x5 index cards to each student. Ask the students to individually think about what they think was the worst decision ever made. It can be one that was made by the individual sitting in class thinking about this task or one that was made by another person or organization. Have them make notes on the index card describing the decision that was made and how they reacted to it. Ask them to be prepared to discuss their selection. The CE should get the students into the affective domain as they recall the bad decision and their reaction to it. The CE should further establish the value of the learning that is about to occur and its importance to each individual from the perspective of improving his or her own critical thinking and decision making skills. An alternative method is to pair up the students and have each pair brief back their selection. The advantage to this method would be fewer experiences to process out in the P&P; the disadvantage is that it may take more time for pairs of students to decide on a "worst decision."

Terminal Learning Objective

NOTE. Inform the students of the following Terminal Learning Objective requirements. At the completion of this lesson, you [the student] will:

Action:	TLO-CC-2.1 Incorporate critical thinking skills.
Conditions:	Given individual reading and writing assignments, staff group and smaller collaborative group discussions, and practical exercises while faced with problems characteristic of the operational environment
Standards:	Incorporation includes A definition of critical thinking; An explanation of the history of critical thinking; The elements of thinking; The Universal Intellectual Standards; An analysis of problem-solving models; An analysis of mental models; An analysis of impediments to critical thinking; and, Meta-cognition. Learning Domain: Cognitive, Level of Learning: Synthesis

Safety Requirements

None

Risk Assessment Level

Low - N/A

Environmental Considerations

NOTE: Instructor should conduct a Risk Assessment to include Environmental Considerations

	IAW FM 3-34.5, Environmental Considerations {MCRP 4-11B}, and ensure students are briefed on hazards and control measures.
Evaluation	None
	NOTE: Describe how the student must demonstrate the accomplishment of the TLO. Refer student to the Student Evaluation Plan.
Instructional Lead-in	None

SECTION III. PRESENTATION

SECTION IV. SUMMARY

Method of Instruction:	None
Instr Type(I:S Ratio/Qty):	None
Time of Instruction:	0
Instructional Strategy:	None

Check on Learning None

Review/ Summary None

SECTION V. STUDENT EVALUATION

**Testing
Requirements**

NOTE: Describe how the student must demonstrate the accomplishment of the TLO. Refer student to the Student Evaluation Plan.

**Feedback
Requirements**

NOTE: Feedback is essential to effective learning. Schedule and provide feedback on the evaluation and any information to help answer students questions about the test. Provide remedial training as needed.

Appendix A - Viewgraph Masters

**Critical Thinking and Problem Solving
701-C121 / Version 1.0**

Sequence	Media Name	Media Type
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Appendix B - Test(s) and Test Solution(s) (N/A)

Appendix C - Practical Exercises and Solutions

PRACTICAL EXERCISE(S)/SOLUTION(S) FOR LESSON 701-C121 Version 1.0

Appendix D - Student Handouts (N/A)

Critical Thinking and Problem Solving
701-C121 / Version 1.0

Sequence	Media Name	Media Type
None		

Appendix E - TRAINER'S LESSON OUTLINE

Critical Thinking and Problem Solving

701-C121 / Version 1.0

DRAFT

1. The importance of this lesson: (Why)

TLO-CC-2.1 Incorporate critical thinking skills.

2. What we want our Soldiers to Achieve: (Outcomes/Standard)

Incorporation includes

1. A definition of critical thinking;
2. An explanation of the history of critical thinking;
3. The elements of thinking;
4. The Universal Intellectual Standards;
5. An analysis of problem-solving models;
6. An analysis of mental models;
7. An analysis of impediments to critical thinking; and,
8. Meta-cognition.

Learning Domain: Cognitive, **Level of Learning:** Synthesis

3. Tasks to be taught

<u>Task Number</u>	<u>Task Title</u>	<u>Task Type</u>
701-CC-0002	Created on: Wed Feb 08 14:40:47 EST 2012 Incorporate critical thinking skills.	Individual TAUGHT

Additional Non-Standard Tasks

None

4. References:

<u>Reference Number</u>	<u>Reference Title</u>	<u>Date</u>
None		

Additional Non-Standard References

None

5. Resources

TIME: Time of Instruction (Time not specified)

LAND: Classroom, Training Area, and Range Requirements

<u>Id</u>	<u>Name</u>
17136-X-1400-20	Classroom XXI

AMMO: Ammunition Requirements

<u>DODIC</u>	<u>Name</u>
None	

MISC: Materiel Items and TADSS Requirements

<u>Id</u>	<u>Name</u>
None	

Additional Non-Standard Resources

None

6. A possible technique to achieve the outcome:

None

7. Conduct AAR with Soldier and Cadre.

None

NOTE: Before presenting this lesson, Instructors must be thoroughly prepared by studying the appropriate lesson plan and identified reference material.

ORSA MAC Phase II Decision Analysis
9077907 / Version 2
Effective Date 05 Jun 2009

SECTION I. ADMINISTRATIVE DATA

All Courses Including This Lesson	<u>Course Number</u>	<u>Version</u>	<u>Course Title</u>	
	GJP	1	ORSA Military Applications Course - Phase II	
	ALMC-SB	3	ORSA Military Applications Course - Phase II	
	5J-49A/9E-S14B	1	ORSA Military Applications Course	
Task(s) Taught(*) or Supported	<u>Task Number</u>	<u>Task Title</u>		
	<u>Individual</u>			
	907-ORSA-0002 (*) 907-ORSA-0003 (*)	Apply technical analytic skills to military issues Conduct analysis		
Reinforced Task(s)	<u>Task Number</u>	<u>Task Title</u>		
	907-ORSA-0001	Formulate solutions to complex problems		
Knowledge	<u>Knowledge Id</u>	<u>Title</u>	<u>Taught</u> <u>Required</u>	
	None			
Skill	<u>Skill Id</u>	<u>Title</u>	<u>Taught</u> <u>Required</u>	
	None			
Administrative/ Academic Hours	The administrative/academic hours required to teach this lesson are as follows:			
	<u>Academic</u>	<u>Resident Hours / Methods</u>		
	Yes	0 hrs	25 mins	Conference/Demonstration
	Yes	17 hrs	25 mins	Conference/Discussion
	Yes	0 hrs	0 mins	Test Review
	Yes	2 hrs	0 mins	Test
	Total Hours:	20 hrs	0 mins	
Test Lesson Number	<u>Hours</u>	<u>Lesson Number</u>		
	None			
Prerequisite Lesson(s)	<u>Lesson Number</u>	<u>Lesson Title</u>		
	None			
Clearance Access	Security Level: Unclassified			
Foreign Disclosure Restrictions	FD5. This productpublication has been reviewed by the trainingeducational developers in coordination with the Fort Lee, VAALMC FD authority. This product is releasable to students from all requesting foreign countries without restrictions.			

D-3. TDC ALU lesson plan example

ORSA MAC Phase II Decision Analysis
9077907 / Version 2
Effective Date 05 Jun 2009

SECTION I. ADMINISTRATIVE DATA

All Courses Including This Lesson	Course Number	Version	Course Title	
	GJP	1	ORSA Military Applications Course - Phase II	
	ALMC-SB	3	ORSA Military Applications Course - Phase II	
	5J-49A/9E-S14B	1	ORSA Military Applications Course	
Task(s) Taught(*) or Supported	Task Number	Task Title		
	Individual			
	907-ORSA-0002 (*)	Apply technical analytic skills to military issues		
907-ORSA-0003 (*)	Conduct analysis			
Reinforced Task(s)	Task Number	Task Title		
	907-ORSA-0001	Formulate solutions to complex problems		
Knowledge	Knowledge Id	Title	Taught	Required
	None			
Skill	Skill Id	Title	Taught	Required
	None			
Administrative/ Academic Hours	The administrative/academic hours required to teach this lesson are as follows:			
	Academic	Resident Hours / Methods		
	Yes	0 hrs	25 mins	Conference/Demonstration
	Yes	17 hrs	25 mins	Conference/Discussion
	Yes	0 hrs	0 mins	Test Review
	Yes	2 hrs	0 mins	Test
Total Hours:		20 hrs	0 mins	
Test Lesson Number	Hours	Lesson Number		
	None			
Prerequisite Lesson(s)	Lesson Number	Lesson Title		
	None			
Clearance Access	Security Level: Unclassified			
Foreign Disclosure Restrictions	FD5. This product/publication has been reviewed by the training/educational developers in coordination with the Fort Lee, VA/ALMC FD authority. This product is releasable to students from all requesting foreign countries without restrictions.			

TRADOC Pamphlet 350-70-7

References

<u>Number</u>	<u>Title</u>	<u>Date</u>	<u>Additional Information</u>
ISBN 0534365973	Making Hard Decisions with Decision Tools (Clemen and Reilly) (Duxbury, 2001)		

Student Study Assignment

None

Instructor Requirements

One GS 1515 / FA49 / Air Force A9 instructor to teach within the course and assist students during practical exercises.

Additional Support Personnel Requirements

<u>Name</u>	<u>Student Ratio</u>	<u>Qty</u>	<u>Staff Hours</u>
GS 1702		0	1.0
ALMC Computer Support Personnel		0	1.0

Equipment Required for Instruction

<u>ID - Name</u>	<u>Student Ratio</u>	<u>Instructor Ratio</u>	<u>Spt</u>	<u>Qty</u>	<u>Exp</u>
2590-01-122-8771 - REMOTE CONTROL	0:0	0:0	No	1	
5820-00-000-0001 - VCR/DVD PLAYER	0:0	0:0	No	1	
5820-01-079-9406 - MONITOR,COLOR TV	0:0	0:0	No	1	
5835-01-035-2864 - SOUND SYSTEM	0:0	0:0	No	1	
5895-01-196-7352 - PRINTER	0:0	0:0	No	1	
6730-01-068-1130 - Projector, Viewgraph	0:0	0:0	No	1	
6730-01-484-2886 - SCREEN,PROJECTION	0:0	0:0	No	2	
7025-01-091-7080 - DESKTOP COMPUTER	0:0	0:0	No	1	
7025-01-482-9882 - Electronic Whiteboard	0:0	0:0	No	1	
7045-00-L00-1331 - Wireless Mouse	0:0	0:0	No	1	
7110-00-132-6650 - CHALKBOARD	0:0	0:0	No	14	
7110-01-416-5197 - DRY ERASE BOARD	0:0	0:0	No	4	
7520-00-079-2406 - EASEL,DISPLAY AND TRAINING	0:0	0:0	No	1	
COMPU-PROJ - OVERHEAD PROJECTOR W/COMPUTER INTERFACE	0:0	0:0	No	1	
SSID250 - Smart Symposium Interactive Pen Display	0:0	0:0	No	1	

(Note: Asterisk before ID indicates a TADSS.)

Materials Required

Instructor Materials:

Laptop computer with Palisades DecisionTools software, Microsoft Office, analysis add-ins and templates.

Textbook: Making Hard Decisions with DecisionTools, Clemen and Reilly, Duxbury, 2001, ISBN: 0534365973.

Student Materials:

Student handouts reference material, student laptop computer with Palisades DecisionTools software, Microsoft Office, analysis add-ins and templates.

Textbook: Making Hard Decisions with DecisionTools, Clemen and Reilly, Duxbury, 2001, ISBN: 0534365973.

Classroom, Training Area, and Range Requirements

<u>ID - Name</u>	<u>Quantity</u>	<u>Student Ratio</u>	<u>Setup Mins</u>	<u>Cleanup Mins</u>
17136 Automation-Aided Instructional Building	1	1:20	0	0

Ammunition Requirements

<u>DODIC - Name</u>	<u>Exp</u>	<u>Student Ratio</u>	<u>Instruct Ratio</u>	<u>Spt Qty</u>
None				

Instructional Guidance

NOTE: Before presenting this lesson, instructors must thoroughly prepare by studying this lesson and identified reference material.

Proponent Lesson Plan Approvals

<u>Name</u>	<u>Rank</u>	<u>Position</u>	<u>Date</u>
None			20 May 2009

SECTION II. INTRODUCTION

Method of Instruction: Conference/Demonstration
 Instr Type(I:S Ratio/Qty): GS 1515 (1:20/1)
 Time of Instruction: 25 mins
 Instructional Strategy: Large Group Instruction

Motivator

ORSA's use Decision Analysis techniques to inform decision makers in military applications.

As described in DA PAM 600-3, "Commissioned Officer Professional Development and Career Management", dated 11 Dec 2007:

- The Operations Research/Systems Analysis (ORSA) functional area provides uniquely skilled officers-problem solvers-who produce the analysis and logical reasoning necessary to inform and underpin critical decisions by leaders and managers at all levels of the DOD. These officers recommend potential solutions for complex strategic, operational, tactical, and business issues.

- The FA 49 officer uses analytic methods and mathematically based procedures to enable leadership decisions in a constantly changing global environment. ORSA's introduce quantitative and qualitative analysis to the military's decision making processes by developing and applying probability models, statistical inference, simulations, optimization, and economic models.

- Consequences of non-performance:

1. Students may be unable to recognize situations where decision analysis is appropriate.
2. Students may be unable to formulate problems using the appropriate decision analysis techniques.
3. Students may be unable to interpret solution results in terms useful to a decision maker or functional expert.

Terminal Learning Objective

NOTE. Inform the students of the following Terminal Learning Objective requirements.

At the completion of this lesson, you [the student] will:

Action:	Conduct analysis on military applications and operations research problems using decision analysis techniques.
Conditions:	Serving as a military officer or civilian assigned to operations research related positions, in a classroom environment, using Decision Analysis techniques, along with previous experience and education, course materials, practical exercises, and information provided by instructor
Standards:	Per instructor guidance: I Define decision making under uncertainty and risk for single attribute decision analysis. I Apply techniques and interpret results for decision making based on one attribute. I Define and apply methods for assessing the value of sample information. I Define and apply utility theory for assessing a decision maker's attitude toward risk. I

	Define decision making based on multiple attributes. Interpret and apply Simple Additive Weighting Method to multi-attribute problems. Interpret and apply Hierarchical Additive Weighting Method when employing decision maker's perception of alternative/attribute importance in a multi-attribute situation.
--	--

Safety Requirements

There are no safety hazards.

Risk Assessment Level

None

Environmental Considerations

NOTE: Instructor should conduct a Risk Assessment to include Environmental Considerations IAW FM 3-34.5, Environmental Considerations {MCRP 4-11B}, and ensure students are briefed on hazards and control measures.

There are no environmental factors or considerations for this course.

Evaluation

Assessments/tests include graded examinations and active classroom participation.

- There is 1 written examination for this module.
- This exam will test the students' ability to satisfactorily complete the module TLO:
| Apply decision analysis techniques to inform decision makers in military applications and operations research problems.
- This exam is conducted in class.
- This exam is open book, open notes, but closed neighbor.
- All work must be student's own individual work.
- Students will have one hour and forty-five minutes to complete exams.

Students must:

- | Achieve a minimum score of 70% on all graded exams.
- | Receive a satisfactory assessment of student participation in classroom discussions.

Students must achieve a minimum score of 70% on all graded exams to demonstrate accomplishment of TLO.

Instructional Lead-in

Introduction to Decision Analysis; Primary question: What is Decision Analysis and how is it used to inform decision makers?

SECTION III. PRESENTATION

1. Learning Step / Activity 1. Discuss basic terms, definitions, and concepts applicable to single attribute decision analysis - Part 1.

Method of Instruction: Conference/Discussion
Instr Type(I:S Ratio/Qty): GS 1515(/1)*
Time of Instruction: 1 hr 0 min
Instructional Strategy: Large Group Instruction
Media Type: Unassigned
Security Classification: Unclassified
Note: Marked as (*) is derived from the parent learning object

At a minimum you must:

- Define decision analysis concepts for single attribute problems.
- Define states of nature, alternatives, uncertainty, risk, and payoff matrix. Discuss single versus multi attribute decision making.
- Apply and interpret MAXIMAX, MAXIMIN, Hurwicz, LaPlace, and MINIMAX REGRET procedures when applied to high object problem under uncertainty.
- Complete student study assignments from textbook (Operations Research Applications and Algorithms (ORAA) 4th edition, Winston, Duxbury, 2003).:
 - Chapter 13, Section 13.1

Check on Learning: Conduct a check on learning and summarize the learning activity.

Question: What is decision analysis?

Answer: Decision analysis is a branch of OR that provides a structured and systematic approach to informed decision making. Decision analysis can be based on a single attribute (cost or profit) or multiple attributes (cost, horsepower, mileage, reliability, etc.).

Question: What are states of nature and alternatives?

Answer: States of nature of those events or conditions in nature under which we select a course of action. Alternatives are merely different courses of action.

Question: What are the conditions under which decisions are made?

Answer: Decisions are made under conditions of uncertainty (probabilities for the states of nature are unknown), and risk (states of nature probabilities are known). Under uncertainty, for high objective problems, decision analysis techniques are MAXIMAX, MAXIMIN, LaPlace, Hurwicz, and MINIMAX Regret.

Review Summary: None

2. Learning Step / Activity 2. Discuss basic terms, definitions, and concepts

applicable to single attribute decision analysis - Part 2.

Method of Instruction: Conference/Discussion
 Instr Type(I:S Ratio/Qty): GS 1515(/1)*
 Time of Instruction: 2 hrs 0 min
 Instructional Strategy: Large Group Instruction
 Media Type: Unassigned
 Security Classification: Unclassified
 Note: Marked as (*) is derived from the parent learning object

At a minimum you must:

- Define decision analysis concepts for single attribute problems
- Apply and interpret expected value and decision trees to high objective problem under risk.
- Apply and interpret MINIMIN, MINIMAX, Hurwicz, LaPlace and MINIMAX REGRET procedures when applied to low objective problems under uncertainty.
- Apply and interpret expected value and decision trees to low objective problem under risk.

- Complete student study assignments from textbook (Operations Research Applications and Algorithms (ORAA) 4th edition, Winston, Duxbury, 2003):
 - Chapter 13, Section 13.1

Check on Learning: Conduct a check on learning and summarize the learning activity.

Question: Which decision analysis techniques are used for low objective problems under uncertainty?

Answer: For low objective problems, they are: MINIMIN, MINIMAX, Hurwicz, LaPlace, and MINIMAX Regret.

Question: Which decision analysis techniques are used under risk?

Answer: Expected values and decision trees are used under risk for both high and low objective problems.

Review Summary: None

3. Learning Step / Activity 3. Discuss basic terms, definitions, and concepts applicable to expected value of sample and perfect information - Part 1.

Method of Instruction: Conference/Discussion
 Instr Type(I:S Ratio/Qty): GS 1515(/1)*
 Time of Instruction: 2 hrs 0 min
 Instructional Strategy: Large Group Instruction
 Media Type: Unassigned
 Security Classification: Unclassified
 Note: Marked as (*) is derived from the parent learning object

At a minimum you must:

- Define and apply techniques for assessing the value of new information.

- Review Bayes' Theorem.
- Develop total probability and Bayes' matrices for determining expected value of sample information.

- Complete student study assignments from textbook (Operations Research Applications and Algorithms (ORAA) 4th edition, Winston, Duxbury, 2003).:
 - Chapter 13, Section 13.3.

Check on Learning: Conduct a check on learning and summarize the learning activity.

Question: What is Bayes' Theorem?

Answer: Bayes' theorem involves computing revised probabilities for events in the presence of new information.

Question: What is the Expected Value of Sample Information (EVSI)?

Answer: EVSI is a technique which assesses the value of information acquired from an informed source.

Review Summary: None

4. Learning Step / Activity 4. Discuss basic terms, definitions, and concepts applicable to expected value of sample and perfect information - Part 2.

Method of Instruction: Conference/Discussion

Instr Type(I:S Ratio/Qty): GS 1515(/1)*

Time of Instruction: 2 hrs 0 min

Instructional Strategy: Large Group Instruction

Media Type: Unassigned

Security Classification: Unclassified

Note: Marked as (*) is derived from the parent learning object

At a minimum you must:

- Define and apply techniques for assessing the value of new information.
- Compute and interpret the expected value of sample information.
- Compute and interpret expected value of perfect information. Determine the efficiency of the sample information.

- Complete student study assignments from textbook (Operations Research Applications and Algorithms (ORAA) 4th edition, Winston, Duxbury, 2003).:
 - Chapter 13, Section 13.3

Check on Learning: Conduct a check on learning and summarize the learning activity.

Question: What tool is routinely applied in studies involving EVSI?

Answer: Decision trees are typically used in such analyses.

Question: What is the Expected Value of Perfect Information (EVPI)?

Answer: EVPI is the value of information acquired from a theoretically

infallible source.

Question: What is the Efficiency of Sample Information (EOSI)?

Answer: EOSI involves dividing EVSI by EVPI to ascertain the utility of sample information when compared to information from a perfect source.

Review Summary: None

5. Learning Step / Activity 5. Discuss basic terms, definitions, and concepts applicable to Utility Theory.

Method of Instruction: Conference/Discussion

Instr Type(I:S Ratio/Qty): GS 1515(/1)*

Time of Instruction: 2 hrs 0 min

Instructional Strategy: Large Group Instruction

Media Type: Unassigned

Security Classification: Unclassified

Note: Marked as (*) is derived from the parent learning object

At a minimum you must:

- Apply decision makers attitude toward risk in single attribute decision making.
- Define application of a lottery for determining decision maker's attitude to risk.
- Determine utility function based on decision makers risk attitude and apply to a single attribute decision problem.

- Complete student study assignments from textbook (Operations Research Applications and Algorithms (ORAA) 4th edition, Winston, Duxbury, 2003):.

- Chapter 13, Section 13.2.

Check on Learning: Conduct a check on learning and summarize the learning activity.

Question: What is Utility theory?

Answer: Utility theory is a method for determining a decision maker's attitude toward risk on the basis of a 50-50 lottery. The results of this lottery are used to construct a utility function. The utility function is then employed to convert decision matrix values to utility values (on a scale from 0 to 1) and expected utilities are then computed for each alternative.

Review Summary: None

6. Learning Step / Activity 6. Discuss concepts and techniques associated with multi-attribute decision analysis and simple additive weighing - Part 1.

Method of Instruction: Conference/Discussion

Instr Type(I:S Ratio/Qty): GS 1515(/1)*

Time of Instruction: 2 hrs 0 min

Instructional Strategy: Large Group Instruction

Media Type: Unassigned

Security Classification: Unclassified

Note: Marked as (*) is derived from the parent learning object

At a minimum you must:

- Define multi-attribute decision analysis and apply Simple Additive Weighting to multi-attribute decision problems.
- Define multi-attribute decision making issues, assumptions, and screening methods.
- Scale data in a multi-attribute decision matrix using numeric, ratio, and interval scales.

- Complete student study assignments from textbook (Operations Research Applications and Algorithms (ORAA) 4th edition, Winston, Duxbury, 2003):
 - Chapter 13, Section 13.2.

Check on Learning:

Conduct a check on learning and summarize the learning activity.

Question: What is multi-attribute decision analysis?

Answer: Multi-attribute decision analysis is a branch of decision analysis which selects an optimal course of action on the basis of two or more attributes.

Question: What are some issues that arise when conducting multi-attribute decision making?

Answer: Determining an adequate number of attributes, different scales of measurement, dependency of attributes, are major issues that need resolution.

Review Summary:

None

7. Learning Step / Activity 7. Discuss concepts and techniques associated with multi-attribute decision analysis and simple additive weighing - Part 2.

Method of Instruction: Conference/Discussion

Instr Type(I:S Ratio/Qty): GS 1515(/1)*

Time of Instruction: 2 hrs 0 min

Instructional Strategy: Large Group Instruction

Media Type: Unassigned

Security Classification: Unclassified

Note: Marked as (*) is derived from the parent learning object

At a minimum you must:

- Define multi-attribute decision analysis and apply Simple Additive Weighting to multi-attribute decision problems.
- Apply Simple Additive Weighting technique to a scaled matrix.
- Apply Excel software to Simple Additive Weighting.

Check on Learning:

Conduct a check on learning and summarize the learning activity.

Question: What is Simple Additive Weighting (SAW)?

Answer: SAW is a multi-attribute technique which transforms all values in a decision matrix on a common scale to facilitate the selection of an optimal alternative. Once this transformation is accomplished, weights are developed for the attributes, and an overall weighted score is obtained for each alternative.

Question: What are the transformation methods used in SAW?

Answer: Transformations based on ratio and interval scaling can be used in SAW applications.

Question: How are weights obtained for the attributes?

Answer: A score of 100 is assigned to the most important attribute, with proportionally lower scores assigned to the others. The scores are summed, and each raw score is divided by this total to acquire a scaled weight for the attribute.

Review Summary: None

8. Learning Step / Activity 8. Discuss concepts and techniques associated with hierarchical additive weighting method - Part 1.

Method of Instruction: Conference/Discussion

Instr Type(I:S Ratio/Qty): GS 1515(/1)*

Time of Instruction: 2 hrs 0 min

Instructional Strategy: Large Group Instruction

Media Type: Unassigned

Security Classification: Unclassified

Note: Marked as (*) is derived from the parent learning object

At a minimum you must:

- Incorporate decision maker's perceptions of importance for alternatives and attributes using Hierarchical Additive Weighting.
- Define Saaty's scale of importance, and the utility of incorporating this information in multi-attribute decision making.
- Apply Saaty's scale to alternatives and attributes in a multi-attribute decision matrix.

Check on Learning: Conduct a check on learning and summarize the learning activity.

Question: What is the Hierarchical Additive Weighting Method (HAWM)?

Answer: HAWM is a multi-attribute technique which attempts to incorporate the decision maker's perceptions of importance into the decision making process. This scale of importance is based on a scale developed by Saaty.

Question: What is the Saaty scale of importance?

Answer: The Saaty scale is a nine point scale where the odd numbers are used to define degrees of importance (a 1 means two elements are of

equal importance, 3 means one is weakly more important than another, a 5 signifies that one has essential importance over another, 7 denotes demonstrated importance, and 9 means one element has absolute importance over another on some attribute. Even numbers are intermediates values for the above categories.

Review Summary: None

9. Learning Step / Activity 9. Discuss concepts and techniques associated with hierarchical additive weighting method - Part 2.

Method of Instruction: Conference/Discussion

Instr Type(I:S Ratio/Qty): GS 1515(/1)*

Time of Instruction: 2 hrs 0 min

Instructional Strategy: Large Group Instruction

Media Type: Unassigned

Security Classification: Unclassified

Note: Marked as (*) is derived from the parent learning object

At a minimum you must:

- Incorporate decision maker's perceptions of importance for alternatives and attributes using Hierarchical Additive Weighting
- Use scaled values to compute normalized matrices and priority weights for alternatives and attributes.
- Compute consistency checks for scaled values.

Check on Learning: Conduct a check on learning and summarize the learning activity.

Question: Where is the Saaty scale applied?

Answer: This scale is applied when assessing the importance of all alternatives for each attribute, and for determining the importance of the attributes themselves.

Question: How is an alternative selected?

Answer: Once the Saaty scale has been applied, normalized values are computed for each alternative within each of the attributes. Also, normalized values are derived for the individual attributes, as well. As with SAW, these normalized values are used to obtain an overall score for each alternative.

Question: How is consistency of the assignment of Saaty values monitored?

Answer: Techniques are available in HAWM to detect inconsistent appraisals on the part of the decision maker.

Review Summary: None

10. Learning Step / Activity 10. Complete a decision analysis examination.

Method of Instruction: Test
Instr Type(I:S Ratio/Qty): GS 1515(/1)*
Time of Instruction: 2 hrs 0 min
Instructional Strategy: Unassigned
Media Type: No Media Selection Required
Security Classification: Unclassified
Note: Marked as (*) is derived from the parent learning object

At a minimum you must:

- Achieve a minimum score of 70% on all graded exams.

ADMINISTRATIVE NOTES FOR EXAM:

1. This exam is open book, open notes, but closed neighbor. All work must be student's own individual work.
2. Students will have one hour and forty-five minutes to complete this exam.
3. Students must show all work. All answers must be justified and supported. There is no credit for incorrect unjustified answers. Ensure student's answer and supporting work is clear, concise, and organized.
4. This exam is worth a total of 100 points. The point value for each problem is listed with each individual problem.

Check on Learning: Conduct a check on learning and summarize the learning activity.

Review Summary: None

SECTION IV. SUMMARY

Method of Instruction:	Conference/Discussion
Instr Type(I:S Ratio/Qty):	GS 1515(1:20/0)
Time of Instruction:	25 mins
Instructional Strategy:	Large Group Instruction

Check on Learning

Determine if the students have learned the material presented by soliciting student questions and explanations. Ask the students questions and correct misunderstandings. Question: What is Decision Analysis? Answer: Decision analysis is a process through which the various alternatives associated with a decision are weighed in order to determine which is best. Question: How is it used to inform decision makers? Answer: Decision analysis is intended to make it easier for the decision maker to make a good decision. A good decision should focus on what goes on during the decision process, rather than what happens after the decision is made. A good decision can be thought of as one where all of the pertinent information is gathered and considered in a systematic manner, within the time available.

Review/ Summary

Desired outcomes for all students at the end of Decision Analysis lessons - students should be able to:

- Recognize situations where decision analysis is appropriate.
- Formulate problems using the appropriate decision analysis technique.
- Apply techniques for decision making based on one or two attributes.
- Interpret solution results in terms useful to a decision maker or functional expert.

SECTION V. STUDENT EVALUATION

**Testing
Requirements**

Assessments/tests include graded examinations and active classroom participation.

- There is 1 written examination for this module.
- This exam will test the students' ability to satisfactorily complete the module TLO:
I Apply decision analysis techniques to inform decision makers in military applications and operations research problems.
- This exam is conducted in class.
- This exam is open book, open notes, but closed neighbor.
- All work must be student's own individual work.
- Students will have one hour and forty-five minutes to complete exams.

Students must:

- I Achieve a minimum score of 70% on all graded exams.
 - I Receive a satisfactory assessment of student participation in classroom discussions.

Students must achieve a minimum score of 70% on all graded exams to demonstrate accomplishment of TLO.

**Feedback
Requirements**

Ask students to complete end of course critique -- providing feedback on this module.

Ensure students are made aware of remedial/refresher training opportunities to improve performance/knowledge.

Appendix A - Viewgraph Masters

**ORSA MAC Phase II Decision Analysis
9077907 / Version 2**

Sequence	Media Name	Media Type
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Appendix B - Test(s) and Test Solution(s) (N/A)

Appendix C - Practical Exercises and Solutions

PRACTICAL EXERCISE(S)/SOLUTION(S) FOR LESSON 9077907 Version 2

Appendix E - TRAINER'S LESSON OUTLINE

ORSA MAC Phase II Decision Analysis

9077907 / Version 2

Effective Date: 05 June 2009

1. The importance of this lesson: (Why)

Conduct analysis on military applications and operations research problems using decision analysis techniques.

2. What we want our Soldiers to Achieve: (Outcomes/Standard)

Per instructor guidance: | Define decision making under uncertainty and risk for single attribute decision analysis. | Apply techniques and interpret results for decision making based on one attribute. | Define and apply methods for assessing the value of sample information. | Define and apply utility theory for assessing a decision maker's attitude toward risk. | Define decision making based on multiple attributes. | Interpret and apply Simple Additive Weighting Method to multi-attribute problems. | Interpret and apply Hierarchical Additive Weighting Method when employing decision maker's perception of alternative/attribute importance in a multi-attribute situation.

3. Tasks to be taught

<u>Task Number</u>	<u>Task Title</u>	<u>Task Type</u>
907-ORSA-0001	Formulate solutions to complex problems	Individual REINFORCED
907-ORSA-0002	Apply technical analytic skills to military issues	Individual TAUGHT
907-ORSA-0003	Conduct analysis	Individual TAUGHT

Additional Non-Standard Tasks

None

4. References:

<u>Reference Number</u>	<u>Reference Title</u>	<u>Date</u>
ISBN 0534365973	Making Hard Decisions with Decision Tools (Clemen and Reilly) (Duxbury, 2001)	

Additional Non-Standard References

None

5. Resources

TIME: Time of Instruction (Time not specified)

LAND: Classroom, Training Area, and Range Requirements

<u>Id</u>	<u>Name</u>
17136	Automation-Aided Instructional Building

AMMO: Ammunition Requirements

<u>DODIC</u>	<u>Name</u>
None	

MISC: Materiel Items and TADSS Requirements

<u>Id</u>	<u>Name</u>
2590-01-122-8771	REMOTE CONTROL
5820-00-000-0001	VCR/DVD PLAYER
5820-01-079-9406	MONITOR,COLOR TV
5835-01-035-2864	SOUND SYSTEM
5895-01-196-7352	PRINTER
6730-01-068-1130	Projector, Viewgraph
6730-01-484-2886	SCREEN,PROJECTION
7025-01-091-7080	DESKTOP COMPUTER
7025-01-482-9882	Electronic Whiteboard
7045-00-L00-1331	Wireless Mouse
7110-00-132-6650	CHALKBOARD
7110-01-416-5197	DRY ERASE BOARD
7520-00-079-2406	EASEL,DISPLAY AND TRAINING
COMPU-PROJ	OVERHEAD PROJECTOR W/COMPUTER INTERFACE
SSID250	Smart Sympodium Interactive Pen Display

(Note: Asterisk before ID indicates a TADSS.)

Additional Non-Standard Resources

None

6. A possible technique to achieve the outcome:

None

7. Conduct AAR with Soldier and Cadre.

None

NOTE: Before presenting this lesson, Instructors must be thoroughly prepared by studying the appropriate lesson plan and identified reference material.

**Appendix E
Rubric Examples**

E-1. Command and General Staff College (USACGSC) form 1009c (Assessing Classroom Participation), May 2011

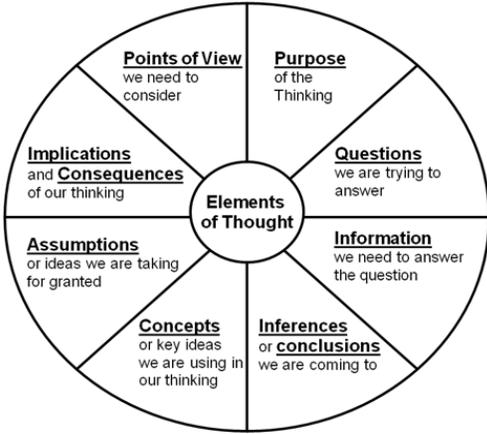
Assessing Classroom Participation			
STUDENT NAME:		STAFF GROUP:	DATE:
COURSE TITLE:		ASSIGNMENT:	
INSTRUCTOR:		DEPARTMENT:	
Classroom Participation Standards: <i>Communicates ideas effectively, demonstrating critical thinking that contributes to group learning.</i>			
		Usually	Sometimes
		Never	
Comments often responded to or built logically on those of others. Helped the group keep a line of reasoning going.			
<u>Questions and comments were thought-provoking and relevant.</u>			
Not hesitant to state an alternate, creative, and/or controversial position.			
Supported positions and comments with evidence indicating critical reasoning, modes of analysis, synthesis, and judgment.			
Did not make random, superficial, or off topic comments that distracted the group from the on-going discussion.			
<u>Tied thoughts to previous instruction or other writings and information about the topic at hand.</u>			
Questions and comments made the group think about alternative positions.			
Communicated clearly and concisely.			
<u>Respectfully challenged others to provide evidence or support for their position.</u>			
Approached the discussion or problem in a creative manner.			
<u>Approached the discussion in a thoughtful, reasoned manner.</u>			
Comments were precise, and accurate.			
<u>Comments demonstrated breadth and depth of understanding.</u>			
Logic was sound.			
Comments demonstrated depth of analysis.			
<u>Asked tough questions that challenged deeply held beliefs.</u>			
Showed tolerance toward opposing beliefs, ideas or opinions.			
<u>Encouraged peers not to dismiss out of hand the opinions and ideas of others.</u>			
Instructor Comments:			
↓ Cognitive Level Attained (Higher levels include characteristics of lower levels)	Elements of Thought	Universal Intellectual Standards	
EVALUATION (Judging or weighing by building and using criteria and standards)		-Clarity -Accuracy -Precision --Relevance -Depth -Breadth -Logic -Significance	
SYNTHESIS (Integrating parts into a new whole)			
ANALYSIS (Breaking material down into component parts to determine structures and relationships)			
APPLICATION (Use of knowledge to solve problems)			
COMPREHENSION (Understanding of the material)			
KNOWLEDGE (Recall of specific information)			

Figure E-1. Command and General Staff College (USACGSC) form 1009c (Assessing Classroom Participation), May 2011

E-2. USACGSC form 1009s (Assessing Speaking and Presentations), June 2011

STUDENT NAME: _____ **STAFF GROUP:** _____ **DATE:** _____

ASSIGNMENT/COURSE TITLE: _____

INSTRUCTOR/DEPARTMENT: _____

ARMY STANDARD: *Transmits a clear, concise, organized message that communicated the speaker's intent.*

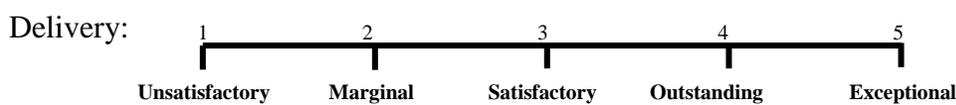
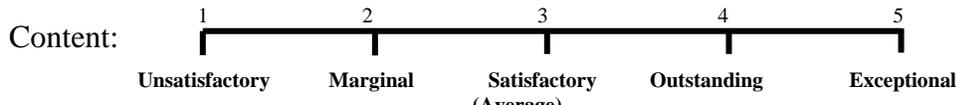
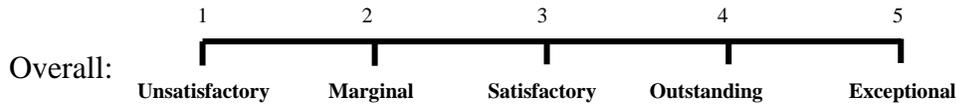
Grade							
U	C	B-	B	B+	A-	A	A+

Assessment				
1	2	3	4	5
Unsatisfactory	Marginal	Satisfactory (Average)	Outstanding	Exceptional

Instructions: *Immediately following the end of the presentation ask the student(s) to assess their own performance using the questions below as a guide.*

Student Assessment of Performance:

Student Question: How do you think you did?



Briefing Start: _____

Briefing Stop: _____

Total Time: _____

Did you practice/rehearse? _____

Describe one thing that you did well in this presentation.

Describe one thing that you would change about your preparation of this presentation and do differently next time.

Synopsis of Instructors Comments:

Figure E-2. USACGSC form 1009s (Assessing Speaking and Presentations), June 2011

Instructions: Use the following scale to assess the student’s performance for each criterion below:
 1 = Unsatisfactory; 2 = Marginal; 3 = Satisfactory (Average); 4 = Outstanding; 5 = Exceptional

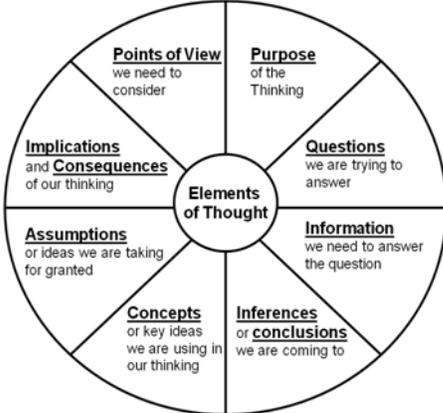
SUBSTANCE/ORGANIZATION (Discernible, balanced plan of presentation)	STYLE
<p><input type="checkbox"/> Introduction</p> <p>Greeting (<i>poised, confident</i>)</p> <p>Purpose (<i>presents BLUF, relevant, focused, clearly and concisely stated controlling idea/ thesis</i>)</p> <p>References (<i>current, meaningful</i>)</p> <p>Procedure/Outline (<i>logical, posted and/or embedded throughout brief</i>)</p>	<p><input type="checkbox"/> Physical Behavior</p> <p>Eye Contact (<i>maintains with audience, natural, avoids excessive reference to slides or notes</i>)</p> <p>Movement (<i>appropriate, not excessive, uses pointer properly</i>)</p> <p>Gestures (<i>meaningful, appropriate, well timed, provided emphasis</i>)</p>
<p>Body</p> <p><input type="checkbox"/> Accuracy/Completeness (<i>all major points, facts/assumptions precisely stated, information is relevant and accurate, no major points omitted, level of detail suitable</i>)</p> <p><input type="checkbox"/> Support/Significance (<i>appropriate use of facts; ample evidence and other perspectives/ examples/ opinions, offered; answers the “So what?” and/or “Therefore...” ; demonstrates analysis</i>)</p> <p><input type="checkbox"/> Sequence (<i>conveys information in clear, logical, and meaningful sequence; easy to follow</i>)</p> <p><input type="checkbox"/> Transitions (<i>appears rehearsed, present logical flow, maintains appropriate tempo</i>)</p>	<p><input type="checkbox"/> Speaking Voice (<i>appropriate volume, comfortable pace, uses pauses effectively</i>)</p> <p><input type="checkbox"/> Vocabulary (<i>clear/concise vocabulary, pronounces words correctly, enunciates clearly</i>)</p> <p><input type="checkbox"/> Enthusiasm/Confidence (<i>conveys sense of “ownership” and confidence in own knowledge and abilities</i>)</p>
<p>Closing</p> <p><input type="checkbox"/> Summary (<i>emphasizes main point, no new information</i>)</p> <p>Ask for Questions</p> <p>Conclusion (<i>appropriate, meaningful, clear and concise</i>)</p>	<p style="text-align: center;">CORRECTNESS</p> <p><input type="checkbox"/> Visuals/Slides/Graphics</p> <p>Format (<i>sequencing, numbering, font, centering, abbreviations</i>)</p> <p>Content (<i>relevant, appropriate use of pictures/graphics, not to busy</i>)</p> <p>Handouts/Video-clips, etc. (<i>introduced, relevant</i>)</p>

USACGSC Form 1009s
 June 2011 (Supersedes USACGSC Form 1009s dated Jun 2002)

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Figure E-2. USACGSC form 1009s (Assessing Speaking and Presentations), June 2011, continued

E-3. USACGSC form 1009w (Assessing Writing), May 2011

Assessing Writing								
STUDENT NAME:			STAFF GROUP:			DATE:		
COURSE TITLE:			ASSIGNMENT:					
INSTRUCTOR:			DEPARTMENT:					
<p>Requirement: Write effectively as defined by the Army standard as "understandable in a single, rapid reading and generally free of errors in grammar, mechanics, and usage."</p> <p>Standard: Writing includes—</p> <ol style="list-style-type: none"> 1. Substance; 2. Organization; 3. Style; and, 4. Correctness. 								
Overall Grade:								
97+: A+	96-94: A	93-90: A-	89-87: B+	86-84: B	83-80: B-	79-70: C	<70: U	Total:
Instructor Comments								
Cognitive Level Attained ↓ (Higher levels include characteristics of lower levels)	Elements of Thought					Universal Intellectual Standards		
EVALUATION (Judging or weighing by building and using criteria and standards)						-Clarity		
SYNTHESIS (Integrating parts into a new whole)						-Accuracy		
ANALYSIS (Breaking material down into component parts to determine structures and relationships)						-Precision		
APPLICATION (Use of knowledge to solve problems)						-Relevance		
COMPREHENSION (Understanding of the material)						-Depth		
KNOWLEDGE (Recall of specific information)						-Breadth		
						-Logic		
						-Significance		

USACGSC Form 1009W, May 2011. (Supersedes USACGSC Form 1009W dated May 2009)

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Figure E-3. USACGSC form 1009w (Assessing Writing), May 2011

Instructions: The rubric below integrates the Elements of Thought and Universal Intellectual Standards, IAW Paul and Elder, with the four standards of effective writing: Substance, Organization, Style, and Correctness. Substance is further divided into Content and Analysis/Problem-Solving/Conclusions. The underlined and bolded words directly correspond with Elements of Thought and Universal Intellectual Standards and demonstrates the relationship between effective writing and critical thinking. This rubric provides a means to explicitly assess critical thinking while assessing writing. Faculty should assign points based on the requirements of the assignment. Assess writing based on the descriptions in the Exceptional, Satisfactory and Unsatisfactory blocks.

<i>Student Self-Assessment</i>		<i>Faculty Assessment</i>		
		Exceptional	Satisfactory	Unsatisfactory
Substance				
<i>Points</i>	Content			<i>Points</i>
	Thesis is <u>clear</u> and concise. Content is fully compliant with the assigned requirement and the needs of the reader; everything is <u>accurate</u> ; <u>level of detail</u> is suited to the needs of the assigned requirement and reader. Explanations and descriptions of content are <u>clear and precise</u> . Quantitative <u>information</u> is <u>relevant and accurate</u> , expressed with appropriate examples, and well integrated into the text.	Thesis is not <u>clear</u> . Small <u>omissions</u> or inadequacies in <u>content</u> , but adequately covers the written requirement and needs of the reader. Some minor <u>inaccuracies</u> , but primarily <u>accurate</u> . May occasionally include <u>irrelevant details</u> or omit <u>important details</u> . Explanations and descriptions are almost always <u>clear and precise</u> . Quantitative <u>information</u> is <u>accurate</u> , and <u>related</u> to the text.	No <u>thesis</u> . <u>Information</u> (<u>facts</u> , <u>assumptions</u> , <u>concepts/theories</u>) are not <u>accurate</u> , and/or content is <u>irrelevant</u> , missing, or misrepresented, and/or insufficient <u>detail</u> , and/or <u>inaccurate</u> or ineffective management of quantitative <u>information</u> .	
<i>Points</i>	Analysis/Problem-Solving/Conclusions			<i>Points</i>
	Attains highest cognitive level that is appropriate to the assignment. Insightful, original <u>analysis</u> ; <u>conclusions</u> superbly supported by <u>evidence clearly explained</u> ; consideration of ethical/legal issues when <u>relevant</u> ; consideration of <u>alternative points of view or counter-evidence</u> is fully addressed.	Attains an adequate cognitive level appropriate to the assignment. Thorough <u>analysis</u> , though perhaps not as insightful or original as it could be; <u>conclusions adequately supported by evidence clearly explained</u> ; legal/ethical issues addressed but may be superficially treated; <u>alternative points of view or counter-evidence</u> , but may not be fully addressed.	Remains at a low cognitive level. <u>Analysis</u> superficial; little or <u>no relation between conclusions and evidence</u> ; ethical/legal issues ignored; fails to address <u>alternative points of view or counter evidence</u> .	
Organization				
<i>Points</i>				<i>Points</i>
	Points are <u>clear and logically arranged</u> so as to develop the <u>content and analysis</u> most productively for the audience.	Points are <u>clear</u> . In general, points establish a <u>logical line of reasoning</u> .	Points are not <u>clear</u> or the sequence of points is <u>illogical</u> or <u>inadequate</u> to the needs of the task or audience.	
Style				
<i>Points</i>				<i>Points</i>
	Words are <u>precise</u> ; language is concise and without wordiness; writer's tone is appropriate to the audience and <u>purpose</u> ; sentences track clearly even to the rapid reader; transitions lead smoothly from one idea to the next. Active voice predominates. Sources, as relevant, are appropriately cited.	Some language is <u>imprecise</u> but generally understandable. Style is adequate but lacks polish and directness.	The language is <u>awkward, hard to read</u> . The reader must backtrack to understand the writer's <u>meaning</u> , or the reader cannot understand the <u>meaning</u> . Language is extremely wordy; or primarily in passive voice, or inappropriate in tone. Citation of sources is missing or <u>inaccurate</u> .	
Correctness				
<i>Points</i>				<i>Points</i>
	Few if any departures from the published standard (grammar, punctuation and usage).	A few departures from the published standard (grammar, punctuation and usage), but not enough to confuse or distract the reader.	Departures from the published standard (grammar, punctuation and usage) significantly confuse or distract the reader.	
				<i>Total Points</i>

USACGSC Form 1009W, May 2011. (Supersedes USACGSC Form 1009W dated May 2009)

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Figure E-3. USACGSC form 1009w (Assessing Writing), May 2011, continued

E-4. USACGSC Enterprise Standards Rubric

TASS Accreditation Rubric AY2012
Situational Awareness

Table E-1. USACGSC Enterprise Standards Rubric: Environmental

Teaching and Learning (each staff group)						
Category (TRADOC Enterprise Standard)	Unsatisfactory	Needs Improvement	Meets Requirement	Superb	Exemplary	Comments or Not Observed
Library (Gov 9)	Access to CARL is difficult and no local library is available.	Students can access CARL but no local library is available.	Library resources are available and accessible.	And high speed access to CARL both in and out of the classroom is available.	And a local research library with a research librarian are available.	
Classrooms (Gov 6)	The classroom is not well lit, not environmentally controlled, or does not provide adequate desk/work areas or seating. No Internet Access.	The classroom marginally meets basic educational classroom standards. One of the following is deficient: Lighting, climate control & HVAC, furnishings and facility.	Classrooms have adequate space, learning support materials (e.g., boards, light, and projection capability) and comfortable seating sufficient for the ILE educational environment. Classrooms have Wi-Fi Internet Access for students and faculty.	And has breakout areas for small group work. .	And breakout areas have commercial wireless Internet access available to students and faculty.	
Billeting Accommodations (Gov 6)	Shared billeting and no internet.	Shared billeting and limited internet.	Billeting is single room for each ILE participant. The room has Internet access that will support Blackboard.	And single room living accommodations with non-shared bathroom.	And billeting includes housekeeping services.	

<p>Acronym Key</p> <p>CARL – Combined Arms Research Library</p> <p>Gov – Governance</p>

Environmental (page 1 of 2)
12 MARCH 2012

Table E-1. USACGSC Enterprise Standards Rubric: Environmental, continued

Teaching and Learning (each staff group)						
Category (TRADOC Enterprise Standard)	Unsatisfactory	Needs Improvement	Meets Requirement	Superb	Exemplary	Comments or Not Observed
Billeting Maintenance (Gov 6)	Health or safety issues are evident.	Facility maintenance is deficient.	Billeting is adequate, sufficient and functional.	And maintenance requests are accomplished in a timely manner.	And maintenance requests are a priority for ILE facilities.	
Dining (Gov 6)	Dining facility hours do not meet the needs of the school.	Dining facility lacks healthy food choices.	Dining Facilities are sufficient and are conveniently located from the classroom and billeting.	And dining facility with a variety of food choices.	And dining facility provides healthy food choices.	
Computers Lab Access (Gov 6)	No Internet access is available outside the classroom.	Internet access is not convenient for faculty or student use after class hours.	Faculty and Students have access to Wi-Fi after class hours.	And students have Commercial access to the Internet in lodging.	And students have Wi-Fi Access in lodging.	

Environmental (page 2 of 2)
12 MARCH 2012

Acronym Key
Gov – Governance

TASS Accreditation Rubric AY2012
Situational Awareness

Table E-2. USACGSC Enterprise Standards Rubric: Logistics

Teaching and Learning (each staff group)						
Category (TRADOC Enterprise Standard)	Unsatisfactory	Needs Improvement	Meets Requirement	Superb	Exemplary	Comments or Not Observed
Waivers (if needed) (Gov 17)	No waiver is on hand for each classroom that exceeds 18:2 or falls below a 8:1 student to faculty ratios.	There is documentary evidence the organization has taken steps to alleviate class size limitations.	A waiver is in the classroom that exceeds 16::2 or falls below 8:1 student to faculty ratios. All students are properly registered in ATRRS and confirmed by DDE as eligible.	No interns count as students.	And classroom meets JPME standard. No greater than 4:1.	
Class Supplies (CAC 34)	Required instructional materials and references are not available in the classroom.	Limited access or availability of courseware or references. Or classroom supplies are provided at faculty or student expense.	Classrooms have adequate space, learning support materials (e.g., boards, light, and projection capability) and comfortable seating sufficient for the ILE educational environment.	And additional instructional materials or references are made available by faculty.	And additional instructional materials or references are made available by students.	
Presentation Tools (Gov 12)	No multimedia tools are available in the classroom.	Limited multimedia tools are available in the classroom limiting presentation of curriculum.	The classrooms have sufficient multimedia tools are available in the classroom.	And whiteboards or butcher paper are available in the classrooms.	And smartboards are available in the classrooms.	

Acronym Key

CAC- Combined Arms Command
Gov – Governance

Logistics
12 MARCH 2012

TASS Accreditation Rubric AY2012
Situational Awareness

Table E-3. USACGSC Enterprise Standards Rubric: Teaching

Teaching and Learning (each staff group)						
Category (TRADOC Enterprise Standard)	Unsatisfactory	Needs Improvement	Meets Requirement	Superb	Exemplary	Comments or Not Observed
Student Feedback to Faculty (CAC 20)	No student feedback is evident in faculty portfolios.	Some student feedback is evident in faculty portfolios.	Encouragement from faculty to students to provide faculty feedback is evident .	And faculty portfolios have abundant feedback from students.	And faculty uses student feedback to improve teaching	
Feedback from Others (CAC 20)	No feedback from others is evident in faculty portfolios.	Some feedback from others is evident in faculty portfolios	Feedback from a variety of others is present in faculty portfolios.	And faculty portfolios have abundant feedback from others	And faculty uses feedback from others to improve teaching	
Assessments (CAC 32)	Assessments are without feedback.	Evidence of student assessment is limited or generic.	Students demonstrate they can achieve learning objectives at the required learning levels.	And the students have been given feedback using a completed rubric that is maintained in the student portfolio.	And student dialogue exceeds the learning objective levels.	

Acronym Key

CAC – Combined Arms Command

Teaching
12 MARCH 2012

TASS Accreditation Rubric AY2012
Situational Awareness

Table E-3. USACGSC Enterprise Standards Rubric: Teaching, continued

Teaching and Learning (each staff group)						
Category (TRADOC Enterprise Standard)	Unsatisfactory	Needs Improvement	Meets Requirement	Superb	Exemplary	Comments or Not Observed
Practical Exercise (if observed) (CAC 32)	There are no opportunities to accomplish learning objectives during practical exercises.	There is poor or no feedback from peers or faculty.	The classroom provides adequate opportunity for students to demonstrate accomplishment of learning objectives.	And students get feedback from their peers and faculty on their performance.	And students self monitor their success on practical exercises.	
Adult Learning Environment (CAC 32)	Faculty lectures	Instruction is faculty centered	Faculty uses adult learning principals	And faculty fosters a student-centered classroom	And dialogues are student lead	
Faculty Portfolios (CAC 32)	Missing any element of faculty qualification requirements.	Missing CV or resume.	Faculty is current in USACGSC FDP1 and foundational workshops and Battalion Train-up.	And has a curriculum vitae or resume in faculty portfolio.	And instructors have graduate degree transcripts in portfolio.	
Feedback to students (CAC 20)	No evidence of faculty feedback to students.	Little faculty feedback to students is evident.	Written feedback to students is evident in student portfolios.	And written feedback is precise.	And written feedback detailed.	
Student IDPs (CAC 24)	No IDP	Minimal feedback in IDP or no faculty signatures.	Student counseling is conducted using the IDP.	And a plan is apparent in IDP and is signed by faculty for every phase attended.	And there is evidence of student success in IDP	
Student Portfolios (CAC 32)	Student Portfolio Missing.	Student Portfolio missing evidence from previous phases.	Student Portfolio exhibits evidence of all Phases attended.	And evidence of faculty feedback.	And rich with faculty feedback.	

<p>Acronym Key</p> <p>CAC – Combined Arms Command</p> <p>IDP – Individual Development Plan</p>
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Teaching
12 MARCH 2012

TASS Accreditation Rubric AY2012
Situational Awareness

Table E-4. USACGSC Enterprise Standards Rubric: Phase 3 and Graduation

Teaching and Learning (each staff group)						
Category (TRADOC Enterprise Standard)	Unsatisfactory	Needs Improvement	Meets Requirement	Superb	Exemplary	Comments or Not Observed
Academic Efficiency Report (AER) (CAC 22)	No AER is issued to student	AER is not prepared by TASS faculty	AER is prepared by TASS faculty and mailed to student	and AER is prepared by TASS Faculty and issued to student prior to departure	and AER is prepared by TASS Faculty, signed by student and issued to student prior to departure	
Diplomas (CAC 22)	No diploma tubes or facsimile are presented at graduation ceremony.	Diplomas are mailed to students. See Note.	and students are presented diploma tubes or facsimile at graduation.	or students are presented the diploma at graduation.	and students receive their AERs at graduation.	
Graduation Ceremony (CAC 22)	No graduation ceremony	Graduation ceremony in classroom environment	Graduation ceremony in an auditorium or other suitable venue	And students walk across the stage	and the ceremony includes a graduation speaker.	

<p>Acronym Key</p> <p>CAC – Combined Arms Command</p>

Phase 3 and Graduation
12 MARCH 2012

Note: Grades must be certified by the USACGSC Registrar's Office prior to issuing diplomas.

Glossary

Section I Abbreviations

ADDIE	analysis, design, development, implementation, and evaluation
AER	Academic Efficiency Report
AIS	Accountable Instructional System
CAC	U.S. Army Combined Arms Center
CARL	Combined Arms Research Library
CC	core curriculum
COA	course of action
CT	critical thinking
DA	Department of the Army
ELO	enabling learning objective
FDP	Faculty Development Program
FM	field manual
GNI	generalize new information
ILE	intermediate level education
JPME	joint professional military education
LEP	Learning Environment Preferences
P&P	publish and process
PE	practical exercise
QAO	Quality Assurance Office
SME	subject matter expert
TASS	The Army School System
TLO	terminal learning objective
TRADOC	U.S. Army Training and Doctrine Command
USACGSC	United States Army Command and General Staff College
USAWC	United States Army War College

Section II Terms

Accountable Instructional System (AIS)

The USACGSC ADDIE process.

ADDIE

Analysis, design, development, implementation, and evaluation.

Assessment of learning

The process of documenting the extent to which the students achieved the learning objectives. It is usually defined in measurable terms gathered using any number of assessment instruments designed to measure the intended learning outcomes.

Course

A discrete body of subjects arranged in a prescribed program.

Course author

A lead curriculum developer at the USACGSC who designs the courses and coordinates with the lesson authors, other course authors, and teaching departments or schools. This allows for building on other courses, avoiding unnecessary duplication of course materials, and ensuring both horizontal and vertical alignment.

Curriculum developer

Anyone who develops curriculum (courses or lessons) in any school. Those individuals having oversight responsibilities of curriculum are also considered curriculum developers.

Enabling learning objective (ELO)

The prerequisites required to achieve TLO. They are the minor topics identified in the topic analysis. These are the standards identified in the TLOs written in action verb form.

Evaluation

A systematic formalized process of gathering and analyzing data (both qualitative and quantitative) to determine the merit, worth, and significance of the program.

Learning outcome

A clearly defined snapshot of what graduates should be able to do at the end of a significant learning event.

Lesson

A structured period of time designed to teach a particular subject or activity.

Lesson author

A curriculum developer who determines *what* and *how much* instruction needs to be developed to meet the course goal.

Program

The integrated courses and other formally planned or scheduled experiences which constitute a particular body of study.

Terminal learning objective (TLO)

A major topic identified during topic analysis. The level of learning of the TLO is always equal to or at a higher level than the ELO.

Theme

A broad topic — an umbrella. Within the theme, curriculum developers design the academic content and lesson materials appropriately integrating the themes throughout the curriculum.

Section III

Special Abbreviations and Terms

This section contains no entries.